Case No COMP/M.6410 - UTC/ GOODRICH

Only the English text is authentic.

REGULATION (EC) No 139/2004
MERGER PROCEDURE

Article 8 (2)
Date: 26/7/2012

EUROPEAN COMMISSION

Brussels, 26.7.2012
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PUBLIC VERSION

COMMISSION DECISION

of 26.7.2012

addressed to:
UNITED TECHNOLOGIES CORPORATION

declaring a concentration to be compatible with the internal market and the EEA agreement

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THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to the Agreement on the European Economic Area, and in particular Article 57 thereof,

Having regard to Council Regulation (EC) No 139/2004 of 20 January 2004 on the control of concentrations between undertakings[1], and in particular Article 8(2) thereof,

Having regard to the Commission's decision of 26 March 2012 to initiate proceedings in this case,

Having regard to the opinion of the Advisory Committee on Concentrations[2],

Having regard to the final report of the Hearing Officer in this case[3],

WHEREAS:

(1) On 20 February 2012, the European Commission received a notification of a proposed concentration pursuant to Article 4 of Council Regulation (EC) No 139/2004 (the "Merger Regulation"), by which United Technologies Corporation ("UTC") acquires, within the meaning of Article 3(1)(b) of that Regulation, control of the whole of Goodrich Corporation ("Goodrich") by way of purchase of shares.[4]

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1 OJ L 24, 29.1.2004, p. 1. With effect from 1 December 2009, the Treaty on the Functioning of the European Union ("TFEU") has introduced certain changes, such as the replacement of "Community" by "Union" and "common market" by "internal market". The terminology of the TFEU will be used throughout this Decision.

2 OJ C ...,...200. , p....

3 OJ C ...,...200. , p....

4 OJ C 57 of 25.2.2012, p. 11.

UTC and Goodrich are designated hereinafter as "the Parties". UTC is also referred as "the Notifying Party".

1. THE PARTIES

(2) UTC is active in the production of a broad range of high-technology products and support services for the building systems and aerospace industries worldwide. The UTC group comprises a number of major business units such as Carrier heating and air conditioning; Otis elevators; UTC Fire & Security systems and UTC Power fuel cells. In addition there are three businesses that are particular relevant for the current transaction: (i) Hamilton Sundstrand aerospace systems and industrial products; (ii) Pratt & Whitney aircraft engines; and (iii) Sikorsky helicopters.

(3) Goodrich is active in the production and sale of systems and services to the aerospace, defence and security industries on a worldwide basis. Goodrich has activities in three main business areas: (i) actuation and landing systems (including landing gear, aircraft wheels and brakes, actuation systems and engine components); (ii) nacelles and interior systems (including aerostructures, interiors and customer services); and (iii) electronic systems (comprising sensors, integrated systems, engine controls, electrical power systems, intelligence systems, surveillance systems and reconnaissance systems).

2. THE OPERATION AND THE CONCENTRATION

(4) On 21 September 2011, UTC announced that it had reached agreement to acquire Goodrich by purchase of shares. The purchase price is USD 18.4 billion.

(5) Pursuant to the Agreement and Plan of Merger as dated of 21 September 2011, UTC intends to acquire control of the whole of Goodrich by means of a merger of Charlotte Lucas Corporation (“Merger Sub”, a wholly owned subsidiary of UTC) and Goodrich. After the proposed transaction, the separate corporate existence of Merger Sub will cease, and Goodrich will continue as the surviving corporation, a wholly-owned subsidiary of UTC.

(6) The proposed transaction therefore constitutes a concentration within the meaning of Article 3(1)(b) of the EU Merger Regulation.

3. UNION DIMENSION

(7) The proposed transaction has a Union dimension as it meets the thresholds of Article 1(2) of the Merger Regulation. The undertakings concerned have a combined aggregate worldwide turnover of more than EUR 5 000 million[5] (UTC: EUR 42 968 million, Goodrich: EUR 5 255 million). Each of them has a Union-wide turnover in

[5] Turnover calculated in accordance with Article 5(1) of the Merger Regulation and the Commission Consolidated Jurisdictional Notice (OJ C 95, 16.4.2008, p. 1).

excess of EUR 250 million (UTC: EUR […]* million, Goodrich: EUR […]* million), but they do not achieve more than two-thirds of their aggregate Union-wide turnover within one and the same Member State.

4. THE PROCEDURE

(8) Based on its first phase investigation, the Commission raised serious doubts as to the compatibility of the transaction with the internal market and adopted a Decision to initiate proceedings pursuant to Article 6(1)(c) of the Merger Regulation on 26 March 2012 ("the 6(1)(c) decision").

(9) Following a request by the Notifying Party, non-confidential versions of certain key submissions of third parties collected during the first phase investigation were provided to the Notifying Party on 30 March 2012.

(10) The Notifying Party submitted its written comments on the Article 6(1)(c) decision on 4 April 2012.

(11) On 15 May 2012, the time limit for taking a final decision in this case was extended by an additional 15 working days pursuant to the second subparagraph of Article 10(3) of the Merger Regulation.

(12) The Notifying Party submitted commitments on 11 June 2012 pursuant to Article 8(2) of the Merger Regulation. Following the submission of the commitments, the Commission launched a market test in order to gather competitors', customers' and other market participants' views on these commitments.

(13) In light of the results of the market test, the Notifying Party presented a revised version of the commitments on 29 June 2012 and a final version of the commitments on 12 July 2012 ("the Commitments"). According to Article 10(2) of the Merger Regulation, decisions pursuant to Article 8(2) of the Merger Regulation shall be taken as soon as it appears that any serious doubts referred to in Article 6(1)(c) of the Merger Regulation have been removed, particularly as a result of modifications made by the undertakings concerned.

(14) The Advisory Committee discussed the draft of this Decision on 12 July 2012 and issued a favourable opinion.

5. RELEVANT MARKETS

5.1. General introduction

(15) Both UTC and Goodrich are active in the production and sale of aviation equipment on a worldwide basis. UTC is also active downstream through its subsidiaries in engine manufacturing (Pratt & Whitney) and helicopters (Sikorsky Aircraft Corporation, designated hereinafter as "Sikorsky").

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* Parts of this text have been edited to ensure that confidential information is not disclosed; those parts are enclosed in square brackets and marked with an asterisk.

(16) The Parties both supply aviation equipment to the manufacturers of airframes or engines – the so-called Original Equipment Manufacturers ("OEMs"). They have largely complementary product portfolios. However, there are some horizontal overlaps between UTC and Goodrich activities. These relate to alternating current ("AC") power generation, electronic engine controls, main fuel pumps, fuel metering units, aircraft flight control actuation and lighting.

(17) Since the UTC group also contains an engine manufacturer, Pratt & Whitney, and a helicopter manufacturer, Sikorsky, the proposed transaction raises a number of vertical issues in relation to a significant number of products sold by Goodrich to UTC's competitors. Due to Pratt & Whitney, the transaction leads to vertically affected markets for the supply of engine controls, fuel nozzles and nacelles to engine manufacturers. As a result of Sikorsky being part of the UTC group, the transaction leads to vertically affected markets in relation to the supply of rescue hoists, low voltage direct current ("DC") power generation, AC power generation, air data probes and ice detection systems to helicopter manufacturers. In addition, the proposed transaction leads to a vertically affected market for the supply of pressure transducers, which are components of engine controls.

(18) Finally, both UTC and Goodrich sell essential input to the aftermarket operators, a market where they are also both active in relation to the maintenance of their own products.

5.2. Electrical systems

5.2.1. Product market definition

(19) The aircraft electrical system is responsible for generating, converting and distributing the electrical power to the various systems and devices deployed on an aircraft during flight.

(20) An aircraft's electrical system is typically used to supply power for aircraft flight instruments, essential systems and passenger services (for example, cabin lighting, entertainment systems and food preparation). The electrical system on an aircraft is primarily composed of two elements: (1) the generation system, which generates the electricity used to power devices on the aircraft; and (2) the distribution system, which takes the power from the power sources (namely, generators) and carries it to individual devices on the aircraft.

Generation systems

(21) A power generator is used to generate electrical power for the systems and devices used on the aircraft.[6] As with generators in general, aircraft generators convert mechanical energy into electrical energy by a process of electromagnetic induction.

[6] Aircraft engines are the source for nearly all the power used on an aircraft. The electrical generators are located on the accessory gearbox of each engine and mechanically coupled via a splined drive-shaft mating. The electrical generator draws its power from the engine, along with the hydraulic pumps, pneumatic off-takes and fuel systems. Aircraft OEMs independently select the engine supplier and the generator supplier, and integrate the two systems themselves.

Power is generated by utilizing the engines to drive a gearbox, which in turn drives electrical generators. The power rating of generators can vary from around 5kVA to over 250kVA, and different sizes of generator tend to be used in different types of aircraft.[7] Moreover, the generator control unit ("GCU") is a device used to control the voltage of the generator, allowing the generator to have regulated voltage. The configuration of a GCU is based on capability requirements and does not depend on the size of the power generator in question. In the past, GCUs worked with analogue controls, which were simpler and used for smaller generators. More recent GCUs employ a digital control loop, which allows communication with the cockpit.[8]

(22) An aircraft will typically have two principal types of generators: (1) a power (engine) generator; and (2) an Auxiliary Power Unit ("APU") generator.[9] Main power generators produce electricity driven by the engines of the aircraft. They are the principal electrical power source for the aircraft during normal flight conditions. APU generators are driven by the APU of the aircraft,[10] and provide electric power for the aircraft's systems and devices while it is on the ground.[11] For most aircraft, APU generators can also provide backup electric power during in-flight operation. While the engine power generator runs at different speeds requiring speed conversion as required by the loads, the APU generator runs at constant speed. In addition, the ability to deal with environment conditions (such as temperature and vibration) is less significant for the APU generator since the APU generator is not operated all the time, unlike the main engine generators. The functions of main generators and APU generators are therefore different, and customers purchase these components separately and from different suppliers.[12] The aircraft also carries an emergency power unit ("EPU"), a device which generates electric power in case of failure of the

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7 The typical capacity rating for generation systems for large commercial aircraft, regional and corporate jets, and helicopters are respectively 90-150 kVa, 10 to 40 kVa, 6 to 40 kVa and 4.5 to 75 KVa. The capacity rating of a generator is typically represented by its power rating (i.e., the amount of electrical power that the generator can produce). The utilization rate" (or "typical utilization") of a generator is typically represented by the proportion of its total capacity that the generator uses in practice in all of the segments it is around 50% of its total capacity. However, it should be noted that at the higher end of the spectrum the Boeing 787 reaches a capacity rating of 250 kVa and a typical utilisation rate around 80-90% due to sophisticated load management.

8 Reply to Question 2 of the Commission's Questionnaire to power generators competitors (Q23) of 4 April 2012.

9 While this is generally true for larger aircraft, smaller aircraft (such as corporate jets and light helicopters) are less likely to have an APU generator.

10 APUs are small gas turbine engines that provide electrical power for pre-flight checks and cabin power prior to main engine start, and provide compressed air to start the main aircraft engine. APUs are not operated continuously in flight but are available in flight in emergency situations to provide back-up electrical power and compressed air to aid in main engine restarting. While APUs provide differing levels of power, they are all small gas turbine engines which are substantially similar in terms of functionality across the power spectrum. APUs are deployed according to the power requirements of an aircraft, with larger aircraft typically requiring greater power for main engine start, pre-flight checks and cabin power (reply to Question 1 of Commission's Questionnaire of April 19 2012).

11 External power sources (e.g., Ground Power Units) are also used when an aircraft is grounded.

12 In a conventional generation system an APU creates two sources of power that together create high-temperature and high-pressure air that is ducted to the front of the engines in order to run the air turbine starter on each engine, thereby generating the initial engine rotational speed required to start the engine.

primary systems, for example, when all engine power is lost.[13] In addition, in some cases, an aircraft may also have a main engine starter generator, which is an add-on feature to the main generator that starts the engine.

(23) As regards aircraft electrical systems, the Notifying Party considers that a distinction should be made between AC technology and DC technology on the basis that demand-side substitutability is limited for technical reasons. Each technology tends to be favoured in particular end-use applications, with DC systems being typically used in smaller aircraft and corporate jet with lower power need and AC systems typically used in larger regional and commercial aircraft with greater power needs and where the power will be distributed on longer lines, such as large commercial aircraft.[14] As regards DC power generation, […]* is present only on the high-voltage DC power generation market[15] while […]* is present only on low-voltage DC power generation market.[16]

(24) The market investigation has broadly confirmed that electrical systems based on AC and DC technology constitute separate product markets. From a demand-side perspective, the choice made will completely change the design of the aircraft and in the tendering process the specifications already define whether the offer should be based on AC or DC. Moreover, from a supply-side perspective, the main suppliers for AC and DC power generation tend to be different or to focus in different niche segments. In this respect, it appears that there are a larger number of competitors in DC than in AC.[17] For example, while Ametek and the Transdigm Group ("Transdigm") are present in DC generation they have no presence in AC generation.[18]

(25) The Notifying Party submits that AC power generators constitute a single product market without the need for a further segmentation according to the type of generator.

(26) The Commission has analysed in the past a number of aerospace component markets and has generally concluded that each aerospace component is a market in itself essentially on the basis that each component performs a distinct and vital function in

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13 Ram air turbines ("RATs") are an example of EPU generators as an emergency power source in the aircraft.

14 The Notifying Party considers that it is not necessary to distinguish separate markets for constant frequency and variable frequency AC generation. However, it notes that the effective displacement of constant frequency by variable frequency generation should be taken into account in the competitive assessment of the proposed transaction.

15 High-voltage (i.e., 270V) DC systems are used on a small number of military fighter aircraft.

16 Low-voltage (i.e., 28V) DC systems are typically used on smaller aircraft where less electricity is needed.

17 Reply to Question 14 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012 and reply to Question 6.3 of the Commission's Questionnaire to electrical systems customers (Q2) of 24 February 2012.

18 Form CO - Annex 7.1 [ES].

the operation of the aircraft types they are used for, and is airframe specific (that is to say, custom engineered).[19]

(27) The market investigation conducted in the context of the proposed transaction broadly confirmed that the power generator, the APU and the EPU constitute separate product markets.[20] From a demand-side perspective, there is limited substitutability as each product serves a different purpose, responds to different specifications and is tendered out separately. From a supply-side perspective, component manufacturers tend to specialise supplying some but not all of the mentioned products.

(28) Within AC generation systems a further distinction can be made between constant frequency and variable frequency.[21] Since an engine rotates at variable speeds during flight, the generator would normally also produce electricity of variable frequency. However, if the generator is equipped with a constant speed drive, it can produce constant frequency. A constant speed drive that takes the variable speed output of the engine and hydro-mechanically produces a constant output speed used to drive the generator. While constant frequency AC generators have traditionally been used in aircraft systems, airframers presently are specifying variable frequency AC generators. It is expected that this trend will continue since variable frequency AC generators offer significant performance advantages over DC generators (for example, they provide greater efficiency in terms of power extraction, weigh less and produce less waste heat). While constant frequency AC generators are utilized in most large commercial aircraft flying today, they represent legacy technology and virtually all newer platforms are being designed and built as variable frequency AC platforms (except for modifications to extend the life of existing aircraft platforms that already utilize constant frequency AC generators, or where existing engines already matched to a constant frequency AC generator are used).

(29) The market investigation broadly confirmed that AC generation systems based on constant and variable frequency constitute distinct product markets. From a demand side perspective, there is limited substitutability between electrical systems based on constant and variable frequency since they differ significantly from each other in terms of design, specifications and performance. Moreover, the specification of the electrical system architecture is already defined in the terms of the tender. From a supply-side perspective, the number of suppliers with capacity in constant frequency

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19 See Commission Decision of 23 August 2002 in Case No COMP/M.2892 – Goodrich/TRW Aeronautical Systems Group, OJ C 11, 17.1.2003, p. 10; Commission Decision of 3 July 2001 in Case No COMP/M.2220 – General Electric/Honeywell, OJ L 48, 18.2.2004, p. 1; Commission Decision of 25 May 1999 in Case No IV/M.1493 – United Technologies/Sundstrand, OJ C 206, 21.7.1999, p. 19.

20 Reply to Questions 6, 6.1, 7, 8, 9, 10 and 11 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012 and reply to Question 5 of the Commission's Questionnaire to electrical systems customers (Q2) of 24 February 2012.

21 In addition, in some cases generators run at (or close to) a constant speed without a constant speed drive being required, because the power source itself runs at a constant speed (this is sometimes the case with, for example, rotorcraft AC generators, turboprop AC generators and APU generators). As constant speed generators generally lack the very high precision frequency control that characterizes constant frequency generators, these are generally considered as variable frequency generators for the purpose of the this Decision.

AC differs significantly from the number of those which have capacity in variable frequency AC generation.[22]

(30) An alternative delineation of AC generation can be made according to the size of the aerospace application served. The main categories being large commercial aircraft, regional commercial aircraft, corporate jets and helicopters.

(31) The Notifying Party considers that it is not necessary to define separate markets within AC generation systems according to the type or size of an aircraft. Furthermore, the Notifying Party claims that the distinction between AC systems used in large aircraft and DC systems used in smaller aircraft is the only meaningful distinction between "large" and "small" aircraft.[23]

(32) It is to be noted that in previous decisions where non-avionic products were examined, the Commission did not find relevant to make a further market subdivision between large commercial aircraft, regional aircraft, corporate aircraft or any other aircraft segment.[24]

(33) However, the market investigation conducted for the purpose of this Decision has been inconclusive as regards the adequacy of further segmenting the AC generation market according to the size of the aircraft. In this respect, from a demand-side perspective, the vast majority of the respondents to the market investigation indicated that the technical specifications of a power generator differ according to the size of the platform in which they are used. In particular, the power generators differ with regards to parameters such as weight,[25] power rating,[26] voltage, speed,[27] cooling system,[28] control technology[29] and failure time.[30] Moreover, generators for large aircraft are more expensive than those for smaller aircraft. In addition, the

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22 Reply to Questions 18, 19, 20, 21, 22, 23, 24 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012 and reply to Questions 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8 of the Commission's Questionnaire to electrical systems customers (Q2) of 24 February 2012.

23 Notifying Party's reply to the Article 6(1)(c) decision of 4 April 2012.

24 Commission Decision of 3 July 2001 in Case No COMP/M.2220 – General Electric/Honeywell, OJ L 48, 18.2.2004, p. 1, recital 235.

25 A small generator weights less than 20 kg while a large generator weights between 20 to 80 kg.

26 A small generator has a power range between 10 to 40 kVa while a large generator has a power range between 80-250 kVa.

27 A small power generator has a rotational speed of 12 000 rpm while a large generator has a rotational speed of up to 25 000 rpm.

28 A small power generator is either air- or oil-cooled while a large generator is generally oil-cooled. (Pitstone visit slides, February 14 2012, p. 6).

29 A small power generator is controlled via a simple analogue GCU while a large generator is controlled by a complex digital GCU.

30 A small power generator has a mean time before failure ("MTBF") of approximately 10 000 to 15 000 hours while a large generator has a MTBF of 30 000 hours or more.

segmentation according to the size of the aircraft is broadly followed by the industry.[31]

(34) From a supply-side perspective, most of the respondents to the market investigation indicated that the competitors active in power generation differ according to the size of the aircraft. Currently, only Hamilton Sundstrand and Goodrich through the Aerolec JV it has with Thales are supplying large AC generators to platforms in production.[32] Moreover, the complexity of building a power generator is directly proportional to the size of the aircraft (relevant parameters include efficiency, mechanical sizing and generator control design, higher rotational speeds of the engine and the power requirements of the aircraft). The responses to the market investigation revealed that suppliers of power generators do not all have the same capabilities irrespectively of the size of the aircraft. In general, the suppliers of larger generators have the capability for building smaller generators but not the other way around. The production of power generators for larger aircraft poses major challenges to the power generator suppliers for smaller aircraft.[33]

(35) However, the question whether generators for different aircraft platform sizes should be defined as a distinct product market can be left open for the purpose of this Decision as it does not alter the conclusions of the competitive assessment.

(36) The Notifying Party further submits that it is not relevant to make a distinction between power generators for civil and military applications. The Commission in previous decisions left open the exact product market definition as to whether components used for either military or commercial applications (that is to say, according to the use of the aircraft) form part of a single product market.[34]

(37) The findings of the market investigation have not been conclusive as to whether it is pertinent to segment the market for power generation into commercial and military applications. From a supply-side perspective, some respondents to the questionnaires have indicated that suppliers differ depending on whether the power generator will be used for military or civil applications. There appears to be more suppliers in power generation on small engines for military applications than for civil applications. From a demand-side perspective, the technical specifications of the generator differ depending on whether they are to be used for military or civil applications. In this respect, the market investigation revealed that electrical power supplied in commercial applications is subject to more stringent quality standards

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31 Reply to Questions 33, 35, 37, 47 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012; reply to Questions 9.1, 9.3, 9.5, 11 of the Commission's Questionnaire to electrical systems customers (Q2) of 24 February 2012 and Pitstone visit slides, February 14 2012, p. 6.

32 Reply to Question 38 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012.

33 Reply to Questions 34, 36, 39 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012 and reply to Questions 9.2, 9.4, 9.6 of the Commission's Questionnaire to electrical systems customers (Q2) of 24 February 2012.

34 An alternative metric for splitting the market is according to the kilo voltage ampere ("kVa") of the power generator but this metric is largely captured by splitting the market according to the size of the aircraft.

than that of military applications. The higher utilisation rates of commercial applications seem to result in the larger operational reliability requirements imposed on generators for those applications. Moreover, the cost of ownership plays a more relevant role in commercial applications while in military applications performance is a more relevant parameter.[35]

(38) However, for the purpose of this Decision the relevance of further segmenting the market for power generation according to commercial and military applications can be left open as it will not materially affect the assessment of the proposed transaction.

Distribution systems

(39) An aircraft's electrical distribution system carries and converts the power from the generators to the individual devices and systems ("loads") powered by electrical energy in the aircraft.

(40) The distribution systems can be divided between "primary" and "secondary" systems. The "primary" system takes and manages large power loads from the aircraft's generators, after which the "secondary" system controls and distributes smaller power loads to individual aircraft systems or devices.[36]

(41) As with power generation, distribution systems are based on either AC or DC technology. As the aircraft's distribution system is directly connected to the generators, it is efficient for the distribution and generation system to utilize the same technology. Accordingly, the aircraft types typically suited to AC and DC generation will predominantly use AC and DC distribution systems respectively.

(42) As distribution systems must employ the same technology as the generators to which they are connected, the same distinctions are considered to apply in relation to AC distribution and DC distribution, as well as in relation to low-voltage and high-voltage DC distribution.

(43) As for the distinction between primary and secondary distribution systems, from a demand-side perspective both distribution systems perform different functions and in many cases customers (the airframe OEMs) purchase these components in separate procurement packages, and from different suppliers. There is also limited supply-side substitutability at present between primary and secondary distribution systems, in particular because of certain technical differences between the two types of system. The supplier know-how required for each type of system is different (primary distribution systems require know-how in contactors, electrical system design and fault isolation, whereas secondary distribution systems require know-how in SSPCs and arc-fault detection), and cannot be usefully applied in the supply of the other type of system. While technological developments may reduce the differences

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35 Reply to Question 9 of the Commission's Questionnaire to power generators competitors (Q23) of 4 April 2012.

36 Essentially, the configuration of the primary and secondary distribution systems used on an aircraft depends on whether the generation system used on the aircraft is an AC or DC system (and in the case of a DC generation system, whether it is a high-voltage or low-voltage DC generation system).

between primary and secondary distribution systems in future, the timing of such convergence is uncertain.

(44) Therefore it is considered appropriate to distinguish between primary and secondary distribution systems within AC distribution, low-voltage and high voltage DC distribution.

5.2.2. Geographic market definition

(45) With respect to the geographic scope of aircraft generation and distribution systems for commercial applications, previous Commission decisions have found that components such as power generation for commercial applications are worldwide in scope.[37] This aspect has been broadly confirmed in this market investigation. The responses to the questionnaires showed that from a demand-side perspective, the aircraft components used in commercial applications are sourced globally while transport costs do not play a significant role and there are significant trade flows for these components across countries. From a supply-side perspective, the production of these components is organised on a worldwide scale and suppliers are active across countries.[38]

(46) As to the geographic scope of components for military applications, the Notifying Party considers that it is worldwide. However, the Commission in previous decisions left open the question whether the markets of components for military applications are national or EEA-wide in scope.[39] The findings of the market investigation in this case have not been conclusive in this regard. Some respondents to the questionnaires have indicated that the geographic scope of the market for components used in military applications may be narrower due to government regulations (for example, export restrictions). In fact, respondents to the market investigation have indicated that defence related regulatory barriers might limit the geographic scope of the markets for components in military applications.[40]

(47) However, for the purpose of this Decision, the exact geographic definition of aircraft AC power generators for military applications can be left open as it will not materially affect the assessment of the proposed transaction.

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37 See Commission Decision of 24 October 1996 in Case No COMP/M.697 – Lockheed Martin/Loral Corporation, OJ C 314, 24.10.1996, p. 9, Commission Decision of 3 July 2001 in Case No COMP/M.2220 – General Electric/Honeywell, OJ L 48, 18.2.2004, p. 1 and Commission Decision of 17 April 2002 in Case No COMP/M.2738 – GEES/Unison, OJ C 134, 6.6.2002, p. 2.

38 Reply to Questions 48, 49, 50, 51, 52, 53, 54 and 55 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012.

39 See inter alia Commission Decision of 23 August 2002 in Case No COMP/M.2892 – Goodrich/TRW Aeronautical Systems Group, OJ C 11, 17.1.2003, p. 10; Case No COMP/M.2308 – Northrop Grumman/Litton Industries and Case No IV/M.1198 – BAe/SAAB.

40 Reply to Question 56 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012.

5.3. Engines and Auxiliary Power Units (APUs)

5.3.1. Product market definition

Aircraft engines

(48) Aircraft engines are deployed to power and propel aircraft. Jet engines are the propulsion system of jet aircraft. Within the broad category of jet engines, a distinction can be made between turbofan engines, turboprop and turboshaft engines. Turbofan engines are those in which a fan driven by a turbine provides extra air to the burner and gives extra thrust. In turboprop engines thrust is provided by an external propeller rather than an internal fan. The turboprop provides the benefits of high-thrust and low-fuel consumption for aircraft designed for short distances. Turboshaft engines produce shaft power, rather than jet thrust. Turboshaft engines are mainly deployed on helicopters.

(49) Previously, the Commission has segmented the aircraft turbofan jet engine market into groups based on the "mission profile" (that is to say, the purpose for which the aircraft is purchased, determined by reference to the aircraft's seating capacity, flying range, and price and operational cost) of the aircraft on which the engine is deployed: (i) jet engines for large commercial aircraft (> 100 passengers, range of 2000 to 8000 nautical miles), which include narrow-body/single-aisle aircraft and wide-body/double-aisle aircraft ("LCA"); (ii) jet engines for large regional aircraft (> 70 passengers, range up to 2000 nautical miles) ("LRA"); (iii) jet engines for small regional aircraft (30-50 passengers, range up to 2000 nautical miles) ("SRA"); and (iv) jet engines for corporate aircraft.

(50) Turboprop and turboshaft engines have not been considered previously in Commission decisions.

(51) The market investigation has not been conclusive as to whether there are any thresholds which split the engine supply market.[41] The majority of the airframers did not agree with the market segmentation based on different mission profiles, as well as did not identify any other major element to distinguish the market.[42] As regards turboprop, it could not be established whether they are substitutable for turbofan engines or if they are mainly deployed on specific platforms (corporate and regional aircraft).[43] The majority of the respondents however agreed that turboshaft engines are only deployed on helicopters.[44] Finally, the investigation found that a distinction between engines for military or civil aircraft could not apply.[45]

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41 Replies to Question 10 of the Commission's Questionnaire to engine customers (Q29) of 11 April 2012.

42 Replies to Questions 11.1 and 11.3 of the Commission's Questionnaire to engine customers (Q29) of 11 April 2012.

43 Replies to Questions 4 and 5 of the Commission's Questionnaire to engine customers (Q29) of 11 April 2012.

44 Replies to Question 7 of the Commission's Questionnaire to engine customers (Q29) of 11 April 2012.

45 Replies to Questions 6 and 11.2 of the Commission's Questionnaire to engine customers (Q29) of 11 April 2012.

(52) For the purpose of this Decision, the question whether the market should be narrowly defined on the basis of the mission profiles, or whether it should be considered a unique market including both turbofan and turboprop engines, can be left open as the assessment of the vertical effects of the transaction in relation to engines does not depend on the precise scope of the engine market.

Auxiliary Power Units

(53) APUs)are small gas turbine engines that are located in the aircraft's tail section. APUs do not provide propulsion but provide power to start the main engines.

(54) Turbine jet engines must be accelerated to a high rotational speed in order to provide sufficient air compression for self-sustaining operation. Before the propulsion engines can be operated, the APU is started by a battery or hydraulic accumulator. Once the APU is running, it provides power (electric, pneumatic, or hydraulic, depending on the design) to start the aircraft's main engines. APUs are used generally only on LCA and regional jet aircraft (and possibly also some corporate jet aircraft) as smaller jet engines are usually started by an electric motor.

(55) APUs also run accessories such as cabin airflow while the engines are shut down. Electrical power generated by the APU is used to run systems for pre-flight checks. Some APUs also operate hydraulic equipment (such as flight controls or flaps) prior to engine start or as a backup in flight in case of engine or hydraulic failure. When the APUs are fitted to extended-range twin-engine operations ("ETOPS") aircraft they are a critical-safety device, as they supply backup electricity and compressed air when the main engine generator fails.

(56) The Commission had previously assessed APUs in *General Electric/Honeywell*[46] without reaching a final conclusion on how the APU market should be delineated. In this case, the market investigation indicates that whilst APUs are customised to a particular aircraft platform, they can be grouped according to the aircraft's mission profile. On the basis of differences in (i) customer groups, (ii) aircraft operating costs and (iii) APU performance requirements determined by the type of the aircraft, APUs for LCA can be distinguished from those for regional jet aircraft. Whether APUs for regional jet aircraft (and possibly corporate jet aircraft) should be further delineated according to power output or performance criteria can be left open for the purpose of this Decision as it does not change the conclusions of the competitive assessment.

5.3.2. Geographic market definition

(57) The market investigation confirmed the Commission's finding in *General Electric/Honeywell*[47] that all engine and APU markets are worldwide.

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[46] Commission Decision of 3 July 2001 in Case No COMP/M.2220 – General Electric/Honeywell, OJ L 48, 18.2.2004, p. 1, recital 36.

[47] Commission Decision of 3 July 2001 in Case No COMP/M.2220 – General Electric/Honeywell, OJ L 48, 18.2.2004, p. 1, recital 36.

5.4. Engine controls

5.4.1. Product market definition

(58) Engine controls cover a range of aerospace components and engine accessories, which can be further split into separate markets. The Parties' activities overlap in the provision of electronic engine controls ("EECs"), main fuel pumps, and fuel metering units ("FMUs") (together referred to as "engine controls"). Together, these on-board systems regulate the flow of fuel, air and other inputs into the aircraft engines. They ensure that the engines operate optimally and safely at controlled speeds and temperatures. The primary function of engine controls is to convert the pilot's commands into changes in the amount of fuel that is fed into the aircraft engine, thereby controlling the amount of thrust produced by the engines and ultimately the speed of the aircraft.

(59) Engine controls are mainly sold to engine manufacturers[48] and the markets in question are characterized by infrequent and large contract awards.

(60) The EEC[49] is essentially customized hardware and software that receives inputs from the cockpit and engine sensors (including the cockpit throttle control, as well as temperature, pressure and vibration sensors within the engine) and processes those inputs through software algorithms to determine how much fuel can be safely fed into the engine in order to provide the necessary thrust for the given conditions. This output is then fed to the FMU.

(61) The FMU[50] meters the amount of fuel fed into the engine combustors according to the commands of the EEC. This is accomplished by altering the position of various valves to either increase or decrease the flow of fuel, driven by the main fuel pumps, that is allowed into the combustion chamber.

(62) The main fuel pump is a mechanical component driven by the gearbox that pumps fuel from the fuel tanks into the combustors. Main fuel pumps provide the engine combustors with fuel, the required amount of which is regulated by the fuel controls.

(63) The Commission has analysed a number of aerospace component markets in previous decisions[51] and the market investigation has confirmed that EECs, main fuel pumps and FMUs are each a market in itself. The potential for demand-side substitution for these components is very limited since each of them performs a distinct and vital function in the operation of the aircraft types they are used for.

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48 Engine controls for use as replacement parts are also supplied to aircraft engine MRO service providers (airlines and other third-party shops) and to spare parts distributors.

49 EECs are also known as full authority digital engine controls ("FADECs"), which essentially consist of a dual channel EEC (the second channel operates as a back-up for the first channel).

50 FMUs are also known as hydro-mechanical units ("HMUs") or fuel control systems.

51 Commission Decision of 3 July 2001 in Case No COMP/M.2220 – General Electric/Honeywell, OJ L 48, 18.2.2004, p. 1, recital 333; Commission Decision of 17 April 2002 in Case No COMP/M.2738 – GEES/Unison, OJ C 134, 6.6.2002, p. 2, recital 9; and Commission Decision of 23 August 2002 in Case No COMP/M.2892 – Goodrich/TRW Aeronautical Systems Group, OJ C 11, 17.1.2003, p. 10, recital 7.

Also, each engine control market should be segmented according to the airframe they serve, meaning that airframe manufacturers require custom-engineered[52] components that are specific to the engine size and the aircraft size. The Notifying Party has not provided arguments that call the absence of demand-substitutability into question.

(64) The Notifying Party considers that a segmentation of engine control product markets by aircraft size or engine size is not warranted. Apart from the limited demand substitutability, the Notifying Party considers that there is a certain degree of supply substitutability on the basis of the functionality of the products and the suppliers' capabilities across the applications. It is submitted that engine controls have similar functionality across different sizes of engine, tend to be adapted from the same underlying architecture and scaled up or down as appropriate for the particular engine.[53] In addition, segmentation based on aircraft size would not be relevant since engine controls are sold to engine manufacturers. Thus, the Notifying Party argues that engine control manufacturers are generally able to produce components for a wide range of engine sizes and types, meaning that there is a high degree of supply-side substitution in the products across the full range of engines and points in that respect to previous Commission decisions.

(65) As to the distinction between civil and military applications (that is to say, according to purpose), the Notifying Party also argues that it is not relevant to make a distinction between engine control product markets. Although there are distinctions, engine controls sold to engine manufacturers have the same basic functionality. According to the Notifying Party, in many cases essentially the same engine (including engine controls) is used for both civil and military applications. Moreover, manufacturers supply engine controls for both civil and military application engines and there would therefore be a similar number of alternative suppliers under either market definition.

(66) In previous Commission first phase decisions, the precise market definition and in particular the relevance of further segmentation according to engine/aircraft size and purpose was left open as this did not materially affect the assessment of the notified concentrations.

(67) The Commission's in-depth investigation in this case has therefore focused on the question to what extent from a supply-side point of view a further segmentation according to engine/aircraft size and aircraft purpose is warranted.

(68) The Commission investigation has shown that the competitive conditions for engine controls differ across segments, in particular in terms of engine size and the aircraft purpose, in view of differences regarding product requirements and performance.

(69) With regard to their technical and performance requirements, engine control products present significant technological requirements that suppliers have to meet and these

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52 Commission Decision of 23 August 2002 in Case No COMP/M.2892 – Goodrich/TRW Aeronautical Systems Group, OJ C 11, 17.1.2003, p. 10, recital 7.

53 Commission Decision of 3 July 2001 in Case No COMP/M.2220 – General Electric/Honeywell, OJ L 48, 18.2.2004, p. 1, recital 334.

are different for the respective aircraft platforms that are powered by engines in different thrust classes. Both customers and competitors have pointed to differences in the degree of complexity across the different types of engines,[54] whereby engine controls are more complex for large commercial aircraft than for, in declining order, regional aircraft, corporate aircraft and helicopters. Although engine controls may display rather similar design approaches across different jet aircraft engines and thus aircraft platforms, in particular when the design has been scaled up or down to the requirements of a specific engine type, that does not imply that such modifications can be applied within the required short period of time to warrant significant supply-side substitutability and as a result of which it could be concluded that suppliers are able to manufacture and supply engine controls for all aircraft engines.

(70) The market investigation has shown that engine controls are sophisticated components which require a detailed knowledge of the engine and airframe systems that interface with the engine. Since these components are integral to the functioning of the engine, the engine manufacturer will require the design to be optimal for its specific purpose and performance, rather than being a derived design that may be too sophisticated (in case of a scaled-down large commercial engine) or too basic (in case of an engine control serving a small limited trust developing engine). Furthermore, manufacturers of large engines essentially cooperate with one supplier: Rolls-Royce with Aero Engines Controls ("AEC"); Pratt & Whitney with Hamilton Sundstrand; and General Electric ("GE") with BAE Systems and Fadec International for EECs, Woodward Governor ("Woodward") for FMUs, and Eaton Aerospace ("Eaton") for main fuel pumps.

(71) Secondly, a sound track record in applying the technology in aerospace jet engine applications is a key discriminator for selection as an engine control supplier as much as component and replacement/repair cost. An engine control supplier that for instance has only developed fuel pumps of sophisticated high thrust jet engines on large commercial aircraft is unlikely to be able to propose a value and cost focused basic design for a helicopter platform. To the same extent, it is unlikely that a fuel pump manufacturer for helicopters will be able to meet the requirements in terms of track record in applying the technology in aerospace jet engine applications for large commercial aircraft engines.

(72) Thirdly, apart from the technology capability and track record, suppliers will need to have the ability to invest[55] in engine programmes (characterised by high up-front

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[54] One competitor's reply to Question 26.1 of the Commission's Questionnaire to engine controls competitors (Q3) of 22 February 2012: fuel injectors, fuel pumps, fuel metering systems, fuel-powered actuators and electronic engine controls including software for gas turbine engines require very special skills, experience, as well as facilities to design, certify and manufacture.

[55] Reply to Question 28 of the Commission's Questionnaire to engine controls customers (Q4) of 23 February 2012: "Williams's experience in its competitive source selection in 2002 showed there were few sources technically able to provide the full engine control system WI needed. Two potential bidders who may have been viable sources, declined to bid. There are significant design & development costs, engine integration and testing costs, including extensive, costly civil certification costs to recertify each type engine with the new engine controls system This new engine certification will include some new certification test requirements added recently This would then be followed by aircraft development and certification costs with the new integrated engine systems." In the reply to Question 17.4 of the Commission's Questionnaire to engine controls competitors (Q3) of 22 February 2012, one competitor

investments and a very long period before cash flows turn positive) other than the platforms they are currently serving and need to be able to provide in-service support. The requirements to do so are significantly different for the distinct aircraft and helicopter platform segments.

(73) Fourthly, the market investigation has demonstrated that for engine controls component manufacturers the costs[56] for developing and certifying engine controls for platform segments are considerable, both in terms of time and investment required,[57] even if that component manufacturer is already producing engine controls for other platform segments.

(74) Therefore, it can be concluded that competitive conditions for engine controls differ on the different aircraft platform segments. Even though supply-substitutability is a feature of a certain importance, the barriers to entry[58] which engine controls manufacturers face in order to move to adjacent platforms are nonetheless significant due to the sophistication of engine controls, the high associated R&D requirements, the cost of obtaining product certification and the need to have a strong technology capability as well as a worldwide product support network.

(75) Furthermore, any potential market entry of an alternative engine controls supplier is offset by the high switching costs for users. Such switching costs entail the modification process, certification, flight testing and airframe manufacturer charges for every aircraft platform for which the engine is selected. In that respect, the market investigation has shown that switching engine controls suppliers on a single

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stated that changing engine control suppliers is very expensive and its customers would have to requalify a second source of supply, which would take 3-5 years and many millions of dollars. Another competitor, in reply to Question 17.4 of the Commission's Questionnaire to engine controls competitors (Q3) of 22 February 2012, stated that for its customers to switch supplier it would take them around 3 years, involving major effort and expenses. Furthermore, one competitor also stated in its reply to Question 25 of the Commission's Questionnaire to engine controls competitors (Q3) of 22 February 2012 that "A new design would typically take 36 to 48 months [to obtain certification]. Less for an adaptation of an existing EEC (24 to 30 months). Effort for the EEC supplier (Non Recurrent Cost) from USD 10 to 70 milllion depending on the size. This figure does not include cost for engine manufacturer."

56 AEC's reply to Question 17.4 of the Commission's Questionnaire to engine controls competitors (Q3) of 22 February 2012: "Large commercial engines could take […]* and estimated cost […]*, small engines […]* and estimated cost […]*."

57 AEC's reply to Question 25 of the Commission's Questionnaire to engine controls competitors (Q3) of 22 February 2012: "Engine control system for a large commercial engine could take […]* to certify at an estimated cost of […]*. Engine control system for a small engine could take […]* at an estimated cost of […]*."

58 One company mentioned that in nearly all of the engine component parts it sources from a specific supplier, the supplier owns the designs and the intellectual property, and each component is specifically designed for the engine to which it goes into - reply to Question 30 of the Commission's Questionnaire to engine controls competitors (Q3) of 23 February 2012. Turbomeca's reply to Question 28 of the Commission's Questionnaire to engine controls customers (Q4) of 23 February 2012: "Know how, patents. Very specific products with high constraints (environmental conditions, safety, performances, cost, standards ….). Long development cycles, high development costs, low production quantities, low trust in a new supplier."

engine type is undesirable,[59] and particularly so when the engine in question is already advanced in its commercial lifetime.

(76) While the exact market definition can be left open, the competitive assessment will reflect that the competitive interaction differs depending on the size of the engine and the purpose of the aircraft.

5.4.2. Geographic market definition

(77) The Notifying Party considers that the geographic market definition for all engine control markets is worldwide since all major suppliers of engine controls are present worldwide and sell to customers on a worldwide basis, aircraft engine manufacturers generally apply a worldwide purchasing policy and prices for engine controls are quoted on a worldwide basis and do not differ by geographic region.

(78) In previous decisions the Commission has considered that the geographic scope of the engine control markets for civil aerospace applications is worldwide in scope.[60] The market investigation supports this view. Engine controls manufacturers market, sell and support EECs, main fuel pumps and FMUs on a worldwide basis. Furthermore, engine manufacturers have a worldwide purchasing policy for their engine controls. The Commission therefore considers that the relevant geographic market for the supply of engine controls to civil applications is worldwide.

(79) For the purpose of this decision, the assessment will be carried out on the basis of a worldwide market. Since the analysis of the vertical relationship between Goodrich and Pratt & Whitney leads to the conclusion that the concentration as notified would significantly impede effective competition for civil applications, and since the proposed divestiture, in combination with Rolls-Royce's buyout of Goodrich's position in AEC, will remove the entire horizontal overlap between Goodrich and UTC in engine controls, it is not necessary to investigate potentially narrower geographical markets for military applications.

5.5. Fuel nozzles

5.5.1. Product market definition

(80) Fuel nozzles are turbomachinery components[61] for aerospace engines whose function is to deliver fuel into the engine's combustion chambers.[62]

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59 Williams's reply to Question 17.4 of the Commission's Questionnaire to engine controls competitors (Q3) of 23 February 2012: "Any customer that had civil certified its aircraft using WI engines would have to invest many millions of USD and take up to three or more years to recertify the aircraft with new engines."

60 Commission Decision of 3 July 2001 in Case No COMP/M.2220 – General Electric/Honeywell, OJ L 48, 18.2.2004, p. 1, recital 336. Commission Decision of 23 August 2002 in Case No COMP/M.2892 – Goodrich/TRW Aeronautical Systems Group, OJ C 11, 17.1.2003, p. 10, recital 7.

61 Turbomachinery components are machines that transfer energy between a rotor and a fluid, including both turbines and compressors. Blades and vanes and power transmission shaft are other types of turbomachinery components. UTC and Goodrich are active in these markets, which however are not affected by the present transaction.

(81) Fuel nozzles are made by attaching various machined detail parts (spray tip, fuel fittings and strainer) to a forged or cast base support. The spray tip is a precision machined part that controls the fuel spray characteristics. The strainer serves to keep large impurities from entering the spray tip possibly causing blockages. The fuel fittings are attached to the base to allow connection of the fuel supply tubes to the fuel nozzle assembly. These pieces are then brazed and/or welded together into a nozzle.

(82) Fuel nozzles are sold directly to the engine manufacturer OEMs, which then assemble them in the engine, or supply them to the end-user as spare parts in the aftermarket (i.e. to independent service shops and airlines MRO departments). The market for fuel nozzles is characterized by infrequent and large contract awards. Fuel nozzle prices are competitively bid for any new engine program on the basis of the OEMs' technical specifications.

(83) According to the Notifying Party, there are no market definition precedents for the aerospace turbomachinery industry. The Commission has previously identified a distinct market for machined parts used in aircraft engines.[63] However, the question whether each type of machined part should constitute a distinct product market and/or whether a distinction should be made according to the type of aircraft was left open.

(84) The Notifying Party considers that there are no meaningful differences in the manufacturing techniques, machines or tooling needed to make any type of fuel nozzle. Differences in cost are driven by design complexity, quality, size, type of metal and the number of parts that need to be brazed and/or welded together. Fuel nozzles are normally sold to engine manufacturers as a stand-alone item and there is no prevailing association between the supply of fuel nozzles and any other particular components. Consequently, the Notifying Party submits that the merchant market for the machining and coating of aerospace fuel nozzles is the narrowest possible product market definition.[64]

(85) The market investigation has assessed whether the fuel nozzle market needs to be further segmented on the basis of the type or size of the aircraft served[65] and whether

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62 The Notifying Party indicates that fuel nozzles are a specific component of turbofan engines (see paragraph 6.1. of the Form CO – Turbomachinery section). However, this statement is contradicted by Goodrich' sales data for fuel nozzles, which provide sales figures in relation to all types of engines, including turboprop or turboshaft engines, such as for example, […]*(see "UPDATE_MS component supply to aircraft and engine manufacturers by value and volume – Goodrich").

63 Commission Decision of 23 April 2007 in Case No COMP/M.4561 - GE/Smiths Aerospace, OJ C 133, 15.6.2007, p. 1, recitals 19–22.

64 The Notifying Party however considers that such a market definition is too narrow because there is a high degree of supply-side substitutability as fuel nozzles for industrial and consumer uses (e.g. train engines, truck engines and heavy equipment engines) employ essentially the same manufacturing processes and machinery as those for aerospace applications.

65 Whereas it clearly emerged from the initial investigation that prices of fuel nozzle components depend on the size and/or type of the engine, there was disagreement as to whether the manufacturing process and the technological know-how required for the production of fuel nozzles would vary on the basis of the type of aircraft served.

the manufacturing techniques/machines/tooling for the production of fuel nozzle are the same for any type of final application (i.e. aerospace, industrial and consumer uses).

(86) The market investigation indicates that the cost of the fuel nozzle component depends on the size and/or type of the engine,[66] and the majority of fuel nozzle suppliers agreed that the production of nozzles for different types of engines requires different know-how and manufacturing techniques.[67] However, the market investigation shows that there is significant supply-side substitutability as all fuel nozzle suppliers: (i) are active in the different segments; (ii) have been considered as credible participants in tenders for different engine segments; and (iii) consider themselves able to manufacture and supply fuel nozzles for all aircraft engines.[68] It also appears that the major competitors on the fuel nozzle market are considered to have capabilities throughout the different engine segments, with the possible exception of the turboprop segment.[69]

(87) For the purpose of this Decision, the exact market definition can be left open as the assessment of the vertical effects of the transaction in relation to engines does not depend on the precise scope of the upstream market of nozzles.

5.5.2. Geographic market definition

(88) The Notifying Party submits that as is the case for the other markets for civil aerospace applications (in line with Commission precedents[70]), the geographic market definition for fuel nozzles is worldwide.

(89) The market investigation confirmed that most of the fuel nozzles suppliers serve their clients regardless of their location,[71] and so do customers when choosing their

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66 Replies to Question 7 of the Commission's Questionnaire to turbomachinery customers (Q11) of 24 February 2012.

67 Replies to Questions 7, 8 and 9 of the Commission's Questionnaire to turbomachinery competitors (Q10) of 24 February 2012 and replies to Questions 3, 4, 5, 6 and 17 of the Commission's Questionnaire to fuel nozzles competitors (Q27) of 4 April 2012.

68 Replies to Questions 2, 10, 11 and 12 of the Commission's Questionnaire to fuel nozzles competitors (Q27) of 4 April 2012.

69 Replies to Questions 4, 5 and 6 of the Commission's Questionnaire to fuel nozzles customers (Q28) of 4 April 2012.

70 Commission Decision of 3 July 2001 in Case No COMP/M.2220 – General Electric/Honeywell, OJ L 48, 18.2.2004, p. 1, recital 36. Commission Decision of 23 August 2002 in Case No COMP/M.2892 – Goodrich/TRW Aeronautical Systems Group, OJ C 11, 17.1.2003, p. 10, recital 7. Commission Decision of 24 October 1996 in Case No COMP/M.697 – Lockheed Martin/Loral Corporation, OJ C 314, 24.10.1996, p. 9, recital 17. Commission Decision of 17 April 2002 in Case No COMP/M.2738 – GEES/Unison, OJ C 134, 6.6.2002, p. 2, recital 12.

71 Replies to Questions 9 and 10 of the Commission's Questionnaire to turbomachinery customers (Q11) of 24 February 2012; replies to Questions 15 and 16 of the Commission's Questionnaire to turbomachinery competitors (Q10) of 23 February 2012 and replies to Question 8 of the Commission's Questionnaire to fuel nozzle competitors (Q28) of 4 April 2012.

suppliers.[72] The Commission therefore considers that the relevant geographic market for the supply of fuel nozzles to civil applications is worldwide.

5.6. Actuation systems

5.6.1. Product market definition

(90) Both Parties supply aerospace flight control actuators,[73] which are hydraulically, mechanically or electronically driven components[74] that move flight control surfaces of aircraft or missiles (or other guided weapons) in order to control their flight.

(91) According to the Notifying Party, there are various types of flight control actuators: primary flight control actuators ("PFCAs"), secondary flight control actuators ("SFCAs"), trimmable horizontal stabilizer actuators ("THSAs"), rotorcraft flight control actuators ("RFCAs") and missile actuators. PFCAs are flight-critical actuators used to keep an airplane in the air and steer it in the desired direction by changing the position of various flight control surfaces (e.g. rudders, ailerons, elevators). SFCAs move flight control surfaces (e.g. flaps, slats) to alter the lift and drag characteristics of the wing for take-off and landing. THSAs trim the horizontal tail of the aircraft during flight in order to allow the elevator panels to fly in a clean wing configuration, thereby optimizing performance. RFCAs primarily control the main and tail rotor on helicopters. Missile actuators control the position of the fins or the thrust vector of a missile in response to steering commands from a flight computer in order to determine its flight path.

(92) The Commission analysed a number of potential segments of aerospace flight control actuation systems in previous decisions,[75] concluding in *Goodrich/TRW Aeronautical Systems Group* that PFCA systems, SFCA systems and missile actuation systems constituted separate markets.

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72 The only exception was the Government of the United States that indicated that the location of supplier/customer is relevant.

73 In addition to flight control actuators, both Parties also supply aerospace actuators generally referred to as "utility actuators", which are used in a variety of applications unrelated to the control of the aircraft or missile flight. In *Smiths Industries/TI Group*, the Commission considered utility actuation systems as a potential segment of the aerospace actuation market – see Commission Decision of 28 November 2000 in Case No COMP/M.2183 – Smiths Industries/TI Group, OJ C 21, 24.1.2001, p. 8. In 2010 UTC had a turnover of EUR […]* million in utility actuation systems while Goodrich's revenues were EUR […]* million. Based on the Counterpoint study "Aerospace Actuation 2010" ("Counterpoint Study"), the Notifying Party estimates that in 2010 the worldwide market size was EUR […]* million and that the Parties' combined market share was [5-10]*% (UTC: [0-5]*%; Goodrich: [5-10]*%). Alternatively, one could split the utility actuation system market according to the different actuation applications. In this respect, both Goodrich and UTC are active in door actuation systems but [reference to the absence of a relevant overlap]*. Regarding the remaining UTC utility actuators, those which are also produced by Goodrich (e.g. manifolds, landing gear actuation and ejector seat actuation) [reference to the absence of relevant overlaps]*. In light of this, the Decision will not further address utility actuation systems.

74 For example, gear assemblies, screws (ball screws, roller screws or acme screws) or hydraulic rams.

75 Commission Decision of 25 May 1999 in Case No IV/M.1493 – United Technologies/Sundstrand, OJ C 206, 21.7.1999, p. 19; Commission Decision of 28 November 2000 in Case No COMP/M.2183 – Smiths Industries/TI Group, OJ C 21, 24.1.2001, p. 8; Commission Decision of 23 August 2002 in Case No COMP/M.2892 – Goodrich/TRW Aeronautical Systems Group, OJ C 11, 17.1.2003, p. 10.

(93) The Notifying Party notes that THSA systems and RFCA systems have not previously been considered by the Commission and submits that there are significant demand- and supply-side differences between THSA systems, RFCA systems and other types of actuation systems. According to the Notifying Party, THSA systems are at times supplied together with PFCA systems or SFCA systems, but aircraft manufacturers may also source the THSA system from a separate supplier. In addition, the supply side would be different given that Rockwell Collins specializes in THSA systems. As regards RFCA systems, the Notifying Party argues that while the majority of companies active in flight control actuation for fixed-wing aircraft are also active in RFCA systems, some suppliers have historically been stronger in RFCA systems as a result of "traditional" alignments with helicopter manufacturers.[76]

(94) The market investigation has broadly confirmed the segmentation of the market for flight control actuation systems into PFCA systems, SFCA systems, THSA systems, RFCA systems and missile actuation systems.[77] However, the respondents to the market investigation generally confirmed that THSA systems are at times tendered together with PFCA systems or SFCA systems.[78] In addition, RFCA systems are sometimes viewed as PFCA systems given the fact that they are vital controls, the failure of which could result in the loss of the helicopter.[79]

(95) The question whether the THSA system market constitutes a separate market or is part of the PFCA or SFCA system markets can ultimately be left open in this case, in so far as it does not affect the competitive assessment of the proposed concentration. Likewise, the precise segmentation with respect to whether the RFCA system market constitutes a separate market or is part of the PFCA system market can ultimately be left open in this case, in so far as it does not affect the competitive assessment of the proposed concentration.

(96) In previous decisions,[80] the Commission left open the question whether commercial/civil and military applications for both PFCA systems and SFCA systems constituted separate product markets. The Notifying Party submits that a distinction between civil and military applications is not relevant for any flight control actuation system segments. The market investigation was not conclusive

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76 This has been confirmed by the vast majority of the competitors which responded to the market investigation – see replies to Questions 11 and 11.1 of the Commission's Questionnaire to flight control actuation competitors (Q5) of 24 February 2012.

77 Replies to the Commission's Questionnaire to flight control actuation competitors (Q5) of 24 February 2012 and replies to Commission's Questionnaire to flight control actuation customers (Q6) of 24 February 2012.

78 Replies to the Commission's Questionnaire to flight control actuation competitors (Q5) of 24 February 2012 and replies to Commission's Questionnaire to flight control actuation customers (Q6) of 24 February 2012.

79 See Counterpoint Study.

80 Commission Decision of 25 May 1999 in Case No IV/M.1493 – United Technologies/Sundstrand, OJ C 206, 21.7.1999, p. 19; Commission Decision of 28 November 2000 in Case No COMP/M.2183 – Smiths Industries/TI Group, OJ C 21, 24.1.2001, p. 8; Commission Decision of 23 August 2002 in Case No COMP/M.2892 – Goodrich/TRW Aeronautical Systems Group, OJ C 11, 17.1.2003, p. 10.

regarding this question. On the one hand, some competitors and customers signalled that the competitive conditions (e.g. number of suppliers, manufacturing techniques/machines, know-how, required investment, marketing and technology) for military applications differ from those of civil applications.[81] For example, one competitor noted that military programs tend to have a more regional set of competitors in light of a national-based approach,[82] while one customer stated that suppliers have a worldwide presence but they may be unable to reach certain countries or programs due to restrictions relating to national security and trade.[83] On the other hand, various competitors and customers regarding the various flight control actuation system segments indicated that the competitive conditions did not significantly vary depending on whether the aircraft purpose was commercial/civil or military.[84] One customer noted that "in the past for some military programs there was a strong requirement to offer content from the countries that could purchase the aircraft. This is no longer true, however, some offset requirements do still exist".[85] In any event, this question can be left open since it does not alter the competitive assessment of the proposed concentration.[86]

(97) In *United Technologies/Sundstrand*, the Commission noted that the market investigation appeared to confirm that the SFCA system market should not be further segmented according to the different types of commercial aircraft (large commercial aircraft, medium commercial aircraft, small business jets) in which the actuators are deployed. In *Goodrich/TRW Aeronautical Systems Group*, the question whether the markets for primary flight control actuators and secondary flight control actuators

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81 Replies to Question 7 of the Commission's Questionnaire to flight control actuation competitors (Q5) of 24 February 2012 and Question 7 of the Commission's Questionnaire to flight control actuation customers (Q6) of 24 February 2012.

82 Reply to Question 7 of the Commission's Questionnaire to flight control actuation competitors (Q5) of 24 February 2012.

83 Reply to Question 17.1 of the Commission's Questionnaire to flight control actuation customers (Q6) of 24 February 2012.

84 Replies to Question 7 of the Commission's Questionnaire to flight control actuation competitors (Q5) of 24 February 2012 and replies to Question 7 of the Commission's Questionnaire to flight control actuation customers (Q6) of 24 February 2012.

85 Reply to Question 17.1 of the Commission's Questionnaire to flight control actuation customers (Q6) of 24 February 2012.

86 Goodrich's revenues for military applications in 2010 were EUR […]* million for SFCA systems and EUR […]* million for RFCA systems, while it had […]* for THSA systems. In military applications, UTC had revenues of EUR […]* million in SFCA systems and […]* in RFCA and THSA systems. As regards a potential segment for civil applications only, the Notifying Party was not able to provide separate market share data. On the other hand, the data provided in the Counterpoint Study indicates that, in light of the Parties' combined modest presence in the military segments, the merged entity's market shares in civil applications for SFCA, THSA and RFCA systems might be higher than its market shares in the overall markets for SFCA, THSA and RFCA systems. While the market shares in SFCA and RFCA systems would still remain below [30-40]*%, the merged entity's market share in civil applications for THSA systems might reach approximately [40-50]*%. The Notifying Party submits that the markets for flight control actuation systems are bidding markets and therefore historical market shares are of limited value for purposes of competitive analysis. In any event, none of the Parties' customers for THSA systems expressed any related concerns. In light of this and also of the negligible or inexistent UTC revenues for SFCA, RFCA and THSA systems, the competitive assessment will focus on the overall markets for each of the relevant flight control actuation systems.

could be further segmented according to the aerospace application that they serve (such as large commercial aircraft, regional commercial aviation, helicopters, general aviation, etc.) was left open.

(98) The Notifying Party submits that none of the market segments for actuation systems should be further segmented according to the size of the aircraft. The vast majority of the respondents to the market investigation support this view.[87] Therefore, the Commission concludes that the markets for actuations systems should not be further segmented according to the size of the aircraft.

(99) As regards missile actuation systems, the market investigation suggested a further segmentation into fin-based missiles and thrust vector control missile actuators. In fin-based missiles, the actuation system controls the position of aerodynamic fins in response to steering commands from the flight computer, while the actuation system in thrust vector control missiles steers the missile by moving the missile engine's exhaust nozzle and thereby changing the direction of the thrust coming from the engine. Thrust vector control is used for ballistic missiles (missiles that fly outside the atmosphere) since aerodynamic control surfaces (movable fins) are ineffective for ballistic missiles that fly outside the atmosphere. The precise definition of this product market can be left open since it will not change the competitive assessment of the proposed concentration.[88]

5.6.2. Geographic market definition

(100) In previous decisions,[89] the Commission concluded that the scope of the flight control actuation markets for civil/commercial applications was worldwide. The Notifying Party and the respondents to the market investigation agree with this approach.

(101) As regards military applications, in *Goodrich/TRW Aeronautical Systems Group* the Commission left open the question whether the geographic market for missile actuation systems and for components used for military aircraft might be national or EEA-wide in scope. The Notifying Party submits that the geographic scope of all aerospace actuation system markets, including any potential segment for military applications, is global in scope since in practice both Parties supply aerospace actuation systems for military platforms on a worldwide basis. The precise definition of the geographic scope for missile actuation systems and military applications of other flight control actuation systems can be left open since it will not change the competitive assessment of the proposed concentration.

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87 Replies to Question 7 of the Commission's Questionnaire to flight control actuation competitors (Q5) of 24 February 2012 and replies to Question 7 of the Commission's Questionnaire to flight control actuation customers (Q6) of 24 February 2012.

88 UTC supplies missile actuation systems through Hamilton Sundstrand's Claverham business unit and UTC's United States-based Space Systems division. [Reference to the absence of relevant overlaps]*.

89 Commission Decision of 25 May 1999 in Case No IV/M.1493 – United Technologies/Sundstrand, OJ C 206, 21.7.1999, p. 19; Commission Decision of 28 November 2000 in Case No COMP/M.2183 – Smiths Industries/TI Group, OJ C 21, 24.1.2001, p. 8; Commission Decision of 23 August 2002 in Case No COMP/M.2892 – Goodrich/TRW Aeronautical Systems Group, OJ C 11, 17.1.2003, p. 10.

5.7. Mechanical sub-assemblies for THSA systems

5.7.1. Product market definition

(102) UTC is active in the supply of mechanical sub-assemblies for THSA systems through its subsidiary Ratier Figeac.

(103) The Commission has not yet analysed the market for mechanical sub-assemblies for THSA systems. However, in *United Technologies/Sundstrand*, the Commission considered a vertical relationship in relation to the supply of "ball screws for actuation systems" but did not discuss the respective market definition.

(104) Mechanical sub-assemblies for THSA systems include ball screws (a screw and nut assembly that has a rolling ball interface between the screw and nut to give efficient operation), as well as a trunnion assembly,[90] a no-back,[91] and all secondary load path devices. For the purposes of operating the THSA, the screw is rotated and the nut (which is prevented from rotating) translates rotational motion to linear motion.

(105) The Notifying Party considers that ball screws for THSA systems should be treated as forming part of the same market as mechanical sub-assemblies for THSA systems. The Notifying Party argues that, in terms of value and function, ball screws are the most significant part of a mechanical sub-assembly for THSA systems, accounting for around half of the value of a mechanical sub-assembly for THSA systems. In addition, the Notifying Party submits that suppliers of THSA systems typically purchase ball screws rather than mechanical sub-assemblies.

(106) In this respect, all competitors which responded to the market investigation consider that mechanical sub-assemblies and ball screws for THSA systems differ from those mechanical sub-assemblies and ball screws used in other flight control actuation systems.[92] Furthermore, UTC is only active in the supply of mechanical sub-assemblies for THSA systems and not in sub-assemblies for any other type of flight control actuation product. Therefore, for the purpose of this Decision, the competitive assessment is carried out with respect to mechanical sub-assemblies and ball screws specifically produced for THSA systems.

(107) With respect to whether the market for mechanical sub-assemblies for THSA systems should include the supply of stand-alone ball screws for THSA systems, the precise market definition can be left open since it will not affect the competitive assessment.

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90 According to the Notifying Party, the trunnion assembly is a structural bearing arrangement that connects the translating nut to the moveable tail plane surface.

91 According to the Notifying Party, the no-back is a load-dependent brake mechanism that prevents the actuator from being back driven by an external load.

92 Replies to Question 8 of the Commission's Questionnaires to THSA mechanical sub-assemblies competitors (Q7) of 24 February 2012.

5.7.2. Geographic market definition

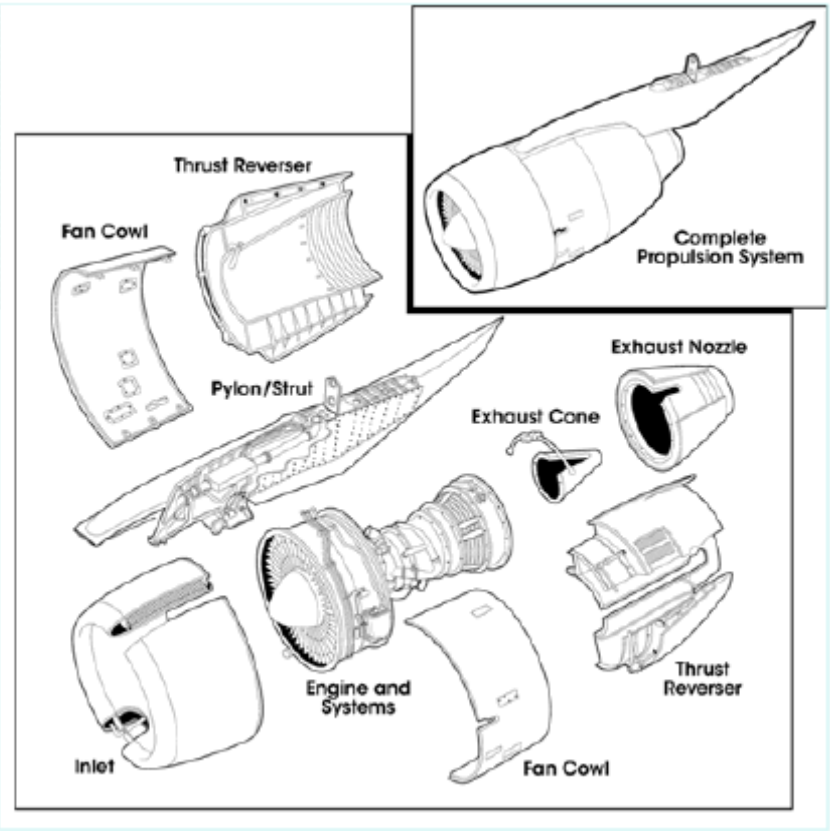
(108) The Notifying Party submits that the geographic scope of the market for mechanical sub-assemblies for THSA systems is global, including regarding a potential segment for military applications. The precise scope of the geographic market can be left open since it will not change the outcome of the competitive assessment of the proposed concentration.

5.8. Nacelles

5.8.1. Product market definition

(109) Nacelle systems are enclosures on the outside of an aircraft, often attached to the wing, used for housing engines. The nacelle system includes various components such as inlet cowl, fan cowls, thrust reverser, exhaust nozzle and plug, engine mounts, engine build-up, podding and paint (Figure 1).

Figure 1: The aircraft nacelle



Source: Notifying Party's response of 27 February 2012 to Commission questions of 24 February 2012, question 234

(110) In *Snecma/Hurel-Dubois*, the Commission has considered nacelle systems as a relevant market.[93] It noted that these systems are generally specific to a given platform and to a given engine, with competition taking place in the context of a tender for the nacelle system.

(111) The Notifying Party submits that an alternative delineation should not be made according to the size of the aerospace application (i.e. large commercial engine or regional jet for instance). Indeed, in the Notifying Party's view, the technology and expertise required to integrate nacelle components for large commercial aircraft do not differ meaningfully from those for regional aircraft.[94] However, Goodrich does not supply nacelle systems for other types of aircraft (e.g. corporate jets).

(112) In *Snecma/Hurel-Dubois*, the Commission considered whether it was necessary to make a distinction within the market for nacelle systems according to the application, i.e. between aircraft of more than 100 seats and aircraft of less than 100 seats.[95] The Commission concluded that no distinction was necessary, emphasizing that technologies are identical for either application.

(113) The market investigation has confirmed that the main competitors active on the manufacturing of nacelle systems for regional jets are able to design and produce nacelle systems for large commercial aircraft.[96] Moreover, a large majority of the respondents to the market investigation indicated that the production of nacelle system components for large commercial aircraft do not require substantially different technological capabilities from those that are needed for other applications.[97]

(114) However, for the purposes of this Decision, it can be left open whether nacelle systems for various types of aircraft constitute separate product markets as it does not affect the competitive assessment, even under the narrowest market definition.

(115) When a nacelle supplier is chosen for a given platform, that supplier will be contractually responsible for the supply of the nacelle system. The successful supplier then has a choice between manufacturing the constituent components itself and sub-contracting the manufacture of these components to third-parties.

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93 Commission Decision of 14 November 2000 in Case No COMP/M.2168 – Snecma/Hurel-Dubois, OJ C 78, 10.3.2004, p. 12, recital 7.

94 Notifying Party's Note of 8 March 2012 in response to the Commission's request for information of 6 March 2012, pp. 1-2.

95 Commission Decision of 14 November 2000 in Case No COMP/M.2168 – Snecma/Hurel-Dubois, OJ C 78, 10.3.2004, p. 12, recital 9.

96 Replies to Question 9 of the Commission's Questionnaire to nacelle systems competitors (Q20) of 1 March 2012.

97 Replies to Question 12 of the Commission's Questionnaire to nacelle systems competitors (Q20) of 1 March 2012; replies to Question 8 of the Commission's Questionnaire to aiframers on nacelle systems (Q21) of 1 March 2012 and replies to Question 8 of the Commission's Questionnaire to engine manufacturers on nacelle systems (Q22) of 1 March 2012.

(116) In *Snecma/Hurel-Dubois*, the Commission identified separate relevant markets for each of the main components used in nacelles systems, notably thrust reversers, nose cowls, nozzles, fan cowls and engine build-ups.[98] The Commission indeed emphasized that these components are subject to specific technological requirements and perform different functions within nacelle systems. As regards individual types of nacelle system components, the Commission has left open the question whether thrust reverser actuation systems and thrust reversers are two relevant product markets.

(117) Goodrich is active both in the production of nacelle system components and in the supply of nacelle systems. UTC is only active downstream of the market for nacelle systems in the markets for aircraft engines. In addition, there is no direct vertical link between the market for nacelle system components and the markets for engines.[99] The precise market delineation in relation to specific nacelle system components can therefore be left open for the purposes of this Decision.

5.8.2. Geographic market definition

(118) In a previous case,[100] the Commission found that the market for nacelle systems should be considered as worldwide in scope.

(119) Indeed, from a supply-side perspective, the market investigation has confirmed that (i) all of the competitors offer their products on a worldwide basis[101] and (ii) that there are no significant price differences for nacelle systems between various regions of the world.[102] From a demand-side perspective, the vast majority of the respondents have submitted that nacelle system components are purchased on a worldwide basis.[103]

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98 Commission Decision of 14 November 2000 in Case No COMP/M.2168 – Snecma/Hurel-Dubois, OJ C 78, 10.3.2004, p. 12, recital 8.

99 This had already been emphasized with regards to thrust reversers and thrust reverser actuators in the Commission Decision of 23 August 2002 in Case No COMP/M.2892 – Goodrich/TRW Aeronautical Systems Group, OJ C 11, 17.1.2003, p. 10, recital 14.

100 Commission Decision of 14 November 2000 in Case No COMP/M.2168 – Snecma/Hurel-Dubois, OJ C 78, 10.3.2004, p. 12, recital 11.

101 Replies to Questions 14 and 15 of the Commission's Questionnaire to nacelle systems competitors (Q20) of 1 March 2012.

102 Replies to Question 13 of the Commission's Questionnaire to nacelle systems competitors (Q20) of 1 March 2012; replies to Question 9 of the Commission's Questionnaire to aiframers on nacelle systems (Q21) of 1 March 2012 and replies to Question 9 of the Commission's Questionnaire to engine manufacturers on nacelle systems (Q22) of 1 March 2012.

103 Replies to Question 10 of the Commission's Questionnaire to aiframers on nacelle systems (Q21) of 1 March 2012 and replies to question 10 of the Commission's Questionnaire to engine manufacturers on nacelle systems (Q22) of 1 March 2012.

5.9. Ice detection systems

5.9.1. Product market definition

(120) Ice detection systems are aircraft sensors that provide the aircraft and pilot with information regarding the presence of icing conditions experienced by the aircraft.

(121) According to the Notifying Party, there are no market definition precedents for ice detection systems. The Notifying Party proposes to analyse ice detection systems as a single separate relevant product market since they serve a specific function and are not substitutable by other products. The Notifying Party further submits that it is not necessary to distinguish between ice detection systems supplied to different platforms (e.g. commercial aircraft, business jets, rotorcraft) as the functionalities and underlying technology of all ice detection systems (which is basic and mature technology) are essentially the same. Furthermore, all manufacturers are generally capable of producing ice detection systems for all aircraft types.

(122) The market investigation confirmed that ice detection systems constitute a distinct market. Regarding a possible further delineation, based on type of aircraft, the findings of the market investigation have not been conclusive.[104] However, for the purpose of this Decision, the exact product market definition of ice detection systems can be left open as the concentration would not impede effective competition according to any potential product market definition.

5.9.2. Geographic market definition

(123) The Notifying Party submits that as is the case for the other markets for civil aerospace applications (in line with Commission precedents[105]), the geographic market definition for ice detection systems is worldwide.

(124) The market investigation confirmed that the ice detection suppliers serve their clients regardless of their location, and so do customers when choosing their suppliers. The Commission therefore considers that the relevant geographic market for the supply of ice detection systems is worldwide in scope.

5.10. Pressure transducers

5.10.1. Product market definition

(125) Pressure transducers are sensors that measure the pressure of the fuel, oil and exhaust streams which flow through aircraft engines. The output of these measurements is

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104 Replies to Question 9 of the Commission's Questionnaire to ice detection competitors (Q15) of 27 February 2012.

105 Commission Decision of 23 August 2002 in Case No COMP/M.2892 – Goodrich/TRW, OJ C 11, 17.1.2003, p. 10, recital 7. Commission Decision of 24 October 1996 in Case No COMP/M.697 – Lockheed Martin/Loral Corporation, C 314, 24.10.1996, p. 9, recital 17. Commission Decision of 3 July 2001 in Case No COMP/M.2220 – General Electric/Honeywell, OJ L 48, 18.2.2004, p. 1, recital 36. Commission Decision of 17 April 2002 in Case No COMP/M.2738 – GEES/Unison, OJ C 134, 6.6.2002, p. 2, recital 12.

sent to the electronic engine control, which processes such information alongside other inputs to determine how much fuel should be fed into the engine. Pressure transducers are supplied to engine controls manufacturers.

(126) The Commission has previously concluded that each engine control component comprises a separate market.[106] In addition, the Commission recognized that sensors (including pressure, temperature, fire and vibration sensors, as well as ignition systems) constitute a distinct product market.[107] The Notifying Party submits that the market for pressure transducers, which constitute just one type of sensor, is the product market defined on the narrowest basis as no further distinction within pressure transducers can be made, either on the basis of the technology, the type of engine/aircraft or the pressure range covered.

(127) Some of the respondents to the investigation suggested that the market for pressure transducers could be further segmented by making a distinction between static air pressure transducers (a segment in which Goodrich is active) and fluids pressure transducers (i.e. devices used with fluids such as fuel, oil and hydraulic fluid). It was also suggested, however, that distinctions based on the physical principles underlying different technologies used in different pressure transducers (i.e. capacitive, resistive, strain-gauge transducers and engine mounted sensors) could apply. However, since there are no horizontal overlaps, the precise market definition can be left open.

5.10.2. Geographic market definition

(128) The Notifying Party submits that in line with what the Commission has established with reference to other markets for civil aerospace applications[108], the geographic market for pressure transducers is worldwide.

(129) In line with the feedback received in the course of the market investigation[109], the Commission considers that the relevant geographic market for the supply of pressure transducers is worldwide.

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106 Commission Decision of 23 August 2002 in Case No COMP/M.2892 – Goodrich/TRW, OJ C 11, 17.1.2003, p. 10, recital 7.

107 Commission Decision of 3 July 2001 in Case No COMP/M.2220 – General Electric/Honeywell, OJ L 48, 18.2.2004, p. 1, recital 332.

108 Commission Decision of 24 October 1996 in Case No COMP/M.697 – Lockheed Martin/Loral Corporation, OJ C 314, 24.10.1996, p. 9, recital 17, Commission Decision of 3 July 2001 in Case No COMP/M.2220 – General Electric/Honeywell, OJ L 48, 18.2.2004, p. 1, recital 36. Commission Decision of 17 April 2002 in Case No COMP/M.2738 – GEES/Unison, OJC 134, 6.6.2002, p. 2, recital 12.

109 Replies to Questions 10-13 of the Commission's Questionnaire to pressure transducers competitors (Q12) of 22 February 2012.

5.11. Lighting

5.11.1. Product market definition

(130) Aircraft lighting refers to all lights that can be found in and on an aircraft, ranging from large fog lights on an aircraft's exterior to small reading lights for individual passengers.

(131) The Notifying Party submits that aircraft lighting could be segmented in two main different markets: (i) exterior lighting consisting of lights increasing the visibility of the aircraft (whether it is on the ground or in flight) and lighting the area around it when on the ground; and (ii) interior lighting comprising lights illuminating the inside of the aircraft, back-light passenger signs and cockpit displays and controls.

(132) According to the Notifying Party, there are distinct markets for exterior and interior aircraft lighting, given the clear demand-side differences between the two. Indeed, for external lighting, brightness, durability and an ability to cope with extreme atmospheric conditions are key factors; whereas for interior lighting, the key issues tend to be life-span, energy efficiency and consistency of intensity and colour.

(133) From a supply-side point of view, not all competitors are active in both interior and exterior lighting: for instance, the Parties overlap only in the market for interior lighting. In addition, interior lighting started to migrate to LED lights much earlier than exterior lighting. Approximately 90% of newly installed interior lights are LED, while just 10% of exterior lights are LED.[110]

(134) The Commission has previously never considered the market for aircraft lighting. For the purpose of this Decision, it can be left open whether interior lighting and exterior lighting constitute separate product markets as it does not affect the competitive assessment, even under the narrowest market definition.

(135) Furthermore, the Notifying Party recognizes that the market for interior lighting could also be further segmented according to individual types of products including back-light passenger signs and cockpit displays and controls, given the limited potential demand-side substitution. Indeed, each component serves a specific purpose and it is not possible directly to substitute, for example, an emergency light with a main cabin light.

(136) However, the Notifying Party also submits that there is a high degree of similarity between the underlying components and technologies across interior lighting products, and therefore a high degree of supply-side substitutability. In addition, airframers are able to choose whether to separately contract with a lighting systems integrator (such as B/E Aerospace, C&D Zodiac, Diehl) or directly with lighting component manufacturers. Hence, in the Notifying Party's view, it would be appropriate to look at the market for interior lighting on an aggregated basis.

(137) For the same supply-side reasons, the Notifying Party considers that it is not necessary to further segment the market for interior lighting based on the type or size

[110] Form CO, Section 6-8 Lighting, p. 4.

of aircraft (e.g. between large commercial aircraft, regional aircraft and helicopters) or on the distinction between civil and military applications.

(138) However, it can be left open for the purpose of this Decision whether separate market segments should be distinguished within the interior lighting segment as it does not affect the competitive assessment.

(139) The Notifying Party also does not believe there is any basis to consider complete interior lighting solutions as a separate product market. In its view, although airframers may increasingly contract with integrators to meet their needs for entire aircraft, they are equally able to procure the composite components and sub-systems themselves.

(140) The market investigation has confirmed that lighting products are put for tender by airframers either separately or as part of a broader lighting or complete interior proposal.[111] Most competitors are either present in a given category of interior lighting products or indicate that they could potentially bid for the supply of such products, and could win the bid.[112] There is therefore confirmation of a certain degree of supply side substitutability.

(141) In any event, […]* and thus there is no horizontal overlap between the Parties in a potential market for internal lighting integrated solutions. […]*.[113]

(142) It can thus be left open for the purpose of this decision whether complete interior lighting solutions and interior lighting components and subsystems form separate product markets.

5.11.2. Geographic market definition

(143) The Notifying Party submits that as it is the case for the other market for civil aerospace applications, the geographic market for interior lighting is worldwide in scope. The Notifying Party emphasizes that (i) all major suppliers of aircraft lighting are present worldwide and sell to customers on a worldwide basis, (ii) aircraft manufacturers generally apply a worldwide purchasing policy in relation to virtually all their inputs, including aircraft lighting, and (iii) prices for aircraft lighting are quoted on a worldwide basis, and prices do not differ according to geographic regions.

(144) The market investigation has confirmed that such market is to be analysed on a worldwide basis. Indeed, the vast majority of the customers which replied to the market investigation submitted that they apply a worldwide purchasing policy.[114]

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111 Replies to Question 9 of the Commission's Questionnaire to aircraft interior lighting competitors (Q8) of 22 February 2012 and replies to Question 7 the Commission's Questionnaire to aircraft interior lighting customers (Q9) of 23 February 2012.

112 Replies to Question 4 of the Commission's Questionnaire to aircraft interior lighting competitors (Q8) of 22 February 2012.

113 Form CO, Section 6-8 Lighting, p. 5.

114 Replies to Question 8 the Commission's Questionnaire to aircraft interior lighting customers (Q9) of 23 February 2012.

Moreover, competitors indicate that there are no significant differences between various regions of the world in terms of price or technical requirements.[115]

5.12. Helicopters

5.12.1. Product market definition

(145) The Commission has investigated the market for helicopters previously[116] and considered it to be a market in itself, distinct from other aircraft.

(146) Within the helicopter market, the Commission has distinguished distinct product markets for military helicopters and civil helicopters on the basis of product characteristics, the structure of demand and the conditions of competition.

(147) The market investigation as well points to the fact that various segmentations of the helicopters markets could be defined, for instance based on the helicopter's application or on its weight.

(148) However, according to the market investigation, this distinction is of limited relevance in assessing the upstream component supply markets that are the object of this Decision. In fact, for the purposes of this Decision, it is not necessary to further delineate the relevant product market for helicopters, as in all alternative market definitions considered, effective competition will not be significantly impeded.

5.12.2. Geographic market definition

(149) As for other aerospace markets, the geographic scope of this market is worldwide.

5.13. Helicopter hoists

5.13.1. Product market definition

(150) Helicopter rescue hoists are cable management devices that are typically mounted on helicopters to aid in search and rescue, emergency medical services, and evacuation activities. Helicopter rescue hoist systems generally consist of a cable, an electric or hydraulic motor that powers the movement of the cable, a brake, and a hook (or other tool).

(151) The most frequent end-users of rescue hoists tend to be the military, police, or other rescue and security forces. To a lesser extent, customers outside of the rescue or medical industries, such as oil or gas companies, also make use of helicopter rescue hoist systems.

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115 Replies to Questions 10 and 11 of the Commission's Questionnaire to aircraft interior lighting competitors (Q8) of 22 February 2012.

116 Commission Decision of 25 February 1991 in Case No COMP/M.017 - Aérospatiale/MBB, OJ C 59, 8.3.1991, p. 13. Commission Decision of 11 May 2000 in Case No COMP/M.1745 - EADS, OJ C 307, 26.10.2000, p. 4.

(152) Rescue hoists are not deployed on all helicopter platforms and helicopter OEMs generally offer rescue hoist as an option. The system is acquired and installed by the helicopter OEM, with the cost of the system being included as part of the purchase price paid to the OEM by the end-customer. In such circumstances, the cost of the rescue hoist typically accounts for only a very small proportion (<1%) of the total price of the helicopter.[117]

(153) Rescue hoists can also be installed by end-customers or third party installers after purchase (so-called "retrofitting"), without the involvement of the helicopter OEM. In some cases, the end-customer will acquire the helicopter rescue hoist system directly from the hoist OEM (or third-party seller of rescue hoist systems) and install it themselves. This is notably the case with companies that are active in upgrading and repairing helicopters. In other cases, the end-customer will engage the services of a third-party installer, which will acquire and install the hoist on behalf of the end-customer.

(154) The technology used in the hoist system may vary. In particular, rescue hoist systems can be electrically, hydraulically, or (less frequently) pneumatically powered. Hydraulic systems are typically used on certain helicopters that have large amounts of avionics and therefore have less electric energy available to power a rescue hoist system.

(155) The Notifying Party claims that helicopter rescue hoist systems are nearly identical in their functioning across models, suppliers and applications, although they vary in their load capacities[118] and technology and may also be installed by pairs (so-called "double hoists").

(156) The Notifying Party submits that the market for helicopter rescue hoists does not need to be further segmented according to the technology used. They emphasize that all suppliers are able to supply electric and hydraulic hoists. Moreover, according to the Notifying Party, the prices for hydraulic and electric hoists with comparable specifications are almost identical.[119] Pneumatic hoists represent only a very small fraction of the helicopter hoists sold. For instance, of the approximately […]* hoists sold by Goodrich, […]* were electric, […]* were hydraulic, and […]* were pneumatic rescue hoists.

(157) The Commission has not considered helicopter rescue hoist systems in any previous decision.

(158) The market investigation has not been conclusive on this point as respondents differ in their views as regard the substitutability of electric, hydraulic and pneumatic

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117 The Notifying Party indicates that the price of a helicopter rescue hoist typically varies from around USD […]* to USD […]* while the typical price of a Sikorsky base aircraft generally can vary between USD […]* million and USD […]* million. Source: Form CO, Sections 6-8 Helicopter Rescue Hoists, p. 5.

118 Rescue hoists have different maximum lift load capacities (i.e., 300, 500, and 600 lbs.).

119 Form CO, Sections 6-8 Helicopter Rescue Hoists, p. 7-8.

rescue hoists in terms of prices, performance and applications.[120] One customer explained that pneumatic rescue hoists are almost obsolete. In this customer's view, while in terms of prices, hydraulic and electric rescue hoist prices are similar, in terms of performance and applications, the latest designs of electric rescue hoists outperform hydraulic hoists and could not be replaced by them. It also notes that switching from electric to hydraulic is very difficult, because electrical hoists have a specific wiring.

(159) The Notifying Party further considers that it is not necessary to distinguish between hoists sold to OEMs and hoists sold for "retrofitting". The Notifying Party emphasizes that the hoists sold for installation by helicopter OEMs and those sold for retrofitting are functionally identical, supplied by the same hoist manufacturers, and used in the same applications. In addition, the end-user is the same and end-customers are largely able to switch between having a rescue hoist installed by an OEM or having the hoist installed post-purchase. Hoists can be retrofitted as long as the necessary components (including a sliding door) have been initially installed on the helicopter. Moreover, according to the Notifying Party, the price paid by the end-customer is similar in both cases (installation by the helicopter OEM and retrofitting).[121]

(160) The market investigation confirmed that it is possible to retrofit a rescue hoists on already equipped helicopters (replacement) and on helicopters that had not been originally equipped with rescue hoists.[122]

(161) The Notifying Party also indicates that there is no basis to define a separate market for "double hoists". "Double hoists" are not a different product, they are simply two rescue hoists installed on the same helicopter. Double hoists use the same rescue hoist, operator panel, and pendant, with an additional hoist mounted outboard. The purpose of double hoists is to assure constant mission capability even in the event of failure of one hoist. In practice, according to the Notifying Party, double hoists are rarely installed. However, any rescue hoist manufacturer that is able to supply a single hoist is also able to supply a double-hoist installation. A double hoist is used by the same end-customers and in the same applications as single hoists.

(162) As regards the distinction between rescue hoists for civil helicopters and rescue hoists for military helicopters, the Notifying Party submits that (i) some common helicopter mission profiles – e.g., search and rescue – are neither uniquely civil nor military; and (ii) there are few supply or demand side differences as regards the supply of the products to different types of helicopter.

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120 Replies to Question 9 of the Commission's Questionnaire to rescue hoists third party and independent installers (Q13) of 28 February 2012 and replies to Question 15 of the Commission's Questionnaire to helicopter OEMs in relation to rescue hoists, ice detection systems and air data probes (Q17) of 24 February 2012.

121 Form CO, Sections 6-8 Helicopter Rescue Hoists, p. 8.

122 Replies to Question 15 of the Commission's Questionnaire to rescue hoists third party and independent installers (Q13) of 28 February 2012 and replies to Question 30 of the Commission's Questionnaire to helicopter OEMs in relation to rescue hoists, ice detection systems and air data probes (Q17) of 24 February 2012.

(163) The market investigation confirmed that it is not necessary to distinguish between rescue hoists for civil and military applications.[123]

(164) However, for the purposes of this Decision it is not necessary to conclude on the precise product market definition, since it does not affect the competitive assessment.

5.13.2. Geographic market definition

(165) The Notifying Party considers that the relevant market for helicopter rescue hoist systems is worldwide in scope. It emphasises that (i) all major suppliers of helicopter rescue hoist systems are present worldwide and sell to customers on a worldwide basis; (ii) rotorcraft manufacturers generally apply a worldwide purchasing policy in relation to virtually all their inputs, including helicopter rescue hoist systems; and (iii) prices for helicopter rescue hoist systems products are quoted on a worldwide basis, and prices do not differ according to geographic region.

(166) Indeed, the respondents to the market investigation have submitted that helicopter rescue hoists components are purchased on a worldwide basis and regardless of the location of the supplier.[124] For the purpose of this Decision, the market for helicopter rescue hoists is therefore considered to be worldwide in scope.

5.14. Air data probes

5.14.1. Product market definition

(167) Air data probes are aircraft sensor systems that are mounted on the exterior body of an aircraft to sense the external pressures experienced by the aircraft. These parameters, collected by multiple air data probes, are used by the aircraft along with other sensors to calculate its altitude and airspeed, two critical measurements for safe aircraft operation. The typical location of air data probes is on the nose of the helicopter and/or forward fuselage or the underwing of the aircraft. Air data probes are directly supplied to aircraft OEMs.

(168) The Notifying Party is not aware of any previous Commission decision relating to air data probes. The Notifying Party proposes to analyse aircraft air data probes as a single separate relevant product market since they serve a specific function and are not substitutable by other products. The Notifying Party also considers that it is not necessary to distinguish between air data probes supplied to different platforms (*e.g.*, commercial aircraft, business jet, rotorcraft) as the functionalities (*i.e.*, measurements performed) and underlying technology of all air data probes (which is basic and mature technology) are essentially the same. Finally, the Notifying Party believes all

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123 Replies to Question 8 of the Commission's Questionnaire to rescue hoists third party and independent installers (Q13) of 28 February 2012 and replies to Question 14 of the Commission's Questionnaire to helicopter OEMs in relation to rescue hoists, ice detection systems and air data probes (Q17) of 24 February 2012.

124 Replies to Questions 10 and 11 of the Commission's Questionnaire to rescue hoists third party and independent installers (Q13) of 28 February 2012 and replies to Questions 22 and 23 of the Commission's Questionnaire to helicopter OEMs in relation to rescue hoists, ice detection systems and air data probes (Q17) of 24 February 2012.

manufacturers are capable of producing air data probes for all aircraft types (high supply-side substitutability).[125]

(169) The market investigation confirmed that aircraft air data probes can be considered as a single separate relevant product market.[126] As regards further segmentation of the market, the investigation indicates that the underlying technology and the manufacturing process are essentially the same for any type of air data probe, regardless of the type of aircraft where the probe is deployed.[127] The majority of customers do not consider air data probes as a highly differentiated market.[128] The Commission therefore considers the market of air data probes as the relevant distinct product market.

5.14.2. Geographic market definition

(170) As regards the geographic scope of the market, the Notifying Party considers that the market for air data probes would be worldwide, in particular because (i) all major suppliers of air data probes are present worldwide and sell to customers on a worldwide basis; (ii) aircraft/rotorcraft manufacturers generally apply a worldwide purchasing policy in relation to virtually all their inputs, including air data probes; and (iii) prices for air data probes products are quoted on a worldwide basis, and prices do not differ according to geographic region.

(171) The market investigation confirmed that air data probes suppliers serve their clients regardless of their location, and so do customers when choosing their suppliers.[129] It is therefore considered that the relevant geographic market for the supply of air data probes is worldwide in scope.

5.15. Spare parts and MRO services

5.15.1. Product market definition

(172) The Parties are vertically integrated in the aftermarkets since they provide global aftermarket support for their own aircraft systems and components to aircraft operators, mostly airlines. In addition, the Parties provide spare parts and services to non-vertically integrated aftermarket service providers with whom they compete. UTC and Goodrich do not provide aftermarket services for products of competing OEMs.

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125 Form CO, Section 6-8 Air Data Probes, p. 5.

126 Replies to Question 5 of the Commission's Questionnaire to aircraft air data probes competitors (Q16) of 24 February 2012.

127 Replies to Questions 6 and 7 of the Commission's Questionnaire to aircraft air data probes competitors (Q16) of 24 February 2012.

128 Replies to Question 18 of the Commission's Questionnaire to helicopter OEMs in relation to rescue hoists, ice detection systems and air data probes (Q17) of 24 February 2012.

129 Replies to Questions 12 and 13 of the Commission's Questionnaire to aircraft air data probes competitors (Q16) of 24 February 2012 and replies to Questions 26 and 27 of the Commission's Questionnaire to helicopter OEMs in relation to rescue hoists, ice detection systems and air data probes (Q17) of 24 February 2012.

(173) OEMs such as UTC and Goodrich are thus active in the aftermarkets on various levels: (i) as direct aftermarket service / spare parts suppliers to aircraft operators, (ii) as suppliers of repair services to integrators and (iii) as suppliers of spare parts to integrators.

Markets for MRO services

(174) According to previous Commission decisions, a first segmentation of the market for MRO services can be made according to what part of the aircraft is to be serviced (or what part is to be replaced) and the level of service required. To that effect, the Commission found that the MRO sector can be categorised into (i) line maintenance; (ii) heavy maintenance; (iii) engine maintenance and (iv) component maintenance.[130] The Commission concluded that a further differentiation should be made according to the aircraft type that is serviced.[131] It moreover noted that line maintenance and heavy maintenance services can be further subdivided according to nature and frequency of the checks involved (i.e., so-called A, B, C, and D-checks).

(175) Only the Parties' activities for component maintenance are of relevance to this case since this is the only MRO market where the Parties overlap.

(176) On the market for component maintenance, OEMs are competing for the servicing of their own services/components with 'integrators', i.e. MRO providers offering aftermarket services for components from multiple OEMs.[132] Such integrators may be airline-owned MRO service providers, independent MRO service providers and increasingly also airframe manufacturers. Integrators aim to offer a comprehensive service ("Nose to tail services" ('NTT')) that covers as much of the components as possible and provides aircraft operators with a one-stop shop for most of the maintenance and repair work.

(177) The market investigation indicates that, in particular as regards the EEA, the market is partly evolving to total care packages, whereby the larger MRO providers (including OEMs) aim to offer integrated MRO services.[133] In particular, Flight Hour Agreements set an inclusive price for the provision of spare parts and MRO services at a set rate per flight hour. In some cases, the airframer will contract with the airline

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130 Commission Decision of 11 August 1999 in Case No COMP/JV.19 – KLM/Alitalia, OJ C 96, 5.4.2000, p. 4, recital 56; and Commission Decision of 11 February 2004 in Case No COMP/M.3280 – Air France/KLM, OJ C 60, 9.3.2004, p. 6, recital 39.

131 For instance, in Case No COMP/JV.19 – KLM/Alitalia, the Commission considered that the MRO markets for civil air transport could be further differentiated on the basis of the aircraft manufacturer (Airbus or Boeing) and of the aircraft platform type (e.g., Airbus A340 or Boeing 737) for which the MRO services are provided.

132 Replies to Question 12 of the Commission's Questionnaire to MRO service providers (Q30) of 5 April 2012; replies to Question 12 of the Commission's Questionnaire to MRO service providers (Q30-bis) of 24 April 2012 and replies to Question 11 of the Commission's Questionnaire to MRO service customers (Q32) of 5 April 2012.

133 Notifying Party's Response to Commission questions of 14 March 2012, Annex 248 ('Customer Support Integration, January 19, 2012'), slides 5-8; ICF SH&E, 'Seven Paradigm Shifts Reshaping Air Transport MRO', slide 11. […]* .

operator and then sub-contract this to the component OEM; in other cases the OEM will contract directly with the airline operator.

(178) When airlines have the capability (including in-house procurement and technical resources) to tender MRO services for certain systems and components separately, OEMs compete with NTT MRO service providers to the extent that they seek to convince customers to "carve out" MRO services for their own components rather than pursuing a complete NTT solution from a single provider. Hamilton Sundstrand and Goodrich (like, to their knowledge, other component OEMs) recognise that they often seek to win such "carve-out" deals.[134]

(179) The Notifying Party submits that, in other cases, aircraft owners/operators are looking for a single service provider to supply all maintenance services for their aircraft. Because the Parties' aftermarket activity is in support of their own components, when customers are seeking a single NTT provider or full component solution, the Parties are not competitors in this space in the Notifying Party's view.

(180) The market investigation has confirmed that airlines and aircraft operators may use the aftermarket services of either the OEM or independent aftermarket service providers, which may include independents, airline-owned MRO providers and airframe manufacturers.[135] Buying behaviours depend to a large extent on customer preferences (Figure 2), pointing to a differentiated product market. In particular, the breadth of the MRO services being purchased together (in terms of coverage of aircraft components and systems) may vary from a single component to total aircraft support.

Figure 2: Buying behaviours in the market for component MRO services

[…]*

Source: Notifying Party's Response to Commission questions of 14 March 2012, Annex 248 ('Customer Support Integration, January 19, 2012'), slide 4

(181) However, for the purposes of this decision it is not necessary to conclude on the precise delineation of the market for component MRO services, since it does not affect the competitive assessment.

Markets for spare parts and inputs related to the provision of MRO services

(182) As regards spare parts, markets can be defined that are separate from the upstream first install aircraft systems and component markets. Although aircraft customers take into account the total cost of ownership of the aircraft, these markets present

134 Notifying Party's response to Commission questions of 19 April 2012 – Spare parts and MRO services, paragraph 17.2.

135 Replies to Question 12 of the Commission's Questionnaire to MRO service providers (Q30) of 5 April 2012; replies to Question 12 of the Commission's Questionnaire to MRO service providers (Q30-bis) of 24 April 2012 and replies to question 11 of the Commission's Questionnaire to MRO service customers (Q32) of 5 April 2012.

important differences. In particular, customers may be different: while the customers of original components are aircraft manufacturers, the customers of spare parts (and inputs related to the supply of MRO services) are to a large extent airlines or independent MRO service providers.

(183) OEMs supply spare parts to independent MRO service providers and intermediaries for the aircraft systems or subsystems for which they provide components. These spare parts are available for purchase either on standard price book terms or on preferential terms in the context of mid-to long-term supply agreements.

(184) For spare parts, OEMs face external competition only to a certain extent. For mature platforms, surplus parts can constitute alternatives. Surplus parts correspond to the surplus inventory from older aircraft. Components from retired aircraft are indeed used as spares and/or are purchased by MROs and disassembled in order to use as piece parts for repairs.

(185) PMA part (Parts Manufacturers Approval) suppliers also act, to a limited extent, as an alternative for OEM replacement parts, in particular for components that are less mission and safety critical. However, a large majority of MRO providers indicated that they do not purchase PMA parts for servicing Goodrich components and systems.[136]

(186) Third-party manufactured PMA parts must be approved for use by the United States Federal Aviation Administration ("FAA"), and other aviation agencies worldwide, and not by the relevant OEM. Accordingly, suppliers of PMA parts for UTC and Goodrich components do not need to be approved by the parties. The Notifying Party indicated that prior to 2007, the European Aviation Safety Agency ("EASA") did not accept the use of PMA parts, and would require their removal if found to be installed on European-registered aircraft. This restriction was, however, removed in 2007 (pursuant to Executive Director Decision 2007/003/C), and PMA parts approved under the applicable Federal Aviation Authority ("FAA") approvals process are now accepted for use provided that they are not considered to be "critical components".

(187) Besides spare parts, other inputs may be provided by OEMs to independent MRO service providers, notably Component Maintenance Manuals ("CMMs"), licences, tooling and test equipment. The market investigation indicated that such inputs are essential for MRO providers[137].

(188) CMMs list the criteria to be used in assessing whether that component is airworthy. They generally provide that the component may be replaced "with an airworthy used or new OEM or PMA part" or may be repaired by a CMM-defined repair process. In most cases, airline MROs are entitled to repair their own hardware under their own

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136 Replies to Question 3 of the Commission's Questionnaire to MRO service providers (Q30) of 5 April 2012 and replies to Question 3 of the Commission's Questionnaire to MRO service providers (Q30-bis) of 24 April 2012.

137 Replies to Question 31 of the Commission's Questionnaire to MRO service providers (Q30) of 5 April 2012 and replies to Question 31 of the Commission's Questionnaire to MRO service providers (Q30-bis) of 24 April 2012.

operating certificate, and independent MROs are entitled to repair hardware under a repair station certificate.

(189) Repairs that are critical to airworthiness and flight safety are restricted to the OEM or a licensed MRO provider.

(190) Moreover, CMMs identify all tooling and test equipment required for the performance of test, repair and overhaul of the relevant equipment. Independent MRO providers may contact OEMs for a quotation for source tooling and test equipment. Alternatively, independent MROs may acquire tooling and test equipment from independent manufacturers, or manufacture the equipment themselves.

(191) For the purposes of this decision it is however not necessary to conclude on the precise delineation of the markets for spare parts and inputs related to the provision of MRO services, since it does not affect the competitive assessment.

Distinction between commercial aviation and business aviation aftermarkets

(192) In addition, the investigation has confirmed the party's submission that a distinction needs to be drawn between commercial aviation on the one hand and business aviation on the other hand.[138]

(193) In commercial aviation (namely, both LCA and regional aircraft), the OEM will provide spare parts for the aircraft components and systems it produces to the MRO service provider that wants to purchase them, in the form of line replaceable units[139] ("LRUs" which enable continuous operation of the aircraft at minimal downtime) and piece parts for individual repairs (i.e., on-the-ground repair of individual units) for its components and systems. If the MRO service provider is not the aircraft owner or operator, the latter may nominate a delegate to procure the parts. In this situation, any independent MRO service provider may procure parts from the OEM as long as it is nominated by an aircraft owner or operator.

(194) In business aviation, the spare parts are supplied directly to the aircraft OEM, who generally provides the aftermarket services.

(195) For the purposes of this Decision, the precise market definition may however be left open as it does not affect the result of the competitive assessment.

5.15.2. Geographic market definition

(196) With regard to the geographic scope of the market, the Commission had concluded in previous decisions that the aftermarkets (notably components maintenance) were worldwide in scope[140] or at least regional as regards line maintenance and heavy

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138 Replies to Question 5 of the Commission's Questionnaire to MRO competitors (Q18) of 23 February 2012.

139 LRUs are replacement units that enable continuous operation of the aircraft.

140 Commission Decision of 11 August 1999 in Case No COMP/JV.19 – KLM/Alitalia, OJ C 96, 5.4.2000, p. 4, recital 57.

maintenance.[141] In more recent decisions, the Commission indicated that the markets for heavy maintenance and engine maintenance were at least EEA-wide in scope, while line maintenance was a local market.[142]

(197) In relation to component maintenance, the Notifying Party indicates that in most cases, faulty products can be transported globally to the relevant MRO facility, so there is generally no need for local geographic coverage for each component. The Notifying Party further submits that the Parties have designed their MRO networks to provide buyers of their components with reliable and effective support on a global basis.

(198) The market investigation confirmed that for component MRO services the location of the facility is of secondary importance and that such services do not need to be performed at airports[143]. Most component MRO service providers are active globally[144] and consider that the markets for component MRO services are worldwide in scope.[145] This conclusion does not differ depending on the type of aircraft or component, with the exception of wheels and brake services, which some respondents described as being a local market due to the nature of the product and transport costs.[146] Customers of component MRO services confirmed this view.[147]

(199) With regard to spare parts, OEMs are the main source and are active worldwide. PMA part suppliers indicated that they are selling PMA parts to customers worldwide irrespective of their location and that the price of PMA parts does not vary substantially depending on whether they are sold in the European Economic Area or in other regions of the world.[148]

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141 Commission Decision of 11 February 2004 in Case No COMP/M.3280 – Air France/KLM, OJ C 60, 9.3.2004, p. 6, recital 40.

142 Commission Decision of 14 April 2004 in Case No COMP/M.3374 – SR Technics/FLS Aerospace, OJ C 180, 13.7.2004, p. 7, recital 12; Commission Decision 16 February 2009 in Case No COMP/M.5399 – Mubadala/Rolls-Royce/JV, OJ C 58, 12.3.2009, p. 2, recital 23.

143 Replies to Question 8 of the Commission's Questionnaire to MRO competitors (Q18) of 23 February 2012 and replies to Question 18 of the Commission's Questionnaire to MRO services customers (Q32) of 5 April 2012.

144 Replies to Question 22 of the Commission's Questionnaire to MRO service providers (Q30) of 5 April 2012.

145 Replies to Question 11 of the Commission's Questionnaire to MRO competitors (Q18) of 23 February 2012; replies to questions 23-24 of the Commission's Questionnaire to MRO service providers (Q30) of 5 April 2012 and replies to questions 23-24 of the Commission's Questionnaire to MRO service providers (Q30-bis) of 24 April 2012.

146 Replies to Questions 23-24 of the Commission's Questionnaire to MRO service providers (Q30) of 5 April 2012 and replies to Questions 23-24 of the Commission's Questionnaire to MRO service providers (Q30-bis) of 24 April 2012.

147 Replies to Question 20 of the Commission's Questionnaire to MRO services customers (Q32) of 5 April 2012.

148 Replies to Questions 8 and 9 of the Commission's Questionnaire to PMA parts providers (Q31) of 16 April 2012.

(200) In any case, for the purposes of this Decision, the markets for component maintenance and spare parts do not need to be precisely defined from a geographical point of view, as it does not affect the result of the competitive assessment.

6. COMPETITIVE ASSESSMENT

6.1. Horizontal effects: Electrical systems

6.1.1. Introduction

(201) The proposed transaction leads to a single horizontally affected market within electrical systems: AC power generation. UTC is currently the leader in aircraft AC power generation through its subsidiary Hamilton Sundstrand.

(202) Within other areas of electrical systems, the activities of the Parties are mostly complementary. As regards DC generation, Goodrich is active in low-voltage DC generation while UTC is active in high-voltage DC generation. As regards distribution systems, only UTC is active in high-voltage DC primary distribution and AC secondary distribution whereas only Goodrich is active in low-voltage DC primary and secondary distribution. None of the Parties is active in high-voltage DC secondary distribution. The only area where both Parties are active besides AC generation is AC primary distribution. However, Goodrich today [reference to Goodrich's revenues in AC primary distribution]*.

(203) The market investigation has revealed three main trends impacting the current development of aircraft electrical systems: (i) the shift from electrical systems designed around constant frequency to systems designed on variable frequency; (ii) the industry trend towards a more electric aircraft; and (iii) the increasing demand for system integration capacities.

6.1.1.1. Shift to variable frequency AC electrical systems

(204) The effect of the proposed transaction has to be assessed in the context of the current shift in the aircraft industry from electrical systems designed around constant frequency AC to systems designed around variable frequency AC.

(205) The technology shift requires a general adaptation of the different devices (so-called loads) using power on the aircraft, since these devices need to be able to cope with variable frequency.

(206) However, new variants of existing platforms may still rely on constant frequency AC generation. This allows airframers to minimise the risk of installing a new technology on a platform which is essentially a refreshment of an existing platform still in operation. An example is the Airbus A320 NEO which will be based on a constant frequency AC generator similar to the successful A320 platform it replaces.

(207) This trend towards power generation systems based on variable frequency AC has been largely confirmed by the market investigation[149]. In fact, new aircraft platforms are increasingly likely to be based on variable frequency AC generation.

6.1.1.2. More electric aircraft

(208) The electrical systems driving an aircraft are subject to a high degree of technological evolution. A particularly significant on-going development is the move towards a “more-electric aircraft” which forms part of a wider trend to develop ever lighter and more fuel efficient aircraft.

(209) While the power for the systems and devices deployed on aircraft is presently drawn from a balance of pneumatic, hydraulic, and electrical sources, the "more electric aircraft" envisage increased use of electric energy for these purposes.[150] In particular, in relation to actuation systems there is likely to be a transition from hydraulic-powered systems to "dual-powered" electric power actuation systems. This shift in architecture drives the need for increased capacity and size of generators, and more sophisticated power distribution systems. The development of the "more electric aircraft" is likely to lead to an increase in the use of electric power in various systems of the aircraft.

(210) As highlighted in a consultancy report[151] "*The advances achieved in the areas of power electronics are providing the technology to improve efficiency and safety of aircraft systems operation. The more electric aircraft ultimate goal is to distribute only electrical power across the airframe. The replacement of existing systems with electric equivalents has, and will continue to significantly increase the electrical power requirement"*. As regards the advantages of the use of more electric architecture the reports signals that it "*offers significant cost benefits with lower recurring costs due to fewer parts, integration of key sub-systems, and multi-use of components.* […] *It also reduces the overall cost of operation and ownership because the architecture helps reduce fuel consumption, increasing overall aircraft performance and energy usage. Reduced maintenance and ground support also help lower the cost of ownership and operation.* […] *It helps reduce the dependability on engine bleed air to drive cabin systems, thereby increasing the efficiency of engine operations*".

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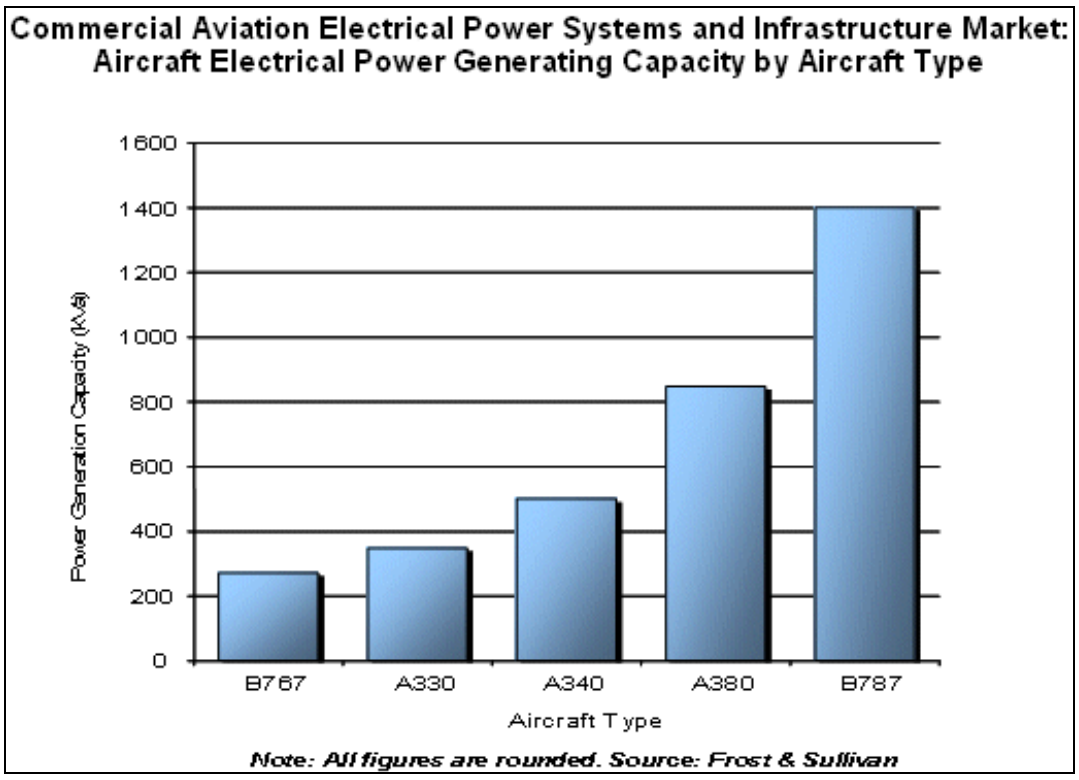
149 Reply to Question 85 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012 and reply to Question 39 of the Commission's Questionnaire to electrical systems customers (Q2) of 24 February 2012.

150 Mechanical power is obtained from the engine by a driven shaft and distributed to a gearbox to drive lubrication pumps, fuel pumps, hydraulic pumps, and electrical generators. Pneumatic power is extracted by extracting bleed air from the high-pressure compressor and is used to drive turbine motors for the engine start systems, wing anti-icing, and environmental control systems. Electrical power and hydraulic power are distributed throughout the aircraft for driving subsystems such as flight control actuators, landing gear brakes, utility actuators, avionics, lighting, and galleys (and weapons systems in case of military aircraft).

151 Aircraft Electrical Power Systems – Charged with Opportunities, Frost & Sullivan, 24 Nov 2008 […]*.

(211) The same report notes the good prospects that lie ahead for the electrical power systems market. [152] According to the report the global market revenue in commercial aviation electrical power systems is estimated to grow at a compound annual growth rate of 13.6% per year between 2007 and 2017 to reach USD 24.2 billion by 2017. The Airbus 350, the Boeing 787, and the Airbus 380 are the first examples of platforms adopting the more electric technology. Moreover, the report foresees that given the long life cycle, long development time, and high R&D costs, the market is unlikely to witness new entrants, whilst offering an extremely profitable business to existing market participants. As shown in Figure 3, most of the improvements concerning the increase in demand of electrical power in the aircraft have happened in the last decade with a fourfold increase in terms of the electrical power capacity requirements of a Boeing 767 compared to that of a Boeing 787[153].

Figure 3: Latest trends regarding aircraft electrical systems



(212) The electrical power requirements grow proportionally to the size of the aircraft platform considered as shown in Figure 4[154]. The figure also shows the increase in electrical power requirements in the new aircraft platforms due to their growing use of electronic instruments.

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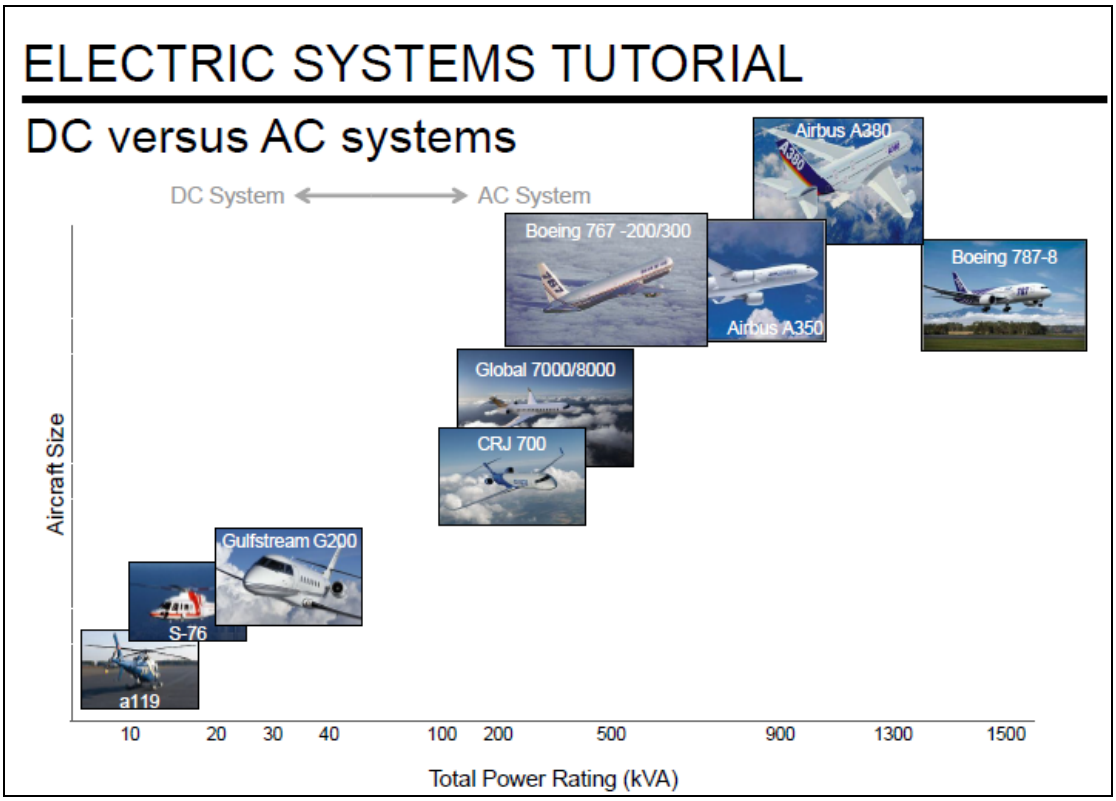
152 Aircraft Electrical Power Systems – Charged with Opportunities, Frost & Sullivan, 24 Nov 2008 […]*.

153 Aircraft Electrical Power Systems – Charged with Opportunities, Frost & Sullivan, 24 Nov 2008. […]*.

154 Electric systems tutorial, 10 February 2012, p. 5.

Figure 4: Power ratings by size of aircraft



(213) The market investigation has revealed that the strength of the company that controls the power generator in the aircraft is enhanced by the industry move towards a "more-electric aircraft".[155]

6.1.1.3. Aircraft systems integration capacity

(214) There is an industry trend towards offering integrated complex electrical systems solutions to customers, in particular for the large commercial aircraft[156]. Complete electrical systems allow airframers to achieve higher performance at lower costs in the aircraft. In this context, a consultancy report indicates that "*with the adoption of system integration mode of manufacturing, gaining preferred supplier status among air framers is vital for OEMs to thrive in the power systems market. It is a fact that if an OEM attains the preferred supplier status it is unlikely that the aircraft manufacturers will choose an alternative owing to the complex nature of power systems*".[157]

(215) In this respect, the market investigation confirmed that customers consider it advantageous for them to purchase different components together from the same

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155 Reply to Question 84 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012 and reply to Question 38 of the Commission's Questionnaire to electrical systems customers (Q2) of 24 February 2012.

156 […]*.

157 Aircraft Electrical Power Systems – Charged with Opportunities, Frost & Sullivan, 24 Nov 2008.

supplier. The vast majority of customers perceive that it is advantageous for the supplier to have the capacity to perform electrical system integration.[158] It further revealed that increased integration of power generation and other systems as currently performed in the Boeing 787 can generate savings at the aircraft level by improving the performance of the power availability and reducing the cost of ownership.[159]

6.1.2. Market structure

(216) Worldwide sales in AC power generation according to the Parties' estimates amounted to EUR […]* million in 2010. The proposed transaction would result in very high market shares for the merging Parties in AC power generation. As shown in Table 1, when one considers AC generation as a whole (the Parties' combined market share in 2010 was [80-90]*%. The combined market share of the Parties has remained relatively stable over the period 2008-2010. UTC is by far the largest supplier in AC generation with a market share that is roughly […]* times that of Goodrich, the second largest competitor in AC generation.

Table 1: Worldwide market shares by value in aircraft AC generation (2008 – 2010)

Company	**2008**	**2009**	**2010**
UTC	[70-80]*%	[70-80]*%	[70-80]*%
Goodrich	[5-10]*%	[10-20]*%	[10-20]*%
Aerolec	[0-5]*%	[0-5]*%	[0-5]*%
Combined	**[80-90]*%**	**[80-90]*%**	**[80-90]*%**
Combined + Aerolec	**[80-90]*%**	**[80-90]*%**	**[80-90]*%**
GE	[0-5]*%	[0-5]*%	[0-5]*%
Honeywell	[5-10]*%	[5-10]*%	[5-10]*%
Thales	[0-5]*%	[0-5]*%	[0-5]*%
Others	[0-5]*%	[0-5]*%	[0-5]*%
Market size (1 000 EUR)	**[…]***	**[…]***	**[…]***

Source: UTC's estimates and Parties' revenues, Form CO , p. 74

(217) If AC generation were to be further split into military and commercial applications, the proposed transaction would also result in very high combined market shares. As shown in Table 2, the combined entity will have very high combined market shares of respectively [90-100]*% and [60-70]*% in civil and military applications.

158 Reply to Question 108 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012 and reply to Question 57 of the Commission's Questionnaire to electrical systems customers (Q2) of 24 February 2012.

159 Reply to Question 20 of the Commission's Questionnaire to power generators competitors (Q23) of 4 April 2012.

Table 2: Worldwide market shares by value in aircraft AC generation by type of application		
Company	**Civil**	**Military**
UTC	[80-90]*%	[50-60]*%
Goodrich	[10-20]*%	[10-20]*%
Aerolec	[0-5]*%	[0-5]*%
Combined	**[90-100]*%**	**[60-70]*%**
Combined + Aerolec	**[90-100]*%**	**[60-70]*%**
GE	[0-5]*%	[10-20]*%
Honeywell	[5-10]*%	[10-20]*%
Thales	[0-5]*%	[0-5]*%
Others	[0-5]*%	[0-5]*%
Total market (1 000 EUR)	**[…]***	**[…]***
Source: UTC's estimates and Parties' revenues, Form CO, Annex 6.9 [ES]		

(218) If the AC generation for commercial applications were further split according to the size of the aircraft, the proposed transaction would also result in very high combined market shares. As shown in Table 3, it would result in a combined market share of [90-100]*% for large commercial aircraft, [80-90]*% for regional aircraft and [90-100]*% for corporate jets.[160]

Table 3: Worldwide market shares by value in AC generation by aircraft size in 2010				
Company	**Large Commercial Aircraft**	**Regional Aircraft**	**Corporate Jets**	**Rotorcraft**
Hamilton Sundstrand	[80-90]*%	[70-80]*%	[60-70]* %	[10-20]*%
Goodrich	[5-10]* %	[0-5]*%	[30-40]*%	[10-20]*%
Aerolec (Goodrich and Thales)	[0-5]*%	[0-5]*%	[0-5]*%	[0-5]*%
Combined	**[90-100]*%**	**[80-90]*%**	**[90-100]*%**	**[30-40]*%**
Combined + Aerolec	**[90-100]*%**	**[80-90]*%**	**[90-100]*%**	**[30-40]*%**
GE	[0-5]*%	[0-5]*%	[0-5]*%	[0-5]*%
Honeywell	[5-10]* %	[10-20]*%	[0-5]*%	[40-50]* %
Thales	[0-5]*%	[0-5]*%	[0-5]*%	[0-5]*%
Others	[0-5]*%	[0-5]*%	[0-5]*%	[10-20]*%
Total market (1 000 EUR)	**[…]***	**[…]***	**[…]***	**[…]***
Source: UTC's estimates and Parties' revenues, Form CO, Annex 6.8 [ES]				

(219) It can therefore be concluded that irrespective of the exact product market definition for AC power generators, the proposed transaction would lead to a very high combined market share for the merged entity.

160 The Notifying Party indicates that the difference between the sum of the total segment sizes for each of the four "splits" (i.e., large commercial aircraft, regional aircraft, corporate jets, and rotorcraft) and the total market size for all AC generation systems provided in the Form CO is primarily attributable to sales of AC generation systems for military fighter aircraft and military transport aircraft, which do not fall into any of these four "splits".

6.1.3. UTC's position in electrical power generation

(220) Power generation is part of UTC's aircraft electrical systems business. UTC is active in aircraft electric systems through its Hamilton Sundstrand subsidiary, which is active in the production and supply of electrical generation and distribution systems for commercial, regional, business, and military aircraft[161]. In 2010, Hamilton Sundstrand's electrical system business had […]* employees and generated sales revenues of USD […]* million.[162] The main facilities of UTC in electrical systems are located in Rockford, Illinois, United States and Nördlingen, Germany.[163]

(221) UTC is by far the largest manufacturer of constant frequency AC generators. Moreover, UTC has won a large number of recent contracts for variable frequency AC generation on a number of platforms including large commercial aircraft, regional commercial aircraft, corporate jets and military transport aircraft. In particular, since 2000 it has won all the competitions for power generators in large commercial aircraft with the exception of the Airbus A380.

(222) As to their specific presence in the AC power generation market, UTC claims that its revenues in AC generation are mostly attributable to its legacy activities in constant frequency AC generators, a technology on which most of the large commercial aircraft relied in the past. Hamilton Sundstrand experienced a near monopoly position in the market for AC power generation as a result of its ownership of a highly reliable and mature technology still found in most of the aircraft flying today, the Integrated Drive Generator (IDG)[164].

(223) In this context, the large market share of UTC in AC generation is predominantly derived from the platforms on which UTC main constant frequency AC generation systems are currently used and will continue to be used.[165] However, UTC has also, more recently, won constant frequency AC generation contracts on variants of old platforms such as the Airbus A320 NEO and Boeing 737 MAX.[166]

(224) According to the bidding data provided by the Notifying Party, Hamilton Sundstrand has participated in […]* of the last 16 bids to supply the AC generator on a large commercial aircraft.

(225) Hamilton Sundstrand pursues an aggressive strategy to maintain its presence in the market for the different electrical systems components in new aircraft. This is revealed in a recent internal document of Hamilton Sundstrand referring to [large

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161 In 2010, UTC generated OE revenues of approximately EUR […]* million worldwide in the supply of electrical systems products and services. In addition, in 2010, it generated EUR […]* million worldwide from spare parts and MRO services for its own electrical systems.

162 Power distribution – Electric power presentation, Hamilton Sundstrand, p. 1 (Annex 17).

163 It also has production facilities at Xi'an, China and Bangalore, India.

164 The IDG is essentially a generator which uses a mechanical gearbox to transform the power from the engine which rotates at variable speeds into constant speed.

165 Including the Boeing 737, 747, 767, and 777, and Airbus A320, A330, and A340 platforms (Form CO [ES], p. 34).

166 Form CO [ES], footnote 51.

commercial aircraft platform tender]*. [References to large commercial aircraft platform tender and Hamilton Sundstrand's strategy]*.[167]

(226) Hamilton Sundstrand is well aware of its current strength in the AC power generation business. […]*.[168]

(227) Power generation is a relevant and […]* business for Hamilton Sundstrand. […]*[169] […]*.

(228) In this respect a study published in 2008 by an independent third party emphasised that "*Hamilton Sundstrand strength is its dominant position as a clear market leader and the brand reputation of its current portfolio of products*".[170]

(229) Hamilton Sundstrand expects to significantly grow its business in variable frequency AC generation. […]*.

Table 4: UTC's Projections of Future Revenues for Variable Frequency AC Generation Systems

Platform	Forecast revenues (USD)		
	2011	2016	2020
[…]*	[…]*	[…]*	[…]*
[…]*	[…]*	[…]*	[…]*
[…]*	[…]*	[…]*	[…]*
[…]*	[…]*	[…]*	[…]*
[…]*	[…]*	[…]*	[…]*
[…]*	[…]*	[…]*	[…]*
[…]*	[…]*	[…]*	[…]*
[…]*	[…]*	[…]*	[…]*
[…]*	[…]*	[…]*	[…]*
[…]*	[…]*	[…]*	[…]*
[…]*	[…]*	[…]*	[…]*
[…]*	[…]*	[…]*	[…]*
Total	**[…]***	**[…]***	**[…]***

Source: Form CO, Annex 6.2.1 [ES]

167 […]*.

168 […]*.

169 Power distribution – Electric power presentation, Hamilton Sundstrand, p. 7.

170 Global Commercial Aviation Electrical Power Systems and Infrastructure Market Assessment, Towards a more electrical aircraft, Frost and Sullivan, August 2008, p. 62 (Annex 17.6 Response to Commission questions of 23 January 2012).

6.1.4. Goodrich's position in electrical power generation

(230) Power generation is part of Goodrich's aircraft electrical systems business. Goodrich's sales revenue in electrical systems in 2011 amounted to approximately EUR […]* million.[171] The business principally comprises the design, production, and supply of AC and low-voltage DC power generation systems, along with its activities in the design production, and supply of electric distribution systems.

(231) In relation to AC power generation systems, Goodrich manufactures a range of systems, including both small AC generators, typically used on larger helicopters and turboprop aircraft, and larger AC generators, typically used on large commercial aircraft.[172]

(232) In relation to low-voltage DC power generation systems, Goodrich manufactures systems which are typically used on small business jets and light helicopters.[173]

(233) The main facilities of Goodrich in electric generation and distribution systems[174] are located at Pitstone in the United Kingdom, and Twinsburg in the United States. In addition to its activities for its own account, Goodrich is also active in the supply of AC generation systems through Aerolec, a joint venture between Goodrich and Thales Avionics Electric Systems SAS ("Thales").[175]

(234) The Pitstone facility built in 2002 is the principal facility of Goodrich's electric power business and focuses in particular on AC and low-voltage DC electric generation and distribution systems development and production. The facility

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171 In 2010, according to the Form CO, Goodrich generated OE revenues of EUR […]* million worldwide in AC generation systems, and OE revenues of EUR […]* million worldwide in DC generation systems. Goodrich also provides spare parts and MRO services for its own electrical systems. In 2010, Goodrich generated revenues of EUR […]* million worldwide from spare parts and MRO services for its own electrical systems.

172 According to the Notifying Party, Goodrich's AC generation systems are currently used on or selected for platforms including the Airbus A320 family, Airbus A330, and the A320 neo, Bombardier Global Express, the Lockheed C-130J, the Boeing CH/MH-47 F/G, the Boeing F-15, the Sikorsky S-92, the Sikorsky H-92/CH-148, the Sikorsky CH-53K (in development), and the Agusta Westland AW101 (EH-101).

173 According to the Notifying Party, Goodrich's low-voltage DC generation systems are currently used on platforms such as the Embraer 135/140/145, the Cessna Citation, the Hawker Beechcraft Kingair series, and the Dassault Falcon 7-X, along with a number of small helicopters including the Bell 206 and the Sikorsky S-76D.

174 In relation to electric distribution, Goodrich supplies only a single low-voltage DC distribution system at present, providing both the primary and secondary distribution for the Dassault Falcon 7X. Goodrich has also been selected to provide the AC primary distribution system for the Sikorsky CH-53K helicopter, although this system is still in development […]*.

175 The Aerolec JV was established pursuant to a Joint Venture Agreement of April 13, 2001 (and a Shareholders' Agreement of May 31, 2001 concluded between certain subsidiaries of Lucas Aerospace (later acquired by Goodrich) and Thales. Goodrich holds 60% of the shares in Aerolec, with Thales having a 40% shareholding. As to their respective contribution to the JV, […]*.

activities include business development, product design and support, manufacturing, assembly and testing, and repair and overhaul.[176]

(235) The Twinsburg facility provides business development, engineering and supply chain support to Goodrich's electric generation and distribution business.[177] It is also the principal hub for marketing Goodrich's electric power systems in the United States.[178]

(236) The Aerolec joint venture does not have any employees or physical assets of its own, with all services provided on behalf of the joint venture by employees of Goodrich and Thales.[179] Goodrich's activities performed for Aerolec are carried out at the Pitstone facility.

(237) As to Goodrich's specific presence in the AC power generation market, Goodrich, through the Aerolec joint venture, won the tender for the Airbus A380 in 2001 and for the Airbus military transport turboprop A400M in 2003.

(238) It appears that after winning the contract on the Airbus A380 with a variable frequency AC generator, Goodrich and Thales have [reference to Goodrich's and Thales's strategy]*.

(239) Goodrich is also present on a standalone basis in variable frequency AC generation in a number of smaller platforms.[180]

(240) As to its presence in constant frequency AC, although according to the Notifying Party, Goodrich exited the constant frequency AC main generation original equipment business more than 15 years ago[181], it still has in service constant frequency generators on various platforms.[182]

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176 Pitstone employs approximately […]* people in electric systems activities. In 2011, the facility recorded revenues of approximately EUR […]* million in electric systems activities.

177 Twinsburg employs approximately […]* people. In 2011, the facility recorded revenues of approximately EUR […]* million in electric systems activities.

178 It includes, for example, Goodrich's supply to Sikorsky for the generation and distribution systems on the CH-53K platform

179 In 2011, Aerolec recorded revenues of approximately EUR […]* million in electric systems activities, of which Goodrich's share of revenues amounted to EUR […]* million. In 2010, Aerolec's revenues from the Airbus A380 program amounted to EUR […]* million from Variable frequency generator, EUR […]* million from APU generators and EUR […]* million from ground power control unit (Form CO).

180 Platforms in which Goodrich is present with variable frequency AC generation include the Agusta Westland military rotorcraft W101 (EH-101), the Bombardier corporate jet Global XRS & 5000, the military transport turboprop from Lockheed Martin c.130J and the Sikorsky military rotorcrafts H-92/CH-148 and CH-53K (HLR) to be launched in […]*.

181 Form CO – Electrical Systems, p. 11.

182 Platforms in which Goodrich is present include the BAE military transport aircraft Nimrod 2000 and the Sikorsky civil rotorcraft S-92 and Sikorsky S-76C++.

(241) According to the bidding data provided by the Notifying Party, Goodrich has participated in […]* of the last 16 bids to supply the AC generator on a large commercial aircraft.

(242) Goodrich takes pride in the fact that it has been the driving force in introducing the variable frequency technology on turbofan applications. According to Goodrich, the first application of variable frequency on a significant application was the Global Express and that was undertaken by Goodrich, formerly Lucas, with Bombardier. This marked the first aircraft system architecture that incorporated the variable frequency approach to electrical power generation and distribution and was the result of Goodrich being able to demonstrate the generator technology and Bombardier being able to demonstrate that the total system was viable.[183]

(243) Goodrich corporate website highlights in this respect that "*Goodrich Electrical Power Systems has pioneered Variable Frequency power generation across business jet and large civil platforms to deliver substantial cost benefits to both OEM and operators. Incorporating the TRW, Lucas and Lear-Siegler generator range, Goodrich covers 28 Volt DC to 230 Volt AC, generators and starter-generators for all sizes of aircraft. Goodrich continues to innovate for lower cost and higher performance in all areas of electrical power including electric engine start, advanced motors and drive systems*".[184]

(244) Goodrich website further states that "*Goodrich introduced the first commercial application of variable frequency on a jet aircraft with the Bombardier Global Express business jet in 1998. Subsequently in 2001, Goodrich variable frequency electrical generator technology was selected to power the Airbus A380 in cooperation with Aerolec. This was a defining moment for variable frequency power – the logical choice for AC power today […] Goodrich, as part of Aerolec, was subsequently selected in 2005 to supply the VF Electrical Generators for the Airbus A400M military transporter*".[185]

(245) As to its future activities in variable frequency generation, Goodrich is developing a new family of variable frequency generators which include electric engine start capability and associated power electronics. Goodrich offers as of today a wide range of oil-cooled variable frequency starter/generators and control systems from 40kVA to in excess of the 250kVA required for the new large commercial aircraft platforms.[186]

(246) As shown in Figure 5 extracted from Goodrich's strategic plan for 2011,[187] […]*.

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183 Deposition of […]* in front of the United States Department of Justice, p. 105.

184 http://www.goodrich.com/Goodrich/Businesses/Electrical-Power-Systems.

185 http://www.goodrich.com/Goodrich/Businesses/Electrical-Power-Systems/Products/Variable-Frequency-Power/Variable-Frequency-Power

186 http://www.goodrich.com/Goodrich/Businesses/Electrical-Power-Systems/Products/Variable-Frequency-Power/Variable-Frequency-Power

187 Engine control and electrical power systems, Goodrich Strategic plan 2011, 2 June 2011, p. 17.

(247) As to the importance of incremental innovation and pedigree in power generation, […]*.[188]

(248) The document shown in Figure 5 shows the strategic importance electrical power generation plays for Goodrich. […]*.[189]

Figure 5: Goodrich's strategic plan in electric power systems

[…]*

(249) Moreover, a consultancy study published in 2008, stressed that "*Goodrich's strength is its dominant market position with the introduction of variable frequency concept for power generation*. It further notes "*the strong product innovation capability of Goodrich*".[190]

(250) Reinforcing this view, Goodrich in an internal document […]*.[191]

(251) An assessment of Goodrich's projected performance in power generation also highlights that […]*. As shown in Table 5, Goodrich projects that its revenues over the period 2012 to 2016 in variable frequency AC generation will […]*. Although at the beginning of the period Goodrich's revenues in variable frequency AC generation systems were about […]* of Hamilton Sundstrand, in 2016 according to the Notifying Party estimates they will represent about […]* of Hamilton Sundstrand's.

Table 5: Goodrich Projected Future Revenues for Variable Frequency AC Generation Systems (USD)

		2012	2013	2014	2015	2016
Aerolec	[…]*	[…]*	[…]*	[…]*	[…]*	[…]*
	[…]*	[…]*	[…]*	[…]*	[…]*	[…]*
	[…]*	[…]*	[…]*	[…]*	[…]*	[…]*
Goodrich	[…]*	[…]*	[…]*	[…]*	[…]*	[…]*
	[…]*	[…]*	[…]*	[…]*	[…]*	[…]*
Total		**[…]***	**[…]***	**[…]***	**[…]***	**[…]***

Source: Annex 6.2.2 [ES] Form CO

6.1.5. The Parties' competitors in power generation

(252) The Notifying Party claims that in variable frequency generators, the Parties' activities are constrained by a significant number of strong alternative suppliers likely to compete strongly for future platforms.

188 Engine control and electrical power systems, Goodrich Strategic plan 2011, 2 June 2011, p. 17.

189 Engine control and electrical power systems, Goodrich Strategic plan 2011, p. 48.

190 Global Commercial Aviation Electrical Power Systems and Infrastructure Market Assessment, Towards a more electrical aircraft, Frost and Sullivan, August 2008, p. 59.

191 EPS Americas Strategic Plan, Goodrich, 24 January 2009, p. 7 (GB Ex2).

(253) The power generation activities of these competitors according to the Notifying Party[192] are as follows:

(a) Honeywell is present in AC power generation for smaller aircraft such as the Gulfstream G-IV, the Bombardier Q-400 and helicopters such as the Sikorsky H-60 Blackhawk (and its derivatives) and the Boeing AH-64 Apache. Honeywell is understood to have competed on 12 of the 15 variable frequency bids in which UTC participated.

(b) GE supplies AC generators for a number of military platforms including the Boeing F-18, the Northrop Grumman Global Hawk and X-47 and the KAI KTX-50X. According to the Notifying Party, GE is understood to have competed on six of the 15 variable frequency bids in which UTC participated. GE has indicated its ambition to become a credible supplier in the market of AC power generation for large commercial aircraft in the future.

(c) Thales is present in AC generation on a standalone basis and through the Aerolec Joint Venture it has with Goodrich. Thales' AC generation systems are currently deployed only on the military rotorcraft NHIndustries NH90 and the military fighter Dassault Rafale. It is also present on a number of regional commercial aircraft, such as the ATR42, the ATR72 although with a DC power generator technology. According to the Notifying Party, Thales has competed on eight of the 15 bids to supply a variable frequency AC power generator in which Hamilton Sundstrand or Goodrich participated.

(d) Safran is positioning itself as a supplier for variable frequency AC generation and has bid in partnership with GE on the Comac C919 platform.

(e) IPS teamed up with ECE Zodiac to bid for the variable frequency AC system on the Bombardier Global 7000/8000 large corporate jet. .

(f) Meggitt through its recent acquisition of Pacific Scientific Aerospace produces the DC power generator for platforms such as the Embraer Legacy 450 and the Cessna 850 Columbus and Aircraft 560XL.[193]

(g) TransDigm is only active in DC generation systems on platforms including the Cessna B-4, the Piaggio P-180, the Beechcraft 1900 King-Air, and the Schweizer 333 Helicopter. According to the Notifying Party, TransDigm does not, at present, have any installed AC generation systems in operation.[194]

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192 Form CO, p. 37-44.

193 Meggitt has two businesses OECO and Artus which design and produce power generation and conversion equipment for Aerospace, land vehicles and specialty markets such as oil exploration.

194 TransDigm Group Incorporated is a designer, producer and supplier of highly engineered aircraft components for use on nearly all commercial and military aircraft in service today. Avionics Instruments, a subsidiary of TransDigm, designs and produces power conversion equipment for commercial aerospace, military and space applications. Skurka Aerospace Inc (SAI), a subsidiary of TransDigm and formerly known as APC designs and manufactures AC and DC motors and DC starter generators for the aerospace and military market.

(h) Astronics is only active in DC generation at present but is expected to enter AC generation in future.

(i) Sinfonia Technology supplies the AC generators for Kawasaki's C-X and X-P1 platforms. It also provides generation systems on the Mitsubishi F-2 and F-15, the Sikorsky SH-60J, the Lockheed Martin P-3C Orion, and the Kawasaki OH-1 helicopter.

(254) However, as of today none of those firms has on a stand-alone basis a variable frequency AC generator in service on a large commercial aircraft. Competitors to Hamilton Sundstrand and Goodrich therefore all lack a proven technology which would allow them to become credible competitors in the market for power generation in the near future.

(255) The Notifying Party considers that the existing and potential capabilities of rival suppliers in AC generation systems should not be underestimated. It further claims that Goodrich cannot be UTC's closest competitor since its last win was […]* years ago and entry was only possible due to Airbus support.[195]

(256) However, the Commission notes that tenders for new aircraft platforms only occur very sparsely in time and that the successful bidder ensures a quasi-monopoly position on the aircraft over the lifetime of the platform (20 years on average). Therefore the fact that Goodrich won its last relevant tender on a power generator […]*years ago does not mean it cannot make a credible bid in future tenders. Moreover, Goodrich has a proven credibility in variable frequency power generation since it already has a variable frequency AC power generation in operation today […]*.

(257) As to the perception of the position of both merging Parties in AC power generation, the in-depth investigation revealed that market operators perceive that UTC has a very strong capacity in AC power generation for large, regional and corporate commercial aircraft. On the other hand, market operators perceive that Goodrich on a standalone basis or through its Aerolec Joint Venture has a strong capacity in AC power generation, in particular as regards regional and corporate aircraft.[196]

(258) At to the Parties major rivals, the in-depth market investigation revealed that Honeywell is viewed as having a weak position in AC power generation in all the platforms except helicopters and in particular a very weak position in large commercial aircraft. GE on the other hand is believed to have today a weak position in all of the segments. As to Thales it is regarded as having a weak position in

195 Notifying Party's reply to the Article 6(1)(c) decision of 4 April 2012.

196 Reply to Question 26 of the Commission's Questionnaire to power generator customers (Q24) of 4 April 2012 and reply to Question 22 of the Commission's Questionnaire to power generators competitors (Q23) of 4 April 2012.

relation to large and regional aircraft but a strong capacity for corporate jets and helicopters.[197]

(259) In fact, the view expressed by the market operators coincides with Goodrich's own assessment of the competitive situation in power generation. As shown in Figure 6, in an internal document from 2010[198], […]*.

Figure 6: Integrated systems market operator capabilities

[…]*

(260) Similarly, an internal document from Hamilton Sundstrand, highlights […]*.[199]

Figure 7: Electric Systems Competitors

[…]*

(261) The market investigation revealed that some respondents were aware of the presence in power generation of some of the smaller companies such as Safran, IPS, Meggitt, TransDigm and Astronics. However, the market investigation revealed that these smaller competitors are not considered to exert at present a competitive constraint on either Hamilton Sundstrand or Goodrich.

(262) In view of the above, the information gathered in the market investigation largely supports the current limited competitive constraint rival suppliers exert on the merging parties in relation to power generation.

(263) In the following, a more detailed analysis of each of the Parties' rivals in power generation is presented.

6.1.5.1. Honeywell

(264) Honeywell is a major global corporation that is active across a wide variety of sectors, including consumer products, engineering services, and aerospace equipment. The company employs over 130 000 people and generated global turnover of around EUR 24.8 billion in 2010.

(265) Within the aerospace sector, Honeywell is active more broadly within aircraft systems, including APUs, turboprop and turboshaft propulsion engines, engine systems and accessories, commercial avionics, flight control systems, environmental control systems, aircraft landing systems, and interior and exterior aircraft lighting.

(266) Honeywell has production facilities related to power generation on Tucson, Tulsa and Mexicali[200]. However, although already present in AC generation, Honeywell

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197 Reply to Question 26 of the Commission's Questionnaire to power generator customers (Q24) of 4 April 2012 and reply to Question 22 of the Commission's Questionnaire to power generators competitors (Q23) of 4 April 2012.

198 Goodrich 2010 ECPS Strategic Plan Presentation, 24 June 2010, p. 40.

199 Electric Systems Strategy, Hamilton Sundstrand, 16 July 2009, p. 79.

lacks as of today a proven technology for AC generation in-service on a large commercial aircraft. The market investigation revealed that Honeywell's facility in Mexicali is not intended to strengthen Honeywell's capacity in variable frequency power generation.[201]

(267) As revealed in the market investigation, according to the bidding data provided by the Notifying Party, Honeywell participated in […]* of the 16 bids to supply the AC generator on a large commercial aircraft, in which also Hamilton Sundstrand or Goodrich participated, although in many instances only participating at the request for information stage.

(268) The market investigation did not reveal that Honeywell is currently considered to be a strong competitor in engine power generation in particular in relation to large commercial aircraft and it appears that some respondents consider that its capabilities might have weakened in recent times.[202]

(269) On the contrary, Honeywell has a leading position in APU. Honeywell is the clear leader in the market for APU with a market share of [70-80]*% in 2011, followed by UTC with a market share of [20-30]*% and Microturbo with [0-5]*%.[203] As indicated in Honeywell corporate website "*Honeywell has been developing Auxiliary Power Units for more than half a century. In fact, we invented the APU, delivering the first units to the U.S. Navy in 1952 Honeywell APUs can be found on more than 80% of aircraft using auxiliary power, more than nine times our nearest competitor in Business and General Aviation*".[204] Honeywell claims in a brochure on Electric Power Generation that "With over 250 000 generating systems delivered, our industry leading generators are proven to deliver highly reliable electric power up to 250 kVA for advanced performance, reduced maintenance, and lower costs of operation in constant and variable frequency AC as well as DC configurations".[205]

6.1.5.2. GE

(270) GE is one of the world's largest corporations, active across a wide variety of sectors, including technology, services, and finance. The company employs over 287 000 people and generated a global turnover of around EUR 113.3 billion in 2010.

(271) Within the aerospace industry, GE's subsidiary, GE Aviation, is the largest supplier of aircraft engines in the world, and also active in avionic systems, mechanical

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200 Reply to Question 1 of the Commission's Questionnaire to power generators competitors (Q23) of 4 April 2012.

201 Reply to Question 38 of the Commission's Questionnaire to Honeywell (Q23) of 4 April 2012.

202 Reply to Question 24 of the Commission's Questionnaire to power generators competitors (Q23) of 4 April 2012 and reply to Question 28 of the Commission's Questionnaire to power generator customers (Q24) of 4 April 2012.

203 Notifying Party response to Commission questions of April 19, 2012, question 2.

204 http://www.honeywellbusinessaviation.com/eng/apu

205 http://www51.honeywell.com/aero/common/documents/myaerospacecatalog-documents/ATR_Brochures-documents/Electric_Power_US.pdf

systems, and integrated power systems. In 2010, GE Aviation generated a worldwide turnover of EUR 14.1 billion.[206]

(272) GE's aviation activities include the manufacture of commercial and military jet engines and components, as well as avionics, electric power and mechanical components and systems for air, ground and naval vehicles. GE Aviation primarily manufactures jet engines for large commercial aircraft, commercial regional jets, and military aircraft. GE Aviation also sells large gas turbine turboprop engines for general aviation aircraft (and turboshaft engines, which are used in helicopters).[207]

(273) The electrical power business of GE Aviation, designs, manufactures and supports electrical power systems and equipment for a variety of civil and military vehicles worldwide. The business employs approximately 1 100 employees in the United States and the United Kingdom who engage in a full spectrum of product related customer oriented activities including engineering design and product testing, manufacturing and assembly, procurement of materials and parts and subassemblies, and repair, overhaul and servicing of legacy products. Customers served range across air, ground and naval vehicle constructors to users of those vehicles for both military and civil applications.[208]

(274) GE purchased in January 2007 the Smiths Group for USD 4.8 billion, a company active among others in electrical power generation, conversion and distribution products. This acquisition provided GE with an opportunity to think of an engine application as a component in a larger chain of integrated activities like electrical power management and airframe and engine diagnostics.[209]

(275) GE is mostly present in generation in the military market and moderately in distribution systems for civil and military aircraft. It has almost no presence in civil generating systems and some presence in civil distribution. Even in military applications, for which GE appears to have a comparative advantage it appears, as shown in Figure 8 extracted from a Hamilton Sundstrand internal document, that GE faces an increasing competitive pressure from Hamilton Sundstrand in platforms where GE was the incumbent.

Figure 8: Power generation system on the F-18

[…]*

Source: Power generation – Competitive Assessment, Hamilton Sundstrand, August 2011, p. 36

(276) Although GE has indicated its intention to become a credible competitor on future platforms for large commercial aircraft it seems it will take GE several years to achieve this ambition. GE currently lacks the reliability in field experience and the

206 Form CO [ES].

207 Reply to Question 1 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012.

208 Reply to Question 1 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012.

209 [Internal document]*.

flight hours that Hamilton Sundstrand and Goodrich have in AC generation on large commercial aircraft.

(277) Furthermore, the bidding data submitted by the Notifying Party, shows that GE has not participated in any of Airbus's recent tenders in variable frequency AC power generation.

(278) It appears that as of today GE lacks the accumulated experience of other competitors in power generation. However, it wishes to be in the future a credible competitor in this market. In particular, GE is establishing an electric power Integrated Systems Research and Development Center near Dayton Ohio focused among others on advanced technologies for military and more electric aircraft to begin operations in 2012. The centre will focus on electric power systems R&D including electric power generation, control, distribution and management, conversion and energy storage equipment.[210] GE has also established an Electrical Power Integration Centre (EPIC) in Cheltenham, England.

(279) According to the bidding data provided by the Notifying Party, GE participated only in […]* of the last 16 bids to supply the AC generator on a large commercial aircraft, […]*.

(280) However, Hamilton Sundstrand in an internal document conducting a competitive analysis of GE's capacity in power generation[211] observes that "*[…]**."

(281) This view about the current weakness of GE in power generation is further confirmed by a market consultancy study[212] which in reference to GE indicates that "*GE weakness is that it is not focused on the power system products while maintaining a diverse range of products*".

(282) Moreover, an internal document of Hamilton Sundstrand highlights that […]*.[213] […]*.

(283) The market investigation further revealed that GE after performing a careful pre-tender analysis opted not to participate in the power generator tenders for the Comac ARJ21, the Sukhoi Superjet 100, or the Mitsubishi MRJ-90,[214] due to lack of relevant generator products, operational experience and reliability data to support these potential products.

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210 GE Press release March 31, 2010. http://www.geaviation.com/aboutgeae/presscenter/systems/systems_20100331.html.

211 [Internal document]*.

212 Global Commercial Aviation Electrical Power Systems and Infrastructure Market Assessment, Towards a more electrical aircraft, Frost and Sullivan, August 2008, p. 65.

213 Electric Systems Strategy, Hamilton Sundstrand, 16 July 2009, p. 42.

214 Reply to Question 35 of the Commission's Questionnaire to GE (Q23) of 4 April 2012.

6.1.5.3. Thales

(284) The Thales Group is a major global corporation that is active in a variety of products and services across the aerospace, defence, transportation, and security sectors. The company employs over 68 000 people and generated global turnover of around EUR 13.1 billion in 2010.[215]

(285) Thales Electrical Systems business line is focused on aircraft electrical generation and conversion market. In this framework, Thales sells, develops and provides electrical generation and conversion systems (including supports services) to airframers.[216] Initially formed under the name Auxilec in 1951, the strategic business line of the Thales Aerospace Division currently represents over 600 people across five locations worldwide[217].

(286) Thales has a full range portfolio of constant frequency (up to 90 kVA) or variable frequency (up to 180 kVA) generators as well as DC systems (starter-generators, brushless generators and APU starters up to 400A).[218]

(287) Along with Goodrich, Thales supplies the variable-frequency electrical power generation system for the Airbus A380 and the Airbus A400M.

(288) According to the bidding data provided by the Notifying Party, Thales participated either alone or through the Aerolec joint venture in […]* of the 16 bids to supply the AC generator on a large commercial aircraft, […]*.

(289) The market investigation revealed that Thales is perceived as a weaker competitor in power generation than Hamilton Sundstrand and Goodrich.[219] According to various respondents in the market investigation, Thales is not a credible supplier on a standalone basis outside the Aerolec JV.[220]

(290) By acquiring Goodrich, UTC would also gain control over the Aerolec joint venture in which Goodrich holds 60% of the shares. Moreover, Goodrich appears to contribute the more important parts to the power generator produced by Aerolec for [reference to large aircraft platforms]*.[221] […]*.Thus it appears that should Goodrich leave the Aerolec joint venture with Thales, Thales would not under the

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215 Form CO [ES].

216 Reply to Question 1 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012.

217 https://www1.online.thalesgroup.com/aerospace/electrical_systems/welcome.php

218 http://www.thalesgroup.com/Portfolio/Aerospace/Aerospace_Product_ElectricalPowerGeneration/?pid=1134

219 Reply to Question 26 of the Commission's Questionnaire to power generator customers (Q24) of 4 April 2012 and reply to Questions 72, 73, 74 and 75 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012.

220 Reply to Question 24 of the Commission's Questionnaire to power generators competitors (Q23) of 4 April 2012.

221 [Reference to the contributions of Goodrich and Thales to Aerolec's business]*.

current set-up be able to compete on a standalone basis against Hamilton Sundstrand in AC power generation for large commercial aircraft.

(291) […]*.[222]

6.1.5.4. Safran

(292) Safran is a major global corporation that is active across the defence, aerospace propulsion and equipment, and security sectors. The Safran Group generated global revenues of around EUR 11 billion in 20107.

(293) Within the aerospace industry, Safran is active in the design and manufacturing of aircraft and rocket engines and propulsion systems, as well as a broad variety of aircraft equipment.

(294) Within aircraft electrical systems, Safran supplies both electrical generation and distribution systems. In this regard, Safran has geared up to become a major industry player, with its new operating unit, Safran Power (within Safran's Hispano-Suiza subsidiary).[223]

(295) However, the market investigation revealed that Safran is perceived as a weak competitor in power generation.[224]

(296) Safran is currently seeking a technology partnership or an acquisition in electrical power generation to expand its presence in relation to aircraft AC power generation.[225] Moreover Safran, has invested since 2002 in a series of technology developments and demonstration programmes related to the more-electric aircraft.[226]

6.1.5.5. Innovative Power Solutions

(297) Innovative Power Solutions (IPS) is a small company founded in 1999 and made up of Ex-Bendix[227] and Ex-Honeywell staff.

(298) Within aircraft electrical systems, IPS is active in a variety of power management and generation system products serving both military and civil customers.

(299) As to its participation in power generation tenders, IPS competed in partnership with ECE Zodiac in the power generator for the Global 7000. Although IPS received funding from the United States government through the Small Business Innovation

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222 Deposition of […]* in front of the United States Department of Justice, p. 161.

223 Form CO [ES].

224 Reply to Question 26 of the Commission's Questionnaire to power generator customers (Q24) of 4 April 2012.

225 Reply to Question 5 of the Commission's Questionnaire to Safran (Q23) of 4 April 2012.

226 Reply to Question 31 of the Commission's Questionnaire to Safran (Q23) of 4 April 2012.

227 Bendix was a manufacturing and engineering company producing among others electric power systems. It was acquired in the early 1980's by Allied Signal which later bought Honeywell and adopted its more recognisable name.

Research (SBIR) programme, Hamilton Sundstrand recognized that receiving this support does not guarantee the commercial success of IPS products on the market.[228] IPS appears to be in the process of retrofitting or installing the power generator in various military aircraft such as the Navy P3 Orion[229] and Saab.[230]

(300) According to Hamilton Sundstrand, IPS will never bid on a stand-alone basis. It is not perceived as a fully accredited peer. As such, IPS does not have the necessary breadth and depth on a stand-alone basis. IPS probably needs capital investment and the support and infrastructure required to grow the business, in particular to show the robustness and the manufacturing chain capacity required to appease its potential customers. IPS needs to partner with a company that has the ability to offer up manufacturing capacity, or space or capital, so the concerns that would be felt by an OEM will be mitigated by that partnering.[231]

6.1.5.6. ECE Zodiac Aerospace

(301) ECE (Zodiac Aerospace) activities include external and internal lighting, flight deck control, electrical power management and windshield wiper system manufacturer.[232]

(302) Zodiac/ECE has a strong presence in Bombardier aircraft. Zodiac teamed up with IPS to bid on the Global 7000. Zodiac does not build generators but teamed up with IPS to be accredited by Bombardier as a viable alternative to Hamilton Sundstrand.[233]

(303) This is confirmed by market consultancy study[234] which in reference to ECE Zodiac indicates that "*ECE Zodiac weakness is its relatively small market share in the power systems markets*".

6.1.6. Bidding markets

(304) According to the Notifying Party's view, the markets for the supply of aircraft components concerned by the proposed transaction are almost all bidding markets, in which the OEMs procure parts at the design or development phase of the relevant platform by soliciting bids from multiple suppliers. Competition among aerospace component suppliers thus takes place at the bidding stage. Once a supplier has been selected, competition for the relevant product on that platform is over, as the winning

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228 Deposition of […]* in front of the United States Department of Justice, p. 117.

229 The IPS air-cooled generator used on the P-3 Orion Aircraft as an upgrade replacement 60 kVA generator provides 75/100 kVA of 3-phase 115 Vac, 400 Hz at 6 000 rpm (http://www.ips-llc.com/files/Generator3.pdf).

230 Deposition of […]* in front of the United States Department of Justice, p. 118.

231 Deposition of […]* in front of the United States Department of Justice, p. 185.

232 Reply to Question 1 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012.

233 Deposition of […]* in front of the United States Department of Justice, p. 183.

234 Global Commercial Aviation Electrical Power Systems and Infrastructure Market Assessment, Towards a more electrical aircraft, Frost and Sullivan, August 2008, p. 68.

bidder will normally continue to supply the system for the life of the aircraft or engine (typically 20-30 years or more). New supply opportunities tend to be large and relatively rare. In this environment, the relative market position of the competitors can shift significantly with the award of a single large contract. However, a significant win will only appear in the market share data several years later, once the aircraft starts to be sold and enters into service.

(305) In common with almost all affected markets in the proposed transaction, the operation of the procurement process for aircraft electrical systems including AC and low-voltage DC generators is as follows. First, aircraft manufacturers engage several prospective bidders in pre-proposal aircraft trade studies to support the architectural definition of the aircraft. The extent to which this occurs varies between customers. This process can take place either by the customer soliciting information via Requests for Information ("RFI") or, in some cases, simply by one or more suppliers providing engineering resource to work alongside the customer's engineering team. The RFI purpose is to identify a preliminary list of potential suppliers in a tender. Following architecture definition, the OEMs issue Requests for Proposal ("RFP"), which typically solicit specific compliance responses to certain defined commercial, technical, programmatic, and service/support requirements. Once the OEM has collected and reviewed these responses, they frequently "down-select" a limited number of final candidates in order to limit the scope of their detailed final assessment to only the most qualified suppliers. This technical assessment can comprise a number of workshops to test various aspects of the proposal. These competitors will be required to submit "Best and Final Offers". Following these offers, the OEMs conduct final negotiations and make their award of selection.

(306) In this respect, the Notifying Party argues that historical market shares have limited value as an indicator of how competition will unfold in future bids for aircraft power generators. It considers that historic market shares would not reflect a given supplier's current strength or weakness. The Notifying Party also claims that historical market shares do not reflect any recent investments in technological development the companies might have incurred. In this respect, it recognises the Parties' strong position post-transaction in constant frequency AC generation. However, it further notes that due to the airframer's move towards using AC variable frequency in large commercial aircraft, Hamilton Sundstrand will be constrained by a number of strong alternative suppliers of which Goodrich is not the most significant constraint.

(307) Furthermore, the Notifying Party argues that the Commission must focus on the competitive constraints exerted by prospective bidders for future platforms. It further claims that in a bidding market, the competitive analysis of the proposed transaction should not be focused on assessing the combined position of UTC and Goodrich. They suggest that the competitive assessment should focus on whether it is Goodrich, or other companies, that constrain UTC's behaviour. It further notes that if companies other than Goodrich are the principal competitive constraint on UTC's behaviour, the removal of Goodrich as a bidder will not harm competition in the relevant market.[235] It further indicates that potential suppliers all have equal chances

[235] Notifying Party's reply to the Article 6(1)(c) decision of 4 April 2012.

of winning the next tender even if their generator only exists on paper since airframers always want to have the latest technology.

(308) As to the relevance of using historic market shares to infer market power in the context of markets such as the ones concerned by the present transaction it must be recalled that in the *General Electric v Commission* judgement[236], the General Court recognised that when analysing the closely related market of jet engines, historic market shares are less relevant for the analysis of the market. In this respect, the General Court noted *"that market shares as at a given date are less significant for the analysis of a market such as the market for jet engines for large commercial aircraft than, for example, for the analysis of a market for everyday consumer goods"*. In particular, the General Court stressed that *"On such a market the fact that a particular company has had a number of recent 'wins' does not necessarily mean that one of its competitors will not be successful in the next competition. Provided that it has a competitive product and that other factors are not heavily weighted in the first company's favour, a competitor can always win a valuable contract and increase its market share considerably at one go"*.

(309) However, the General Court further noted in the judgment that even in the context of bidding markets, historic market shares are not devoid of any meaning and that they can be informative about the nature of competition in the market. In this context, the judgement states "*However, this does not mean that market shares are of virtually no value in assessing the strength of the various manufacturers on a market of that kind, especially where those shares remain relatively stable or reveal that one undertaking is tending to strengthen its position*".[237]

(310) While it is correct that the effect of the transaction should be judged on the prospective analysis of likely effect on future tenders, there are good reasons to rely on historical market shares only as a first approximation to assess the relative strength of the different competitors.

(311) First, it is noticed that the prior experience (also known as pedigree) a supplier has as regards to providing a given product is an important market driver in variable frequency for large generators since the machines based on this technology are relatively new to the market.[238] The pedigree basically allows customers to assess the risk of the potential suppliers.[239] From the point of view of pedigree for large aircraft variable frequency AC generation, the Notifying Party recognises that the field experience of having a system in service would be led by Hamilton Sundstrand, Goodrich and Aerolec. It further notes that the same companies would have the strongest pedigree in terms of technology since the other companies such as GE and Honeywell are in the position of developing and demonstrating that capability.[240] The market investigation showed in fact that the pedigree (accumulated in-flight

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236 Case T-210/01 General Electric v Commission [2005] ECR II-5575, para. 149.

237 Case T-210/01 General Electric v Commission [2005] ECR II-5575, para. 150.

238 Deposition of […]* in front of the United States Department of Justice, p. 81.

239 Deposition of […]* in front of the United States Department of Justice, p. 89.

240 Deposition of […]* in front of the United States Department of Justice, p. 230.

operation experience) is one of the key elements in determining who will be successful in the next bid for power generators given the limited risk tolerance of customers, in particular, in relation to critical aircraft components such as the electrical power generator.[241] Therefore, market shares offer a good approximation to each competitor's pedigree.

(312) Second, the market investigation revealed that the research and development expenditures which companies allocate to specific programmes are key to remain competitive in the market for power generation and that intellectual property rights are used by companies to protect the know-how developed in electrical systems.[242] A company's capacity to innovate in electrical power generation therefore relies on its accumulated R&D expenditures which are also dependent on the revenues generated from the past sales of generators.

(313) Third, the market investigation further revealed that a very large percentage (about 80%) of the technological know-how gained through having an in-service power generator can be transferred into a new aircraft platform, assuming that both platforms are based on either a variable frequency or a constant frequency electrical system proposal.[243] Moreover, the market investigation revealed that the incumbent supplier for an existing platform is normally retained by the customer when a bid is launched on a variant platform.[244] Recertification of a power generator in a variant is less stringent than in a totally new aircraft. However, the recertification requirements will depend on how extensive are the variations of the specifications on the new generator.[245]

(314) As to all potential suppliers having equal chances to win a bid, the Commission notes that to participate in a bid, potential component suppliers have to develop their new technologies and concepts to a technology readiness level (TRL) which minimises the risk at the proposal stage. The TRL is a benchmark widely used in the aerospace industry to compare the maturity level of different technologies offered.[246] Competitors' chances of winning a tender will largely depend on the level of maturity of their technology offering.

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241 Reply to Question 70 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012.

242 Reply to Questions 86 and 88 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012.

243 Reply to Question 13 of the Commission's Questionnaire to power generator customers (Q24) of 4 April 2012.

244 Reply to Question 14 of the Commission's Questionnaire to power generator customers (Q24) of 4 April 2012.

245 Reply to Question 14 of the Commission's Questionnaire to power generator customers (Q24) of 4 April 2012.

246 The TRL benchmark generally comprises 9 levels of technology maturity. The TRL suitable to participate in a request for proposal is 5 or 6. It requires to have demonstrated analytically an integration opportunity or a particular component technology (Deposition of […]* in front of the United States Department of Justice, p. 114).

(315) The market investigation also revealed the relevance of non-recurring costs (NRCs)[247] in the bidding process. Potential bidders rely heavily on the NRCs when setting their offer prices.[248] NRCs are largely determined by the amount of engineering work. The NRC of developing a new generator can be significantly reduced by relying on experience gained in the development of an earlier generator.

6.1.7. Overview of recent bids in AC power generation

(316) In order to complement the analysis of market shares and pursuant to paragraph 29 of the Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings ("Horizontal Guidelines")[249], the Commission has scrutinised the recent bids in power generation. It has used this bidding information to investigate how effective competition evolves in this market and to assess current and prospective competitive constraints that may remain on the merged entity post-transaction.

(317) The electrical systems bidding data submitted by the Notifying Party[250] sets out, to the best of the Parties' ability, the identity of the bidders in recent competitions for AC generation systems on civilian and military aircraft and rotorcraft currently in production (or for which definitive awards have been made) on a platform-by-platform basis.[251]

(318) The submitted bidding data confirms that UTC has traditionally been highly successful in winning bids for platforms relying on constant frequency AC generators. The Notifying Party claims however that the recent bidding data suggests that the evolution from constant frequency to variable frequency AC systems has increased competitors' opportunities to bid on AC aircraft platforms.

(319) The analysis of the tenders on large commercial aircraft in Table 4 shows that Hamilton Sundstrand has in fact won since the late 1970's […]* of the tenders in constant frequency AC generation for large commercial aircraft. These tenders were based on an IDG technology offering in which Hamilton Sundstrand had a near monopoly position. Hamilton Sundstrand has won as recently as in 2011 a tender relying on constant frequency AC generation on the Airbus A320NEO platform the new variant of the successful A320 platform. For any future tenders requiring constant frequency, Hamilton Sundstrand is likely to remain unchallenged.

(320) In order to perform a forward looking analysis and given the recent trend in the industry towards using variable frequency AC power generation in large and regional

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247 Cost of developing a component that meets customer specifications.

248 Deposition of […]* in front of the United States Department of Justice, p. 79.

249 Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings, OJ C 31, 05.02.2004, p. 5.

250 Annex 7.1. [ES] of Form CO.

251 The data set contains bids relating to AC generation in 79 platforms. It also covers tender in which Hamilton Sundstrand has not participated.

commercial aircraft, it is relevant to examine in detail all the most recent tenders concerning the supply of variable frequency AC power generation.

Large commercial aircraft

(321) As shown in Table 4, the first tender concerning a variable frequency AC generator on a large commercial aircraft was the Airbus A380. Airbus launched this tender in 2001 to supply the variable frequency AC generator for their new A380 widebody platform. Aerolec, a joint venture between Goodrich and Thales won the tender against Honeywell. […]*.[252]

(322) Hamilton Sundstrand ever since it lost out on the variable frequency contract for the A380 in 2001 has developed a strong position in variable frequency AC generation. In 2004, it won the tender to supply the variable frequency generator on the 787, the new widebody platform of Boeing.[253] Hamilton Sundstrand also won the tenders for all the new sizable commercial platforms relying on variable frequency AC power generators since 2004 – in particular the Airbus A350 to be launched in […]*, the Comac C919 to be launched in […]* and the Irkut MC-21 to be launched also in […]*.[254]

(323) Apart from the Parties, the market investigation identified Honeywell and GE as the only two competitors which have credibly participated in the mentioned tenders to supply the power generator for large commercial aircraft. However, the fact that they have not been able to win any of the tenders point to their relative weaker position compared to Hamilton Sundstrand or Goodrich. Other smaller competitors such as ECE Zodiac, Safran and IPS have started to participate in some of the more recent tenders.

252 Deposition of […]* in front of the United States Department of Justice, p. 182.

253 […]*.

254 Hamilton Sundstrand has won two recent bids (the Airbus A320 NEO and the Boeing 747-8) with a constant frequency AC power generator offering. However, these two aircraft are variants of existing platforms and not totally new platforms.

Table 6: Recent tenders for AC generation for large commercial aircraft					
Airframer	**Platform (projected year of launching)**	**System**	**Year contract awarded**	**Winner**	**Possible competitors**
Boeing	767-200/300/400	CF	1978	HS	Honeywell
Airbus	A320 Family	CF	1986	HS	Goodrich
Airbus	A330-200/300	CF	1987	HS[(1)]	
Airbus	A340	CF	1987	HS	
Boeing	777-200ER	CF	1989	HS	Goodrich, Honeywell (RFI only)
Boeing	737 Family	CF	1994	HS	Goodrich, Honeywell, Shinko?
Boeing	777-300ER/200LR/F	CF	2000	HS	
Airbus	**A380**	**VF**	**2001**	**Aerolec**	**Aerolec, Honeywell**
Boeing	**787 (2011)**	**VF**	**2004**	**HS**	**GE, Honeywell/Goodrich**
Boeing	747-8 (2011)	CF	2007	HS	
Airbus	**A350 (2013)**	**VF**	**2008**	**HS**	**Goodrich, Honeywell**
Bombardier	**CS100 (4Q 2013)**	**VF**	**2008**	**HS**	**ECE, IPS, Goodrich, Thales (RFI only)**
Comac (CN)	**C919 (2016)**	**VF**	**2009**	**HS**	**Aerolec, ECE, GE, Honeywell, IPS, Safran**
Irkut (RU)	**MC-21 (1Q 2016)**	**VF**	**2009**	**HS**	**Aerolec, Honeywell, Thales**
Airbus	A320 NEO (2015)	CF	2011	HS	None
Boeing	737 MAX Family	CF	2012	HS (*)	

[(1)] HS stands for Hamilton Sundstrand (*) Form CO [ES] p. 34.

Source: Parties' estimates

Regional commercial aircraft

(324) In relation to the recent tenders for regional aircraft (shown in Table 7), all of the tenders for supplying the AC power generation have been won by Hamilton Sundstrand relying on the mature constant frequency AC generation technology.

Table 7: Recent tenders for AC generation for regional commercial aircraft					
Airframer	**Platform (projected year of launching)**	**System**	**Year contract awarded**	**Winner**	**Possible competitors**
Bombardier	CRJ700/900	CF	1997	HS[(1)]	
Embraer	170/175	CF	1998	HS	Goodrich, Honeywell, Thales
Embraer	190/195	CF	1998	HS	
Comac	ARJ21 (10/2011)	CF	2003	HS	AVIC[(2)], GE, Goodrich, Thales
Sukhoi	Superjet 100 (1Q2011)	CF	2003	HS	Goodrich, Thales, GE[(4)]
Bombardier	CRJ1000	CF	2007	HS	
Mitsubishi	MRJ-90 ([…]*)	–[…]*	2008	HS	ECE, GE, Goodrich, Honeywell, IPS[(3)]

[(1)] HS stands for Hamilton Sundstrand
[(2)] AVIC (Aviation Industry Corporation of China) is a Chinese company with presence in component manufacturing.
[(3)] All competitors only responded to RFI
[(4)] Not known for sure

Source: Parties' estimates

Corporate jets

(325) In relation to the recent tenders for corporate jets, almost all of the tenders were won by Hamilton Sundstrand, including the most recent tender for the Bombardier Global 7000/8000 platform to be launched in 2015 which relies on variable frequency AC. The only exception is the tender for the Bombardier XRS & 5000 which was won by Goodrich in 1994.

Table 8: Recent tenders for AC generation for corporate jets					
Airframer	**Platform (projected year of launching)**	**System**	**Year contract awarded**	**Winner**	**Possible competitors**
Bombardier	605	CF	1970s	HS(1)	
Gulfstream	350/450	CF	1980s	HS	
Gulfstream	500/550	CF	1990s	HS	Honeywell
Bombardier	Global XRS & 5000	VF	1994	Goodrich	HS, Honeywell, Goodrich, Thales
Hawker	4000	VF	1996	HS	Goodrich, Honeywell, Thales
Bombardier	850	CF	2005	HS	
Gulfstream	650	CF	2007	HS	
Bombardier	Global 7000 / 8000 ([…]*)	[…]*	2010	HS	IPS/ECE, Goodrich, HS, Thales
Gulfstream	P42-1/2/3 ([…]*)	[…]*	2010	HS	GE, Thales
Bombardier	Challenger New ([…]*)	[…]*	(*)		ECE, Goodrich, HS, Honeywell, Thales

(1) HS stands for Hamilton Sundstrand
(*) Not yet awarded

Source: Parties' estimates

6.1.8. Case-by-case analysis of recent bids in AC generation

(326) Following the general overview on recent bids presented above, the in-depth market investigation has allowed the reconstruction on a case-by-case basis of the competitive conditions faced by the Parties and their competitors in the bids to supply the AC power generation on the most recently launched aircraft platforms.[255]

(327) The case-by-case analysis revealed that the bidding data contained in Table 4 submitted by the Notifying Party is not always accurate.

6.1.8.1. Boeing 777-200ER

(328) The Boeing 777-200ER is a long range wide body aircraft with over 300 seats. The tender for the constant frequency AC power generator on this commercial widebody platform was won in 2001 by Hamilton Sundstrand according to the bidding data

255 The most recent regional aircraft platforms of Embraer (Embraer 170/175 and Embraer 190/195) awarded in 1998 according to the bidding data submitted by the Notifying Party rely on constant frequency AC generation.

submitted by the Notifying Party.[256] The projected 10 year OEM revenue of the platform is USD […]* million. The platform entered in service in 1996. The Notifying Party claims that the only other contenders in the bid were Goodrich and Honeywell who only participated in the RFI stage.

6.1.8.2. Bombardier Global Express (XRS) & 5000

(329) The Bombardier Global Express and its shorter version the Global 5000 are corporate jets with up to 19 seats. According to the bidding data submitted by the Notifying Party[257], the tender for on this corporate jet was won in 1994 by Goodrich with a variable frequency AC power generator. The Global Express was the first aircraft to adopt variable frequency AC power generation.[258] The projected 10 year OEM revenue of the platform is USD […]* million. The platform entered in service in 1998. The Notifying Party claims that the other contenders in the bid were Hamilton Sundstrand, Honeywell and Thales.

6.1.8.3. Airbus A380

(330) The A380 is a wide body commercial aircraft with 525 up to 850 seats depending on the configuration. The tender for the variable frequency AC power generator on this platform was won in 2001 by Goodrich and Thales through the Aerolec JV according to the bidding data submitted by the Notifying Party.[259] The projected 10 year OEM revenue of the platform is USD […]* million. The platform entered in service in 2006. The Notifying Party claims that the only other contender in the bid was Honeywell.

(331) The market investigation revealed that Hamilton Sundstrand also bid on the Airbus A380. […]*.[260]

(332) […]*.[261]

(333) Therefore, the in-depth market investigation revealed that Aerolec and Hamilton Sundstrand were the two closest contenders in in the bid for the power generator in the A380.

6.1.8.4. Boeing 777-300ER / 200LR / 200F

(334) The Boeing 777-300ER is a long range wide body aircraft with over 300 and up to 550 seats depending on the variant. The tender for the constant frequency AC power generator on this commercial widebody platform was won in 2001 by Hamilton

256 Annex 7.1 [ES] Form CO.

257 Annex 7.1 [ES] Form CO.

258 Deposition of […]* in front of the United States Department of Justice, p. 72.

259 Annex 7.1 [ES] Form CO.

260 Deposition of […]* in front of the United States Department of Justice, p. 63.

261 Deposition of […]* in front of the United States Department of Justice, p. 182.

Sundstrand according to the bidding data submitted by the Notifying Party.[262] The projected 10 year OEM revenue of the platform is USD […]* million. The platform entered in service in 2003. The Notifying Party claims that the contract was awarded directly to Hamilton Sundstrand.

6.1.8.5. Boeing 787

(335) The Boeing 787 dreamliner is a long range wide-body aircraft with 210 to 290 seats depending on the variant. The tender for the variable frequency AC power generator was won in 2004 by Hamilton Sundstrand according to the bidding data submitted by the Notifying Party.[263] The projected 10 year OEM revenue generated from supplying this platform is USD […]* million. The platform entered in service in 2011. The Notifying Party claims that the other contenders in the bid where Goodrich, GE and Honeywell.

(336) [Reference to the influence of a competitor regarding the content of Hamilton Sundstrand's bid]*.[264]

(337) However, it appears that Honeywell was not alone in the bid against Hamilton Sundstrand on the Boeing 787. In fact, Goodrich collaborated with Honeywell in the submission of a joint bid to supply the power generator on the Boeing 787 platform.[265] [Reference to the contributions of Goodrich and Honeywell for the joint bid]*.[266] [Reference to Goodrich's contribution for the joint bid]*.[267]

(338) Moreover, Honeywell had chosen to partner with Goodrich on the engine starter generator system competition due to Goodrich’s credibility in large variable frequency generation after it had won the generator in the A380. The joint bid was ultimately unsuccessful. However, Honeywell still intended to team with Goodrich. In this respect, meetings were held in late 2005 for the planned Boeing Next Generation single aisle aircraft to replace the 737NG, which was ultimately pushed out to the 2025+ timeframe.[268]

(339) GE (formerly known as Smiths Aerospace electric power) also participated in the Boeing 787 electrical power trade studies. However, it appears that Smith did not participate in the final tender since it would have required a large investment to design and produce the hardware as Boeing decreed that all bidders had to submit functioning variable AC starter/generator hardware to the Boeing labs in order to qualify to receive the final tender.[269]

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262 Annex 7.1 [ES] Form CO.

263 Annex 7.1 [ES] Form CO.

264 Deposition of […]* in front of the United States Department of Justice, p. 125.

265 Reply to Question 29 of the Commission's Questionnaire to GE (Q23) of 4 April 2012.

266 Deposition of […]* in front of the United States Department of Justice, p. 125.

267 Deposition of […]* in front of the United States Department of Justice, p. 128.

268 Reply to Question 17 of the Commission's Questionnaire to Honeywell (Q23) of 4 April 2012.

269 Reply to Questions 27 and 28 of the Commission's Questionnaire to GE (Q23) of 4 April 2012.

(340) Therefore, the in-depth market investigation revealed that Goodrich and Hamilton Sundstrand were the two main contenders in the bid for the power generator in the Boeing 787.

6.1.8.6. Airbus A400M

(341) The Airbus A400M is a turboprop military transport aircraft. According to the bidding data submitted by the Notifying Party[270], the tender for the variable frequency AC power generator on this military platform was won in 2004 by Goodrich and Thales through the Aerolec JV. The projected 10 year OEM revenue generated from supplying this platform is USD […]* million. The Notifying Party claims that the other contenders in the bid where GE and Honeywell.

(342) Goodrich in an internal document[271] revealed that contrary to the information provided in the submitted bidding data, Hamilton Sundstrand also participated in the tender for the A400M and made it to the downselection stage. [Reference to Goodrich's views concerning Hamilton Sundstrand]*.

(343) In the same internal document, Goodrich revealed that Honeywell [reference to Goodrich's views concerning Honeywell]*.

(344) As regards GE, the in-depth market investigation revealed that GE only participated in the tender at the RFI stage but did not make it to the RFQ stage.

(345) Therefore, contrary to the Parties claim, the in-depth market investigation revealed that Goodrich and Hamilton Sundstrand were the two main contenders in the bid for the power generator in the newest Airbus A350 platform.

6.1.8.7. Boeing 747-8

(346) The Boeing 747 is a wide-body aircraft with a configuration of over 460 seats. It is the fourth generation of the Boeing 747 version. According to the bidding data submitted by the Notifying Party[272], the tender for the variable frequency AC power generator on the new large commercial widebody Airbus platform was won in 2007 by Hamilton Sundstrand. The projected 10 year OEM revenue generated from supplying this platform is USD […]* million. The platform was launched in 2011.

(347) The market investigation confirmed that the bid was won by Hamilton Sundstrand with a constant frequency AC power generator based on the IDG technology. Only Hamilton Sundstrand participated in the bid for the power generator of this platform.[273]

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270 Annex 7.1 [ES] Form CO.

271 Electrical Power Generation Systems A400M, Goodrich, p. 13 ([…]* - Exhibit 13).

272 Annex 7.1 [ES] Form CO.

273 Reply to Question 3 of the Commission's Questionnaire to Boeing (Q24) of 4 April 2012.

6.1.8.8. Airbus A350 XWB

(348) The Airbus A350 is a long range wide-body 250 to 350 seats aircraft. According to the bidding data submitted by the Notifying Party[274], the tender for the variable frequency AC power generator on the new large commercial widebody Airbus platform was won in 2008 by Hamilton Sundstrand. The projected 10 year OEM revenue generated from supplying this platform is USD […]* million. The platform is not yet in service but launch is expected for […]*. The Notifying Party claims that the other contenders in the bid were Goodrich and Honeywell.

(349) [Reference to Aerolec]*.[275] Moreover, Thales, Goodrich's partner in the Aerolec JV did not participate in this bid and this signals its limitations to participate in bids on a standalone basis.

(350) The market investigation revealed that contrary to what was indicated in the bidding data submitted by the Parties, Honeywell did not bid for the A350[276]. In fact, Honeywell participation on the A350XWB tender was limited to the APU.[277]

(351) Therefore, there were effectively only two contenders in the bid for the power generator in the newest Airbus A350 platform, namely Hamilton Sundstrand and Goodrich.

6.1.8.9. Bombardier CS100

(352) The CS100 is a narrow body regional commercial aircraft with 110 seats. According to the bidding data submitted by the Notifying Party[278], the tender for the variable frequency AC power generator on this corporate jet was won in 2008 by Hamilton Sundstrand. The projected 10 year OEM revenue generated from supplying this platform is USD […]* million. The platform is not yet in service but launch is expected for […]*. The Notifying Party claims that the other contenders in the bid were Goodrich, ECE and IPS and Thales.

(353) However, the in-depth market investigation revealed that no other competitor had been downselected in the Bombardier CSeries.[279]

(354) Therefore, Hamilton Sundstrand was the only effective bidder on the CSeries platform. It won the tender with a variable frequency AC power generator.

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274 Annex 7.1 [ES] Form CO.

275 Footnote 18 Form CO – Electrical systems.

276 Deposition of […]* in front of the United States Department of Justice, p. 301 and HS President's Price Review, Hamilton Sundstrand, 13 October 2009 ([…]* - Exhibit 8, p. 6).

277 Deposition of […]* in front of the United States Department of Justice, p. 111.

278 Annex 7.1 [ES] Form CO.

279 HS President's Price Review, COMAC C919 Electrical System, Hamilton Sundstrand, 13 October 2009, p. 28. ([…]* - Exhibit 008).

6.1.8.10. Comac C919

(355) The C919 is a narrow-body 170-190 seats aircraft. It is one of the most recent tenders organised for the launch of the first large commercial aircraft by Chinese aircraft manufacturer Commercial Aircraft Corporation of China (Comac). According to the bidding data submitted by the Notifying Party[280], the tender for the variable frequency AC power generator on this single aisle platform was won in 2009 by Hamilton Sundstrand. The projected 10 year OEM revenue generated from supplying this platform is USD […]* million. The platform is still not yet in service but launch is expected for […]*. The Notifying Party claims that the other contenders in the bid were Aerolec, ECE Zodiac, GE, Honeywell, IPS, Safran and SEAC. The C919 tender process involved separate Requests for Proposal (RFPs) for the generation system and the distribution systems (primary and secondary).

(356) Safran and GE Aviation Systems (GEAS) bid in partnership to supply the electrical power generation system on the Comac C919. They proposed through their CFM International ("CFMI") joint venture a new innovative technology for the power generator based on an integrated generation gearbox (IGGB). The IGGB is a solution which foresees the integration of an electrical generator in the engine's accessory gearbox, thus eliminating the need for a dedicated oil circuit for the power generator.

(357) Although according to Safran the analysis showed a superior saving in terms of weight and cost for the aircraft, Safran and GEAS were not able to convince Comac that this technology will deliver a better solution than that proposed by Hamilton Sundstrand, which was installed on Comac's smaller ARJ21 platform.[281]

(358) Even though the winning bid for the power generator on the C919 was based on variable frequency, Comac expressed its preference in awarding the contract to a company showing the strongest pedigree in constant frequency AC generation, instead of Aerolec or Goodrich which had at that time the largest accumulated number of flying hours in variable frequency. In fact, Goodrich recognises that its competitor in the C919 was Hamilton Sundstrand.[282] [Reference to Goodrich's views concerning GE]*[283] [reference to Goodrich's views concerning GE]*.[284]

(359) At the moment of the proposal, [reference to Hamilton Sundstrand's capabilities]*.[285]

(360) [Reference to Hamilton Sundstrand's views concerning its competitors]*.[286] [Reference to Hamilton Sundstrand's views concerning Goodrich]*.

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280 Annex 7.1 [ES] Form CO.

281 Reply to Question 27 of the Commission's Questionnaire to Safran (Q23) of 4 April 2012 and Safran C919 Safran equipment proposal, Safran magazine, January 2010.

282 Deposition of […]* in front of the United States Department of Justice, p. 111.

283 Deposition of […]* in front of the United States Department of Justice, p. 120.

284 Deposition of […]* in front of the United States Department of Justice, p. 132.

285 Deposition of […]* in front of the United States Department of Justice, p. 116.

286 HS President's Price Review, COMAC C919 Electrical System, 13 October 2009. ([…]* – Exhibit 008, p. 34).

Figure 9: VF Generator suppliers

[…]*

(361) Hamilton Sundstrand revealed that at the time of the bid Goodrich was perceived as […]*, due to their 50 year experience and their presence on the A380 main generator and on the A330 and A340 auxiliary generators.[287]

6.1.8.11. Irkut MC21

(362) The Irkut MC 21 is mid-size aircraft with 150 to 212 seats depending on the variant. According to the bidding data submitted by the Notifying Party[288], the tender for the variable frequency AC power generator on this single aisle platform was won in 2009 by Hamilton Sundstrand. The projected 10 year OEM revenue generated from supplying this platform is USD […]* million. The platform is not yet in service but launch is expected for […]*. The Notifying Party claims that the other contenders in the bid were Aerolec, ECE Zodiac, GE, Honeywell, IPS, Safran and SEAC.

(363) However, according to Hamilton Sundstrand only Goodrich and Honeywell were the competitors on the MC21.[289]

(364) [Reference to tender]*.[290]

6.1.8.12. Bombardier Global 7000 / 8000

(365) The Bombardier Global 7000/8000 is a corporate jet for 8 to 10 people. According to the bidding data submitted by the Notifying Party[291], the tender for the variable frequency AC power generator on this corporate jet was won in 2010 by Hamilton Sundstrand. The projected 10 year OEM revenue generated from supplying this platform is USD […]* million. The platform is not yet in service but launch is expected for […]*. The Notifying Party claims that the other contenders in the bid were Goodrich, IPS/ECE and Thales.

(366) [Reference to details of Goodrich's bid]*.[292] [Reference to Goodrich's views regarding its chances of winning the tender]*.[293]

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287 Deposition of […]* in front of the United States Department of Justice, p. 307. HS President's Price Review, COMAC C919 Electrical System, Hamilton Sundstrand, 13 October 2009, p. 29 ([…]* - Exhibit 008).

288 Annex 7.1 [ES] Form CO.

289 Deposition of […]* in front of the United States Department of Justice, p. 302 and HS President's Price Review, Comac C919 Electrical system, Hamilton Sundstrand, 13 October 2009, p. 28 ([…]* - Exhibit 008).

290 Deposition of […]* in front of the United States Department of Justice, p. 181.

291 Annex 7.1 [ES] Form CO.

292 Deposition of […]* in front of the United States Department of Justice, p. 64.

293 Bombardier M170 – Bid review and approval, Electric power generation and distribution, Goodrich, February 2010, p. 11 and Deposition of […]* in front of the United States Department of Justice, p. 172.

(367) [Reference to Goodrich's views regarding why they lost the tender]*.[294]

(368) The other retained bidder in the downselection phase was IPS/ECE[295]. However, in the end the winner of the tender was Hamilton Sundstrand.

6.1.8.13. Gulfstream P42 1/2/3

(369) The Gulfstream P42 is a corporate jet. According to the bidding data submitted by the Notifying Party, the tender based on a constant frequency AC power generator on this corporate jet was won in 2010 by Hamilton Sundstrand. The projected 10 year OEM revenue generated from supplying this platform is USD […]* million. The platforms are not yet in service but launch is expected for […]*. The Notifying Party claims that the other contenders in the bid were GE and Thales.

(370) However, the market investigation revealed that General Electric teamed up with Goodrich to supply a variable frequency generator on this platform, where Goodrich was to be responsible for the […]* and GE for the […]*.[296]

6.1.8.14. Embraer 170/190EV

(371) This is an Embraer project concerning a derivative of an existing aircraft, the 170/190 commercial airliner. It concerns a single aisle commercial aircraft with a capacity of 60 to 160 passengers.[297] The aircraft is a replacement of the Embraer 170/175/190/195 platform.

(372) [Reference to Goodrich's tender participation and views concerning Hamilton Sundstrand]*.[298]

(373) […]*.[299]

6.1.8.15. Boeing 777-8 (dash 9)

(374) […]*.[300] With regards to this bid, Hamilton Sundstrand [reference to Hamilton Sundstrand's views concerning Goodrich]*.[301]

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294 Deposition of […]* in front of the United States Department of Justice, p. 93.

295 Deposition of […]* in front of the United States Department of Justice, p. 142.

296 Deposition of […]*in front of the United States Department of Justice, p. 176 and Meeting minutes ECEPS – EPS visit to GE Aviation Vandalia, 10 May 2010 ([…]* - Exhibit 21).

297 […]*([…]* - Exhibit 2, p. 3).

298 […]*Exhibit 2, p. 9.

299 Deposition of […]* in front of the United States Department of Justice, p. 52.

300 Deposition of […]* in front of the United States Department of Justice, p. 218.

301 Deposition of […]* in front of the United States Department of Justice, p. 227.

6.1.8.16. Conclusion

(375) On the basis of the above, it can be concluded that Hamilton Sundstrand and Goodrich have been key contenders in most of the recent bids to supply the AC power generation on recently launched aircraft platforms.

6.1.9. Closeness of competition

(376) The Notifying Party considers that Goodrich is not the most significant constraint on UTC in variable frequency generation, where UTC is constrained by a number of strong alternative suppliers likely to compete forcefully for future platforms. In particular, the Notifying Party points to the fact that recent bidding data highlights that the evolution from constant frequency to variable frequency systems has increased opportunities for competitors to bid on AC generation platforms. It further notes that a number of competitors, including GE, Honeywell, and Thales have bid consistently on recent AC generation platforms and can be expected to compete strongly for future opportunities.

(377) The move towards a platform architecture based on variable frequency AC generation has indeed allowed competitors to challenge the historic near monopoly position held by Hamilton Sundstrand in constant frequency AC generation. The tender for the Airbus A380 was the first truly open tender of this kind for large commercial aircraft. In this tender, Airbus selected the Aerolec joint venture between Goodrich and Thales. The tender was unusual in that the winning bid relied on a variable frequency AC generator which until then did not have a track record in terms of in-service flying hours.

(378) […]*.[302] However, it is noted that, until now Goodrich – through its partnership with Thales in the Aerolec Joint Venture – is the only company other than Hamilton Sundstrand to have won any major tenders for variable frequency AC generation.

(379) The Notifying Party has indicated that Goodrich had been investing in R&D for variable frequency AC generation systems since the 1990s,[303] which suggests that Goodrich was particularly well placed to enter into variable frequency AC generation when the possibility became available. As to whether Goodrich will be prepared to credibly bid for the power generation systems in the next generation aircraft, the Notifying Party further indicates that Goodrich has continued to invest in electric systems in recent years in order to ensure its presence in this market segment.[304]

(380) The market investigation confirmed that Hamilton Sundstrand and Goodrich (or alternatively Goodrich through its partnership in the Aerolec joint venture) are seen as the first and second best suppliers concerning quality, technical specifications,

302 Deposition of […]* in front of the United States Department of Justice, p. 182.

303 Notifying Party's reply to Commission questions of February 10 and February 13, 2012, question 152.

304 […]*.

MRO services and spare parts and prices in variable frequency AC power generation for large and regional commercial aircraft.[305]

(381) The majority of the respondents to questionnaires view Hamilton Sundstrand and Aerolec as the only two companies with the capacity to manufacture variable frequency AC generators for widebody large commercial aircraft.[306]

(382) The market investigation confirmed that Goodrich is perceived as the closest competitor to Hamilton Sundstrand in variable frequency AC generators in large commercial and regional aircraft and, to a lesser extent, in corporate jets.[307]

(383) For corporate jets and helicopters, respondents perceive other companies such as Thales, GE, Sinfonia Technology, Pacific Scientific (Meggit) and IPS as credible suppliers.[308]

(384) In this context, several of the respondents to the market investigation indicated that Goodrich is perceived as the only currently available alternative to team up with to counteract Hamilton Sundstrand strength in power generation.

(385) If the Airbus A380 and the Boeing 787 programs are to be used as proxies for the trend towards electrical power requirement in commercial aviation platform, the next large body commercial aircraft will likely require generators in the 200kVA-250kVA power range. It appears that Hamilton Sundstrand, Aerolec, Goodrich, GE, and Honeywell are the only competitors which have design and manufacturing capacity to be present in that range.[309]

(386) [Reference to Hamilton Sundstrand's and Goodrich's views concerning each other]*, an internal document of Goodrich[310] shown in Figure 10 […]*.

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305 Reply to Questions 72, 73 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012 and reply to Questions 26, 27 of the Commission's Questionnaire to electrical systems customers (Q2) of 24 February 2012.

306 Reply to Question 68 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012 and reply to Question 22 of the Commission's Questionnaire to electrical systems customers (Q2) of 24 February 2012.

307 Reply to Question 76 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012 and reply to Question 30 of the Commission's Questionnaire to electrical systems customers (Q2) of 24 February 2012.

308 Reply to Question 77 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012 and reply to Question 31 of the Commission's Questionnaire to electrical systems customers (Q2) of 24 February 2012.

309 Reply to Question 38 of the Commission's Questionnaire to power generators competitors (Q23) of 4 April 2012.

310 Engine control and electrical power systems, Goodrich Strategic plan 2010, p. 37.

Figure 10: Integrated systems capacity

[…]*

(387) The market investigation also revealed that the merging parties are the closest competitor in relation to one of the main parameters customers use to discriminate competitors in power generation, the power-to-weight ratio (lbs/KVa). In this respect, Hamilton Sundstrand in an internal document shown in Figure 11[311] […]*.

Figure 11: Generator Power to weight

[…]*

(388) In relation to future platform opportunities, Goodrich in an internal document[312] produced around mid-2011 which excludes Hamilton Sundstrand from the assessment, shows that Goodrich has the best position to win the tenders on the variable frequency generator in a series of new platforms such as […]* .

6.1.9.1. Conclusion

(389) On the basis of the above, it can be concluded that Hamilton Sundstrand and Goodrich are currently close competitors in AC power generation.

6.1.10. Countervailing buyer power

(390) The Notifying Party claims that aircraft or engine manufacturers who buy the Parties' components are large, sophisticated firms with significant technical understanding and buying power, which maintain strategic and highly competitive sourcing policies.[313]

(391) The market investigation has revealed that despite the fact that aircraft manufacturers are large and technologically sophisticated customers, the limited number of credible competitors fulfilling the relevant criteria's reduces the choices these customers have to stimulate competition in power generation.

(392) […]* indicate that in the absence of competition, the buyer power of the large airframers is not a sufficient competitive constraint to discipline its suppliers.

(393) While it is true that the ability of Aerolec to enter the market was partly due to the willingness of Airbus to assume the technological risks associated with the move to variable frequency for its A380, this long term project effort would be defeated by the proposed transaction. On the basis of the above, it can be concluded that aircraft manufacturers exert limited countervailing buyer power over the merged entity.

311 Power generation – Competitive Assessment, Hamilton Sundstrand, August 2011, p. 9.

312 Deposition of […]* in front of the United States Department of Justice, p. 147 (Mr Curry - Exhibit 7).

313 Form CO, Sections 1-5 and Common Introduction, p. 2.

6.1.11. The Parties' integration capacity

(394) The Notifying Party indicates that the ability of power generation supplier to offer integration services cannot be considered as a requirement to compete effectively in the supply of AC generation systems. It highlights that even where the generation supplier is unable to integrate the electrical system, the distribution supplier or the airframer would have this capacity.[314]

(395) However, internal documents highlight the increasing relevance that integration capacity plays in relation to electrical systems. In this respect, an internal document of Goodrich […]*.[315]

(396) […]*.[316]

Figure 12: Goodrich's integrated systems capacity

[…]*

(397) The relative weakness of Goodrich in distribution systems will be compensated post transaction since Hamilton Sundstrand has significant presence both in primary and secondary distribution systems.[317]

(398) The airframers requirement for more integrated systems increases the complexity of the products to be supplied, which in turn limits the level of competition between suppliers. However, it is also recognised that in general greater integration would lead to more efficient aircraft.

(399) The market investigation revealed that UTC's merger with Goodrich will contribute to reinforce the merging parties' capacity in electrical systems integration.[318]

(400) In view of the above, it can be concluded that the combination of Hamilton Sundstrand with Goodrich will allow the merged entity to reinforce its position in the fast growing market of electrical integrated systems.

6.1.12. High barriers to entry

(401) Barriers to entry in power generation are relatively high, in particular in AC power generation which is used in most large commercial aircraft. The market investigation has confirmed that incumbent suppliers have an advantage against new entrants due

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314 Notifying Party's reply to the Article 6(1)(c) decision of 4 April 2012.

315 Engine control and electrical power systems, Goodrich Strategic plan, 2 June 2011, p. 19.

316 Engine control and electrical power systems, Goodrich Strategic plan, 2 June 2011, p. 20.

317 According to the Parties estimates, Hamilton Sundstrand market share in AC primary distribution was [20-30]*% out of a total market size of EUR […]* million in 2008 and [10-20]*% out of a total market size of EUR […]* million in 2010 (Form CO, p. 25). As to Hamilton Sundstrand's presence in AC secondary distribution its sales represented approximately EUR […]* million (Form CO, p. 27).

318 Reply to Question 22 of the Commission's Questionnaire to power generators competitors (Q23) of 4 April 2012.

to the relevance that reputational effects, accumulated flying hours and in-service experience play in this market. It has also shown that although the move towards more electric aircraft has enhanced opportunities for new entrants in the aircraft power generation business, those that want to be considered credible alternatives have to incur significant sunk costs in the form of upfront investments for product development.[319] There are many hurdles to get over in order to enter the aircraft power generator market. First, entry requires developing specific technical knowledge due to the aircraft environment in which material reliability, weight and volume constraints, power density and mechanical constraints are not comparable to those applicable in other kind of environments. Second, entry involves engaging in relevant product development, qualification and certification costs. Third, the industrial maturity of the proposed technology plays a role in potential entry. Fourth, the new entrant has to overcome the airframer's general mistrust regarding the technical maturity of the solution proposed by the new entrant.

(402) The Notifying Party contests that suppliers of smaller generators are not able to supply AC generation systems for large commercial aircraft. It is claimed that all suppliers are generally able to supply systems suitable for use on large commercial aircraft. In particular, it is noted that the technical differences cited (for example, efficiency, mechanical sizing, generator control, rotational speeds, and power requirements) between generation systems for larger and smaller aircraft would not preclude suppliers of smaller generators from supplying larger generators.[320]

(403) However, the market investigation broadly confirmed that even for competitors that are already present in variable frequency AC power generation for smaller aircraft entry into the segment for large commercial aircraft will involve significant investments in the order of various tens of millions of EUR and development times above five years from the reply to the request for information to the supply of the product to the customer.[321]

(404) In support of its argument regarding the potential entry in power generation, the Notifying Party[322] submits that airframers do not have a "general mistrust regarding the technical maturity" of a new product offering.

(405) However, the market investigation has confirmed that the TRL, which provides an indication of the technical maturity of the proposed technology, is an important factor to establish who is a credible bidder in a tender.[323] Moreover, the respondents

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319 Reply to Questions 96 and 97 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012 and reply to Questions 47, 48, 49, 50 and 53 of the Commission's Questionnaire to electrical systems customers (Q2) of 24 February 2012.

320 Notifying Party's reply to the Article 6(1)(c) decision of 4 April 2012.

321 Reply to Questions 98 and 99 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012 and reply to Question 51 of the Commission's Questionnaire to electrical systems customers (Q2) of 24 February 2012.

322 Notifying Party's reply to the 6(1)(c) decision of 4 April 2012.

323 Reply to Question 66 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012.

indicate that there is a certain technology readiness level[324] which a potential bidder must reach in order for it to be considered to have a credible product.[325]

(406) The Notifying Party, diminishing the relevance that incumbency plays in this market, argues that accumulated flying hours and in-service experience are not the means by which customers assess reliability of potential bidders.[326]

(407) However, the market investigation has broadly confirmed that the amount of accumulated flying hours and in-service experience are relevant factors to establish who is best placed to win a tender.[327] […]*.[328]

(408) According to Goodrich, on a standalone basis or through Aerolec JV, they are the company with the largest number of accumulated hours on a variable frequency generator. It is claimed that there are three variable frequency platforms in operation today, the Boeing 787, the Airbus A380 and the Global Express business jet. Goodrich provides the generator on the Global Express, Aerolec provides the generator on the A380 and Hamilton Sundstrand provides the generator on the Boeing 787.

(409) Furthermore, the Notifying Party highlights that the dynamic character of the market does not play to the advantage of the incumbents. In particular, the Notifying Party[329] indicates that the market for AC generation systems, like most markets within electrical systems, continues to evolve significantly. The market is characterized by high levels of technological development, as customers seek to develop lighter and more fuel-efficient aircraft and environmental regulations become increasingly stringent. In such circumstances, airframers are consistently looking for customized solutions and the "newest technology", which, by definition, usually means generation systems not yet in flight.

(410) However, the market investigation revealed that notwithstanding the continuous technological improvements in power generation, incumbents have an advantage over new entrants. In particular, they have an advantage because they can reduce the technological risk associated with developing a new generator by relying on the accumulated R&D expenditures, know-how and experience gained from their generators in operation.

(411) Entry in power generation for large commercial aircraft from the neighbouring market of high voltage DC power generation is limited. The market investigation

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324 TRL5 requiring component and/or breadboard validation on relevant environment or TRL6 requiring system/subsystem model or prototype demonstration in relevant environment.

325 Reply to Question 67 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012.

326 Notifying Party's reply to the Article 6(1)(c) decision of 4 April 2012.

327 Reply to Question 65 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012.

328 Deposition of […]* in front of the United States Department of Justice, p. 94.

329 Notifying Party's reply to the 6(1)(c) decision of 4 April 2012.

revealed that DC power generation will not, at least in the near future, become an alternative for power generation in large commercial aircraft, in particular given the significant technical hurdles with high voltage DC power generation prior to application on commercial aircraft.[330] Honeywell points out that it has conducted research in this area but does not believe that high voltage DC power generation will be used in large commercial aircraft in the near future, as evidenced by the reluctance of larger OEMs to take this approach and the difficulties in obtaining the necessary certification. Honeywell considers high voltage DC power generation in large commercial aircraft a possibility in the longer term, possibly around 2030.[331]

(412) The Notifying Party considers that the barriers to entry identified in the Decision would not preclude market entry and/or expansion. The Parties further claim that GE, Honeywell, IPS and Thales already have a track record in APU, military, helicopter and smaller aircraft and are investing to expand into large commercial aircraft.

(413) The Commission observes to the contrary that the results of the market investigation clearly reveal that significant barriers to entry and expansion apply in the market for power generation. Reputational effects, accumulated flying hours and in-service experience are factors that play to the advantage of the incumbent against new entrants in a relatively conservative and risk adverse industry. Besides the existence of significant sunk costs, the market investigation revealed that power generation suppliers with presence in smaller aircraft have limited capacity to supply generators for larger aircraft unless they engage in significant investments due to, among others, technical and product development constraints. The market investigation revealed that presence in APU, military or helicopters is not sufficient to expand into power generation for large commercial aircraft.

(414) The Notifying Party claims that the fact that Goodrich was chosen to supply the power generation on the Airbus A380, is a clear example that customers have the proven capability to sponsor entry.[332]

(415) However, the Commission notes that when Goodrich competed for the A380 platform, it was not a totally unknown company in power generation as it had already competed in the bids for the constant frequency AC generator on several large commercial aircraft platforms, such as the Airbus A320, the Boeing 737 Family and the Boeing 777, as well as in military platform, such as the Boeing C-17, Boeing F-15, Eurofighter Typhoon and Lockheed F-16.[333]

(416) In view of the above, it can be concluded that relatively high barriers to entry or to expansion apply in relation to AC power generation, in particular for large commercial aircraft.

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330 Reply to Question 24 of the Commission's Questionnaire to power generator customers (Q24) of 4 April 2012.

331 Reply to Question 16 of the Commission's Questionnaire to power generators competitors (Q23) of 4 April 2012.

332 Notifying Party's reply to the Article 6(1)(c) decision of 4 April 2012.

333 Electrical systems bidding data Annex 7.1 [ES] of Form CO.

6.1.13. Impact on competition

(417) The impact on competition of the proposed transaction can be summarised as follows. First, when Airbus selected Aerolec to supply the power generator on the A380 platform, it introduced a competitive constraint on Hamilton Sundstrand, which had until then enjoyed a near monopoly position with high profits. Second, the proposed transaction would allow the merged entity to recreate the initial situation in which Hamilton Sundstrand held a near monopoly position although in relation to a new technology. Third, feedback received in the market investigation overwhelmingly shows that customers are concerned about this possibility. Fourth, the market investigation revealed that market players are concerned about the impact the transaction may have on reducing the incentives for innovation. Fifth, rivals expressed their fear that by removing Goodrich, existing and potential entrants will lose a relevant independent company with whom to partner to counteract Hamilton Sundstrand strength in variable frequency AC generation.

(418) Most of the respondents to the market investigation confirm that Hamilton Sundstrand's success in variable frequency AC power generation[334] tenders shows its strength in this segment. Moreover, the market investigation revealed that Goodrich is Hamilton Sundstrand's closest competitor in variable frequency AC generation.

(419) A significant number of market operators expressed concerns that the transaction will have a negative impact on competition on electrical power generation. Post-transaction it appears that only one significant supplier would remain in variable frequency AC generators.[335]

(420) The market investigation further revealed that Goodrich’s expertise and proven technology in variable frequency AC is considered important to the industry. Some respondents expressed concerns that post transaction there would be no credible alternative partner to team up with that would allow them to offer an alternative to Hamilton Sundstrand. It appears that the investments required to ensure standalone presence in generation for large commercial aircraft would be so substantial that teaming up with another industrial partner is considered key to reduce development risks.[336]

(421) Some respondents also noted that the proposed transaction might lead to a reduction in innovation in power generation, since Hamilton Sundstrand will have lower

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334 For example, the A350 XWB of Airbus in 2008, the CS100 of Bombardier (Canada) in 2008, the C919 of Comac (China) in 2009, or the MC21 of Irkut (Russia) in 2009.

335 Reply to Questions 117, 118, 120 and 122 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012 and reply to Questions 64, 65, 67 and 68 of the Commission's Questionnaire to electrical systems customers (Q2) of 24 February 2012.

336 Reply to Questions 117, 118, 120 and 123 of the Commission's Questionnaire to electrical systems competitors (Q1) of 24 February 2012 and reply to Questions 64, 65, 67 and 69 of the Commission's Questionnaire to electrical systems customers (Q2) of 24 February 2012.

incentives to devote resources to R&D due to the disappearance of the competitive constraint exerted by Goodrich.[337]

6.1.14. Conclusion

(422) In view of the above, the in depth investigation has confirmed the serious doubts as to the concentration compatibility with the internal market as expressed in the Article 6(1)(c) decision relation to the market for AC power generators (or alternatively on its possible submarkets).

6.1.15. Modifications of the proposed transaction

6.1.15.1. Description of the proposed commitments

(423) The Notifying Party submitted commitments to the Commission on 11 June 2012. Following the market test, the commitments were modified on 29 June 2012 and a final version was submitted on 12 July 2012.

(424) The commitments consist in the divestiture of Goodrich's entire electrical power systems business.

(425) The commitment removes the entire overlap in relation to AC power generation, and appears a priori to fully address the significant impediment to effective competition identified in this market.

(426) The commitment also includes Goodrich's activities in low voltage DC electric systems and distribution activities, where no significant impediment to effective competition was identified.

(427) In particular, the Electrical Power Systems Divestment Business comprises Goodrich's activities in the design, production, and supply of power generation systems, along with its activities in the design, production, and supply of electric distribution systems. In addition, the Divestment Business includes Goodrich's interests in the Aerolec joint venture between Goodrich and Thales.

(428) The detailed text of these commitments is annexed to this Decision. The main elements of the commitments, as modified, are summarised below.

(429) The business to be divested (hereinafter "the Divestment Business") includes:

(a) Goodrich's facility located in Pitstone, U.K.; […]*;

(b) Goodrich's facility located in Twinsburg, U.S.;

(c) Goodrich's 60% shareholding in Aerolec, a joint venture between Goodrich and Thales; and

[337] Reply to Question 16 of the Commission's Questionnaire to power generator customers (Q24) of 4 April 2012.

(d) All tangible and intangible assets owned by Goodrich or Goodrich Affiliated Undertakings, as well as the personnel (including key personnel) which contribute to the current operation or are necessary to ensure the viability and competitiveness of the Electrical Power Systems Divestment Business.

(e) In addition, UTC is willing, for a transitional period, to supply the Purchaser with […]* currently supplied to the Electrical Power Systems Divestment Business by Goodrich for use in the Electrical Power Systems Divestment Business.

6.1.15.2. Assessment of the commitments

Suitability of the Divestment Business for removing the significant impediment to effective competition

(430) The Divestment Business covers all overlaps between the Parties in the field of aircraft power generation, so that the commitment proposal leads to a complete removal of the overlap.

(431) The technical assistance, transfer of tangible and intangible assets as well as transfer of personnel (including key personnel) involved in the development, production, servicing, and sale of the electric systems products and the transitional supply arrangements provided for in the commitments ensure with the necessary degree of certainty the timely implementation of the commitments and the removal of the significant impediment to effective competition.

(432) The Divestment Business includes all MRO services currently provided in relation to Goodrich's electric systems activities relating to existing (in-service) and future electrical system products, apart from […]*.

(433) The Divestment Business also includes all R&D capability necessary for the viability and competitiveness of the Divestment Business.

(434) Given that the commitments lead to a complete removal of the overlap and have a wider scope in terms of products than the market where the significant impediment to effective competition was identified, the market test undertaken focussed on the viability of the divestment business, in particular on the duration and the scope of the transitional agreements and the transfer of personnel.

Viability of the Divestment Business and modifications of the initial commitments in view of the market test

(435) The market test showed that the commitments would generally enable potential buyers to viably run the Divestment Business. A number of respondents also indicated that they would be interested in buying the Divestment Business.

(436) The technical assistance, the transfer of tangible assets such as the R&D facilities and the manufacturing plants, the transfer of intangible assets, the transfer of personnel involved in the development, production, servicing, and sale of the electric systems products and the transitional supply arrangements provided for in the commitments were seen as sufficient, so that potential buyers could viably run the Divestment Business. However, some scope for improvement was seen in particular

regarding: (i) the duration and the scope of the transitional supply arrangements; (ii) the identification of relevant personnel and assets; (iii) the treatment of the shared resources in the carved out from the Divestment Business; (iv) a requirement that the purchaser should have experience in the field of aerospace and (v); a requirement to have a single purchaser for the entire Divestment Business.

(437) As regards the duration of transitional supply arrangements, it was brought to the Commission's attention that given the long maturity times in which the industry operates, some purchasers might require longer periods to be able to develop the assets in house or to find alternative sources of supply. Therefore, UTC included the possibility to extend the supply arrangements' duration to […]* in these cases. As regards the scope of the transitional supply arrangements, it was considered necessary that given the complexity of the product, besides those transitional arrangements described in the commitments, the Purchaser of the Divestment Business should have the option to require from UTC the provision of certain additional transitional products and services necessary to operate the Divestment Business. Since personnel and the relevant assets are viewed as key to ensure the viability of the Divestment Business, it was considered relevant that at the request of the Purchaser the scope of the personnel and assets covered could be broadened in as far as they are required for the operation of the Divestment Business. The shared resources between the Divestment Business and the carve out activities, which are necessary to ensure the viability of the Divestment Business, should be allocated to the Divestment Business. Finally, following comments received in the market test, UTC specified in the purchaser criteria that the purchaser must have experience in aerospace and that the Divestment Business should be sold to a single purchaser,unless […]*.

(438) It is noted that the fact that the Divestment Business includes Goodrich's activities in relation to electrical DC and APUs contributes to the overall viability of the Divestment package.

6.1.15.3. Conclusion on the commitments

(439) Based on the market test and in view of the above modifications by UTC, the Commission considers that the Divestment Business is a viable business and that the modalities foreseen for its transfer would enable its operation by the purchaser in a competitive and viable manner. The commitments address the concerns identified in this Decision as they remove entirely the overlap between UTC and Goodrich in the market of AC power generation. The Commission therefore considers that the commitments, as modified, are sufficient to remedy the concerns.

6.2. Horizontal effects: Engine Controls

6.2.1. Introduction

(440) The proposed transaction leads to horizontally affected markets in EECs, main fuel pumps and FMUs,[338] as well as in all their segments according to aircraft size (i.e.

[338] The Notifying Party noted a possible overlap between Hamilton Sundstrand and GPECS in the manufacture of lube and scavenge pumps. However, Hamilton Sundstrand only supplies lube and

large commercial aircraft, regional aircraft, corporate aircraft and helicopters) and purpose (civil and military) but for the FMU market segments in large commercial aircraft and regional aircraft.

(441) UTC is active in the production of EECs, main fuel pumps and FMUs through its subsidiary, Hamilton Sundstrand. Goodrich is active in engine controls through two separate businesses, Aero Engine Controls ("AEC") and Goodrich Pump & Engine Control Systems ("GPECS"). Goodrich transferred its engine control design and manufacturing business (including associated personnel and facilities) for larger engines (specifically, those over […]* lbs thrust) into AEC, a 50/50 joint venture with Rolls-Royce, in 2009. GPECS constitutes the engine control business left with Goodrich after the creation of AEC. It produces engine controls for all engine sizes, with a particular focus on engines under […]* lbs thrust.

6.2.2. The treatment of joint-ventures

(442) The Notifying Party submits that it would be inappropriate to assign AEC's market position to Goodrich. According to the Notifying Party, AEC is captive to Rolls-Royce (and vice-versa) and therefore there is no prospect of competition between Hamilton Sundstrand and AEC. Furthermore, the fact that Goodrich has transferred most of its engine controls business into AEC means that a significant portion of its technical know-how, financial strength, manufacturing capability and goodwill is no longer taken into consideration by customers when considering whether GPECS should supply engine controls for a given engine. Moreover, AEC is operationally fire-walled from Goodrich, […]*.

(443) The Commission considers that it would be incorrect to qualify the market shares of AEC as part of the market that is not covered by the merged entity, thereby leaving the impression that it is available to third parties or that AEC could constitute a competitive constraint on the merged entity. Indeed, it is justified to aggregate the market shares of AEC and Goodrich for a number of reasons. First, through its joint control over AEC, Goodrich can exercise decisive influence over its commercial policy, i.e. AEC is not an independent competitive force. Second, according to the Notifying Party, AEC's EECs, main fuel pumps and FMUs are not sold in competition with those of GPECS. Third, Rolls-Royce does not compete

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scavenge pumps for four old Pratt & Whitney engines (the PW2000, PW4000, PW6000 and PW150), […]*. Hamilton Sundstrand's revenues from lube and scavenge pumps are therefore limited (around EUR […]* million in 2010). GPECS only manufactures lube and scavenge pumps for the Eurofighter APU and has de minimis sales (around EUR […]* in 2010). In addition, the Notifying Party estimates that the Parties' combined market share would be under [5-10]*%. Furthermore, the Parties overlap in engine actuators. Hamilton Sundstrand's revenues in this market amounted to USD […]* million in 2010. It only supplies Pratt & Whitney with the exception of Rolls-Royce Trent 900, which was bid before the creation of the AEC joint venture. Goodrich's turnover was USD […]* in 2010, while AEC's revenues amounted to USD […]* million. The Notifying Party estimates the market shares of Hamilton Sundstrand, Goodrich and AEC to be under [0-5]*%, under [0-5]*% and around [5-10]*% respectively. Further to original equipment, the Parties also provide spare parts and MRO services for their own engine controls (Goodrich earned EUR […]* million and Hamilton Sundstrand EUR […]* million from such activities in 2010), but neither Party provides material volumes of spare parts or MRO services for any third party engine controls. Therefore, those markets are not dealt with further in the competitive assessment for engine controls.

independently in these markets, i.e. it is not a prime contractor for EECs, main fuel pumps and FMUs. Fourth, […]*. Fifth, Goodrich has the exclusive right to provide aftermarket services regarding AEC's EECs, main fuel pumps and FMUs. Furthermore, the fact that Goodrich transferred a significant part of its engine controls business to AEC and that AEC is fire-walled from Goodrich is irrelevant for the attribution of the AEC market share. This assessment is in line with the consistent practice of the Commission and the General Court.[339]

6.2.3. Market structure

(444) The worldwide markets for EECs, main fuel pumps and FMUs had an approximate total value of respectively EUR […]* million, EUR […]* million and EUR […]* million in 2010.

(445) The Tables 9-11 show the Notifying Party's estimates for the worldwide market shares in EECs, main fuel pumps and FMUs.

Table 9: Worldwide EEC market shares (2008-2010)

Company	2008		2009		2010	
	Revenues (EUR million)	**Market share (%)**	**Revenues (EUR million)**	**Market share (%)**	**Revenues (EUR million)**	**Market share (%)**
H. Sundstrand	[…]*	[20-30]*	[…]*	[20-30]*	[…]*	[20-30]*
Goodrich	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
AEC	[…]*	[0-5]*	[…]*	[10-20]*	[…]*	[20-30]*
Combined	**[…]***	**[20-30]***	**[…]***	**[40-50]***	**[…]***	**[40-50]***
FADEC Intl.	[…]*	[40-50]*	[…]*	[30-40]*	[…]*	[30-40]*
BAE Systems	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[10-20]*
Safran (Hispano)	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
MTU	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Honeywell	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
JSC Star/Russian	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Other	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Total	**[…]***	**100**	**[…]***	**100**	**[…]***	**100**

339 Commission Decision of 3 July 2001 in Case No COMP/M.2220 – General Electric/Honeywell, OJ L 48, 18.2.2004, p. 1, recitals 47-49 and Case T-210/01 General Electric v Commission [2005] ECR II 5575, paras. 141-147.

Table 10: Worldwide main fuel pump market shares (2008-2010)						
Company	**2008**		**2009**		**2010**	
	Revenues (EUR million)	**Market share (%)**	**Revenues (EUR million)**	**Market share (%)**	**Revenues (EUR million)**	**Market share (%)**
H. Sundstrand	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[10-20]*
Goodrich	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[10-20]*
AEC	[…]*	[0-5]*	[…]*	[5-10]*	[…]*	[5-10]*
Combined	**[…]***	**[30-40]***	**[…]***	**[30-40]***	**[…]***	**[30-40]***
Eaton	[…]*	[40-50]*	[…]*	[30-40]*	[…]*	[30-40]*
JSC Star/Russian	[…]*	[5-10]*	[…]*	[5-10]*	[…]*	[10-20]*
Safran (Hispano)	[…]*	[0-5]*	[…]*	[5-10]*	[…]*	[5-10]*
Woodward	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Honeywell	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Other	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Total	**[…]***	**100**	**[…]***	**100**	**[…]***	**100**

Table 11: Worldwide FMU market shares (2008-2010)						
Company	**2008**		**2009**		**2010**	
	Revenues (EUR million)	**Market share (%)**	**Revenues (EUR million)**	**Market share (%)**	**Revenues (EUR million)**	**Market share (%)**
H. Sundstrand	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[10-20]*
Goodrich	[…]*	[5-10]*	[…]*	[5-10]*	[…]*	[5-10]*
AEC	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[5-10]*
Combined	**[…]***	**[20-30]***	**[…]***	**[20-30]***	**[…]***	**[20-30]***
Woodward	[…]*	[40-50]*	[…]*	[30-40]*	[…]*	[30-40]*
Honeywell	[…]*	[20-30]*	[…]*	[20-30]*	[…]*	[20-30]*
Safran (Hispano)	[…]*	[0-5]*	[…]*	[5-10]*	[…]*	[5-10]*
JSC Star/Russian	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[5-10]*
Other	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Total	**[…]***	**100.0**	**[…]***	**100.0**	**[…]***	**100**

(446) The Tables 12-14 show the Parties' estimates for the worldwide combined market shares in EECs, main fuel pumps and FMUs based on a split per engine size.[340]

[340] Form CO, Annex 6.2 [ECS]. The market size estimates provided by the Notifying Party according to the different splits (i.e. per engine size, aircraft purpose and aircraft size) are not entirely consistent. In particular, there is a substantial difference between the total market size figures provided for the split per aircraft size and the market size figures provided for the remaining splits.

Table 12: Worldwide EEC market shares according to engine thrust (over and under 8 000 Ibs thrust) (2010)

Company	Large engines		Small Engines	
	Revenues (EUR million)	Market share (%)	Revenues (EUR million)	Market share (%)
H. Sundstrand	[…]*	[20-30]*	[…]*	[20-30]*
Goodrich	[…]*	[0-5]*	[…]*	[10-20]*
AEC	[…]*	[10-20]*	[…]*	[20-30]*
Combined	**[…]***	**[30-40]***	**[…]***	**[60-70]***
FADEC Intl.	[…]*	[40-50]*	[…]*	[0-5]*
BAE Systems	[…]*	[5-10]*	[…]*	[20-30]*
MTU	[…]*	[0-5]*	[…]*	[0-5]*
Safran (Hispano)	[…]*	[0-5]*	[…]*	[10-20]*
JSC Star/Russian	[…]*	[0-5]*	[…]*	[0-5]*
Honeywell	[…]*	[0-5]*	[…]*	[5-10]*
Other	[…]*	[0-5]*	[…]*	[0-5]*
Total	**[…]***	**100**	**[…]***	**100**

Table 13: Worldwide main fuel pump market shares according to engine thrust (over and under 8 000 Ibs thrust) (2010)

Company	Large Engines		Small Engines	
	Revenues (EUR million)	Market share (%)	Revenues (EUR million)	Market share (%)
H. Sundstrand	[…]*	[10-20]*	[…]*	[5-10]*
Goodrich	[…]*	[10-20]*	[…]*	[30-40]*
AEC	[…]*	[10-20]*	[…]*	[0-5]*
Combined	**[…]***	**[30-40]***	**[…]***	**[30-40]***
Eaton	[…]*	[40-50]*	[…]*	[10-20]*
JSC Star/Russian	[…]*	[10-20]*	[…]*	[5-10]*
Safran (Hispano)	[…]*	[0-5]*	[…]*	[10-20]*
Woodward	[…]*	[0-5]*	[…]*	[5-10]*
Honeywell	[…]*	[0-5]*	[…]*	[0-5]*
Other	[…]*	[0-5]*	[…]*	[5-10]*
Total	**[…]***	**100**	**[…]***	**100**

Table 14: Worldwide FMU market shares according to engine thrust (over and under 8 000 Ibs thrust) (2010)

Company	Large Engines		Small Engines	
	Revenues (EUR million)	Market share (%)	Revenues (EUR million)	Market share (%)
H. Sundstrand	[…]*	[5-10]*	[…]*	[10-20]*
Goodrich	[…]*	[0-5]*	[…]*	[5-10]*
AEC	[…]*	[5-10]*	[…]*	[10-20]*
Combined	**[…]***	**[10-20]***	**[…]***	**[40-50]***
Woodward	[…]*	[40-50]*	[…]*	[20-30]*
Honeywell	[…]*	[30-40]*	[…]*	[10-20]*
JSC Star/Russian	[…]*	[5-10]*	[…]*	[5-10]*
Safran (Hispano)	[…]*	[0-5]*	[…]*	[10-20]*
Other	[…]*	[0-5]*	[…]*	[0-5]*
Total	**[…]***	**100**	**[…]***	**100**

(447) The Tables 15-17 show the Parties' estimates for the worldwide combined market shares in EECs, main fuel pumps and FMUs based on a split per aircraft purpose.

Table 15: Worldwide EEC market shares according to aircraft purpose (2010)

Company	Civil		Military	
	Revenues (EUR million)	Market share (%)	Revenues (EUR million)	Market share (%)
H. Sundstrand	[…]*	[20-30]*	[…]*	[10-20]*
Goodrich	[…]*	[0-5]*	[…]*	[0-5]*
AEC	[…]*	[10-20]*	[…]*	[30-40]*
Combined	**[…]***	**[40-50]***	**[…]***	**[50-60]***
FADEC Intl.	[…]*	[40-50]*	[…]*	[0-5]*
BAE Systems	[…]*	[5-10]*	[…]*	[20-30]*
Safran (Hispano)	[…]*	[0-5]*	[…]*	[5-10]*
Honeywell	[…]*	[0-5]*	[…]*	[0-5]*
JSC Star/Russian	[…]*	[0-5]*	[…]*	[0-5]*
MTU	[…]*	[0-5]*	[…]*	[5-10]*
Other	[…]*	[0-5]*	[…]*	[0-5]*
Total	**[…]***	**100**	**[…]***	**100**

Table 16: Worldwide main fuel pump market shares according to aircraft purpose (2010)

Company	Civil		Military	
	Revenues (EUR million)	Market share (%)	Revenues (EUR million)	Market share (%)
H. Sundstrand	[…]*	[5-10]*	[…]*	[10-20]*
Goodrich	[…]*	[10-20]*	[…]*	[30-40]*
AEC	[…]*	[0-5]*	[…]*	[10-20]*
Combined	**[…]***	**[20-30]***	**[…]***	**[50-60]***
Eaton	[…]*	[60-70]*	[…]*	[5-10]*
Safran (Hispano)	[…]*	[5-10]*	[…]*	[5-10]*
Woodward	[…]*	[0-5]*	[…]*	[0-5]*
JSC Star/Russian	[…]*	[0-5]*	[…]*	[20-30]*
Honeywell	[…]*	[0-5]*	[…]*	[0-5]*
Other	[…]*	[0-5]*	[…]*	[0-5]*
Total	**[…]***	**100**	**[…]***	**100**

Table 17: Worldwide FMU market shares according to aircraft purpose (2010)

Company	Civil		Military	
	Revenues (EUR million)	Market share (%)	Revenues (EUR million)	Market share (%)
H. Sundstrand	[…]*	[10-20]*	[…]*	[5-10]*
Goodrich	[…]*	[0-5]*	[…]*	[10-20]*
AEC	[…]*	[5-10]*	[…]*	[10-20]*
Combined	**[…]***	**[10-20]***	**[…]***	**[30-40]***
Woodward	[…]*	[40-50]*	[…]*	[10-20]*
Honeywell	[…]*	[20-30]*	[…]*	[10-20]*
Safran (Hispano)	[…]*	[0-5]*	[…]*	[10-20]*
JSC Star/Russian	[…]*	[0-5]*	[…]*	[10-20]*
Other	[…]*	[0-5]*	[…]*	[0-5]*
Total	**[…]***	**100**	**[…]***	**100**

(448) Finally, the Tables 18-20 show the Parties' estimates for the worldwide combined market shares in EECs, main fuel pumps and FMUs based on a split per aircraft size.

Table 18: Worldwide EEC market shares according to aircraft size (2010)

Company	Large commercial aircraft		Regional aircraft		Corporate jets		Rotorcraft	
	Revenues (EUR million)	Market share (%)	Revenues (EUR million)	Market share (%)	Revenues (EUR million)	Market share (%)	Revenues (EUR million)	Market share (%)
H. Sundstrand	[…]*	[20-30]*	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[20-30]*
Goodrich	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[20-30]*
AEC	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[40-50]*	[…]*	[0-5]*
Combined	**[…]***	**[30-40]***	**[…]***	**[30-40]***	**[…]***	**[70-80]***	**[…]***	**[40-50]***
FADEC Intl.	[…]*	[60-70]*	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
BAE Systems	[…]*	[0-5]*	[…]*	[50-60]*	[…]*	[5-10]*	[…]*	[20-30]*
Safran (Hispano)	[…]*	[0-5]*	[…]*	[5-10]*	[…]*	[0-5]*	[…]*	[10-20]*
JSC Star/Russian	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[10-20]*
Honeywell	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[10-20]*	[…]*	[0-5]*
Total	**[…]***	**100**	**[…]***	**100**	**[…]***	**100**	**[…]***	**100**

Table 19: Worldwide main fuel pump market shares (2010) according to aircraft size

Company	Large commercial Aircraft		Regional aircraft		Corporate jets		Rotorcraft	
	Revenues (EUR million)	Market share (%)	Revenues (EUR million)	Market share (%)	Revenues (EUR million)	Market share (%)	Revenues (EUR million)	Market share (%)
H. Sundstrand	[…]*	[10-20]*	[…]*	[0-5]*	[…]*	[5-10]*	[…]*	[0-5]*
Goodrich	[…]*	[0-5]*	[…]*	[20-30]*	[…]*	[10-20]*	[…]*	[30-70]*
AEC	[…]*	[0-5]*	[…]*	[20-30]*	[…]*	[10-20]*	[…]*	[0-5]*
Combined	**[…]***	**[10-20]***	**[…]***	**[50-60]***	**[…]***	**[40-50]***	**[…]***	**[40-50]***
Eaton	[…]*	[80-90]*	[…]*	[40-50]*	[…]*	[40-50]*	[…]*	[5-10]*
JSC Star/Russian	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[20-30]*
Safran (Hispano)	[…]*	[0-5]*	[…]*	[5-10]*	[…]*	[0-5]*	[…]*	[20-30]*
Other	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Woodward	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[5-10]*
Honeywell	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[5-10]*	[…]*	[0-5]*
Total	**[…]***	**100**	**[…]***	**100**	**[…]***	**100**	**[…]***	**100**

Table 20: Worldwide FMU market shares according to aircraft size (2010)								
Company	**Large Commercial Aircraft**		**Regional Aircraft**		**Corporate Jets**		**Rotorcraft**	
	Revenues (EUR million)	**Market share (%)**	**Revenues (EUR million)**	**Market share (%)**	**Revenues (EUR million)**	**Market share (%)**	**Revenues (EUR million)**	**Market share (%)**
H. Sundstrand	[…]*	[0-5]*	[…]*	[10-20]*	[…]*	[20-30]*	[…]*	[5-10]*
Goodrich	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[20-30]*
AEC	[…]*	[5-10]*	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Combined	**[…]***	**[10-20]***	**[…]***	**[10-20]***	**[…]***	**[30-40]***	**[…]***	**[30-40]***
Woodward	[…]*	[50-60]*	[…]*	[50-60]*	[…]*	[40-50]*	[…]*	[20-30]*
Honeywell	[…]*	[30-40]*	[…]*	[10-20]*	[…]*	[20-30]*	[…]*	[5-10]*
Safran (Hispano)	[…]*	[0-5]*	[…]*	[10-20]*	[…]*	[0-5]*	[…]*	[20-30]*
JSC Star/Russian	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[10-20]*
Other	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Total	**[…]***	**100**	**[…]***	**100**	**[…]***	**100**	**[…]***	**100**

(449) Regarding EECs, the merged entity would have a [40-50]*% market share at the worldwide level based on 2010 figures. In narrower segments, the Parties' highest combined market share is in corporate jets ([70-80]*%). In main fuel pumps the Parties' combined market share at the worldwide level is [30-40]*%. The Parties' highest combined worldwide market share in narrower segments is [50-60]*%, for military applications. As regards FMUs, the merged entity would reach a market share of [20-30]*% at the worldwide level. The highest worldwide market share in a narrower segmentation would be [40-50]*% in smaller engines.

6.2.4. Assessment

(450) The Notifying Party submits that the question of how the transaction will impact competition in the EECs, main fuel pumps and FMUs markets is fundamentally affected by the alignment between engine controls manufacturers and engine manufacturers. In addition, they argue that a prospective analysis should focus on ensuring there are sufficient suppliers who are capable of competing with the merged entity.

(451) Regarding engines for large commercial aircraft, there are essentially three suppliers, namely GE, Rolls-Royce and Pratt & Whitney. Pratt & Whitney procures all engine controls from Hamilton Sundstrand except […]*. AEC supplies the large majority ([…]*%) of Rolls-Royce's requirements with the remaining part being legacy contracts from other suppliers. For future engines above […]* lbs thrust, Rolls-Royce will only source engine controls from AEC and AEC will only supply engine controls to Rolls-Royce. The Notifying Party further submits that even though GE operates a somewhat more diversified engine controls procurement policy, they also have strong relationships with their preferred partners, BAE Systems and FADEC International (a joint venture between BAE Systems and Safran) on EECs, Eaton on main fuel pumps and Woodward on FMUs. Together, these suppliers provide […]*% of GE's engine control requirements.

(452) According to the Notifying Party, the net effect of these relationships is that there is no competition between Hamilton Sundstrand and AEC for the supply of EECs, main fuel pumps and FMUs to Rolls-Royce engines above […]* lbs thrust or to Pratt & Whitney's and GE's large engines. However, though GPECS mainly focuses on the supply of engine controls for engines below […]* lbs thrust, the market investigation showed that it also produces engine controls for engines with a higher thrust.[341]

(453) The Notifying Party submits that whilst the level of formal integration is lower for the supply of EECs, main fuel pumps and FMUs for smaller engines, even here engine manufacturers have preferred suppliers and not all opportunities are openly competed for. Therefore, as regards the impact of the transaction from UTC's acquisition of GPECS, the existence of customer alignments would reduce the number of opportunities where the two businesses would be in competition. However, even where they are in competition, the Notifying Party submits that there would remain a sufficient number of alternative suppliers.

6.2.4.1. Aero Engines Controls

(454) The Commission's in-depth investigation confirmed that AEC is captive to Rolls-Royce for the supply of EECs, main fuel pumps and FMUs for future engines above […]* lbs thrust. The investigation also confirmed that in the markets for the supply of EECs, main fuel pumps and FMUs there are other preferred supply relationships, in particular regarding large civil engines.

(455) In any event, […]*. In the course of the procedure, Rolls-Royce has agreed to purchase all of Goodrich's shares in AEC upon the closing of the proposed transaction.[342] In light of this, the only horizontal overlap on engine controls relevant for the purposes of the assessment of this transaction concerns the activities of GPECS and Hamilton Sundstrand.[343]

6.2.4.2. GPECS

(456) As regards the supply of these engine controls by GPECS, the investigation has shown that GPECS and Hamilton Sundstrand have at times participated in the same tenders. For example, both Hamilton Sundstrand and GPECS have bid for the EEC

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341 For example, GPECS supplies EECs, main fuel pumps and FMUs for engines in the 7 000 lbs thrust class.

342 On 7 June 2012, Goodrich and Rolls-Royce have entered into an agreement whereby Rolls-Royce committed itself to exercise its right to purchase all of Goodrich's shares in AEC should the current proposed transaction be completed. […]*.

343 Since Goodrich and Rolls-Royce are the parent companies of AEC, the proposed transaction would create an additional link between two engine manufacturers, Rolls-Royce and Pratt & Whitney (which is part of the UTC group), which could potentially allow the exchange of sensitive information between the two companies and increase the likelihood of coordination. However, during the in-depth investigation, none of the market respondents showed any substantiated concerns regarding potential coordination between the merged entity and Rolls-Royce. In particular, engine customers showed no concerns and were reassured by customary firewalls and nondisclosure agreements – replies to Question 34 of the Commission's Questionnaire to engine customers of 4 April 2012. The Commission did not identify any reasons for concern in this regard.

of the […]*. According to the bidding data submitted, both Parties have also bid to supply EECs for […]*.

(457) The Notifying Party submits that numerous, capable suppliers will continue to compete with UTC to supply engine controls for small engines.

(458) As regards EECs, the Notifying Party submits that BAE Systems is a significant supplier of EECs for both small and large engines. Looking at small engines in particular, BAE Systems supplies the EEC for General Electric's CF34 engine, which powers various regional and business jets, including the Bombardier Challenger 600/800 and CRJ 700/900/1000 and the Embraer ERJ 170/190, and was recently selected to provide engine controls for the JSF F136 engine for military aircraft. BAE Systems has also been approved to provide engineering and technical services to the United States' Army and other federal customers under the Rapid Response-3rd Generation Government-wide contract, making it eligible to bid on a range of task orders during the ten-year life of the contract. BAE Systems' Fort Wayne plant also supplies EECs for GE's T700 engine, which powers Boeing's AH-64 Apache and Sikorsky's UH-60 Black Hawk helicopters.

(459) Safran, through its Hispano-Suiza and Sagem subsidiaries, possesses significant engine controls experience and expertise. Safran produces the ART series of engine controls units, which were developed for the Turbomeca Arrius 1A/1M, Makila 1A2/1K2 and TM333 2B2 turboshaft engines. These engines power the Eurocopter AS 355 Ecureuil, AS 555, AS 532 and Super Puma MkII, Denel Rooivalk and HAL DHRUV helicopters. The ART 2 series of engine controls are installed on various offshore, military and civilian helicopters such as the Eurocopter EC 725 and EC 225. Safran also supplies an EEC for the Snecma M88, an engine designed for the Dassault Rafale fighter aircraft. In 2004, Safran was awarded the contract to supply EECs for Pratt & Whitney Canada's PW610F and PW615F turbofan engines, which power the Eclipse 500 and the Cessna Mustang aircraft, respectively. The Notifying Party understands that recently Safran chose to self-provide (through its Hispano-Suiza subsidiary) the EEC for Snecma's Silvercrest turbofan engine.

(460) Honeywell supplies the EEC for its own TFE731 engine (which powers various Hawker Beechcraft, Lear, Dassault and Gulfstream business aircraft), TPE331 engine (for the HAL 228 military transport), and HTF7000 engine (which powers the Bombardier Challenger 300 and Gulfstream 280), as well as GE's F110 engine (which powers the F-15/F-16 aircraft). Recently, Honeywell competed […]* to provide the entire engine control system, including the EEC, for Rolls-Royce's M250, RR300, and RR500 engines, which power a wide range of Agusta, Bell, and Sikorsky helicopters.

(461) Thales developed a new EEC in collaboration with Turbomeca in 2006. Just a year later, Thales reported that the successful partnership with Turbomeca was growing, and Thales was anticipating the delivery of over 2 000 units of the new FADEC. More recently, in 2009 Thales was awarded a contract to supply the EEC for Turbomeca's Arriel 2D turboshaft engine […]*. Since then, Thales has also competed for the EEC on Turbomeca's Makila 2 engine and on Snecma's Silvercrest turbofan engine (in both cases Goodrich was amongst the competing bidders).

(462) MTU has significantly increased its presence and capabilities in the EEC business over the past decade. MTU developed and introduced its HD-PCM EEC in 2005. Soon after, MTU developed a new generation of engine control units that control the engine and concurrently monitor it. This system, the Digital Engine Control and Monitoring Unit, is currently deployed aboard the Rolls-Royce EJ200 engine, which powers the Eurofighter Typhoon aircraft. In addition, MTU provides the EEC for the Rolls-Royce/MTU/Avio RB199 turbofan engine, which powers the Tornado multirole combat aircraft. Working with Safran, MTU also supplies EECs for the MTR 390 turboshaft engine, which powers the Eurocopter Tiger family of helicopter engines. MTU is now expanding its EEC activities, and in 2011 formed a joint venture with Safran's Sagem, to develop "safety-critical engine controls for programs such as the TP400-D6" Europrop engine and to leverage its relationship with Sagem to "access a wider range of market segments".

(463) Woodward has expanded its reach in EECs as part of a corporate strategy to grow beyond its traditional FMU business and offer the full suite of engine controls. […]*, Woodward subsequently announced that it would combine other electrical products with its core fuel system products to provide a fully integrated engine control system. […]*.

(464) Rockwell Collins […]*Rockwell Collins believes that its proposed engine control system would enable a 50% cost reduction over current engine control systems.

(465) Regarding main fuel pumps, the Notifying Party argued that Eaton, through its Argotech division, is a leading main fuel pump manufacturer for both commercial and military engines. It supplies main fuel pumps to numerous large engines, as well as for the smaller Rolls-Royce BR710 engine (which powers the Gulfstream V and Bombardier Global Express XRS). The company supplies several Pratt & Whitney Canada engines, including variants of the PT6 and PW100 engines, which power a wide range of ATR, Bombardier, and Embraer business and regional aircraft.

(466) Safran provides main fuel pumps for the MTR 390 (which powers the Eurocopter Tiger family) and the RTM 322 (which powers NHIndustries NH90, and the Agusta Westland AW101 and MCH 101). The Notifying Party understands that Safran is also the main fuel pump provider for its Turbomeca subsidiary's Arriel, Arrius, and Makila families of helicopter engines which power an array of Eurocopter platforms including the AS365 series, the AS532, the AS550, the EC130, the EC155, and the EC635.

(467) Woodward has recently developed its main fuel pump capabilities as a complement to its position in the supply of FMUs, and is an increasingly active supplier. Its pumps are deployed on Pratt & Whitney Canada's PW206B and PW206B2 engines (which power the Eurocopter EC135 light-utility civil helicopter and EC635 light utility military), the PW207 engine (which powers Boeing's A160 Hummingbird), the PW207D (which powers Bell's 429 light-utility multi-purpose helicopter), and the PW207E (which powers the MD Helicopter MD902 multi-purpose light-utility helicopter). Woodward also supplies fuel pumps for various Pratt & Whitney Canada corporate jet engines, such as the PW610F (deployed on the Eclipse 500), and the slightly larger PW615F (deployed on the Cessna Mustang).

(468) Honeywell has recently been expanding its main fuel pump capabilities. Honeywell not only provides the pump along with other engine control components for its own TPE331-5 turboprop engine (which powers the Beechcraft King Air, the Dornier 228-200, and a number of other business and regional aircraft) but is now leveraging its extensive experience developing similar systems for the Joint Strike Fighter to establish itself as a systems supplier of both FMUs and main fuel pumps for other engine OEMs. For example, […]*And the Notifying Party understands that Honeywell was recently selected to provide both the FMU and the main fuel pump for General Electric's GE38 turboshaft engine, which will power the Sikorsky CH-53K helicopter. Honeywell's current focus is to further establish itself as a provider of the complete "wetted" side of the engine control system, including both the FMU and the main fuel pump.

(469) With respect to FMUs, the Notifying Party submits that Woodward is a market leader and supplies FMUs for a wide range of engine platforms, including GE's T700 series (e.g., the T700-GE-401 for the Bell UH-1 Y and AH-1 Z, the T700-GE-701C for the Boeing AH-64 and Sikorsky MH-60 R/S, and the T700-GE-701D and GE-701E for the Sikorsky Black Hawk UH-60 and S-70). Most recently, Woodward was selected to provide the fuel system for GE's Passport 20 engine, which will power Bombardier's Global 7000 and 8000 long range business aircraft. Woodward also supplies FMUs for a wide range of large engines.

(470) Honeywell's current focus is to further establish itself as a provider of the complete "wetted" side of the engine control system including both the FMU and the main fuel pump. Honeywell's FMUs have more than a billion fuel control flight hours accumulated, and it supplies the FMU for Pratt & Whitney Canada's PT6 and PW100 engine families. Honeywell deployments on these engine families include the PT6 B-37 (for the Agusta Westland AW-119), the PW123 (for the Bombardier Dash 8 Q200 and Q300), and the PW127 (for Bombardier's ATR 42 and ATR 72 regional aircraft). Honeywell also provides FMUs for its own TFE 731 family of engines, which are deployed aboard the Hawker Beechcraft 750 and 900 XP, the Bombardier Learjet 40 and 45, the Lockheed Martin AT-63 Pampa, the Gulfstream G150, the China Nangchang K-8, and the Dassault Falcon 900 EX; and for its HTF7000 engine, which powers the Bombardier Challenger 300 and is planned for the new Gulfstream G280. […]*.

(471) Safran's FMUs are deployed aboard Turbomeca's Arrius 2B engine, which powers Eurocopter's EC135 light-utility commercial helicopter. In addition, Safran provides the FMU for the RTM 322 engine, manufactured jointly by Rolls-Royce and Turbomeca, deployed on NHIndustries' NH-90 medium-utility, military helicopter and Agusta Westland's AW101 Merlin medium-utility, military helicopter, as well as the MTR390 engine, deployed on the Eurocopter Tiger family of helicopter engines. The Notifyin Party believes that Safran is also the FMU provider for its Turbomeca subsidiary's Arriel, Arrius, and Makila families of helicopter engines which power an array of Eurocopter platforms.

(472) Eaton is actively expanding its activities in the FMU segment. […]*.

(473) During the market investigation, a number of concerns were raised by competitors with respect to potential anticompetitive unilateral effects, in particular concerning

the supply of engine controls for the small engine market, namely engines for corporate aircraft and helicopters.

(474) One competitor pointed out that the competitive conditions in small engine market would decrease.[344] However, this competitor is mainly active in the upper engine market.

(475) In addition, two competitors mentioned that the proposed transaction would make it more difficult to access Pratt & Whitney and Rolls-Royce (for regional aircraft and helicopters).[345] Yet, the competitor referring to Pratt & Whitney does not have any supply relationship with that company, so the proposed transaction would not bring about any change. As regards access to Rolls-Royce, the market investigation indicated that for engines above […]* lbs thrust Rolls-Royce is captive to AEC and vice-versa, so the proposed transaction will not have any related impact. With respect to engines below […]* lbs thrust, Rolls-Royce is not captive to any engine control supplier. It is noteworthy however that Rolls-Royce stated that in the market for the supply of engine controls for small engines there is scope for competition amongst suppliers due to the intense nature of competition in the engine market where OEMs require engine controls suppliers to continually improve in order to support competition at an engine level.[346]

(476) However, while some competitors stated that competitive conditions would change, the only substantiated concerns brought by customers were intimately related to the vertical relationship with the engine market, as none of the customers raised concerns in relation to any unilateral effects resulting from the horizontal overlap between the Parties in EECs, main fuel pumps and FMUs. Customers argued that the proposed transaction does not affect their ability to compete as engine manufacturers[347] and also that the proposed transaction would not increase the negotiating power of the merged entity.[348]

(477) Finally, the customer and competitor replies to the market investigation overall confirmed that for each engine controls segment there are sufficient alternative suppliers to UTC and Goodrich. Customers consistently confirmed that, as submitted by the Notifying Party, there are alternative suppliers for each of the EECs, main fuel pumps and FMUs.[349] None of the customers raised any substantiated concern relating to the lack of alternative suppliers for a particular engine controls segment.

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344 Reply to Question 40.3 of the Commission's Questionnaire to engine controls competitors (Q3) of 22 February 2012.

345 Replies to Questions 40.3, 43.1 and 47.1 of the Commission's Questionnaire to engine controls competitors (Q3) of 22 February 2012.

346 Reply to the Question 38.3 of the Commission's Questionnaire to engine controls customers (Q4) of 24 February 2012.

347 Replies to the Question 44 of the Commission's Questionnaire to engine controls customers (Q4) of 24 February 2012.

348 Replies to the Question 41 of the Commission's Questionnaire to engine controls customers (Q4) of 24 February 2012.

349 Replies to the Commission's Questionnaire to engine controls customers (Q4) of 24 February 2012, in particular to Question 48.

6.2.4.3. Conclusion

(478) In view of the above, the concentration would not significantly impede effective competition with respect to the horizontally affected markets concerning EECs, main fuel pumps and FMUs.

(479) In any event, the Notifying Party has submitted as a commitment the divestiture of GPECS thereby removing the overlap in the markets in question.

6.3. Vertical effects: Engines / APUs

6.3.1. Introduction

(480) The transaction will give rise to a number of vertically affected markets in relation to the market for engines and APUs. Whereas UTC is active as one of the main engine and APUs supplier (through respectively Pratt & Whitney and Hamilton Sundstrand subsidiaries), Goodrich is active upstream as manufacturers and suppliers of engine components such as (1) EECs, (2) fuel nozzles, and (3) nacelles.

(481) The Commission has investigated whether the transaction would lead to vertical non-coordinated effects because of the strong market position held by the merged entity in the mentioned upstream markets and its downstream presence in the market for engines/APUs.

6.3.1.1. Engines

(482) UTC is active in the market for aircraft engines through its subsidiary Pratt & Whitney, as well as two joint ventures, International Aero Engines ("IAE") and Engine Alliance (a 50/50 joint venture between Pratt & Whitney and GE).

(483) Pratt & Whitney's largest business segment is large commercial engines, which it addresses both directly and through the IAE and Engine Alliance joint ventures. However, Pratt & Whitney is also active on the small engine segment.

(484) IAE is presently jointly controlled by Pratt & Whitney and Rolls-Royce. Since 1983, IAE has designed, produced, and sold the V2500 aircraft engine, which is used in large commercial narrow-body aircraft[350] and principally as an engine option on the Airbus A319/A320/A321 family. On 12 October 2011, Pratt & Whitney and Rolls-Royce announced a transaction whereby Pratt & Whitney will acquire Rolls-Royce's equity interests in IAE and thereby acquire sole control over IAE.

(485) The Engine Alliance was established in 1996 in order to develop, manufacture, sell, and support a family of engines for long-range wide-body jet aircraft. The Engine Alliance was originally established to develop the GP7000 engine for the next generation of Boeing 747 and Airbus A3XX aircraft. It produces the GP7200 engine, which serves the Airbus A380 platform.

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350 Narrow-body aircraft have around 150-200 seats (with some smaller configurations) and are generally used to transport passengers across medium distances of around 2 000 to 4 000 nautical miles or to move passengers from small "spoke" airports to larger "hub" airports for flight connections.

(486) According to the Notifying Party, the main competitors on the market are GE, Safran/Snecma, CFMI (a 50/50 joint venture between GE and Safran), Rolls-Royce, Honeywell and Williams.

(487) GE (through GE Aviation) primarily manufactures jet engines for large commercial aircraft, commercial regional jets and military aircraft. GE also sells large gas turbine turboprop engines for general aviation aircraft and turboshaft engines, which are used in helicopters.

(488) Snecma, which is part of the Safran group, produces commercial and military aircraft engines. Snecma manufactures the majority of its large engines in partnership with GE through CFMI. In addition, Snecma also produces engines for military aircraft and it owns Turbomeca, which produces turboshaft engines.

(489) Rolls-Royce has a very broad portfolio of turbofan, turboprop and turboshaft engines. In addition, Rolls-Royce's engines power aircraft in all types of major military aviation applications, from military transport aircraft and helicopters, to trainers and combat aircraft.

(490) CFMI's CFM56 engine has for many years been the exclusive engine for the Boeing 737 aircraft family, which is the best-selling narrow-body large commercial aircraft in the world. The CFM56 is also an engine option on the Airbus A320 family. As a result of these positions, CFMI is the leading supplier of engines for large commercial narrow-body aircraft, with a share of around [70-80]*% in the segment (the other [20-30]*% being represented by the IAE V2500 engine).

(491) Honeywell manufactures engines for regional and corporate jets, as well as helicopters. It has more than twice the market share of GE when it comes to corporate aircraft turbofan engines.

(492) Williams designs, develops, manufactures and certifies small turbofan jet engines which have between 1 000 and 4 000 lbs thrust. Its engines compete mainly for the corporate aircraft segment.

(493) The tables below show the Notifying Party's estimates for worldwide market shares regarding the various engine markets.[351]

[351] The Parties have not submitted market shares for small regional aircraft turbofan engines since they argue that there are none currently in production.

Table 21: Large Commercial Aircraft Turbofan Engines (2011)		
Company	**Sales (USD million)**	**Market Share (%)**
CFMI	[…]*	[40-50]*%
GE	[…]*	[20-30]*%
IAE	[…]*	[10-20]*%
Rolls-Royce	[…]*	[10-20]*%
Engine Alliance	[…]*	[0-5]*%
Pratt & Whitney	[…]*	[0-5]*%
Total	**[…]***	**100%**
Source: Notifying Party's estimates		

Table 22: Large Regional Aircraft Turbofan Engines (2011)		
Company	**Sales (USD million)**	**Market Share (%)**
GE	[…]*	[80-90]*%
Safran	[…]*	[5-10]*%
Rolls-Royce	[…]*	[0-5]*%
Honeywell	[…]*	[0-5]*%
Total	**[…]***	**100%**
Source: Notifying Party's estimates		

Table 23: Corporate Aircraft Turbofan Engines (2011)		
Company	**Sales (USD million)**	**Market Share (%)**
Rolls-Royce	[…]*	[40-50]*%
Pratt & Whitney	[…]*	[20-30]*%
Honeywell	[…]*	[10-20]*%
GE	[…]*	[5-10]*%
Williams	[…]*	[5-10]*%
Total	**[…]***	**100%**
Source: Notifying Party's estimates		

Table 24: Turboprop/Turboshaft Engines (2011)		
Company	**Sales (USD million)**	**Market Share (%)**
Pratt & Whitney	[…]*	[40-50]*%
Rolls-Royce	[…]*	[20-30]*%
GE	[…]*	[10-20]*%
Safran	[…]*	[10-20]*%
Honeywell	[…]*	[0-5]*%
Others	[…]*	[0-5]*%
Total	**[…]***	**100%**
Source: Notifying Party's estimates		

6.3.1.2. APUs

(494) UTC is active in the APU market through its subsidiary Hamilton Sundstrand. Honeywell and Hamilton Sundstrand are the two main players in the market for APUs. In 2011, Honeywell achieved [70-80]*% market share and UTC, through Hamilton Sundstrand, had a [20-30]*% market share (see Table 25).

Table 25: Market shares for the production of APUs						
	2009		**2010**		**2011**	
	Revenue (EUR million)	**Market Share**	**Revenue (EUR million)**	**Market Share**	**Revenue (EUR million)**	**Market Share**
Honeywell	[…]*	[80-90]*%	[…]*	[70-80]*%	[…]*	[70-80]*%
UTC	[…]*	[10-20]*%	[…]*	[20-30]*%	[…]*	[20-30]*%
Microturbo	[…]*	[0-5]*%	[…]*	[0-5]*%	[…]*	[0-5]*%
Total	**[…]***	**100%**	**[…]***	**100%**	**[…]***	**100%**
Source: Notifying Party's estimates. The Notifying Party – Response to the Commission's questions on APUs of 19 April 2012						

(495) With 20 basic models and 41 variants, Honeywell APUs are found on the majority of aircraft worldwide. Since 1952, Honeywell has delivered more than 64 800 APUs, used in more than 150 applications. Aircraft which use Honeywell APUs include the Boeing 737, 747, and 777, as well the Airbus A320. Honeywell's Model 131-9 APU (which is the sole-source on the 737 and an option on the A320) is the most widely produced APU today. Honeywell currently procures […]* of fuel nozzles for its APUs from Goodrich.[352]

(496) Hamilton Sundstrand has been manufacturing APUs for commercial transport aircraft for a comparatively short period of time. In 1989 Hamilton Sundstrand formed a joint

[352] The Notifying Party – Response to the Commission's request for information on APUs of 26 April 2012, p. 1.

venture (called APIC) with Turbomeca in order to produce APUs for commercial aircraft. At that time, the only producer of APUs for large commercial aircraft was Honeywell. […]*, APIC developed APUs for the Boeing 737 Classic and Airbus A320. Hamilton Sundstrand purchased Turbomeca's interest in APIC in 1996.

(497) More recently, Microturbo (a member of the Safran group and a subsidiary of Turbomeca) joined Hamilton Sundstrand in 2010 in a risk-sharing partnership to develop new APUs.

6.3.2. Engine controls

6.3.2.1. Input foreclosure in relation to engine controls for engines

6.3.2.1.1. Introduction

(498) The transaction gives rise to a vertical link between the upstream supply of EECs, main fuel pumps and FMUs, where both Goodrich and UTC (through Hamilton Sundstrand) are active, and the downstream supply of aircraft engines, where UTC is active through Pratt & Whitney. Goodrich has among its customers some of Pratt & Whitney's main competitors in the small engine segment, such as Honeywell and Williams.

(499) During the market investigation, both Honeywell and Williams raised concerns regarding a potential input foreclosure by the merged entity with respect to the supply of EECs, main fuel pumps and FMUs for Honeywell's and William's engines.

(500) Williams designs, develops, manufactures and certifies small turbofan jet engines which have between 1 000 and 4 000 lbs thrust. Its engines – the FJ33-5, FJ44-1, FJ44-1AP, FJ44-2/2A/2C, FJ44-3A, FJ44-3AP and FJ44-4 models - compete mainly for the corporate aircraft segment. The seating capacity in the aircraft which deploy Williams's engines varies from three to eight passengers and the range varies from approximately 1 000 to 2 000 nautical miles.

(501) Williams has been selected as the engine supplier for a number of aircraft: the FJ33-5 (currently undergoing certification) for the Cirrus SJ50 and the Diamond D-Jet; the FJ44-1 for the Cessna CJ and CJ1 (not in production anymore); the FJ44-1AP for the Cessna CJ1+ (not in production anymore) and M2 (currently undergoing certification, expected production start in 2013); the FJ44-2 for Scaled Composites (not yet certified); the FJ44-2A for the Beechcraft Premier 1A, the Sierra FJ44 Stalion, the Sierra Eagle II and the Syberjet SJ30; the FJ44-2C for the Cessna CJ2 (not in production anymore) and the Spirit Wing (not yet certified); the FJ44-3A for the Cessna CJ2+ and CJ3, the Sierra Super II and S-II, and the Clifford Citation II and SII; the FJ44-3AP for the Nextant 400XT and the Hawker 200 (not yet certified; program currently on stop order); and the FJ44-4 for the Cessna CJ4 and the Hawker 400XPR (currently undergoing certification, expected production start in late 2012).[353] Williams competes head-on with Pratt & Whitney Canada in the market for corporate aircraft turbofan engines.

[353] Reply to Question 2 of the Commission's Questionnaire to Williams of 23 April 2012.

(502) Goodrich (through GPECS) supplies Williams with engine controls for the large majority of its engines. Williams and Goodrich have a long term agreement ("Williams LTA"),[354] which was initially signed for the development and supply of the engine controls for the FJ44-3 engine,[355] but which also covers other engines using the same or substantially the same engine controls.[356] Notably, under the Williams LTA Goodrich supplies engine controls for the FJ33-5, FJ44-1AP, FJ44-3A, FJ44-3AP and FJ44-4 models.[357] Therefore, the only engines which do not have Goodrich's engine controls are the FJ44-1, which is out of production, as well as the FJ44-2/2A/2C.

(503) The Williams LTA has been in place since 21 December 2001 and fixes the prices until it expires on 31 December 2012.[358] […]*.[359] Williams believes that post transaction "it will be much more difficult to complete future negotiations at a fair and competitive price".[360] Given that Goodrich supplies the majority of Williams's engines, the company is concerned that the proposed transaction will negatively impact on its ability "to continue to be competitive in its civil engine thrust class of 8000# and below" and "to support aircraft owners/operators who have existing civil certified aircraft [that] use WI's engines".[361]

(504) Honeywell manufactures turbofan, turboprop and turboshaft engines. Its turbofan engines deliver approximately between 3 500 and 7 500 lbs thrust and its turboshaft engines deliver approximately between 650 and 4 800 shp. They are deployed in numerous regional and corporate aircraft, as well as in helicopters. Pratt & Whitney competes with Honeywell on all these aircraft types.

(505) Goodrich supplies Honeywell with EECs, main fuel pumps and FMUs for a number of Honeywell's engines, such as[362]: EECs for the LF502, the LF507, the T55, the CTS800 (produced by a joint venture between Rolls-Royce and Honeywell), the HTS900 and the T800 (produced by a joint venture between Rolls-Royce and Honeywell); main fuel pumps for the T55, the HTS900, and the HTF7000; and FMUs for the T55 and the HTS900. These engines are mainly deployed in

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354 […]*.

355 In particular, engine control units ("ECUs") and fuel delivery units ("FDUs", which include the main fuel pumps and the FMU).

356 […]*.

357 Reply to Question 11.1 of the Commission's Questionnaire to engine control customers (Q4) of 23 February 2012.

358 […]*.

359 […]*.

360 Reply to Question 46 of the Commission's Questionnaire to engine control customers (Q4) of 23 February 2012.

361 Reply to Question 53 of the Commission's Questionnaire to engine control customers (Q4) of 23 February 2012.

362 Reply to Question 5.c of the Commission's Questionnaire to Honeywell of 25 April 2012 and replies to Questions 8 and 17 of the Commission's Questionnaire to Honeywell (Q34) of 4 April 2012.

helicopters, regional aircraft and corporate aircraft, and the majority is deployed in aircraft which are in production.[363]

(506) These supply relationships are covered in a long term contract between Goodrich and Honeywell ("Honeywell LTC") that expires on 31 December 2012[364]. […]*. Honeywell believes that post transaction the merged entity will have the ability to foreclose access to these components in view of the forthcoming expiry of the supply contract with Goodrich.

(507) Post transaction Goodrich's incentives regarding its supply relationships with Williams and Honeywell would change since Goodrich would become part of the same group as Pratt & Whitney, which competes on the engine market with Williams for the corporate aircraft segment and with Honeywell for the corporate, regional and helicopter segments.

(508) In light of these concerns, the in-depth market investigation examined whether the merged entity would have the ability and incentive to implement an input foreclosure strategy with respect to EECs, main fuel pumps, FMUs for engines, in particular regarding Williams and Honeywell. The respective findings are presented in Sections 6.3.2.1.2-5.

6.3.2.1.2. Ability

(509) The Commission's findings indicated that engine controls constitute essential components of the engine. Furthermore, the supply agreements regarding the engine controls supplied by Goodrich for a large number of Williams's and Honeywell's engines expire in December 2012. If the companies do not reach an agreement, Goodrich is not obliged to continue supplying and could in practice stop the supply of engine controls to Williams and Honeywell. Since Williams and Honeywell do not have a second source in place for the engines deploying Goodrich's engine controls, they would be left without engine controls supplier for a number of their existing engine platforms. Therefore, the merged entity could affect Williams's and Honeywell's existing supply relationships with aircraft OEMs by simply not renewing their supply contracts unless Williams and Honeywell could find alternative suppliers and replace in good time Goodrich without incurring significant switching costs. Depending on the timing required for switching to a new supplier, this strategy could also affect the participation of Williams and Honeywell in tenders for future engine supply relationships.

(510) The Notifying Party argues that in any event sufficient alternative sources of engine controls are available.[365] It notes that Honeywell regularly sources in-house the engine controls and that Williams erroneously considers alternatives to be limited since its information on competition in engine controls is ten years old, i.e. based on the tender for the contract signed with Goodrich in 2002. As regards potential

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363 According to Honeywell, some engines, such as the T55 and the T800 are either planned to be in future production or will participate in future competitions which could place them in production. […]*.

364 […]*.

365 Notifying Party's reply to Article 6(1)(c) decision of 4 April 2012.

switching costs, the Notifying Party submits that a number of examples of past situations where the engine manufacturer changed the main fuel pump or the engine control unit make it clear that a motivated OEM working with an experienced supplier can often replace an engine control component in a relatively short time and without excessive cost to the OEM.[366]

Existence of alternative suppliers

(511) The investigation has considered to what extent alternative engine controls manufacturers could replace Goodrich as the current supplier to the majority of Williams' engines.

(512) Many engine control suppliers have a close alignment/vertical integration with engine manufacturers. Hamilton Sundstrand, Honeywell and Sagem (from the Safran group) are examples of vertically integrated suppliers. Independent suppliers would be, for example, BAE Systems, Thales, MTU, Woodward and Eaton, though these are not supplying all of the engine controls types (EECs, main fuel pumps and FMUs) across the entire small engine segments, i.e. regional aircraft, corporate aircraft, helicopters and military applications. Combining Pratt & Whitney with Goodrich would significantly reduce the number of suppliers of engine controls for the small engine segment that are not vertically integrated or otherwise connected to an engine manufacturer

(513) Williams submitted that other than Goodrich there is no ready alternative supplier for Williams's engine controls system. According to Williams, the company needs "the engine controls source to deliver a complete engine control system designed and made to work as a united system that goes into [Williams's] engine and integrates into all WI customer aircraft systems".[367] Although Williams selected Goodrich as its single supplier for the EECs, main fuel pumps and FMUs with respect to the majority of its engines, the market investigation indicated that having a single supplier for the three components is not an essential aspect to be taken into account in order to assess whether a supplier constitutes a viable alternative. First, the vast majority of the respondents to the market investigation have confirmed that having a single supplier of EECs, main fuel pumps and FMUs for each engine platform may be advantageous but is not essential.[368] In addition, a number of Williams's engines have different suppliers for the various engine controls components. This is also true for a number of other engine OEMs which compete with Williams, such as Pratt & Whitney Canada and Honeywell.

(514) Even though Williams specified that it considers Goodrich and Hamilton Sundstrand as the only ready suppliers that "can provide the engine control components fully

366 […]*.

367 Reply to Question 23.1 of the Commission's Questionnaire to engine control customers (Q4) of 23 February 2012.

368 Reply to Question 23.1 of the Commission's Questionnaire to engine control customers (Q4) of 23 February 2012.

capable of meeting [Williams's] requirements",[369] Williams does not consider Hamilton Sundstrand as a viable alternative since it is part of the same group as Pratt & Whitney, which competes with Williams for the corporate aircraft segment.

(515) In that respect, the market investigation has shown that both Hamilton Sundstrand and Honeywell could not be considered as an alternative to Goodrich for the supply of engine controls to Williams. This is because Hamilton Sundstrand and Honeywell produce engine controls that are placed on, respectively, Pratt & Whitney engines and Honeywell engines that compete directly with Williams in the market for corporate aircraft turbofan engines. In fact, according to Williams, who considers Honeywell and Hamilton Sundstrand as sufficiently capable engine controls suppliers and thus viable alternative sources to Goodrich,[370] Honeywell and Hamilton Sundstrand have declined to participate in the 2001 tender for supplying engine controls to Williams.

(516) The Notifying Party submits that engine manufacturers are willing to do business with affiliates of their competitors where those affiliates provide the best value proposition for their engines, and the reputation of the affiliated company depends on providing an assured source of quality supplies.[371] It provides a number of examples of cross-supply relationships involving GE, UTC, Honeywell, Rolls-Royce and Safran. According to the Notifying Party, the fact that cross-supply relationships between competitors are extremely common in the aircraft engine industry is evidence that industry participants do not regard the theoretical prospect of such strategic conduct to be problematic.[372]

(517) Some engine controls competitors, in particular with respect to EECs and FMUs, confirmed the Notifying Party's view that engine manufacturers are willing to do business with affiliates of their competitors in certain situations.[373] This was confirmed for example by Safran, which supplies EECs to Pratt & Whitney Canada, a competitor of Safran's subsidiary Turbomeca.[374] Moreover, they also stressed that engine manufacturers take into account the fact that a supplier is also a competitor

(518) Honeywell states that while it has a supply relationship with Hamilton Sundstrand, that relationship is much narrower in scope than Honeywell's relationship with Goodrich. For example, Hamilton Sundstrand only supplies the main fuel pump for the 731 and CFE738 engines, while Goodrich supplies EECs, main fuel pumps and

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369 Reply to Question 11.3 of the Commission's Questionnaire to engine control customers (Q4) of 23 February 2012.

370 Although Williams considered the likelihood of awarding a contract to these competitors as very low, it attempted to review all potential suppliers. Reply to Question 9.c of the Commission's Questionnaire to Williams of 23 April 2012.

371 Notifying Party's reply to Article 6(1)(c) decision of 4 April 2012.

372 Notifying Party's reply to Article 6(1)(c) decision of 4 April 2012.

373 Replies to Questions 31.1.1, 31.2.1 and 31.3.1 of the Commission's Questionnaire to engine controls competitors (Q25) of 4 April 2012.

374 Note however that accepting that a vertically integrated supplier could be considered as a reliable and viable alternative supplier does not imply that the merged entity, as a vertically integrated supplier of engine controls, could not have the incentive to employ a foreclosure strategy.

FMUs for the HTS900 and the T55, […]*.[375] While these companies cross-supply each other, Goodrich and UTC do not source any product from Williams. Therefore, there is an element of potential retaliation which is present in the cross-supply relationships mentioned by the Notifying Party but which would not exist in the supply relationship between Williams and the merged entity. Therefore, it is accepted that engine controls suppliers active downstream may not constitute viable competitors for Williams.

(519) While Williams submits that Goodrich and Hamilton Sundstrand are the only ready suppliers of engine controls and Goodrich is the only viable supplier, the in-depth market investigation indicated that Williams could resort to other alternatives. First, although in the 2002 tender Williams considered that Goodrich's proposal was considered technically superior,[376] it also considered that the Woodward/Snecma and Goodrich commercial proposals "were very competitive to each other".[377]

(520) As regards main fuel pumps and FMUs, Williams' current G[P]ECS configuration uses an integrated fuel control consisting of both the main fuel pump and the FMU. However, as discussed, whether a supplier is able to provide components cannot be accepted as a valid criterion to assess whether it constitutes a credible alternative for the supply of each of them. Williams had rejected in 2001 an alternative Woodward/BAE Systems bid for the main fuel pump and the FMU due to high non-recurring costs and technical issues[378] but Woodward already supplied the FJ44-2A so it cannot be excluded as capable of developing and providing a replacement unit.

(521) Furthermore, as discussed in the section concerning the horizontal overlap in engine controls, the in-depth market investigation indicates that in addition to Hamilton Sundstrand and Honeywell there remain a number of alternative suppliers of engine

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375 Reply to Question 17 of the Commission's Questionnaire to Honeywell (Q34) of 4 April 2012.

376 Reply to Question 8 of the Commission's Questionnaire to Williams of 23 April 2012. According to Williams, the technical and certification risk for the Goodrich proposal was considered lower than the Woodward/Snecma offer based on several reasons: "(a) Goodrich designs and builds the complete system – design and development are under one roof. (b) Goodrich existing designs were the basis of all major components and were proven in production environments. (c) Goodrich had proven certification experience with pumps, mechanical controls, electronic controls, and software. (d) Goodrich projected a weight advantage of 4.4#. (e) WAES/Snecma proposed a unique method of channel transfer based on a Snecma Tech Demo program; Goodrich proposed conventional fault and detection and handoff. (f) Goodrich proposed a certified circuit design and logic; Woodward/Snecma proposed a new circuit design. (g) Technical ratings out of a possible score of 5.0 – i. Goodrich 4.4, ii. Woodward/Snecma 2.9".

377 Reply to Question 9.d of the Commission's Questionnaire to Williams of 23 April 2012.

378 Reply to Question 9.b of Commission's Questionnaire to Williams of 23 April 2012. Woodward/BAE engine control product for the FJ44-2A was experiencing some problems and the significant lead time for problem resolution between the two companies was considered in the selection. In addition, the proposal was significantly more expensive than others (+70%). However, see also Reply to Question 11.a of Commission's Questionnaire to Williams of 23 April 2012: "Our experience with the FJ44-2A control showed BAE systems as a very capable house; however, they were used to working military programs and all changes regardless of significance were to be formally priced and agreed to prior to proceeding. In our commercial applications with both Woodward and Goodrich, changes are expected and are mutually worked between the companies in order to produce the best product for the marketplace. The Woodward/BAE proposed product weighed more than the Goodrich offering".

controls for corporate aircraft available to Williams, notably BAE Systems, Safran/Sagem and Woodward for EECs, Eaton and Woodward for main fuel pumps, as well as at least Woodward for the FMUs.

(522) As regards Honeywell, in light of its supply relationship with Goodrich, it is relevant to assess whether Honeywell would have alternative suppliers for EECs, main fuel pumps and FMUs for small regional aircraft, corporate aircraft and helicopters.

(523) Honeywell recognizes that it is present or is a potential entrant in some of the market segments in which it sources engine controls from Goodrich. As regards EECs, Honeywell is present in the small regional and corporate EEC segments and a potential supplier in EECs for commercial and military helicopters, while it supplies main fuel pumps for the small regional aircraft as well as the commercial and military helicopter segments and FMUs for all segments in which it sources engine controls from Goodrich except for the military helicopter segment. Honeywell also indicates that Eaton and Woodward supply all ranges of main fuel pumps and FMUs respectively.[379] However, it notes that they do not provide the integration that companies with the full "suite" of products can do. In addition, it considers that other suppliers lack technical knowledge. Honeywell also argues that the fact that a component supplier is active in a certain segment does not mean that it is easy for that supplier to provide components for every engine in that segment. Although engines have similarities in their operations, each one has a different components and the electrical interface is very different.[380]

(524) However, given the presence of Honeywell in the relevant engine control segments and the conclusions reached concerning the existence of alternative engine controls suppliers in the section relating to the horizontal overlap in engine controls, the Commission concludes that there remain a number of alternative suppliers of engine controls for small regional aircraft, corporate aircraft and helicopters available to Honeywell, which includes the possibility for Honeywell to develop the engine controls components in-house.

Switching costs

(525) Even if Williams and Honeywell could find alternative suppliers to Goodrich, the in-depth market investigation has shown that switching costs would be high and that it would take at least three years for Williams and Honeywell to develop alternative engine control systems.

(526) Given that Goodrich could stop supplying Williams not only with one of the components but all three of them (EEC, main fuel pump and FMU), Williams would need to switch to a new supplier for the whole engine control system. According to Williams, this change would entail "significant design and development costs, engine integration and testing costs, including extensive, costly civil certification costs to

379 With the exception of the military helicopter segment, for which Honeywell does not consider Woodward as a supplier.

380 Reply to Questions 13, 14, 15 and 16 of the Commission's Questionnaire to Honeywell (Q34) of 4 April 2012.

recertify each type [of] engine with the new engine controls system. This new engine certification will include some new certification test requirements added recently. This would then be followed by aircraft development and certification costs with the new integrated engine systems."[381]

(527) Moreover, developing a new engine control system and certifying it on all aircraft platforms in production would take considerable effort and resources from Williams. Indeed, it would involve not only engine certification but also aircraft certification. As explained by one engine manufacturer, further to a recertification of the engine due to the change of the EEC, main fuel pump or FMU supplier, "most certification testing is at the engine level" though "certification at the aircraft level will involve engineering support from the aircraft manufacturer to its airworthiness authority and may include flight testing".[382] Usually a recertification of the aircraft is caused by the engine supplier or its suppliers, such certification would have to be paid by the engine supplier.

(528) Based on the time required for the development of the FJ44-3 engine controls, Williams argues that changing from Goodrich to another engine controls supplier would require up to four years, including three years to develop and certify a new supplier and one additional year to certify the new supplier on each engine.[383] According to Williams, separate engine controls certification would need to be performed for each of the engine models deployed in the various specific aircraft platform since each platform has different engine thrust power settings requiring unique engine controls configurations.[384]

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381 Reply to Question 25.1 of Commission's Questionnaire to engine control customers (Q4) of 23 February 2012.

382 Replies to Question 21 of Commission's Questionnaire to engine controls customers (Q26) of 4 April 2012. According to an engine manufacturer, a change of the supplier would not require the recertification of the engine or the aircraft, but would need to endure an extensive programme of development, including flight testing.

383 Reply to Question 14.a of the Commission's Questionnaire to Williams of 23 April 2012. According to Williams, "[t]he time to perform the initial detail design, development and certification of the new supplier [for] EEC and FMU [which, in the case of Williams, includes the main fuel pumps] at the component level is projected to require three (3) years from program go-ahead. This estimated time schedule is supported by the actual timeframe required by Goodrich/Williams to accomplish that equivalent scope of work on the initial existing EEC/FMU. The additional time required by Williams to certify this initial new supplier [for] EEC/FMU on the engine would equate to one (1) year. Thus the total elapsed time from EEC/FMU program go-ahead to certification on the engine is four (4) years. It should be noted that there is considerable engine development testing occurring during years 2-3 of the three (3) year period the new supplier is developing/certifying the EEC/FMU at the component level". Furthermore, Williams claims that developing and testing an engine control system (EECs, main fuel pumps and FMUs) for a newer version of an existing engine would require approximately 2-3 years and USD 5-7 million depending on the extent of the change to the fuel control system, while an all-new engine would require 5 years and USD 50 million to fully develop and test the new control system – reply to Question 5.a of the Commission's Questionnaire to Williams of 27 April 2012.

384 Reply to Questions 14.a and 14.b of the Commission's Questionnaire to Williams of 23 April 2012. According to Williams, "the unique part number/configurations associated with each EEC for each Williams engine model due to the engine model's application software requirements, will require Williams to perform certification of the EEC/FMU on each and every production engine model for the specific aircraft application (due to unique engine power setting requirements)."

(529) As regards costs, Williams estimates that the total costs would amount to USD 30-35 million, involving eight separate engine certification actions.[385] These platforms are the FJ44-4A for CJ4 (3600 lbs. rating), FJ44-4A-32 for Hawker XPR (3200 lbs. rating), FJ44-3A-24 for CJ2 (2400 lbs. rating), FJ44-3A for CJ3, Sierra SII/Super SII, Clifford (all 2800 lbs. ratings), FJ44-3AP for Nextant 400XT (3000 lbs. rating), FJ44-1AP-21 for Cessna M2 (2100 lbs. equivalent rating), FJ33-5 for Cirrus SJ50 (1900 lbs. rating) and the FJ33-5 for Diamond D-Jet (also 1900 lbs. rating, but with different bleeds/loads than Cirrus).[386]

(530) This appears to be consistent with the costs associated with the FJ44-3 tender. It cost Williams a significant amount of money to complete the first development and engine certification with the aircraft.[387] Furthermore, in its bid for the FJ44-3 engine controls, Goodrich estimated the total non-recurring engineering costs to be USD […]* million.[388]

(531) In addition, such change of engine controls supplier would be required for a very significant part of Williams' engine range.

(532) Williams also showed concerns regarding the possible necessity of performing a "field campaign" in order to replace the engine controls in the aircraft that are already certified with Goodrich engine controls when these would be no longer available.[389] However, […]*.[390] Therefore, the merged entity would not be able to implement this particular foreclosure strategy and a field campaign to replace the engine controls would not be necessary.

(533) According to Honeywell, changing one fuel pump, fuel control, or EEC in which the IP is owned by the supplier involves at least 3-5 years of work, and tens of millions of dollars. In particular, an EEC would require 3-5 years to be developed with a cost of USD 20-40 million. Fuel pumps and fuel controls would also require approximately three years to be developed with a cost of approximately USD 6-8 million for a small to medium engine.[391]

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385 Reply to Question 14.a of the Commission's Questionnaire to Williams of 23 April 2012.

386 Reply to Question 10 of the Commission's Questionnaire to Williams of 27 April 2012.

387 Reply to Question 25.1 of the Commission's Questionnaire to engine control customers (Q4) of 23 February 2012.

388 […]* provided as Item 7 of the reply to the Commission's Questionnaire to Williams of 27 April 2012.

389 Reply to Question 14.c of the Commission's Questionnaire to Williams of 23 April 2012. Williams estimated the time and cost of such an operation to be around 10 years and USD 84-105 million: "There are currently about 1800 Williams engines that have been produced/delivered with the Goodrich fuel control system. We expect this quantity will increase over the next three to five (3-5) years wherein a fleet quantity of up to 3500 engines is expected. … [A field campaign] could be performed primarily during engine scheduled maintenance events (i.e. conducted in conjunction with schedule engine overhaul). Therefore, this may take in excess of ten (10) years to completely affect the fielded engines. The total cost of such an effort would be significant. Assuming an engine control system replacement estimated cost of USD 30 000 X the number of Williams' fielded engines is USD 84 million to USD 105 million."

390 […]*.

391 Reply to Question 19 of the Commission's Questionnaire to Honeywell of 4 April 2012.

(534) The information provided by Williams and Honeywell concerning timing and costs required for switching suppliers of EECs, main fuel pumps and FMUs is in line with the feedback provided by other respondents to the market investigation. Indeed, a switch of the supplier of EECs, main fuel pumps or FMUs requires significant investments - several millions of euros[392] - in product development as well as the re-certification of the engine, or at least substantial testing.[393] All these efforts are time-consuming as well. The market investigation has shown that switching the suppliers of EECs, main fuel pumps and FMUs would require up to two years (or three, in the case of the EEC supplier). Respondents also indicated that the engine manufacturer is locked-in to the suppliers of EECs, main fuel pumps and FMUs at least three years before the expected time for starting production.[394]

(535) The Notifying Party also submits that there are various risk mitigation strategies to dampen the impact of delays in qualifying a supplier, including situations where […]*. However, the Commission notes that given the imminent expiry of the supply contracts with Williams and Honeywell, as well as the time required for switching supplier, it is unlikely that any of the mitigation strategies put forward by the Notifying Party would succeed in dampening the impact of delays in qualifying a supplier.

(536) The Commission therefore concludes that the merged entity would have the ability to stop, disturb or otherwise restrict the supply of EECs, main fuel pumps and FMUs to Honeywell and Williams.

6.3.2.1.3. Incentive

(537) A key question is whether the merged entity would also have an economic incentive to foreclose engine manufacturers by disrupting the supply of the EECs, main fuel pumps or FMUs. Foreclosure would only be profitable if it would induce engine customers to purchase Pratt & Whitney's engines instead of its competitors' engines. The in-depth market investigation has therefore focused on identifying the scenarios in which UTC would have an opportunity to shift sales to Pratt & Whitney by engaging in input foreclosure strategies against Williams and Honeywell.

(538) The Notifying Party is not aware of any near term opportunities for strategic behaviour. It submits that there are very few, if any, situations in which UTC would actually have an opportunity and ability to shift engine sales to Pratt & Whitney by engaging in input foreclosure strategies against competitors as the result of the proposed transaction.[395] First, there would be no ongoing competition between existing engines that power regional aircraft, corporate aircraft or helicopters because airframers typically sole-source the engines for such airframes to one engine

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392 Replies to Question 26 of Commission's Questionnaire to engine control customers (Q26) of 4 April 2012.

393 Replies to Question 26 of Commission's Questionnaire to engine control customers (Q4) of 23 February 2012.

394 Replies to Question 27 of Commission's Questionnaire to engine control customers (Q26) of 4 April 2012.

395 Notifying Party's reply to Article 6(1)(c) decision of 4 April 2012.

supplier. Second, there would be no known opportunities to place an existing, already-certified engine on a new airframe platform on the horizon. Third, it is not plausible that UTC might stop supplying a Goodrich engine control on a sole-sourced rival engine in the hope that the aircraft OEM would re-source the engine and choose Pratt & Whitney since it would take considerably longer to source and certify a different engine than it would take to change an engine control component and therefore such a strategy would not result in the shifting of any engine sales to Pratt & Whitney. Finally, the possibility that UTC might hope to increase sales of alternative aircraft (on which a Pratt & Whitney engine is deployed) by holding up the supply of Goodrich engine controls to non-Pratt & Whitney engines deployed on other aircraft is remote. Such a strategy would be ineffective, since (a) there would be no guarantee that sales would be diverted to airframes on which Pratt & Whitney engines are deployed, and (b) the sales-cycles for end-customer airlines are very long and a one/two year impact would likely not have a significant impact on procurement decisions.

(539) In this respect, the market investigation has confirmed that there are no aircraft platforms dual sourcing the engine from Williams or Honeywell and Pratt & Whitney, i.e. where the aircraft customer could choose between a Pratt & Whitney engine and a Williams or Honeywell engine. Also, the market investigation did not point to near-term opportunities whereby Williams or Honeywell would be competing with Pratt & Witney Canada for the engine selection on new corporate aircraft platforms.[396]

(540) However, both Williams and Honeywell provided a list of aircraft in production (or shortly in production) which deploy Pratt & Whitney engines and which compete with aircraft deploying Williams's and Honeywell's engines that use Goodrich's engine controls.

(541) As regards Honeywell, the relevant aircraft are listed in Table 26.

[396] Since there are no near-term opportunities and given the time necessary to develop a new engine control system, even if Williams would not reach a new agreement with Goodrich regarding the supply of engine controls, it would have enough time to find an alternative engine controls supplier before the selection of the engine supplier in the next tender. Therefore, the merged entity would have no ability to foreclose Williams with respect to future tenders for new engine supply relationships.

Table 26: Competing aircraft deploying Honeywell and UTC engines			
Honeywell engine	**Aircraft with Honeywell engine**	**Competing aircraft with UTC engine**	**UTC engine**
T55	Boeing Ch-47/MH-47 Chinook	Bombardier Q400[397]	PW150 or derivatives of PW1000 and PW100
T53	Bell UH-1H Huey, Huey II, AH-1F Cobra, Kaman K-Max, Fuji Bell 205B	Bell (various models)	PT6T-6 PT6C67
LTS101	Bell 222, Eurocopter HH-65A, Eurocopter KHI BK117, Eurocopter AS350D	Eurocopter EC135, AgustaWestland A109E Power	PW206 PW207
T800	Boeing Sikorsky Comanche RAH-66	Bell 412 (various models)	PT6T-6 PT6C67
CTS800-4N	AW Lynx AW159, Super Lynx 300, Lynx ShinMaywa US-2, AW129T	Bell 412(various models)	PT6T-6 PT6C67
HTS900	Bell 407, Bell Kiowa, various aftermarket retrofit programs	Sikorsky S-76D	PW209 PW210
HTF7000	Bombardier Challenger 300 and derivatives, Gulfstream G280, Embraer Legacy 450/500 and derivatives	Gulfstream 200, Hawker 4000,	PW307 PW308
Source: Reply to the Commission's Questionnaire to Honeywell of 16 May 2012			

(542) Williams is the engine supplier for a number of aircraft either in production or whose production is expected to start soon. Goodrich supplies engine controls for a number of these engines. Furthermore, Pratt & Whitney also supplies engines to a number of aircraft which are in production and which compete with those aircraft deploying Williams's engines.[398] The Cirrus SJ50 and the Diamond D-Jet, which use a Williams FJ33 engine, are expected to start production in 2015 and compete with the Cessna Mustang (which deploys a PW 615).[399] The Cessna M2, which uses a Williams FJ44-1AP engine, whose certification is expected in 2013, competes with the Cessna Mustang (which deploys a PW 615) and the Embraer Phenom 100 (which deploys a PW 617). The Cessna CJ2+ and CJ3, the Sierra Super II and S-II, and the Clifford Citation II and SII, which use a Williams FJ44-3A engine, compete with the Embraer Phenom 300 (which deploys a PW 535).[400] Furthermore, the Cessna CJ4, which uses

397 However, while the Boeing Ch-47 is a helicopter, the Bombardier Q400 is a turboprop regional aircraft.

398 Reply to Question 4.a of Commission's Questionnaire to Williams of 23 April 2012.

399 According to Williams, the Cirrus SJ50 and the Diamond D-Jet also compete with the Eclipse 500 (which deploys a PW 610), but the latter is not in production anymore. Replies to Questions 4.a and 5 of the Commission's Questionnaire to Williams of 23 April 2012.

400 According to Williams, the Cessna CJ2+/CJ3, the Sierra Super II/S-II, and the Clifford Citation II/SII also compete with the Cessna Encore (which deploys a PW 530), but the latter is not in production

a Williams FJ44-4 engine, competes with the Embraer Phenom 300 (which deploys a PW 535).

(543) The Notifying Party submits that engine controls vary in price, largely in correlation to the size of the engine they are used on. According to the Notifying Party, the percentage of the engine price represented by Hamilton Sundstrand's engine controls prices varies between […]* (EECs and FMUs) and […]* (main fuel pumps). The price of Goodrich's engine controls represent between […]* of the price of the engine depending on the engine.

(544) Furthermore, based on the aircraft lists provided by Williams and Honeywell and revenue estimates provided by the Notifying Party, the Commission compared: (i) the merged entity's expected losses on the aircraft where Williams and Honeywell are the engine suppliers; and (ii) the merged entity's expected gains on the competing aircraft where Pratt & Whitney is the engine supplier.[401] These expected losses and gains are based on all products supplied by the merged entity for the relevant aircraft and cover OEM sales as well as the aftermarket. The comparison provides an overview of the number of aircraft units deploying Williams's and Honeywell's engines which the merged entity can forego in order to still make profit for each aircraft that deploys Pratt & Whitney's engines and which is sold as a result of a potential input foreclosure scenario.

(545) The data indicates that the merged entity would need to win around one aircraft for every […]* Honeywell-powered aircraft that it forecloses.[402] As regards Williams, the merged entity would need to win around one aircraft for every […]* Williams FJ44 powered aircraft it forecloses.

Table 27: Comparison expected losses and gains – corporate aircraft Williams's platforms

Williams engine	Aircraft deploying Williams's engine	Pratt & Whitney engine	Aircraft deploying Pratt & Whitney's engine	Ratio life term profit
FJ44-1AP	Cessna M2	PW 615	Cessna Mustang	[…]*
		PW 617	Embraer Phenom 100	[…]*
FJ44-3A	Cessna CJ2+	PW 535	Embraer Phenom 300	[…]*
	Cessna CJ3			
FJ44-4	Cessna CJ4	PW 535	Embraer Phenom 300	[…]*
Source of revenue estimates: Notifying Party				

anymore. Replies to Questions 4.a and 5 of the Commission's Questionnaire to Williams of 23 April 2012.

401 This comparison was done with respect to a non-exhaustive number of engine and aircraft platforms, and focused on the corporate market.

402 The difference is due to the different content that the merged entity has in each aircraft deploying Honeywell's and Pratt & Whitney's engines.

Table 28: Comparison expected losses and gains – corporate aircraft Honeywell's platforms				
Honeywell engine	**Aircraft deploying Honeywell's engine**	**Pratt & Whitney engine**	**Aircraft deploying Pratt & Whitney's engine**	**Ratio life term profit**
HTF7000	Embraer Legacy 450	PW308	Hawker 4000	[…]*
	Embraer Legacy 500			
	Gulfstream G280			
Source: Notifying Party				

(546) These scenarios suggest that the merged entity would have the incentive to foreclose Williams if the foreclosure decision were to be based on a comparison of expected upstream losses and downstream gains.

(547) Furthermore, the contracts between Williams and aircraft OEMs contain contractual and legal liabilities for delays and failure to perform. A disruption in the supply from Goodrich would impact Williams's ability to deliver engines. Should the Goodrich delay persist for ten days (or longer if agreed by the aircraft OEM), the termination for default provisions would apply and Williams's customers could invoke remedies. The vast majority of Williams's contracts do not limit the aircraft OEMs' available legal or contractual remedies under said conditions.[403] Therefore, should Goodrich decide to stop supplying engine controls to Williams, such action would have a significant impact on Williams's business, which would not only be limited to lost sales but also relate to potential damage payments and loss of reputation. This scenario would benefit the merged entity because it would divert Williams's time and resources from investing in new products to managing these issues.

(548) Irrespective of whether the profits from any additional Pratt & Whitney engine sales would exceed the lost profits from the foregone component sales, the Notifying Party submits that the merged entity would need to take into account the long-run consequences of any input foreclosure strategy, whether it would be an outright refusal to supply or the degrading of the supply conditions.[404] First, the merged entity would be highly likely to lose the ability to supply any engine components or other products to the engine manufacturer for the foreseeable future. Second, the potential reputational damage to the merged entity would be incalculable, since the industry would learn quickly of any attempted disruptive input foreclosure strategy, and this would apply even if such a strategy was implemented through providing defective goods or delaying tactics, in which case UTC would lose an important part of its reputation for product quality and customer service. Moreover, any attempt at input foreclosure would be quickly detected, and the reputational costs and likely damage from customer retaliation would be enormous. This damage would add to the short-term lost sales of engine controls and vastly outweigh any additional engine sales that hypothetically might be made by Pratt & Whitney in the relatively short time that the foreclosed engine manufacturer would need to source an alternative supplier.

403 Reply to Question 4.b of the Commission's Questionnaire to Williams of 23 April 2012.

404 Notifying Party's reply to Article 6(1)(c) decision of 4 April 2012.

(549) As regards the Notifying Party's argument concerning reputation, the in-depth market investigation appears to confirm that in these markets companies are conscious that they would risk losing significant business should they attempt to implement a foreclosure strategy based on breaching their supply obligations. The vast majority of engine control customers considered it unlikely or very unlikely the merged entity would post transaction change Goodrich's behaviour as a supplier of engine controls.[405] As explained by an engine OEM, Goodrich would not be able to sustain any foreclosure strategy which would require breaching its contractual obligations, since this behaviour would be transparent to the aerospace industry and their customers.[406]

(550) However, such reputational damage might not be evident in the current scenario where Goodrich does not renew its supply agreements with Honeywell and Williams. The way the industry views a disruption of supply within a contractual framework is significantly different than the view it would have if the merged entity were to stop supplying engine controls in the absence of an agreement between the two sides.[407]

(551) Therefore, the Commission concludes that the merged entity would have the incentive to stop, disturb or otherwise restrict the supply of EECs, main fuel pumps and FMUs to Honeywell and Williams.

6.3.2.1.4. Impact

(552) The Notifying Party submits that an input foreclosure strategy would at best have an immaterial and temporary effect on a rival engine manufacturer's ability to compete with Pratt & Whitney since not all of Honeywell's and Williams's engines are reliant on Goodrich's components.[408] However, the Commission notes that almost all Williams's engines rely on Goodrich's engine control system. In addition, the vast majority of Honeywell's helicopters engines deploy Goodrich's engine controls.

(553) As can be seen from Table 23, Honeywell and Williams combined cover [20-30]*% of the market for corporate aircraft turbofan engines and Pratt & Whitney holds

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405 Replies to Question 34 of Commission's Questionnaire to engine controls customers (Q25) of 4 April 2012.

406 Reply to Question 33.1 of Commission's Questionnaire to engine controls customers (Q25) of 4 April 2012.

407 In any event, Williams submits that Goodrich would be willing to risk its reputation by disrupting the supply to Williams because "Goodrich's performance in terms of on-time product delivery, quality and reliability has historically been unacceptable … Examples of this are two active product field campaigns, one for the ECU [EEC] and one for the FDU [main fuel pump and FMU] to address product reliability issues. From a delivery standpoint, their new product on time delivery performance is currently 5% (on a six (6) month basis) and coupled with the above demands due to the campaign, places significant challenges/risks upon Goodrich to perform and thus substantial risks to WI. The merger of UTC/Goodrich further exasperates this as we have already seen the effect of reduced management attention to Williams' programs. This is a matter of priorities driven by Goodrich internal objectives/resources such as the UTC/Goodrich merger and which are often tied to other customer programs which may be larger and generally greater sales/revenues due to larger engine controls/pricing." Reply to Question 3 of the Commission's Questionnaire to Williams of 23 April 2012.

408 Notifying Party's reply to Article 6(1)(c) decision of 4 April 2012.

[20-30]*% market share. However, since different engines within the market have different specifications, each engine competition is likely to be between a relatively limited number of specific engines. The Notifying Party has confirmed that Pratt & Whitney compete directly with Honeywell and Williams for small engines.

(554) On the one hand, if Honeywell and Williams were not able to respond to engine orders placed under their existing engine supply contracts, their customers (i.e. airframers) might not be able to deliver aircraft to the final customers (such as airlines). As a consequence, final customers might opt for buying a competing aircraft deploying a Pratt & Whitney engine. Therefore, the choice of aircraft for final customers could be significantly reduced.

(555) On the other hand, if Honeywell or Williams were not able to participate in tenders for the supply of new engines, the airframers' choice of engine suppliers for their new platforms could be significantly reduced. This reduction of choice might in turn lead to an increase in price level and a reduction in quality.

(556) Vertical foreclosure of engine competitors, such as for example Honeywell and Williams, would therefore reduce an important competitive constraint on Pratt & Whitney, which would likely lead to higher prices. In the case of Honeywell and Williams, this appears particularly true in the corporate turbofan engine segment.[409]

(557) Therefore, a successfully implemented input foreclosure strategy in particular on small engine competitors would have detrimental effect on competition and hence customers.

6.3.2.1.5. Conclusion

(558) In view of the above, in the absence of supply agreements between the merged entity and its customers Honeywell and Williams, the Commission concludes that the in depth investigation has confirmed the serious doubts as to the concentrations compatibility with the internal market as expressed in the Article 6(1)(c) decision with respect to the vertical relationship between, on the one hand, EECs, main fuel pumps and FMUs, and on the other hand, small engines.

6.3.2.2. Modifications of the proposed transaction

(559) The Notifying Party submitted commitments on 11 June 2012. These commitments were market tested by the Commission. In light of the results of the market test, on 29 June 2012 the Notifying Party submitted a revised version, and a final version of the commitments was submitted on 12 July 2012. This version of the commitments is annexed to this Decision and forms an integral part thereof.

6.3.2.3. Description of the proposed commitments

(560) The remedy package consists of a divestiture of (i) Goodrich's engine control business situated at West Hartford, Connecticut, United States and (ii) the assets and

409 For example, according to the Notifying Party, in this segment only Williams and Honeywell are competing with Pratt & Whitney's JT15D and PW500 engines.

intellectual property used for engine controls activities in Montreal, Canada (the "Montreal Assets"), that are currently being transferred to the West Hartford facility (together, the "Engine Controls Divestment Business"). The Engine Controls Divestment Business comprises only the assets owned by GPECS that are relevant for engine controls for small engines. The GPECS legal entities unconnected to engine controls, such as Goodrich's fuel nozzle and turbomachinery businesses and part of Goodrich's landing gear business, are not included in the Divestment Business.

(561) The Engine Controls Divestment Business includes the following:

(a) All tangible and intangible assets (including intellectual property rights) which contribute to its current operation, or are needed to ensure its viability and competitiveness, or are necessary for the development, production, servicing, maintenance, repair, overhaul, airworthiness and sale of its engine control products, […]*;

(b) All transferable licenses, permits and authorisations issued by any governmental organisation for the benefit of the Engine Controls Divestment Business; the Parties will make all reasonable efforts to support the purchaser's receipt of any non-transferrable licenses, permits, and authorizations required for the operation of the Engine Controls Divestment Business;

(c) All contracts, leases, commitments and customer orders of the Engine Controls Divestment Business, including (for the avoidance of doubt) […]*, and all customer, credit and other records that relate to the Divestment Business;[410] and

(d) All personnel currently employed by the Engine Controls Divestment Business.

(562) Further, the remedy package closely tracks the Commission's Model Text for Divestiture Commitments and there are no deviations of any substance.

6.3.2.4. Assessment of the commitments

(563) The divestiture offered addresses all the concerns identified for the engine controls. Through the divestiture, Pratt & Whitney Canada's competitors, in the supply of small engines, will be supplied with engine controls by a third party independent from the merged entity or otherwise related to Pratt & Whitney Canada.

[410] The Notifying Party also undertook to offer to extend certain engine controls supply contracts to which the Engine Controls Divestment Business is a party when those contracts are in place at the date of adoption of the Decision and expire before the Engine Controls Divestment Business is transferred to the purchaser (and are not renegotiated in the meantime). The relevant contracts would be […]*, where the customer's engines for which the engine controls are supplied directly compete with Pratt & Whitney's aircraft engines. These contracts would be extended at the price and on terms and conditions equivalent to those provided at present (either under contract or, where applicable, by course of conduct), for a transitional period expiring one month after closing of the transfer of the Engine Controls Divestment Business to the purchaser.

(564) The wide majority of the respondents to the market test were positive with respect to the suitability of the commitments to remove the competition concerns with regard to the engine controls.

(565) The respondents were of the view that the proposed remedy will attract suitable purchasers, is viable and a suitable purchaser can indeed effectively compete for the supply of engine controls on a lasting basis. Moreover they also deemed the commitment to be sufficiently clear. A number of respondents also indicated that they would be interested in buying the Engine Controls Divestment Business.

(566) On the basis of the above, the Commission concludes that the proposed remedy is sufficient to remove the concerns identified on the markets for engine controls and small engines.

6.3.2.5. Conclusion on the commitments

(567) In light of the above, it is considered that the commitments as submitted on 12 July 2012 would remove the concerns in the markets for engine controls and small engines.

6.3.3. Fuel nozzles

6.3.3.1. Market structure

Fuel nozzles for engines

(568) In 2011, Goodrich generated EUR […]* million from the sale of fuel nozzles for aerospace engines[411] and achieved a worldwide market share of [20-30]*% on this market (see Table 29).[412]

[411] Pratt & Whitney Canada has a captive production of fuel nozzles, which covers about […]* of its total demand for fuel nozzles.

[412] Response to the Commission questions of April 26, 2012 – Auxiliary Power Units, 30 April 2012.

Table 29: Market shares for the production of fuel nozzles for aerospace engines (2009–2011)						
	2009		2010		2011	
	Sales (EUR million)	Share of sales (%)	Sales (EUR million)	Share of sales (%)	Sales (EUR million)	Share of sales (%)
Goodrich	[…]*	[20-30]*	[…]*	[20-30]*	[…]*	[20-30]*
Parker	[…]*	[30-40]*	[…]*	[40-50]*	[…]*	[30-40]*
Woodward	[…]*	[20-30]*	[…]*	[20-30]*	[…]*	[20-30]*
Third party overhaul	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Unison/GE Smiths (AIT)	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Wood Group	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Canyon Engineering	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Jean Gallay	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Triumph	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Aerotech	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Others	[…]*	[5-10]*	[…]*	[0-5]*	[…]*	[0-5]*
Total	**[…]***	**100.0**	**[…]***	**100.0%**	**[…]***	**100.0**
Source: Parties' estimates						

(569) According to the Notifying Party, Goodrich's main competitors are Parker and Woodward.[413] Each of them is active in the design, development, and manufacture of fuel nozzles for all major gas turbine engine manufacturers. They all have similar technical expertise and manufacturing capabilities and have over the years developed close relationships with their key customers.

(570) Parker is active, through its Gas Turbine Fuel Systems Division, in the design and manufacture of fuel nozzles for a broad spectrum of applications, including for commercial and military aircraft engines and power generation turbine engines (namely APUs).

(571) Woodward designs and manufactures gas fuel, liquid fuel and water nozzles for gas turbine engines for commercial and military aircraft and APUs.

Fuel nozzle for APUs

(572) In the course of the market investigation, the APU (Auxiliary Power Unit) market was identified as another vertically affected market in relation to the Parties' presence in the upstream market for fuel nozzles (through Goodrich) and the downstream market for APUs (through Hamilton Sundstrand).

(573) In 2011 Goodrich sold fuel nozzles for APUs for an overall value of EUR […]* million, which represented about [70-80]*% of this market segment. Parker and

413 Form CO Sections 6-8 Turbomachinery, p. 4.

Woodward, Goodrich's two main competitors, had respectively about [10-20]*% and [5-10]* % of this market segment (see Table 30).[414]

Table 30: Market shares for the production of fuel nozzles for APUs (2009–2011)

	2009		2010		2011	
	Sales (EUR million)	**Share of sales (%)**	**Sales (EUR million)**	**Share of sales (%)**	**Sales (EUR milllion)**	**Share of sales (%)**
Goodrich	[…]*	[50-60]*	[…]*	[60-70]*	[…]*	[70-80]*
Parker	[…]*	[20-30]*	[…]*	[20-30]*	[…]*	[10-20]*
Woodward	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Third party	[…]*	[10-20]*	[…]*	[5-10]*	[…]*	[0-5]*
Others	[…]*	[20-30]*	[…]*	[5-10]*	[…]*	[0-5]*
Total	**[…]***	**100.0**	**[…]***	**100.0**	**[…]***	**100.0**
Source: Parties' estimates						

(574) Goodrich's important market share can be explained in view of the supply relationship with the APU market leader, i.e. Honeywell, […]*.[415]

6.3.3.2. Input foreclosure in relation to fuel nozzles for engines and APUs

(575) The proposed transaction gives rise to a vertical link between the supply of aircraft engines and APUs, where UTC is active respectively through its subsidiary Pratt & Whitney and Hamilton Sundstrand, and the manufacture of fuel nozzles for engines and APUs, where Goodrich is active. Goodrich has among its customers some of Pratt & Whitney's main competitors in the small engine segment, such as Honeywell and Williams. In addition, Goodrich has engaged in a R&D cooperation with Rolls-Royce, one of the main large commercial engine manufacturers competing with Pratt & Whitney, to develop a new generation of fuel nozzles that will reduce large engines emissions. Finally, Goodrich also supplies fuel nozzles for Honeywell's APUs, which compete directly with Hamilton Sundstrand's APUs.

(576) In the course of the proceedings, in view of the existing supply relationship with Honeywell and Williams and the R&D agreement with Rolls-Royce, concerns arose that the merged entity will have the ability and incentive to implement a foreclosure strategy in relation to fuel nozzles for engines and APU so as to damage these companies to the merged entity's benefit.

Williams

(577) Williams sources all the fuel nozzles for its civil certified engines from Goodrich (Delavan),[416] and it does not have any long term supply agreement for fuel nozzles. However, Williams has a product support agreement for fuel nozzles, which covers

414 Response to the Commission questions of April 26, 2012 – Auxiliary Power Units, 30 April 2012.

415 […]*.

416 Response to the Commission's request for information to Williams of 23 April 2012.

all of Williams' platforms and […]*This product support agreement therefore guarantees continuity of supply for all of Williams' existing engine contracts.[417]

Honeywell

(578) Honeywell expressed the concerns that the proposed transaction would enable the merged entity to foreclose access to fuel nozzles in relation to existing platforms and possibly to future platforms.

(579) Honeywell, which source fuel nozzles for several of its engine and APU platforms, has no life-of-type agreement with Goodrich[418] and expressed the concern that whereas prior to the proposed acquisition, Goodrich was an independent supplier aligned with its customers to provide an assured supply of quality parts on a timely basis and at competitive pricing, with UTC's proposed acquisition of Goodrich, these incentives would change and it could be in UTC/Goodrich's interest to diminish Goodrich's current customers' ability to compete against UTC engines.[419]

(580) Switching fuel nozzle supplier is not straight forward. In fact, the IPRs associated to the fuel nozzle component are normally held by the supplier,[420] therefore, in order to introduce a new supplier and replace the incumbent, the engine OEM should account for the time required by the new supplier to design and develop from scratch the new nozzle component. In addition, as for other engine components, the replacement of a fuel nozzle on an existing certified engine platform requires in any case the testing and certification of the new component.[421] Honeywell argues that switching would take between 3-7 years[422] and require investments of tens-of-millions of dollars.[423]

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417 The market investigation has also indicated that there are no near-term opportunities for strategic foreclosure behaviour to hinder Williams' competitiveness in future engine tenders.

418 Once the fuel nozzle supplier has been selected, the engine OEM can either sign supply contracts that last for the life of the component (i.e. Life of Type Contracts) or contracts of limited duration. Supply contracts normally cannot be renegotiated during their term.

419 Honeywell - Reply to Question 37 of the Commission's Questionnaire to turbomachinery customers (Q11) of 24 February 2012.

420 For any new engine program, the fuel nozzles supplier is selected on the basis of a competitive tender procedure. Normally the engine OEM only provides the technical specifications (such as performance specifications and installation requirements) for the fuel nozzle, whereas the fuel nozzle supplier carries out the work to design and develop a nozzle component that can meet the specifications provided by the OEMs. Consequently, fuel nozzles suppliers normally retain all the IPRs associated to the design, development and manufacture of the nozzles.

421 The Notifying Party indicate that in case the engine has already been approved, the engine OEM would just perform testing on the new fuel nozzle, including a 150-hour endurance test, an engine performance test, a flight test, and a cold start test. The OEM would also perform First Article Inspection (FAI) as required by the aerospace quality standards (AS9100). The Notifying Party maintains that in total this testing phase would take between […]*.

422 The Notifying Party indicates that in Goodrich's experience, switching fuel nozzle supplier would take an engine OEM from […]* to […]*, depending on the application and the complexity of the hardware.

423 Honeywell - Reply to question 20.1 of the Commission's Questionnaire to turbomachinery customers (Q11) of 24 February 2012.

(581) The market investigation confirmed that switching is highly costly and time consuming. Woodward indicated that from the receipt of the technical specifications it would take about 18 to 24 months to start delivering to the engine OEM.[424] Parker provided the example of the CF34-10 program, where GE was initially dual sourcing nozzles from Goodrich and Parker and, further to a technical problem with Goodrich's nozzle, Parker was invited to take over Goodrich's part of business. Despite the fact that Parker was already on the platform and, thus, had ready a nozzle design that required just a modest change, it nonetheless took Parker about a year and a half to qualify the component and start shipping production.[425]

(582) Second, since fuel nozzle is a critical component for the functioning of the engine, a foreclosure strategy in relation to nozzles would be able to disrupt Honeywell's engine production. During the time needed to qualify a new supplier for nozzles, Honeywell would not be able to honour its existing engine supply contracts with airframers, and it might also not be able to win upcoming/near-term tenders for the supply of engines.[426]

(583) Third, Honeywell relies on Goodrich for the supply of nozzles for a number of engine platforms, which compete head-to-head with Pratt & Whitney in the small engine segment (i.e. corporate turbofan and turboprop segment).[427] Therefore, an input foreclosure strategy against Honeywell would likely increase sales of Pratt & Whitney engines because, at least for some platforms, airframers would procure Pratt & Whitney's engines because of the impossibility of obtaining Honeywell's engines.

(584) In addition, Honeywell pointed out that Goodrich supplies nozzles for Honeywell's 131-9A APUs, which continuously compete head-to-head with Hamilton Sundstrand APUs for the A320.[428] In fact, Airbus dual sources APUs for the A320 platform from Honeywell and Hamilton Sundstrand. Honeywell bids for these APU contract awards with its 131-9A APU and Hamilton Sundstrand with its APS 3200.[429] Consequently, UTC would have the ability to disrupt supply of fuel nozzles to Honeywell, so as to gain higher profits by capturing Honeywell's A320 APU sales. According to Honeywell, in the best case scenario, a total input foreclosure strategy would keep

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424 Woodward - Reply to question 22.1.4 of the Commission's Questionnaire to turbomachinery competitors (Q10) of 23 February 2012.

425 Parker Hannifin - Reply to question 22 of the Commission's Questionnaire to turbomachinery competitors (Q10) of 23 February 2012.

426 The Notifying Party indicates that in the smaller regional and corporate engine segments it is quite common practice to participate in tenders by offering slightly different versions of existing engines.

427 Honeywell - Reply to Question 11 of the Commission's Questionnaire to fuel nozzles customers (Q28) of 4 April 2012.

428 Honeywell - Reply to Question 8.c, Additional Responses to the Commission's Questionnaire to engine controls competitors (Q25) of 12 April 2012.

429 Honeywell - Reply to Question 5.c, Additional Responses to the Commission's Questionnaire to engine controls competitors (Q25) of 12 April 2012.

Honeywell out of the market for at least 2-3 years[430], as this would be the minimum time needed to qualify a new APU fuel nozzle supplier.[431]

(585) At the basis of Honeywell's concerns about a possible input foreclosure in relation to its existing platforms was the fact the current fuel nozzles supply contract with Goodrich, which covers the fuel nozzle requirements for multiple engine and APU platforms (including the 131-9A APU), was due to expire on 30 June 2012[432].

(586) On 8 June 2012, after lengthy negotiations, Goodrich and Honeywell reached an agreement on the terms for a […]*extension of the current supply contract for nozzles […]*. Based on the findings of the market investigation, the proposed timeframe of the contract and the notice requirement will give Honeywell enough time to introduce a new supplier for nozzles and be able to guarantee production continuity if Goodrich decides not to supply beyond […]*. Honeywell confirmed that the new agreement reduces its concerns about the ability of the merged entity to foreclose access to fuel nozzles as it guarantees security of supply for the next years.[433] In the meantime, the Notifying Party indicates that Honeywell has already started to take arrangements to introduce another fuel nozzle supplier on its platforms, at least for APUs.[434] Therefore, the Commission considers that the new extended contract dispel any concern in relation to the merged entity's ability to foreclose access to fuel nozzles in relation to engines and APUs to Honeywell.

(587) As regards the ability of the merged entity to prevent Pratt & Whitney competitors from developing new engines in the future by restricting access to Goodrich's fuel nozzles, Honeywell indicated that they often had considered Goodrich as the only capable supplier for their engines. However, the market investigation indicated that Parker and Woodward are considered capable alternative suppliers to Goodrich in the various engine segments, [435] including small engines and APUs.[436]

(588) To conclude, post-transaction Honeywell and any of Pratt & Whitney's and Hamilton Sundstrand's competitors will continue to have sufficient choices for the out-sourcing of fuel nozzles for aerospace engines and APUs.

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430 Honeywell - Submission to the European Commission on vertical effects of UTC/Goodrich, 2 May 2012.

431 This estimate varies significantly from that of the Notifying Party, which considers that it takes one year to qualify a new supplier for APU nozzles.

432 […]*.

433 Honeywell - Reply to question 1 of Questionnaire to Honeywell on the extension of the supply agreement with Goodrich in relation to fuel nozzles of 12 June 2012.

434 […]*.

435 The Commission investigation confirmed that Parker and Woodward competed in the past 3 years for the supply of nozzles not only for large turbofan engines, but also for other types of engines and for APUs. Woodward confirmed its interest and willingness to supply to any engine segment. Williams considers Woodward as a capable and credible supplier of fuel nozzles. Parker as well has confirmed that, despite finding the large turbofan market more attractive, the company is present to varying degree in all the different engine segments and would not experience any difficulties in supplying nozzles for any of the specific engine segment.

436 […]*.

Rolls-Royce

(589) Goodrich is currently cooperating with Rolls-Royce on the development of a new lean burn fuel nozzle technology, which will improve the emission performance of engines and is expected to be a stringent requirement for participating in future competitions for large commercial engines. The investigation shows that the merged entity will have the ability and incentive to implement an input foreclosure strategy in relation to the new lean burn fuel nozzles.

6.3.3.3. Assessment

Ability

(590) Contrary to more generic components, fuel nozzles are interlocked with engine production as each nozzle is designed specifically to meet the performance requirements associated to a particular engine. As such they constitute a crucial input pursuant to paragraph 34 of the Guidelines on the assessment of non-horizontal mergers under the Council Regulation on the control of concentrations between undertakings ("Non-Horizontal Guidelines")[437] and may provide the supplier the ability to carry out input foreclosure.

(591) The Notifying Party explained that fuel nozzle suppliers, driven by the new regulatory requirement about fuel emissions reduction, are currently working with engine OEMs to develop new technologies to meet tighter NOx (nitrogen oxides) emission requirements (i.e. CAEP 8), which will likely enter into force as of 2014[438].

(592) Engine OEMs are obliged to comply with these requirements and must ensure that an engine certified after a specific cut-off date is compliant. Consequently, improved emission performance is expected to be a crucial requirement for future large commercial engines.

(593) The Notifying Party indicates that compliance with NOx reduction requirements can be achieved through use of a variety of technologies and/or modifications to the combustion process in the engine.

(594) In 2009 Goodrich has signed a […]* research and cooperation agreement with Rolls-Royce to develop a new lean–burn technology, which will help to cut engine emissions. This technology requires that the fuel mixture injected into the combustor is less fuel-rich and contains more air, hence enabling a cleaner (“lean”) burn. It involves the use of “lean-burn fuel nozzles” that mix the fuel with more air.

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437 OJ C 6, 18.10.2008, p. 265.

438 The CAEP emission standard is issued by the UN body responsible for worldwide planning, implementation and coordination of civil aviation, namely the International Civil Aviation Organization-ICAO. This standard is then followed and implemented by national and supranational aviation regulatory bodies is currently expected to enter in force in 2014. The CAEP 8 standard is expected to improve the current standard (CAEP 6) by up to 15% and is expected to enter into force in 2014.

(595) Both GE and Rolls-Royce have been pursuing this technology. However, GE's GENx engine (deployed on Boeing's 787 and 747-8 aircraft) is the first and only engine flying today with lean-burn technology.[439] […]*.

(596) […]*.[440] […]*. Boeing indicates that the 777X will have new engines that will meet the next level of emissions requirements. Boeing indicated that engine performance in terms of NOx emissions will be a crucial criterion for the award of the platform.[441]

(597) […]*.[442] Therefore, it is crucial for Rolls-Royce to be able to continue its cooperation with Goodrich, in order not to miss a major technological breakthrough for the market. If Goodrich were to withdraw from the current cooperation agreement, Rolls-Royce would be delayed and not be ready to compete for the B777X. […]*.

(598) […]*.

(599) Nonetheless, it should be underlined that contrary to Honeywell's supply contract, where refusal to supply or deterioration of supply conditions or product quality would be easily recognized as a breach of the contract, the correct implementation of Rolls-Royce R&D agreement with Goodrich would be much harder to monitor. In fact, it should be considered that R&D agreements are normally drafted under the assumption that the parties to the agreement are in good faith and have the interest/incentive to successfully complete the project. […]*. Therefore, it cannot be assumed that Rolls-Royce would be able to establish to which extent failure/delays in the R&D project is due to Goodrich's poor cooperation or simply to the normal risks associated to an R&D project.

(600) Moreover, the crucial point is not whether Rolls-Royce will be able to find an alternative supplier, which from the market investigation seems most likely, but whether the merged entity will have the ability to prevent Rolls-Royce from participating in the B777X competition. Fuel nozzles constitute essential components of the engine and switching supplier requires substantial investments and time. In this case, time is of the essence as […]*[443]. Therefore, even if Rolls-Royce would be able to resume the R&D project on lean burn with other suppliers, it would not be able to develop a lean burn engine in time to compete effectively for the B777X platform.

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439 The Notifying Party - Response to Commission Questions of May 21, 2012 – Low NOx Emission Engines, question 2.

440 The Notifying Party - Response to Commission Questions of May 21, 2012 – Low NOx Emission Engines, question 7.

441 Boeing - Response to the Commission's request for information of 21 May 2012.

442 The Notifying Party - Response to Commission Questions of May 21, 2012 – Low NOx Emission Engines, question 2.

443 The Notifying Party - Response to Commission Questions of May 21, 2012 – Low NOx Emission Engines, question 2.

Conclusion on ability

(601) The Commission therefore concludes that the evolving regulatory environment will enable the merged entity to foreclose access to the new lean burn technology and hinder Rolls-Royce' competitiveness in future tenders for large commercial engines, and specifically in the upcoming tender for the B777X platform.

Incentive

(602) The Notifying Party maintains that the merged entity would have no incentive to frustrate cooperation with Rolls-Royce, as to do so would result in an immediate loss for the merged entity without any corresponding gain (including for Pratt & Whitney).

(603) Whether the combined entity would find an input foreclosure strategy profitable basically depends on the relative margins between lost sales of upstream fuel nozzles and increased sales of downstream P&W engines.[444]

(604) The fuel nozzle kit on a single engine would generally comprise between 15 and 20 nozzles. Even so, the overall value of the fuel nozzle kit represents a very minor part of the engine cost.[445]

(605) Though it is not clear at this stage whether Boeing will dual source engines for the B777X platform, Pratt & Whitney provided an estimate of the expected revenues from the supply to the B777X platform, under the dual-sourcing scenario and the assumption that Pratt & Whitney will capture about 40% of the orders (see Table 31).

Table 31: Pratt & Whitney's estimated revenues expected from the supply to the B777X platform

Year	Estimated Number of Pratt & Whitney Engines Sold	Estimated Revenues (USD million)
2019	[…]*	[…]*
2020	[…]*	[…]*
2021	[…]*	[…]*
2022	[…]*	[…]*
2023	[…]*	[…]*
2024	[…]*	[…]*
2025	[…]*	[…]*
2026	[…]*	[…]*
2027	[…]*	[…]*
2028	[…]*	[…]*
2029	[…]*	[…]*
2030	[…]*	[…]*

444 See paragraph 40 of the Non-Horizontal Guidelines.

445 Form CO – Sections 6-8 Turbomachinery, p. 15.

(606) Given that the overall turnover associated with Goodrich's entire fuel nozzle business in 2011 was USD […]* million, the figures shown in Table 31 clearly indicate that the expected revenues from the engine supply to the B777X platform would likely offset losses from foregoing supply of nozzles for the B777X engine.

(607) In addition, by comparing the lifetime margin earned by Pratt & Whitney on a single large turbofan engine platform to the profits made by Goodrich from the fuel nozzle supply to a large turbofan engine platform (see Tables 32-33), it is clear that the expected profits associated with an engine contract are much more attractive than the ones associated with a fuel nozzle supply.

Table 32: Pratt & Whitney's lifetime margins on Large turbofan Commercial Engine platforms

Pratt & Whitney Engine	Aircraft platform	Aircraft Manufacturer	2011 Engine Price*	Lifetime Margin**	
			Value (USD)	Percent (%)	Value (USD)
GP7000 (7270)	P&W	Airbus	[…]*	[…]*	[…]*
PW1127G	P&W	Airbus	[…]*	[…]*	[…]*
PW4000 (4060)	P&W	Boeing	[…]*	[…]*	[…]*
PW4000 (4062A)	P&W	Boeing	[…]*	[…]*	[…]*
PW4000 (4168A)	P&W	Airbus	[…]*	[…]*	[…]*
PW4000 (4170)	P&W	Airbus	[…]*	[…]*	[…]*
PW4084 (4090)	P&W	Boeing	[…]*	[…]*	[…]*
V2500	P&W	Airbus	[…]*	[…]*	[…]*
V2500	P&W	Airbus	[…]*	[…]*	[…]*
V2500	P&W	Airbus	[…]*	[…]*	[…]*

*2011 Engine Price is equal to the 2011 OE Sales Value divided by 2011 OE Sales Volume for commercial engines. Because of the way revenue is booked for cost-plus programs, military engine prices are based on contract prices.
** Lifetime Margin % reflects the estimated margin on the initial sale as well as all net present value aftermarket profits, expressed as a percentage of the 2011 engine price. P&W's lifetime margin estimates are based on business case studies.

Table 33: Goodrich's lifetime margins on fuel nozzles for large turbofan commercial engines

Engine	Manufacturer	Shipset Value USD (2011)	Lifetime Margin	
			Percent (%)	Value (USD)
Trent 900	Rolls-Royce	[…]*	[…]*	[…]*

(608) In addition, Goodrich would save the on-going R&D costs in relation to the fuel nozzle project.[446] Since Pratt& Whitney […]*, it will in any event be able to meet the expected tighter environmental requirements for the B777X engine without requiring the development of a new fuel nozzle component.

[446] Goodrich's non-refundable engineering costs in the research and development project with Rolls-Royce were approximately USD […]* million for the period 2008-2012.

(609) In view of the above, it can be concluded that if Pratt & Whitney's chances to win the B777x competition were to increase as result of the foreclosure strategy, the merged entity would definitively have the incentive to foreclose Rolls-Royce.

(610) However, the Notifying Party argues that any attempt by the merged entity to engage in strategic behaviour would result in significant damage to UTC's reputation, which would put at risk its hard-earned reputation as a reliable supplier. This damage would be particularly acute for Hamilton Sundstrand, which had over USD 4.7 billion in aerospace sales in 2011, predicated on being a reliable supplier of quality products, in particular in its sales of systems and components to airframers and engine manufacturers (including engine manufacturers that compete with Pratt & Whitney), while also harming Goodrich's reputation and thus undermining the value of the proposed transaction.

(611) Nevertheless, as already mentioned, because of the uncertainty which characterizes the scope of an R&D agreement, it might be extremely difficult to ascertain whether one party has failed to devote enough resources and investments into the project, so as to establish a material breach of the agreement. If Goodrich were therefore to decide to foreclose Rolls-Royce (i.e. by sabotaging the project), it is not clear (i) whether Rolls-Royce would be able at all to prove a breach of the contract, and (ii) from where the damage to reputation would stem, given the confidentiality surrounding the content of the lean burn R&D cooperation agreements vis-à-vis other operators in the industry.

Conclusion on incentive

(612) The Commission concludes that the merged entity will have the incentive to foreclose access to the lean burn fuel nozzle to its downstream competitor Rolls-Royce.

Impact

(613) Vertical foreclosure of engine competitors, such as for example Rolls-Royce, would reduce an important competitive constraint on Pratt & Whitney, which would likely lead to higher prices in the large commercial engine segment.

(614) If Rolls-Royce is not able to participate in the B777X tender, Boeing in the first place will suffer from a choice reduction as it will have less engine suppliers competing for the contract. This reduction of choice might in turn lead to price increase and quality reduction.

(615) The Notifying Party notes that this effect would at best be immaterial and temporary, as Rolls-Royce would retain the ability to compete in the future.

(616) However, if Rolls-Royce ability to compete on this new type of emission-efficient engines is hindered, the choice of engine suppliers for other airframers might be significantly reduced in the future.

(617) In addition, the likely negative impact will be felt by customers through the duration of the B777X platform (cf. Pratt & Whitney's estimated revenues expected from the supply to the B777X platform).

Conclusion

(618) The Commission therefore concludes that the concentration would not significantly impede effective competition with respect to the vertical relationship between fuel nozzles and APUs.

(619) Furthermore, it is concluded that the concentration as notified would significantly impede effective competition with respect to the vertical relationship between fuel nozzles and engines.

6.3.3.4. Modifications of the proposed transaction

(620) The proposed transaction would raise serious doubts in the market for large commercial engines.

(621) The Notifying Party submitted commitments on 11 June 2012. These commitments were market tested by the Commission. In light of the results of the market test, on 29 June 2012 the Notifying Party submitted a revised version, and a final version of the commitments was submitted on 12 July 2012. This version of the commitments is annexed to this Decision and forms an integral part thereof.

6.3.3.5. Description of the proposed commitments

(622) The remedy package offered by the Notifying Party will grant Rolls-Royce the option (exercisable for […]* after the completion of the proposed transaction) to acquire the Lean Burn R&D Project (the 'Lean Burn Divestiture Business').

(623) Subject to the exercise of the option by Rolls-Royce, the divestiture will take place pursuant to the terms of a Memorandum of Understanding signed by UTC and Rolls-Royce on 7 June 2012.

(624) The Lean Burn Divestiture Business will include:

(a) The Lean Burn R&D Foreground Intangible Assets;

(b) The Lean Burn R&D Tangible Assets;

(c) The Lean Burn R&D Background Intangible Assets; and

(d) […]*.

(625) In addition, the remedies offered in relation to the Lean Burn R&D Project include a number of obligations such as: (i) the obligation to preserve the economic viability, marketability and competitiveness of the Lean Burn Divestment Business; (ii) hold-separate obligations to manage the Lean Burn Divestment Business as a distinct and saleable entity separate from the businesses retained by UTC; (iii) ring-fencing obligations to implement and/or enforce all necessary measures to ensure that UTC does not obtain any business secrets, know-how, commercial information, or any other information of a confidential or proprietary nature relating to the Lean Burn Divestment Business; and (iv) the obligation to ensure continued cooperation to support Rolls-Royce bid for the 777X program for the time period necessary to support Entry into Service of the lean burn engine.

6.3.3.6. Assessment of the commitments

(626) The divestiture offered addresses all the concerns identified in relation to the market of large commercial engines.

(627) Rolls-Royce will have the option to acquire the lean burn R&D project so as to make sure to have access to this component critical for the new emission-efficient engines; which will be more and more required by airframers. The safeguarding of Rolls-Royce's ability to develop a new fuel efficient engine is ensured by the existence of the option and does not depend on its exercise as such.

(628) In particular, the commitments address the concern that the merged entity will prevent Rolls-Royce from competing for the B777X program, since Goodrich will continue the cooperation with Rolls-Royce for the time necessary to support the Entry into Service of the new engine.

6.3.3.7. Conclusion on the commitments

(629) On the basis of the above, the Commission concludes that the proposed remedy is sufficient to remove the concerns in the markets for fuel nozzles and engines.

6.3.4. Nacelle systems

6.3.4.1. Market structure

(630) Goodrich currently mainly supplies nacelle systems for large commercial aircraft engines. In this market segment, nacelle systems tend to be sold to airframers although in some instances (e.g. the Airbus A330[447]) the airframers prefer to outsource this function to engine manufacturers. […]* of Goodrich's 2011 nacelle system sales by value were supplied to airframers, and […]* were supplied to engine manufacturers[448]. UTC is not active in the design or manufacturing of nacelle systems, therefore there is no horizontal overlap between the Parties' activities.

(631) In the segment for nacelle systems for large commercial aircraft, Goodrich had sales representing USD […]* million in 2011. The overall value of this market was estimated at USD […]* million. Goodrich therefore achieved a worldwide market share of [20-30]*% (Table 34) in 2011. It competes mainly against Spirit Aerosystems ([20-30]*%) and Aircelle ([20-30]*%). Spirit AeroSystems only supplies nacelle systems to Boeing as regards large commercial aircraft. Aircelle, Middle River Aircraft Systems and Short Brothers plc are subsidiaries of respectively SAFRAN, General Electric and Bombardier. Aircelle and Middle River Aircraft Systems are also active in nacelle systems through their joint venture Nexcelle[449].

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447 There are 3 engine options for the A330: General Electric CF6-80E, Pratt & Whitney PW4000, or Rolls-Royce Trent 700.

448 Notifying Party's response of 27 February 2012 to Commission questions of 24 February 2012, recital 234.3.

449 Nexcelle was formed in 2009 to provide nacelles for next-generation single aisle aircraft and has been selected to supply the nacelle system for the Comac C919. However, the Comac C919 is not yet commercialized and so Nexcelle does not feature in Table 34.

Table 34: Shares of Supply of Nacelle Systems for Large Commercial Aircraft Engines (2011)[450]	
Company	**Market share (%)**
Goodrich	[20-30]*
Sprit Aerosystems	[20-30]*
Aircelle	[20-30]*
Short Brothers plc	[5-10]*
Middle River Aircraft Systems	[5-10]*
Alenia Aermacchi	[0-5]*
Others	[10-20]*
Source: Notifying Party's Note of 8 March 2012 in response to the Commission's request for information of 6 March 2012	

(632) Apart from the large commercial aircraft segment, Goodrich's activities in nacelle systems are limited to its work on the nacelles for a regional jet, the Embraer 190/195. In the segment for nacelle systems for regional jets, Goodrich achieved sales of USD […]* million in 2011. The overall value of this market was estimated at USD […]* million. Goodrich therefore had a worldwide market share of [10-20]*% (Table 35) in 2011. It competes mainly against Middle River Aircraft Systems ([30-40]*%) and Short Brothers plc ([20-30]*%).

Table 35: Shares of Supply of Nacelle Systems for Regional Jets (2011)	
Company	**Market share (%)**
Goodrich	[10-20]*
Middle River Aircraft Systems	[30-40]*
Short Brothers plc	[20-30]*
Aircelle	[5-10]*
Alenia Aermacchi	[0-5]*
Others	[5-10]*
Source: Notifying Party's Note of 8 March 2012 in response to the Commission's request for information of 6 March 2012	

6.3.4.2. Nature of the link between the supply of nacelle systems and the supply of aircraft engines

(633) The market investigation has confirmed the Notifying Party's claim[451] that manufacturers of large commercial aircraft select the supplier of nacelle systems and engines themselves rather than purchasing integrated solutions from the engine

450 The shares accounted for by companies other than Goodrich, Spirit Aerosystems or Aircelle represent instances in which the airframer or the engine manufacturer have handled nacelle component integration on their own and procured components from the identified suppliers.

451 Notifying Party's Note of 8 March 2012 in response to the Commission's request for information of 6 March 2012.

supplier.[452] Usually an airframe manufacturer selects the engine first. The nacelle providers' selection takes place either in parallel or later on. The nacelle is generally certified with the airframe although there are also integration requirements between the engine and the nacelle. Furthermore, the design of the nacelle systems results from teaming arrangements between engine suppliers, airframers and nacelle providers. The airframer has the overall responsibility for integration and decides who will be responsible for the nacelle/engine "podding", i.e. the combination of the nacelle and the engine, which is usually carried out by the nacelle manufacturer in the large civil aircraft sector.

(634) As regards corporate and regional aircraft, engine manufacturers typically supply fully integrated power plants combining the engine and the nacelle. In this case, the engine manufacturer either relies on a third party for the integration of the nacelle system or handles the integration responsibility itself buying components from existing suppliers.

6.3.4.3. Assessment

(635) One airframer has expressed the concern that very few companies are active in nacelle systems and that the number of possible combinations between engines and nacelle systems could be significantly reduced by the proposed transaction[453].

(636) The majority of the respondents to the market investigation do not support this airframer's view that the number of possible combinations between engines and nacelles for large commercial aircraft would be reduced by the proposed transaction or that such combination would have negative effects.[454] Moreover, collaboration of engine manufacturers with a nacelle system supplier belonging to the same group as one of their competitors already happens in practice, e.g. on the Airbus A380 where Aircelle provides the nacelle for both the Engine Alliance and Rolls-Royce engines.[455]

(637) Furthermore, post-transaction, Rolls-Royce will be the only manufacturer of engines for large aircraft which does not have in-house capability to produce nacelle systems and is thus dependent on third party nacelle suppliers to be able to offer integrated propulsion systems combining the engine, nacelle, thrust reverser, and ancillary hardware.

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452 Replies to Question 10 of the Commission's Questionnaire to nacelle systems competitors (Q20) of 1 March 2012; replies to Question 6 of the Commission's Questionnaire to aiframers on nacelle systems (Q21) of 1 March 2012 and replies to Question 6 of the Commission's Questionnaire to engine manufacturers on nacelle systems (Q22) of 1 March 2012.

453 Replies to Questions 14.1 and 20 of the Commission's Questionnaire to airframers on nacelle systems (Q21) of 1 March 2012.

454 Replies to Questions 18 and 19 of the Commission's Questionnaire to nacelle systems competitors (Q20) of 1 March 2012; replies to Questions 14 and 15 of the Commission's Questionnaire to aiframers on nacelle systems (Q21) of 1 March 2012 and replies to Questions 14 and 15 of the Commission's Questionnaire to engine manufacturers on nacelle systems (Q22) of 1 March 2012.

455 Similarly, Goodrich supplies the nacelle system for both engine options on the A320 (the CFM56 and IAE V2500) and the Boeing 787 (the Rolls-Royce Trent 1000 and the GEnx).

(638) However, Rolls-Royce did not express concerns regarding the impact of the transaction on the market for nacelles.[456] In Rolls-Royce's view (i) the Spirit Aerosystems is an alternative to Aircelle and Goodrich for nacelle integration, although it currently supplies nacelles only for Boeing aircraft, and (ii) there are potential newcomers who are currently active in the sub-component market and/or smaller nacelles for other airframe market sectors (e.g. GKN and Nordam).[457]

(639) Moreover, as explained above, manufacturers of large commercial aircraft select the supplier of nacelle systems and engines themselves rather than purchasing integrated solutions from the engine supplier. UTC will therefore not be in a position to impose to large aircraft manufacturers that only its own nacelle systems are used in combination with Pratt & Whitney's engines. Indeed, refusing to supply separately engines and nacelle systems by offering only bundles would result in the risk of losing the contract for both the engine and the nacelle system.

(640) As regards corporate and regional aircraft, one competitor expressed the concern that post-transaction, Pratt & Whitney could decide to source its nacelle systems from Goodrich exclusively, which could threaten the viability of its nacelle business[458].

(641) Manufacturers of engines for regional and corporate jets typically supply fully integrated power plants combining the engine and the nacelle. Thus Pratt & Whitney may decide to source its nacelle systems from Goodrich exclusively. However, a sufficient customer base will remain. Firstly, non-vertically integrated suppliers of nacelle systems will continue to have the opportunity to bid for nacelle systems of non-vertically integrated engine manufacturers such as Rolls-Royce, Honeywell and Williams, which together represent [60-70]*% of the market for corporate jet engines: a large customer base will therefore remain on the market for corporate jets. Second, on the market for regional jets, the main engine manufacturers are already vertically integrated: in particular, GE and SAFRAN are vertically integrated (with respectively Aircelle and Middle River Aircraft Systems) and together represent [90-100]*% of the market for regional jets.

(642) Aircraft manufacturers will therefore retain several options for their choice of integrated power plants combining engines and nacelle systems, including several vertically integrated suppliers. Moreover, Bombardier, an important supplier of corporate and regional aircraft owns a subsidiary active in nacelle systems (Short Brothers plc) and did not express concerns in relation to nacelle systems[459].

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456 Minutes of the conference call with Rolls-Royce of 2 March 2012 and Rolls-Royce's email of 20 June 2012.

457 Minutes of the conference call with Rolls-Royce of 2 March 2012.

458 Replies to Questions 22, 26 and 27 of the Commission’s Questionnaire to nacelle systems competitors (Q20) of 1 March 2012.

459 Replies to Questions 20 and 21 of the Commission’s Questionnaire to engine manufacturers on nacelle systems (Q22) of 1 March 2012.

(643) Finally, the market shares of Goodrich on the various segments of the market for nacelle systems are below the safe harbour threshold set out in Paragraph 25 of the Non-Horizontal Guidelines.[460]

(644) Based on these elements, it can therefore be concluded that the concentration would not significantly impede effective competition with regards to nacelle systems and engines.

6.4. Vertical effects: Helicopters

(645) The transaction will also give rise to a number of vertically affected markets in relation to the market for rotorcrafts (i.e. helicopters). Whereas UTC is active (through its Sikorsky subsidiary) as one of the main helicopter suppliers, Goodrich is active upstream as manufacturer and supplier of a number of components for helicopter manufacturers, namely (1) rescue hoists, (2) air data probes, (3) ice detection systems, and (4) power generation.

(646) The Commission has investigated whether the transaction would lead to vertical non-coordinated effects because of the strong market position held by the merged entity in the mentioned upstream markets and its downstream presence in the market for helicopters, where UTC is present, through Sikorsky, with a [20-30]*% market share.

Table 36: Market shares in helicopter market

Agusta Westland	Bell	Boeing	Eurocopter/EADS	Sikorsky	Other
[10-20]*%	[10-20]*%	[20-30]*%	[20-30]*%	[20-30]*%	[0-5]*%

Source: 2011 Teal World Rotorcraft Review

6.4.1. Electrical systems

(647) Vertical relationships arise between the Parties' activities in low-voltage DC and AC generation and distribution and UTC's downstream activities, through its Sikorsky subsidiary, as a supplier of rotorcraft.

6.4.1.1. Low voltage DC generation

(648) The proposed transaction leads to a vertically affected market in relation to Goodrich's upstream activities in low-voltage DC generation and UTC downstream presence in rotorcraft.

(649) Although UTC's share of supply in the downstream market for the supply of rotorcraft is below 25%, Goodrich's share of supply in the upstream market for low-voltage DC generation exceeds 25% as shown in Table 37.

460 "The Commission is unlikely to find concern in non-horizontal mergers, be it of a coordinated or of a non-coordinated nature, where the market share post-transaction of the new entity in each of the markets concerned is below 30 %".

Table 37: Low voltage DC generation			
	2008 Share of sales	**2009 Share of sales**	**2010 Share of sales**
UTC	[0-5]*	[0-5]*	[0-5]*
Goodrich	[40-50]*	[30-40]*	[30-40]*
Combined	**[40-50]***	**[30-40]***	**[30-40]***
Unison (GE)	[20-30]*	[20-30]*	[20-30]*
Thales	[10-20]*	[10-20]*	[10-20]*
Honeywell	[0-5]*	[0-5]*	[0-5]*
Magneti Marelli	[0-5]*	[0-5]*	[0-5]*
Advanced Industries (Ametek)	[0-5]*	[0-5]*	[0-5]*
Pacific Scientific (Meggitt)	[0-5]*	[0-5]*	[0-5]*
Others	[10-20]*	[10-20]*	[10-20]*
Total sales (1 000 EUR)	**[…]***	**[…]***	**[…]***
Source: Form CO			

(650) As regards potential input foreclosure, it is noted that Goodrich faces competition from a relatively large number of suppliers within low-voltage DC generation, such as Unison (a GE subsidiary), Thales, Ametek, Pacific Scientific and Honeywell.

(651) Moreover, the bidding data provided by the Notifying Party shows that several of Goodrich's competitors have won significant recent tenders in low-voltage DC generation.[461]

(652) It is therefore concluded that the merged entity would not have the ability to foreclose its downstream rivals' access to low-voltage DC generation systems.

(653) As regards potential customer foreclosure, UTC's share in the supply of rotorcraft is below 25%[462]. Given UTC's downstream share, having the merged entity as a customer would not be critical to electrical systems supplier's upstream business.

(654) It is therefore concluded, that the merged entity would not have either the ability to foreclose the access of its upstream rivals in low-voltage DC power generation to a sufficient customer base.

6.4.1.2. AC power generation systems

(655) The proposed transaction leads to a vertically affected market in relation to the Parties upstream activities in AC power generation and UTC downstream presence in rotorcraft.

(656) As regards potential input foreclosure, it is noted that there are a sufficient number of strong, active, and qualified alternative suppliers in AC generation for rotorcraft

461 See Annex 7.1 [ES] Form CO.

462 According to the Notifying Party, Sikorsky market share by volume (units delivered 2012-2021) is [10-20]*% and by revenue is [20-30]*% (Annex 6.1[General] Form CO).

(including Honeywell, Thales and GE) and that as shown by the bidding data several competitors have won recent tenders in AC generation for rotorcraft.[463]

(657) It is therefore concluded that the merged entity would not have the ability to foreclose its downstream rivals' access to AC generation systems for rotorcraft.

6.4.1.3. Distribution systems

(658) The proposed transaction leads to a vertically affected market in relation to the Parties upstream activities in distribution systems and UTC downstream presence in rotorcraft.

(659) As regards potential input foreclosure, it is noted that there are a sufficient number of strong, active, and qualified alternative suppliers in AC distribution (including Safran, Honeywell, GE, ECE, Crane, and Esterline/Leach) and low-voltage DC distribution (including ECE, Ametek, Esterline/Leach, Astronics, GE, and Eaton). Moreover, as shown by the bidding data, several competitors have won significant recent tenders in AC distribution and low-voltage DC distribution systems.[464]

(660) It is therefore concluded that the merged entity would not have the ability to foreclose its downstream rivals' access to AC distribution and low-voltage DC distribution systems.

6.4.1.4. Conclusion

(661) In view of the above, it can therefore be concluded that the concentration would not significantly impede effective competition with respect to the vertical relationship between AC power generation and distribution systems, and helicopters.

(662) It is further noted that in any case any concerns related to any vertical relationships which might arise in relation to the Parties' presence in power generation and distribution systems would be removed given the commitments offered by the Notifying Party to remedy the horizontal overlaps in power generation.

6.4.2. Rescue hoists

(663) Goodrich is active in the supply of helicopter rescue hoists, where it achieved a market share of [40-50]*% worldwide in 2010. While UTC is not active in this market, its helicopter business (Sikorsky) purchases rescue hoists for installation on some of the helicopters that it supplies to end-customers, or repairs and upgrades in the after-market. There is, therefore, a vertical relationship between Goodrich's activities in the production and support of rescue hoists and UTC's activities in the

[463] See Annex 7.1 [ES] Form CO.

[464] See Annex 7.1 [ES] Form CO.

production of helicopters. In the market for helicopters, Sikorsky holds a [20-30]*% market share worldwide.[465]

(664) It thus needs to be assessed whether the merged entity might successfully foreclose (i) downstream rivals of Sikorsky by restricting their access to helicopter rescue hoists supplied by Goodrich, and (ii) upstream rivals of Goodrich by sourcing all helicopter hoists needed by Sikorsky from Goodrich.

6.4.2.1. Market structure

(665) Goodrich currently supplies around 30 different models of rescue hoist systems that are deployed on a number of different helicopters, including AgustaWestland, Eurocopter, and Sikorsky. In 2010, Goodrich generated helicopter hoists sales of EUR […]* million.

(666) Goodrich is the market leader as regards helicopter hoists with a [40-50]*% market share. It faces competition from to main competitors, Breeze Eastern and ESW GmbH, a subsidiary of Jenoptik AG Group (see Table 38).[466]

Table 38: Revenues and market shares of Goodrich and its major competitors in helicopter rescue hoist systems, cargo hooks and ancillary products, 2008-2010

Supplier	2008		2009		2010	
	Total sales (EUR million)	Share of sales (%)	Total sales (EUR million)	Share of sales (%)	Total sales (EUR million)	Share of sales (%)
Goodrich	[…]*	[40-50]*	[…]*	[40-50]*	[…]*	[40-50]*
Breeze-Eastern [467]	[…]*	[30-40]*	[…]*	[30-40]*	[…]*	[30-40]*
Others (including ESW)	[…]*	[20-30]*	[…]*	[20-30]*	[…]*	[20-30]*
Total	**[…]***	**100**	**[…]***	**[…]***	**[…]***	**100**

Source: Form CO, Sections 6-8 Helicopter Rescue Hoists, p. 14

(667) The Notifying Party submits that the rescue hoists supplied by these manufacturers are substitutable and that these manufacturers compete in the bids organized by helicopter OEMs for the supply of rescue hoists.

6.4.2.2. Regulatory environment

(668) According to the Notifying Party, while every rescue hoist installed on a rotorcraft must be certified through the applicable governing regulatory agency (*e.g.*, the Federal Aviation Administration in the United States or the European Aviation

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465 The main manufacturers of rotorcrafts include Bell/Textron ([10-20]*% market share), Boeing ([20-30]*%), Eurocopter/EADS ([20-30]*%), Sikorsky/UTC ([20-30]*%), and AgustaWestland ([10-20]*%).

466 The Notifying Party indicated that no market information regarding the total number of hydraulic versus electric hoists that have been sold into the marketplace is available and it is not able to estimate market shares for these separate segments.

467 Breeze-Eastern data correspond to a fiscal year ending March 31.

Safety Administration in the EU), a rescue hoist supplier (or a third party installer) does not need the assistance of the helicopter OEM to become certified to install a hoist on a given platform. For a commercial platform, the rescue hoist supplier (or third party installer) can obtain Supplemental Type Certification through the FAA or EASA with or without the assistance of the helicopter OEM. Military buyers similarly have their own air worthiness ratings for rescue hoists that do not require input from the helicopter OEM. In the Notifying Party's view, these civilian and military ratings are relatively straightforward to achieve, and can typically be obtained in around a year.

(669) The Notifying Party emphasises that, as a result, most helicopter platforms are, in practice, already available with more than one rescue hoist options. For example, several third-party companies active in upgrading and repairing helicopters, such as Bristow, CHC Helicopters, Scotia, Carson Helicopters, and Priority One Air Rescue, each hold Supplemental Type Certifications for different hoist installations on the Sikorsky S-61 platform, even though Sikorsky does not offer a rescue hoist option on this platform.

6.4.2.3. Competitive Assessment

(670) None of the respondents to the market investigation has expressed concerns limited to one specific type of rescue hoists.

Input foreclosure

(671) One competitor of Sikorsky has expressed the concern that it may have restricted access to technologies and capacity of Goodrich post-transaction.[468] This customer emphasised that switching to a new hoist supplier may be long and costly.

(672) The time and costs needed to add a new source of hoist to an existing platform depend on whether the new supplier has already a rescue hoist with performances similar to the existing one or not. If the new source already has a suitable rescue hoist, the helicopter OEM or the hoist manufacturer needs to invest in Supplementary Type Certification process to allow the hoist to be marketed for use with a specific helicopter type. These qualification expenditures thus have to be supported by sufficient projected hoist system sales.

(673) However, most helicopter manufacturers are not dependent on Goodrich for the supply of hoists as they are already dual sourcing their rescue hoists or because they have never sourced from Goodrich. The market investigation has confirmed that Breeze-Eastern constitutes a credible alternative to Goodrich for all types of rescue hoists.[469]

(674) In addition, helicopter rescue hoists represent a small share of the total cost of the helicopter and customers have effective counter-strategies, notably retrofit

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468 Replies to Questions 77 and 78 of the Commission's Questionnaire to helicopter OEMs in relation to rescue hoists, ice detection systems and air data probes (Q17) of 24 February 2012.

469 Replies to Questions 34 and 35 of the Commission's Questionnaire to helicopter OEMs in relation to rescue hoists, ice detection systems and air data probes (Q17) of 24 February 2012.

installation. As helicopter rescue hoists are typically offered as an option rather than as a standard feature, end-customers are able to purchase a helicopter without a rescue hoist system installed. End-customers have the ability to choose their preferred rescue hoist through "retrofit" (i.e., post-purchase) installation, without the involvement of the helicopter OEM.

(675) Finally, helicopter customers will continue to have several options beyond Sikorsky. For example, alternatives for non-military SAR helicopters include AgustaWestland (AW139), Eurocopter (EC155 and EC225), and NHIndustries (NH-90). For instance almost all of AgustaWestland's platforms are dual-sourced.[470]

Customer foreclosure

(676) Sikorsky's position in the downstream market is relatively small and would be unlikely to allow a substantial reduction of the customer base of Goodrich's competitors in the market for the supply of rescue hoists. In particular, according to the Notifying Party's estimates, Sikorsky's 2010 rescue hoists purchases represented only around […]* of Breeze-Eastern's total sales in 2010.[471] Breeze-Eastern would therefore continue to be able to offer a competitive supply of rescue hoists absent its revenues from Sikorsky. Similarly, Sikorsky does not source rescue hoists from ESW.

(677) In addition, the Notifying Party lacks the ability to prevent the use of competitor hoists on Sikorsky helicopters, in particular because customers could simply purchase the helicopter without a hoist system and then install the hoist of their choosing post-purchase. UTC therefore lacks the incentives to attempt to foreclose Goodrich competitors in the market for rescue hoists. In that regard, the Notifying Party indicates that Sikorsky intends to continue its existing commercial policy of dual-sourcing rescue hoists for both existing and future platforms, whenever this is feasible in view of hoist quality and cost considerations.[472] It indeed has the incentive to best support the needs of operators by being in a position to provide the rescue hoist solutions preferred by the end-customer.

6.4.2.4. Conclusion

(678) Based on these elements, it can therefore be concluded that the concentration would not significantly impede effective competition with regards to the markets for helicopter hoists and helicopters.

6.4.3. Air data probes

6.4.3.1. Market structure

(679) Goodrich is active in the production and supply of air data probes. Goodrich currently supplies air data probes that are deployed on a number of different airplane

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470 Form CO, Sections 6-8 Helicopter Rescue Hoists, Annex 7.1 [HRH].

471 Form CO, Sections 6-8 Helicopter Rescue Hoists, p. 17.

472 Form CO, Sections 6-8 Helicopter Rescue Hoists, p. 17.

and helicopter platforms. In 2011, Goodrich generated about EUR […]* million from the supply of air data probes globally and achieved a worldwide market share of [60-70]*% on the market for the supply of air data probes (see Table 39).

Table 39: Worldwide air data probes market shares (2009-2011)

Supplier	2009		2010		2011	
	Total sales (EUR million)	**Share of sales (%)**	**Total sales (EUR million)**	**Share of sales (%)**	**Total sales (EUR million)**	**Share of sales (%)**
Goodrich	[…]*	[60-70]*	[…]*	[60-70]*	[…]*	[60-70]*
Thales	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[10-20]*
Aero-Instruments	[…]*	[5-10]*	[…]*	[10-20]*	[…]*	[10-20]*
Aeropribor Voskhod	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Harco Laboratories (Transdigm)	[…]*	<[0-5]*	[…]*	<[0-5]*	[…]*	<[0-5]*
Others	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Total	**[…]***	**100**	**[…]***	**100**	**[…]***	**100**

Source: Goodrich

6.4.3.2. Assessment

(680) The Notifying Party submits that no input foreclosure concerns can arise in relation to this affected market since: (i) time and cost of switching the air data probe supplier are low;[473] (ii) there are strong and viable alternative suppliers of air data probes; and (iii) air data probes represent too small a share of the total cost of the helicopter[474] to be used in a downstream foreclosure strategy for helicopters.[475]

(681) As regards the possibility of a customer foreclosure, the Notifying Party considers that with its market share below 25%, Sikorsky is not a sufficiently significant customer to raise customer foreclosure concerns. The Notifying Party conclude that post transaction, more than 75% of the helicopter air data probes demand would be available for Goodrich's competitors, not to mention the much larger set of opportunities for fixed-wing aircraft in which no such vertical overlap exists. In addition, the Notifying Party reports that Sikorsky currently sources of its air data probes from Goodrich,[476] and this further limits any possible foreclosure effect.

(682) The market investigation was not conclusive about the time and cost required for switching air data probes suppliers, as feedback ranged from minimum 1 year to up

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473 The Notifying Party argues that approximate costs and lead time are around USD 0.5-1 million and 6-12 months including certification, which would likely be piggybacked with other certification projects.

474 The Notifying Party indicates that a typical air data probe shipset for a Sikorsky-type helicopter would cost in the range of EUR […]*, representing well under […]* of the price of a new helicopter.

475 The last argument is clearly rebutted by the finding from the market investigation that air data probes represent a distinct market. As no other product can perform the function of an air data probe, it is irrelevant whether the component value is a small percentage of the overall value of the final product (i.e. helicopter).

476 […]*.

3-5 years.[477] With the exception of Boeing, all the companies interviewed recognized Goodrich as the market leader for air data probes.[478] However, customers confirmed that there are multiple valid alternative suppliers to Goodrich and, though Goodrich is already market leader, the transaction will not change anything.[479] None of the respondents expressed concerns about losing access to an important customer such as Sikorsky.[480] Finally, none of the respondents raised any specific concern that the transaction might produce anti-competitive effects for the market of air data probes.[481]

6.4.3.3. Conclusion

(683) In view of the above, it can be concluded that the concentration would not significantly impede effective competition with respect to the vertical relationship between air data probes and helicopters.

6.4.4. Ice detection systems

6.4.4.1. Market structure

(684) While Goodrich is active in the supply of ice detection systems, UTC is not and therefore there is no horizontally affected market within this product area. The proposed transaction however leads to a vertically affected market in relation to the market for rotorcrafts (i.e. helicopters). UTC is active through its Sikorsky subsidiary as one of the main helicopter suppliers and Goodrich is active upstream as manufacturers and suppliers of ice detection systems.

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477 Replies to Question 70 of the Commission's Questionnaire to helicopter OEMs in relation to rescue hoists, ice detection systems and air data probes (Q17) of 24 February 2012.

478 Replies to Question 74 of the Commission's Questionnaire to helicopter OEMs in relation to rescue hoists, ice detection systems and air data probes (Q17) of 24 February 2012 and replies to Question 15 of the Commission's Questionnaire to aircraft air data probes competitors (Q16) of 24 February 2012.

479 Replies to Questions 72 and 81 of the Commission's Questionnaire to helicopter OEMs in relation to rescue hoists, ice detection systems and air data probes (Q17) of 24 February 2012.

480 Replies to Question 18 of the Commission's Questionnaire to aircraft air data probes competitors (Q16) of 24 February 2012.

481 Replies to Question 19 -22 of the Commission's Questionnaire to aircraft air data probes competitors (Q16) of 24 February 2012 and replies to Questions 81, 82 and 83 of the Commission's Questionnaire to helicopter OEMs in relation to rescue hoists, ice detection systems and air data probes (Q17) of 24 February 2012.

Table 40: Worldwide ice detection market shares (2009-2011)						
Supplier	**2009**		**2010**		**2011**	
	Total sales (EUR million)	**Share of sales (%)**	**Total sales (EUR million)**	**Share of sales (%)**	**Total sales (EUR million)**	**Share of sales (%)**
Goodrich	[…]*	[80-90]*	[…]*	[80-90]*	[…]*	[80-90]*
Curtiss-Wright Corporation (Penny & Giles)	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[10-20]*
Meggitt (Vibrometer)	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Ultra Electronics (DNE Technologies)	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Madelec Aero	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Total	**[…]***	**100**	**[…]***	**100**	**[…]***	**100**
Source: Notifying Party						

(685) At present, Goodrich has a strong market position and is the clear market leader for ice detection systems with an [80-90]*% market share on an overall market. The two main competitors are Curtiss-Wright Corporation ("Curtis-Wright") and Madelec Aero. Neither of them is vertically integrated. On a narrower market for rotorcraft the market shares of Goodrich would be lower since its main competitor in the market, Curtiss-Wright, is only active in rotorcraft.[482] Curtiss-Wright has [10-20]* % on an overall market.

6.4.4.2. Assessment

Input foreclosure

(686) A third party, being a competitor of Sikorsky, has indicated that the proposed transaction could lead to input foreclosure for future platforms which would prevent competition from taking place in the down-stream market for helicopters. The market investigation has not confirmed these concerns.

(687) The Commission's investigation has pointed to the contestable character of the up-stream market. Indeed, ice detection systems are, relative to the other aerospace markets, of low technological value and the remaining competitors have spare capacity. As a result, barriers to entry or to expansion can be considered relatively low. The Commission's investigation has indicated that existing alternative suppliers, notwithstanding their current limited market positions, may supply ice detection systems readily and quickly at a relatively low cost. Curtiss-Wright is also seen as a

[482] Replies to Question 10 of the Commission's Questionnaire to ice detection competitors (Q15) of 27 February 2012.

viable alternative to Goodrich today. The investigation also indicated that there are potential entrants that soon might be able to enter the market.[483]

(688) In addition, the Commission's investigation has indicated that the merged entity would have little scope for raising rival costs, for instance by increasing the price of Goodrich's ice detection systems. Owing to the low input cost that these products represent in the overall price of the helicopter, any possible price increase could not materially affect the ability of rival helicopter to compete in the down-stream market. The investigation has indicated that the cost of Goodrich's ice detection systems represents a very small fraction of the total cost of a helicopter (significantly less than 1%).

Customer foreclosure

(689) A competitor to Goodrich, has indicated that the proposed transaction could lead to customer foreclosure for future platforms. The market investigation has not confirmed these concerns. First, Sikorsky has a market share in the market for rotorcraft of less than 25%. Hence, even in case of an exclusive supply relationship between Goodrich and Sikorsky post transaction, more than 75% of the helicopter ice detection system demand would still be available for Goodrich's competitors, not to mention the much larger set of opportunities for fixed-wing aircraft in respect of which no vertical overlap exists.

(690) Secondly, Sikorsky covers already a significant part of its demand for ice detection systems by purchases from Goodrich (more than […]* of its purchases). Given Sikorsky's current low spend on competing ice detection systems, the proposed transaction will not materially affect the Goodrich's ice detection competitors access to customers. Even absent their current modest revenues from Sikorsky, Goodrich's competitors would continue to be able to develop and offer a competitive supply of ice detections systems.

6.4.4.3. Conclusion

(691) In view of the above, the Commission concludes that the concentration would not significantly impede effective competition with respect to the vertical relationship between ice detection systems and helicopters.

6.5. Vertical effects: Electronic engine controls

(692) Another vertically affected market in relation to the transaction is the market for pressure transducers. In fact, whereas Goodrich is active upstream as manufacturer and supplier of pressure transducers, both UTC and Goodrich are active in the downstream market of EECs.

[483] Replies to Question 60 of the Commission's Questionnaire to ice detection competitors (Q15) of 27 February 2012.

6.5.1. Pressure transducers

6.5.1.1. Market structure

(693) Goodrich is active in the production of pressure transducers through its Sensors and Integrated Systems division. In 2010, Goodrich generated revenues of EUR […]* million from pressure transducer sales and achieved a worldwide market share of [10-20]*%, against [20-30]*% for Honeywell, [10-20]*% by Kulite and [10-20]*% by Esterline Technologies (see Table 41).

Table 41: Worldwide pressure transducers market shares (2008-2010)[484]

Supplier	2008		2009		2010	
	Revenue (EUR million)	Market shares (%)	Revenue (EUR million)	Market shares (%)	Revenue (EUR million)	Market shares (%)
Goodrich	[…]*	[10-20]*	[…]*	[5-10]*	[…]*	[10-20]*
Honeywell	[…]*	[20-30]*	[…]*	[20-30]*	[…]*	[20-30]*
Kulite	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[10-20]*
Esterline Technologies	[…]*	[10-20]*	[…]*	[5-10]*	[…]*	[10-20]*
Crane (Eldec)	[…]*	[0-5]*	[…]*	[5-10]*	[…]*	[5-10]*
General Electric	[…]*	[0-5]*	[…]*	[5-10]*	[…]*	[5-10]*
Ametek	[…]*	[0-5]*	[…]*	[5-10]*	[…]*	[5-10]*
Meggitt	[…]*	[0-5]*	[…]*	[5-10]*	[…]*	[5-10]*
Others	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[10-20]*
Total	**[…]***	**100**	**[…]***	**100**	**[…]***	**100**

Source: Notifying Party's estimates (figures have been rounded to the nearest million Euros)

(694) The Notifying Party indicates Honeywell as the main supplier on the pressure transducers market with over 40 years of experience in the sector.[485] Honeywell's Pressure Sensors and Transducers division manufactures pressure sensors which cover pressure ranges of 20, 50, 150, 750, and 1000 psi. Honeywell's pressure transducers are used in a wide variety of applications including aerospace jet engines where, for example, they are used in FADEC International's FADEC 1, 2 and 3 products (employed on aerospace platforms such as the Airbus A320, A330, A350; and the Boeing 737 and 787) and as a second source on the F135 engine (for the Joint Strike Fighter).[486]

6.5.1.2. Assessment

(695) At present, Goodrich has […]* independent pressure transducer customers: […]*. The Notifying Party explains that it is common for EEC producers to certify pressure transducers from two separate providers for new products. In fact, Goodrich is not an exclusive supplier to any of its customers. The Notifying Party indicates that Honeywell already provides BAE Systems a drop-in replacement for Goodrich's product.[487] In addition, BAE Systems explained that the performance (and other

484 These revenue share data are based on the use of pressure transducers for use in aircraft engines and APUs.

485 Honeywell press material, available at *http://www.pressuresensing.com/index.php*.

486 Form CO Sections 6-8 Pressure Transducers, p. 12-13.

487 Form CO Sections 6-8 Pressure Transducers, p. 5.

characteristics) of the pressure transducers supplied by Goodrich is proprietary information of BAE Systems.[488] In agreement with the Notifying Party, it can be concluded therefore that the transaction does not raise concerns in relation to an input foreclosure strategy.

(696) The EEC market is highly concentrated and Hamilton Sundstrand, AEC and FADEC are the major producers. Therefore, the risk that post-transaction AEC and Hamilton Sundstrand, representing about [40-50]*% of the market, might become less accessible to independent (non-UTC) suppliers shall be analysed.

(697) In the course of the market investigation, however, Rolls-Royce announced its firm intention to buy UTC/Goodrich out of AEC. As such, the majority of the EEC market will remain available to independent suppliers.

(698) Furthermore, the Notifying Party considers that Hamilton Sundstrand is not a sufficiently important customer for suppliers of pressure transducers to substantiate a theory of harm based on customer foreclosure. In particular, the Notifying Party stresses that Hamilton Sundstrand already source […]* of its pressure transducers requirements from Goodrich. Hamilton Sundstrand's share of EEC production (namely about [20-30]*% in 2010) thus materially overstates its significance as a customer of third-party pressure transducers.

(699) Finally, no specific concern was expressed in relation to possible anti-competitive effects of the transaction.

6.5.1.3. Conclusion

(700) In view of the above, the Commission concludes that the concentration would not significantly impede effective competition with respect to the vertical relationship between EECs and pressure transducers.

6.6. Aerospace flight control actuation

6.6.1. Introduction

(701) The proposed transaction leads to a number of horizontally affected markets regarding aerospace flight control actuation, notably in SFCA systems, THSA systems, RFCA systems and missile actuation systems.[489]

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488 Reply to the Commission's request for information to BAE Systems of 12 March 2012.

489 Only Goodrich is active in PFCA systems if one does not include RFCA systems or THSA systems in the PFCA system market. UTC has (through Hamilton Sundstrand's Claverham business unit in the United Kingdom) minor PFCA activities […]*. UTC derived sales in PFCA systems of EUR […]* million in 2006, EUR […]* million in 2007, EUR […]* million in 2008, EUR […]* in 2009 and EUR […]* in 2010, […]*. If RFCA systems or THSA systems (or both) were considered part of PFCA systems, the latter would be horizontally affected. Based on the Counterpoint Study, the Notifying Party estimates the size of the worldwide PFCA system market (excluding THSA and RFCA systems) to be EUR […]* million (2010 figures), while Goodrich's turnover in PFCA systems in 2010 was EUR […]* million. As regards the RFCA system market, the Notifying Party estimates its size at the worldwide level to be EUR […]* million in 2010, while Goodrich's turnover was EUR […]* million and UTC's turnover was EUR […]* million. With respect to the THSA system market, the estimated size in 2010

(702) Furthermore, the proposed transaction gives rise to vertically affected markets concerning THSA systems (downstream) and mechanical sub-assemblies for THSA systems (upstream).

6.6.2. Horizontal effects: Aerospace flight control actuation

6.6.2.1. Market structure

(703) The worldwide market for SFCA systems had a total value of approximately EUR […]* million in 2010. According to the Notifying Party's market share estimates for 2010, the merged entity would become the market leader with [20-30]*% (Goodrich: [10-20]*%; UTC: [5-10]*%), followed by Liebherr ([20-30]*%), Moog ([10-20]*%), Curtiss-Wright ([5-10]*%), Parker ([5-10]*%) and a number of other competitors.

Table 42: Worldwide SFCA systems market shares (2008-2010)

Company	2008		2009		2010	
	Total sales (EUR million)	**Share of sales (%)**	**Total sales (EUR million)**	**Share of sales (%)**	**Total sales (EUR million)**	**Share of sales (%)**
UTC	[…]*	[10-20]*	[…]*	[5-10]*	[…]*	[5-10]*
Goodrich	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[10-20]*
Parties Combined	***[…]****	***[20-30]****	***[…]****	***[20-30]****	***[…]****	***[20-30]****
Liebherr	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[20-30]*
Moog	[…]*	[5-10]*	[…]*	[10-20]*	[…]*	[10-20]*
Curtiss-Wright	[…]*	[5-10]*	[…]*	[5-10]*	[…]*	[5-10]*
Parker	[…]*	[5-10]*	[…]*	[5-10]*	[…]*	[5-10]*
Nabtesco	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Woodward	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Eaton	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Others	[…]*	[20-30]*	[…]*	[20-30]*	[…]*	[20-30]*
Total	**[…]***	**100**	**[…]***	**100**	**[…]***	**100**

Source: Notifying Party and 2010 Counterpoint Study

(704) With respect to THSA systems, the estimated size in 2010 is EUR […]* million. The Parties have a combined worldwide market share of [30-40]*% (Goodrich: [30-40]*%; UTC: [5-10]*%)[490], followed by Rockwell Collins ([20-30]*%), Boeing

is EUR […]* million and the Parties' turnover was EUR […]* million (Goodrich) and EUR […]* million (UTC). Therefore, the merged entity would have a market share of [10-20]*% (Goodrich: [10-20]*%; UTC: [0-5]*%) in a PFCA system market encompassing both RFCA and THSA systems, [10-20]*% (Goodrich: [10-20]*%; UTC: [0-5]*%) in a PFCA system market including RFCA systems, and [10-20]*% (Goodrich: [10-20]*%; UTC: [0-5]*%) in a PFCA system market including THSA systems. In any of these scenarios, the increment accrued by the proposed transaction is minimal (less than [0-5]*%) and there would remain a number of alternative competitors. Furthermore, the respondents to the market investigation did not raise any concerns relating to the PFCA system market. In light of this, the competitive assessment will not further address the PFCA system market. Furthermore, the competitive assessment will assess the THSA and SFCA system markets separately, as markets structure and the combined market shares of the Parties in these two markets do not significantly differ from the Parties' combined market share (Goodrich: [10-20]*%; UTC: [5-10]*%) and the market structure in a market encompassing SFCA systems and THSA systems.

490 […]*.

([10-20]*%)[491], Eaton ([5-10]*%), Thales ([0-5]*%), Parker ([0-5]*%), Sagem ([0-5]*%) and Moog ([0-5]*%).

Table 43: Worldwide THSA systems market shares (2008-2010)

Company	2008		2009		2010	
	Total sales (EUR million)	**Share of sales (%)**	**Total sales (EUR million)**	**Share of sales (%)**	**Total sales (EUR million)**	**Share of sales (%)**
UTC	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[5-10]*
Goodrich	[…]*	[30-40]*	[…]*	[20-30]*	[…]*	[30-40]*
Parties Combined	***[…]****	***[30-40]****	***[…]****	***[30-40]****	***[…]****	***[30-40]****
Rockwell Collins	[…]*	[20-30]*	[…]*	[20-30]*	[…]*	[20-30]*
Boeing	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[10-20]*
Eaton	[…]*	[0-5]*	[…]*	[5-10]*	[…]*	[5-10]*
Thales	[…]*	[5-10]*	[…]*	[5-10]*	[…]*	[0-5]*
Parker	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Sagem	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Moog	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Others	[…]*	[5-10]*	[…]*	[5-10]*	[…]*	[5-10]*
Total	**[…]***	**100**	**[…]***	**100**	**[…]***	**100**

Source: Notifying Party and 2010 Counterpoint Study

(705) The Notifying Party estimates the size of the worldwide RFCA system market to be EUR […]* million in 2010. Post transaction the merged entity would become the market leader with a market share of [20-30]*% (Goodrich: [10-20]*%; UTC: [5-10]*%), overcoming Liebherr ([10-20]*%), Parker ([10-20]*%), Moog ([10-20]*%) and Woodward ([10-20]*%).

491 According to the Notifying Party, Boeing has been sourcing THSA components and integrating the THSA system for the platforms prior to the Boeing 787, whose THSA system is integrated and supplied by Rockwell Collins. Therefore the Notifying Party argues that the portion of the market supplied by Boeing was contestable since Boeing could equally have sourced the THSA system from third parties. The competitors who responded to the market investigation generally consider customers which integrate their own actuation systems as competitors – see replies to Question 32 of the Commission's Questionnaire to flight control actuation competitors (Q5) of 24 February 2012. The Parties would have a [40-50]*% combined market share regarding a THSA market excluding the Boeing in-house integrated THSA systems, followed by Rockwell Collins ([30-40]*%), Eaton ([5-10]*%), Thales ([5-10]*%), Parker ([0-5]*%), Sagem ([0-5]*%) and Moog ([0-5]*%).

Table 44: Worldwide RFCA systems market shares (2008-2010)						
Company	**2008**		**2009**		**2010**	
	Total sales (EUR million)	**Share of sales (%)**	**Total sales (EUR million)**	**Share of sales (%)**	**Total sales (EUR million)**	**Share of sales (%)**
UTC	[…]*	[5-10]*	[…]*	[5-10]*	[…]*	[5-10]*
Goodrich	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[10-20]*
Parties Combined	***[…]****	***[20-30]****	***[…]****	***[20-30]****	***[…]****	***[20-30]****
Liebherr	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[10-20]*
Parker	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[10-20]*
Moog	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[10-20]*
Woodward	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[10-20]*
Others	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[10-20]*
Total	**[…]***	**100**	**[…]***	**100**	**[…]***	**100**
Source: Notifying Party and 2010 Counterpoint Study						

(706) The worldwide market for missile actuation systems had a total value of approximately EUR […]* million in 2010. According to the Notifying Party's estimates, Goodrich is the worldwide market leader ([30-40]*%) while UTC represents a relatively small increment ([0-5]*%). Woodward is the second supplier ([10-20]*%), followed by SENER ([10-20]*%), Moog ([10-20]*%), Parker ([5-10]*%), General Dynamics ([5-10]*%) and Honeywell ([5-10]*%).[492]

[492] As regards a potential overlap in a narrower geographic market, UTC supplies missile actuation systems in the EEA through Hamilton Sundstrand's Claverham business unit, deriving its revenues from platforms won more than ten years ago with the following customers: MBDA (Italy) for the Marte Mk2S and MBDA (the United Kingdom) for the Sea Wolf, the VL Sea Wolf, and the Rapier; Kongsberg (Norway) for the Penguin; Diehl (Germany) for the RBS15 Mk3; BAE Systems (the United Kingdom) for the Spearfish torpedo; and Boeing (the United Kingdom) for the Brimstone […]*. As regards Goodrich, [reference to Goodrich's business in Norway and Germany]*. In Italy, Goodrich currently supplies a small hydraulic actuator to Avio for the MBDA ASTER 30 Missile. In the United Kingdom, Goodrich currently has funded Post Design Services contracts on MBDA's ASRAAM, ALARM and Sea Skua missiles. Moreover, in the past five years, Goodrich has had funded refurbishment production orders (specific repair task to be performed on returned units) on MBDA's ALARM and PGM missiles. […]*. In any event, MBDA did not raise any concerns in reply to the market investigation.

Table 45: Worldwide missile actuation systems market shares (2008-2010)						
Company	**2008**		**2009**		**2010**	
	Total sales (EUR million)	**Share of sales (%)**	**Total sales (EUR million)**	**Share of sales (%)**	**Total sales (EUR million)**	**Share of sales (%)**
UTC	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Goodrich	[…]*	[20-30]*	[…]*	[30-40]*	[…]*	[30-40]*
Parties Combined	***[…]****	***[20-30]****	***[…]****	***[30-40]****	***[…]****	***[30-40]****
Woodward	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[10-20]*
SENER	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[10-20]*
Moog	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[10-20]*
Parker	[…]*	[5-10]*	[…]*	[5-10]*	[…]*	[5-10]*
General Dynamics	[…]*	[5-10]*	[…]*	[5-10]*	[…]*	[5-10]*
Honeywell	[…]*	[5-10]*	[…]*	[5-10]*	[…]*	[5-10]*
Others	[…]*	[10-20]*	[…]*	[0-5]*	[…]*	[0-5]*
Total	**[…]***	**100**	**[…]***	**100**	**[…]***	**100**
Source: Notifying Party and 2010 Counterpoint Study						

(707) The Notifying Party argues that UTC and Goodrich are not close competitors since Goodrich focuses on fin-based actuation systems and UTC is mainly active on thrust vector control actuation systems.

6.6.2.2. Assessment

Unilateral effects

(708) While in the course of the market investigation the vast majority of the flight control actuation customers did not express any concerns,[493] a number of concerns were raised by competitors with respect to potential anti-competitive unilateral effects concerning flight control actuation systems in general, as well as RFCA systems and SFCA systems.

(709) A number of competitors indicated that the proposed transaction would create a market leader with significant market power that would negatively affect their ability to compete. At the same time however, these competitors recognised that three other major competitors would remain in flight control actuation and that it is unlikely that the proposed transaction would lead to competition problems.[494] The responses to the market investigation further indicated that other companies such as GE Aviation, Woodward and Nabtesco have a small presence in flight control actuation.

(710) According to one RFCA system competitor, post transaction the combined position of UTC and Goodrich in this market would be significant and it would reduce choice

493 Replies to the Commission's Questionnaire to flight control actuation customers (Q6) of 24 February 2012.

494 Replies to Questions 64 and 65 of the Commission's Questionnaire to flight control actuation competitors (Q5) of 24 February 2012.

for Western Europe helicopter manufacturers.[495] Furthermore, a potential entrant in the RFCA systems market raised concerns that the merged entity would have a very strong position in the European RFCA system market and that the transaction would in practice prevent them from accessing this market.[496] However, as regards the relevance of competition being assessed at the EEA level, helicopter manufacturers indicated that they source flight control actuation systems at the worldwide level. Furthermore, the market investigation indicates that the combined market share of the Parties at the worldwide level is in line with the Parties' estimates, i.e. below 25%. In addition, even though one European-based helicopter manufacturer indicated that it currently sources the majority of the RFCA systems from the Parties and that the merged entity might raise prices, it considered that such would be constrained by the presence of alternative suppliers, such as Moog, Woodward, Liebherr,[497] and this was confirmed by another European-based helicopter manufacturer.

(711) One SFCA system competitor also raised concerns with the proposed transaction leading to a reduction of choice but at the same time admitted that there are sufficient alternative competitors.[498]

(712) One flight control actuation competitor submitted that the transaction would "limit the number of total major actuation integrator/suppliers to Parker, Moog, Goodrich/UTC, and Liebherr" while GE, Woodward and Nabtesco are "secondary players but do not have the heritage and capability of the majors".[499]

(713) Further to these concerns brought by competitors, one missile actuation customer stated that the merged entity would be able to increase prices, decrease quality and reduce choice across the military sector.[500] However, it also indicated that it would still have three alternative suppliers. Furthermore, it submitted that the proposed transaction was unlikely to create competition problems in the markets for flight control actuation systems and that it would not affect its ability to compete as missile and aircraft supplier.[501]

(714) The customer and competitor replies to the market investigation overall confirmed that for each flight control actuation system market there are sufficient alternative

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495 Reply to Question 63 of the Commission's Questionnaire to flight control actuation competitors (Q5) of 24 February 2012.

496 Reply to Question 64.1 of the Commission's Questionnaire to flight control actuation competitors (Q5) of 24 February 2012.

497 Replies to Questions 20.3, 45.1 and 49.1 of the Commission's Questionnaire to flight control actuation customers (Q6) of 24 February 2012.

498 Replies to Questions 64.1 and 65.1 of the Commission's Questionnaire to flight control actuation competitors (Q5) of 24 February 2012.

499 Reply to Question 63 of the Commission's Questionnaire to flight control actuation competitors (Q5) of 24 February 2012.

500 Reply to Question 49 of the Commission's Questionnaire to flight control actuation customers (Q6) of 24 February 2012.

501 Replies to Questions 52, 55 and 56 of the Commission's Questionnaire to flight control actuation customers (Q6) of 24 February 2012.

suppliers to UTC and Goodrich.[502] Apart from the above referred to respondents, the vast majority of customers in each actuation segment which responded to the market investigation consider that the merged entity would not be able to raise prices or decrease quality post transaction and that the proposed transaction is unlikely to create competition problems.[503]

Conglomerate effects

(715) One competitor expressed broader concerns with regard to conglomerate effects relating to the various flight control actuation markets. In its view, the proposed transaction would lead to competition problems and would negatively affect its ability to compete in the aerospace actuation markets since the merged entity would be able to offer discounts for the supply of a combination of various types of flight control actuation systems.[504]

(716) However, these concerns do not appear merger specific since both UTC and Goodrich, are already offering a wide array of flight control actuation systems and other products before the transaction. Furthermore, the same applies to other competitors, such as Parker, Moog or Woodward, which are present in the same markets as the Parties. Therefore, the proposed transaction is unlikely to lead to anti-competitive effects as a result of the presence of the merged entity across various flight control actuation systems.

6.6.2.3. Conclusion

(717) In view of the above, the Commission concludes that the concentration would not significantly impede effective competition as regards the horizontally affected markets in aerospace flight control actuation.

6.6.3. Vertical effects: Mechanical sub-assemblies for THSA systems

(718) A vertical relationship results from UTC's presence (through Ratier) in mechanical sub-assemblies and the Parties' downstream activities in THSA systems. Given the Parties' market shares upstream and downstream, these markets are vertically affected.

6.6.3.1. Assessment

Input foreclosure

(719) In 2010, UTC had a turnover of EUR […]* million in the upstream market of mechanical sub-assemblies (including the stand-alone supply of ball screws) for

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502 Replies to Questions 20.3 and 22 of the Commission's Questionnaire to flight control actuation customers (Q6) of 24 February 2012 and replies to Questions 25.3 and 26 of the Commission's Questionnaire to flight control actuation competitors (Q5) of 24 February 2012.

503 Replies to Questions 49 and 56 of the Commission's Questionnaire to flight control actuation customers (Q6) of 24 February 2012.

504 Reply to Question 64.1 of the Commission's Questionnaire to flight control actuation competitors (Q5) of 24 February 2012.

THSA systems.[505] The Notifying Party estimates that the size of such market at the worldwide level in 2010 was EUR […]* million and therefore UTC's market share was [30-40]*%. Post-transaction the merged entity will continue to face competition from significant suppliers such as Thomson ([20-30]*%), Umbra ([10-20]*%), and Beaver ([5-10]*%) and the merged entity's ability to foreclose downstream input supplies is therefore limited.

Table 46: Worldwide mechanical sub-assemblies for THSA systems market shares (2008-2010)

Company	2008		2009		2010	
	Total sales (EUR million)	**Share of sales (%)**	**Total sales (EUR million)**	**Share of sales (%)**	**Total sales (EUR million)**	**Share of sales (%)**
UTC	[…]*	[30-40]*	[…]*	[40-50]*	[…]*	[30-40]*
Thomson (Meggitt)	[…]*	[10-20]*	[…]*	[20-30]*	[…]*	[20-30]*
Umbra	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[10-20]*
Beaver	[…]*	[5-10]*	[…]*	[5-10]*	[…]*	[5-10]*
Others	[…]*	[20-30]*	[…]*	[10-20]*	[…]*	[10-20]*
Total	**[…]***	**100**	**[…]***	**100**	**[…]***	**100**

Source: The Parties and 2010 Counterpoint Study

(720) In any event, in 2010 UTC made OE sales of approximately EUR […]* million in mechanical sub-assemblies for THSA to Goodrich and these sales accounted for about […]* of its total 2010 revenues in this product area. Furthermore, the remaining UTC customer confirmed that there are a number of alternatives to UTC[506] and did not raise any input foreclosure concerns during the market investigation.

Customer foreclosure

(721) The Parties' combined worldwide market share in 2010 in the downstream market for the supply of THSA systems was [30-40]*% (Goodrich: [30-40]*%; UTC: [5-10]*%). There are a number of other THSA systems suppliers, such as Rockwell Collins, Eaton, Thales, Parker, Moog and Sagem. The merged entity therefore does not appear to be a sufficiently significant customer to raise customer foreclosure concerns. This is reinforced by the fact that UTC sources mechanical sub-assemblies for THSA systems internally and as such there is already a *de facto* vertical link between UTC and Goodrich. In addition, none of the upstream competitors has raised substantiated concerns in relation to potential customer foreclosure issues resulting from the vertical link between the markets for THSA systems and mechanical sub-assemblies for THSA systems.

505 […]*.

506 This is also confirmed by the great majority of the remaining respondents to the market investigation – see replies to Question 14 of the Commission's Questionnaire to THSA mechanical sub-assemblies competitors (Q7) of 24 February 2012 and replies to Question 60 of the Commission's Questionnaire to flight control actuation competitors (Q5) of 24 February 2012.

6.6.3.2. Conclusion

(722) In view of the above, the Commission concludes that the concentration would not significantly impede effective competition with respect to the vertical relationship between THSA systems and mechanical sub-assemblies for THSA systems.

6.7. Horizontal effects: Lighting

6.7.1. Exterior lighting

(723) UTC (through its subsidiary Page) is only active in interior lighting. There is therefore no overlap between the Parties in relation to exterior lighting.

(724) Goodrich's annual aircraft lighting revenues from original equipment amount to approximately EUR […]* million. Its exterior lighting business accounts for approximately […]* of these revenues. Goodrich's market share in the exterior lighting segment was [10-20]*% in 2010.

(725) The market for exterior lighting is very fragmented (see Table 47) and the merged entity will continue to face significant competitors, including Honeywell ([30-40]*%) and B/E Aerospace ([10-20]*%).

Table 47: Worldwide exterior lighting market shares (2008-2010) according to the Parties' estimates

Company	2008		2009		2010	
	Total sales (EUR million)	**Share of sales (%)**	**Total sales (EUR million)**	**Share of sales (%)**	**Total sales (EUR million)**	**Share of sales (%)**
Honeywell	[…]*	[30-40]*	[…]*	[30-40]*	[…]*	[30-40]*
Goodrich	**[…]***	**[10-20]***	**[…]***	**[20-30]***	**[…]***	**[10-20]***
B/E Aerospace	[…]*	[5-10]*	[…]*	[0-5]*	[…]*	[10-20]*
Astronics	[…]*	[5-10]*	[…]*	[5-10]*	[…]*	[5-10]*
Zodiac/ECE	[…]*	[5-10]*	[…]*	[0-5]*	[…]*	[0-5]*
Emteq	[…]*	[5-10]*	[…]*	[5-10]*	[…]*	[0-5]*
Lufthansa	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Sirio Panel	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
PGA Electronics	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Madelec	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
SELA	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
A.E.S.	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Luminator	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Others	[…]*	[0-5]*	[…]*	[5-10]*	[…]*	[5-10]*
Total	**[…]***	**100.0**	**[…]***	**100.0**	**[…]***	**100.0**

Source: Form CO Sections 6-8 Lighting, p. 12

6.7.2. Interior lighting

6.7.2.1. Closeness of competition

(726) UTC's aircraft interior lighting business is conducted through Page, a Hamilton Sundstrand subsidiary. Page's annual revenues from aircraft lighting original equipment amount to under EUR […]* million. Page is only active in interior lighting, where it focuses on wash lighting and cockpit lighting components. It also

offers reading lights for passenger compartments, cargo and service compartment lighting, and emergency lighting. Page's lighting business includes its wholly-owned subsidiary, Airsigna, which offers lighted information, exit, emergency and lavatory signs.

(727) Goodrich's most significant interior lighting product is the passenger service unit ("PSU"), which is the device that is built into the aircraft interior ceiling above the seats and combines passenger reading lights, "fasten seat belt" and "no smoking" signs, air outlets, flight attendant call indicators, and audio output for announcements. Goodrich also supplies other interior lighting components, including lighting for the cockpit.

(728) Both Goodrich and UTC are thus active in interior lighting. Although they overlap in most components (see Table 48), Goodrich derives half of its revenues in this segment from PSU, a component that Page does not supply. The majority of the customers which replied to the market investigation suggested that Goodrich and UTC are not close competitors as regards interior lighting.[507] In addition, none of the respondents to the market investigation raised specific concerns in relation to a given segment of the interior lighting market (either by type/size of aircraft or application).

Table 48: Overview of interior lighting products supplied by either of the Parties

Product	Product Examples	Supplied by Page	Supplied by Goodrich
Cockpit	LED Storm lights	✓	✓
	LED Panel Illumination	✓	✓
	LED Pilot/Co-Pilot specific work lights	✓	✓
Main Cabin	LED Linear LED light units	✓	✓
	LED Dome lights (customer specific)	✓	✓
	LED Ceiling mounted reading lights	✓	✓
	LED Handrail light (Airbus)	✓	✓
	LED Staircase & Step lighting	✓	✓
	LED Star lights (Feature lights)	✓	✓
Cabin Signage	Passenger Service Units	×	✓
	LED No smoking/Fasten seat belt signs	✓	✓
	LED Call lights	✓	✓
	LED Toilet occupied signs	✓	✓
	Lavatory Passenger Service Units	✓	✓
Egress Lighting	LED Exit signs	✓	✓
	LED Exit floor strips	×	✓
	LED Exit door lights	✓	✓
	LED Exit seat lights	✓	✓
Egress Batteries	Emergency lighting battery units	✓	✓
Cargo	LED cargo lights	✓	✓
	Loading area lights	✓	✓
	Service area lights	✓	✓

Source: Form CO Sections 6-8 Lighting, p. 6

[507] Replies to Question 13 of the Commission's Questionnaire to aircraft interior lighting customers (Q9) of 23 February 2012.

6.7.2.2. Market structure

(729) The worldwide markets for interior lighting had a total value of approximately EUR […]* million in 2010. On an overall market for interior lighting, the Parties' combined market shares are below the 25% safe harbour threshold set out in the Merger Regulation (see Table 49).[508]

(730) When participating in bids for interior lighting products, the Parties will continue to be constrained by a significant number of credible alternative suppliers, including Diehl ([20-30]*%), B/E Aerospace ([10-20]*%) and Honeywell ([5-10]*%). The many other smaller suppliers achieve a combined marked share of [30-40]*%, evidencing that the market for interior lighting is highly fragmented.

Table 49: Worldwide interior lighting market shares (2008-2010) according to the Parties' estimates

Company	2008		2009		2010	
	Revenues (EUR million)	**Market share (%)**	**Revenues (EUR million)**	**Market share (%)**	**Revenues (EUR million)**	**Market share (%)**
UTC	[…]*	[10-20]*	[…]*	[5-10]*	[…]*	[5-10]*
Goodrich	[…]*	[10-20]*	[…]*	[10-20]*	[…]*	[10-20]*
Combined	***[…]****	***[20-30]****	***[…]****	***[20-30]****	***[…]****	***[20-30]****
Diehl	[…]*	[20-30]*	[…]*	[20-30]*	[…]*	[20-30]*
B/E Aerospace	[…]*	[5-10]*	[…]*	[5-10]*	[…]*	[10-20]*
Honeywell	[…]*	[5-10]*	[…]*	[5-10]*	[…]*	[5-10]*
Zodiac/ECE	[…]*	[5-10]*	[…]*	[0-5]*	[…]*	[0-5]*
Emteq	[…]*	[5-10]*	[…]*	[5-10]*	[…]*	[0-5]*
Sirio Panel	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Astronics	[…]*	[0-5]*	[…]*	[5-10]*	[…]*	[0-5]*
Lufthansa	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
PGA Electronics	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Madelec	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
SELA	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
A.E.S.	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Luminator	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Koito	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Bruce	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[0-5]*
Others	[…]*	[0-5]*	[…]*	[0-5]*	[…]*	[5-10]*
Total	**[…]***	**100**	**[…]***	**100**	**[…]***	**100**

Source: Form CO Sections 6-8 Lighting, p. 16

(731) In the course of the market investigation, none of the Parties' main competitors expressed substantiated concerns as regards unilateral effects.[509] Although two

508 Paragraph 32.

509 Replies to Questions 17 and 18 of the Commission's Questionnaire to aircraft interior lighting competitors (Q8) of 22 February 2012.

companies indicate that, since Page and Goodrich are tier 2 suppliers for the same kind of products, the risk of price increase exists, they consider that no significant effects are to be expected and that there will still have enough alternatives after the proposed transaction.[510]

6.7.2.3. Assessment

Concerns expressed in relation to the interior lighting aftermarket

(732) With respect to customers, Lufthansa and Austrian[511] have explained that they are faced with a monopoly situation as regards repair, since they are bound by the supplier selections the aircraft manufacturers have made. With regard to items from Goodrich Lighting, Lufthansa has for instance to single source related parts to almost 100%. However, Lufthansa and Austrian acknowledge that the transaction does not change this pre-existing situation.[512] Concerns regarding the aftermarket are further addressed in a dedicated section of the present decision.

Conglomerate effects

(733) The transaction is unlikely to lead to anticompetitive effects as a result of the presence of the merged entity in both interior lighting and exterior lighting. Not only are the combined market shares of the Parties below 25% on these two segments, but there will continue to exist several significant lighting suppliers who equally offer both interior and exterior lighting: these include but are not limited to Honeywell, B/E Aerospace, Astronics, Zodiac and Lufthansa.

(734) Two relatively smaller companies expressed broader concerns with regard to conglomerate effects.[513] In their view, the large array of systems and components offered by UTC creates the possibility of UTC pricing certain products, such as lighting, at deep discounts in consideration for the selection of multiple UTC product lines in a given program. In their view, this kind of bundling of products puts companies with fewer products to sell at a disadvantage. However, there will remain several major alternatives (*e.g.* Diehl, B/E Aerospace, Honeywell, and Zodiac) that are able to offer multiple types of products beyond interior lighting on a given platform. In addition, this concern does not appear merger specific since UTC and Goodrich were already offering a wide array of systems and components beyond lighting products before the transaction.

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510 Replies to Questions 17 and 18 of the Commission's Questionnaire to aircraft interior lighting competitors (Q8) of 22 February 2012.

511 Replies to Questions 18, 19 and 20 of the Commission's Questionnaire to aircraft interior lighting customers (Q9) of 23 February 2012.

512 Replies to Question 20 of the Commission's Questionnaire to aircraft interior lighting customers (Q9) of 23 February 2012.

513 Replies to Questions 17 and 18 of the Commission's Questionnaire to aircraft interior lighting competitors (Q8) of 22 February 2012.

6.7.3. Conclusion

(735) Based on these elements, it can therefore be concluded that the concentration would not significantly impede effective competition with regards to aircraft lighting.

6.8. Spare parts and MRO services

(736) Within the different segments of the MRO services market (i.e., line maintenance, heavy maintenance, engine maintenance, and component maintenance), the Parties are simultaneously active only in component maintenance and the supply of spare parts and inputs related to MRO services.

(737) Prior to the transaction UTC and Goodrich are not directly competing against each other with regard to the supply of MRO services, spare parts and related inputs for their own components and systems. However, each of them is competing with providers of integrated MRO services (which also cover the components and systems of both UTC and Goodrich). In the course of the market investigation, a number of concerns were raised by third parties that the transaction could potentially increase the market power of the merged entity vis-à-vis customers of MRO services and spare parts and that this might change its ability and incentives of the merged entity to foreclose integrated MRO providers.

6.8.1. Structure of supply

(738) The transaction brings together two manufacturers of aircraft components with largely complementary activities. Component manufacturers compete ex-ante to be selected by an aircraft or engine manufacturer to supply specific components for a new aircraft or engine platform. Once selected as the OEM supplier of a specific component for the platform, and following the sale of the aircraft, component manufacturers also sell spare parts and provide MRO services for their components in the aftermarket throughout the life of the aircraft/engine platform.

(739) The Notifying Party submits that UTC and Goodrich primarily provide spare parts and MRO services for their own aircraft systems and components. It emphasises that the Parties do not provide to any important extent spare parts or MRO services for each other or for any competing equipment manufacturers. Their offer is therefore different from that of NTT services providers. In that regard, the Notifying Party further stresses that typical NTT service offering include not only repairs of all major aircraft components and systems, but also a range of other services including: line maintenance, heavy maintenance/overhauls, spare parts & logistics services, and maintenance planning & logistics (see Table 50).

Table 50: Aftermarket services supplied by the merged entity

Element of NTT service	NTT provider	UTC (pre-Transaction)	Merged entity (post-Transaction)
Line maintenance[119]	✓	×	×
Heavy maintenance/overhauls	✓	×	×
General spare parts & logistics services (including consumable planning & holding, purchasing & supplier management, inventory ownership)	✓	UTC active only in supply of spare parts for UTC components and systems	Merged entity active only in supply of spare parts for UTC and Goodrich components and systems
Rotables planning	✓	×	×
Maintenance planning & logistics	✓	×	×

Source: Notifying Party's reply to the Article 6(1)(c) decision, 4 April 2012

(740) Providers of MRO services can indeed be split into four categories:

(1) Airline-owned MRO suppliers (i.e. airlines with their own in-house MRO service such as inter alia Air France/KLM, BA/Iberia, Lufthansa and Air Canada) have significant service capabilities which they apply for servicing both their own fleet and that of third party customers. These MRO suppliers are mainly airlines without MRO capabilities, but also include airlines that lack MRO service capabilities for specific checks, aircraft, engines or other components.

(2) Independent aftermarket providers are a second category of suppliers. The largest independents, including ADAT, Haeco and Mubadala SRT, are capable of providing an overall MRO service.

(3) A third category of MRO service providers is constituted by aircraft OEMs, in particular Airbus and Boeing, which have recently entered the MRO market. Such aircraft OEMs market NTT programs in direct competition with the traditional MRO providers listed above. Aircraft OEMs act as integrators (to provide operators with a one-stop-shop solution) and outsource the MRO services to OEMs.

(4) Finally, OEMs provide aftermarket services for their own systems or components and are in that respect competitors of both airline MROs and independent MRO providers, albeit for a smaller scope of systems and components.

(741) The proportions of MRO services that are provided by each of the types of suppliers vary per system or component. Systems for which aftermarket services are provided in large part by independent repair shops and which could use spare parts produced by approved independent suppliers are generally relatively less complex and flight-critical (such as lighting, helicopter rescue hoists) compared to the systems that are serviced by the OEMs and certified MRO providers with OEM spare parts. The latter category would include electric systems, particularly AC generators, actuation, engine controls, most turbomachinery parts and ice detection systems. There is no

service market for pressure transducers and air data probes as these are replaced rather than repaired.

(742) When airline and independent MRO providers secure a full MRO service contract for an airline's complete aircraft fleet of a certain type, it may be the case that they outsource specific checks, repairs or overhaul of a specific component or system to the OEM because of the latter's specific expertise[514] or because of the independent MRO's lack of access to tooling or test equipment.[515]

(743) With regard to spare parts replacing worn-out or malfunctioning components within complex flight-critical systems, the service providers are dependent on the OEMs. The investigation has indicated that, for reasons of air safety certification, design and other intellectual property rights, there are only limited replacement parts produced by third parties ("PMA parts"), and almost none for flight-critical systems and components.[516] In particular in Europe, the use of PMA parts is limited. As there are distinct spare part markets for each aircraft component, OEMs hold a near-monopoly position for the supply of spare parts to MRO providers that service the aircraft.

(744) Depending on the individual agreement and the customer's specific needs and requirements, aftermarket service contracts with Hamilton Sundstrand and Goodrich may cover individual transactions or may involve long term agreements ranging up to […]*.[517] […]* According to the Notifying Party, such contracts are common in the industry and entered into by all component OEMs.

(745) As a result of the transaction, UTC will enlarge the share of the components of an aircraft that it can service (by adding the components that Goodrich serviced pre-merger), thereby reinforcing its ability to convince customers to "carve out" MRO services for its own components rather than pursuing a complete NTT solution from a single provider.

6.8.2. Aftermarkets structure and dynamics

(746) Over the period of use of an aircraft (20 to 30 years), the sales of MRO services and spare parts related to aircraft systems are very substantial in terms of value. Such is confirmed by the Parties as evidenced in their internal documents.[518] The

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514 According to the Notifying Party, these repairs are typically needed for individual piece parts or sub-components of flight-critical components and in aggregate represent less than […]* of the Parties' total aftermarket revenues.

515 The Notifying Party explained that this situation arises regularly with respect to some electronic components, such as Electronic Engine Controls, which need significant capital investment in the necessary test equipment but do not require frequent servicing. In such cases, independent MRO providers lack the economic incentive to develop the relevant in-house repair capability.

516 Replies to Question 17 of the Commission's Questionnaire to MRO service providers (Q30) of 5 April 2012 and replies to Question 17 of the Commission's Questionnaire to MRO service providers (Q30-bis) of 24 April 2012.

517 […]*.

518 […]* Hamilton Sundstrand has […]* MRO facilities worldwide, while Goodrich has […]* MRO facilities worldwide. The merged entity will have combined aftermarket earnings of USD […]* billion

aftermarkets represent a large share of the Parties' revenues ([…]* for Goodrich, […]* for Hamilton Sundstrand).

(747) Regarding component maintenance specifically, around USD 10 billion were spent worldwide in 2011, representing one fifth of the global MRO market.

(748) More generally, for aerospace equipment manufacturers, the revenues streams from growing aftermarket sales are important in order to recoup the initial investment associated with developing the parts […]*.[519]

(749) In the global market for spare parts, the share of surplus parts has been growing in recent years, from 10% in 2001 to 18% in 2011. PMA penetration, on the other hand, remains limited at about 2.5%.[520] It is a common feature in the industry that OEM suppliers seek to obtain long-term agreements with MROs. These agreements provide for a negotiated discount off the catalogue price in return for the customer agreeing to purchase spare parts exclusively from the OEM.

(750) With regard to MRO services of their own components, the Parties account for a variable share of the market depending on the product area. In particular, their share appears more limited in areas where the penetration of PMA parts is higher.[521]

(751) The Parties' share of MRO services further varies according to the aircraft platform. The Notifying Party estimates that Hamilton Sundstrand and Goodrich components respectively represent […]* and […]* of total component MRO spending on the Boeing 787 platform[522], […]* and […]* on the Airbus A350 platform, and […]* and […]* on the Boeing 777 platform.[523] The market investigation has shown that estimates of the Parties' share of the components of a given platform vary widely.[524] For instance, certain market players indicate that on the Boeing 787, the merged entity would account for in excess of […]* of the serviceable parts.[525]

(752) The market for MRO services is also characterized by increasing participation by airframers who seek to benefit from the highly profitable aftermarket. Through

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(Hamilton Sundstrand USD […]* billion, Goodrich USD […]* billion). Other UTC companies, including Pratt & Whitney, are not included.

519 […]*.

520 […]*.

521 Notifying Party's response to Commission Questions of April 19, 2012, Annexes 1.1 and 1.2.

522 […]*.

523 Notifying Party's response to Commission questions of April 19, 2012 spare parts and MRO services, paragraph 2.3; […]*.

524 Replies to Question 8 of the Commission's Questionnaire to MRO service providers (Q30) of 5 April 2012; replies to Question 8 of the Commission's Questionnaire to MRO service providers (Q30-bis) of 24 April 2012 and replies to Question 4 of the Commission's Questionnaire to MRO service customers (Q32) of 5 April 2012.

525 […]*.

acquisitions[526] and the use of their advantageous position (since they can offer discounts on the purchase of an aircraft on the condition that they are selected as integrators for MRO services), they have started to expand their position as MRO service providers.[527] However, airframers usually do not perform the repairs themselves but rather outsource them to the OEMs.

(753) The market investigation indicated that the transaction occurs in the context of the following general trends in the aftermarkets:

(a) Airlines (at least in the Union) want to purchase more and more maintenance services from one provider. This has led to the emergence of providers of nose-to-tail (NTT) service integrators, i.e. parties that offer a full portfolio of maintenance services to airlines and then subcontract the services of specific components to other parties (including component OEMs) as required. Important NTT providers are MROs associated with airlines (such as Lufthansa Technik, KLM/Air France MRO etc.). More recently, Airbus and Boeing have also started to sell such services to their customers.[528]

(b) Against this trend, component OEMs are taking more and more control of the aftermarket of their components and provide more and more of the maintenance and repair services themselves rather than just providing spare parts to independent MRO shops. According to some respondents to the market investigation, OEMs do this, for instance, by restricting access to technical documentation or by charging high fees for testing equipment or licenses.[529]

6.8.3. Concerns raised by third parties

(754) The market investigation identified two main concerns.

(755) First, as a result of their dependency for the supply of spare parts, both independent and airline MRO providers have pointed in the investigation to instances where OEMs restrict or frustrate access to spare parts, tooling, maintenance data/manuals and testing equipment.

(756) Concerns were raised by a number of MRO providers who indicated that UTC recently succeeded in imposing on them licenses on the IP related to the use of its

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526 In 2011, for example, Airbus acquired Danish aircraft component distributor Satair (for USD 504 million), Canadian helicopter MRO provider Vector Aerospace (for USD 619 million), and established a joint venture with Pipavav Defence and Offshore Engineering to provide MRO services in India. Boeing acquired Aviall (the world's largest aftermarket distributor) in 2006 and is expected to open a new MRO facility in Nagpur, India.

527 According to the Notifying Party, Boeing currently provides aftermarket services on the Boeing 737, 747-400F, 777, and 787; Airbus provides aftermarket services on most of its aircraft; and Embraer and Bombardier provide aftermarket services on all of their aircraft.

528 Notifying Party's Response to Commission questions of 14 March 2012, Annex 248 ('Customer Support Integration, January 19, 2012'), […]*.

529 Replies to Question 26 of the Commission's Questionnaire to MRO competitors (Q18) of 23 February 2012 and replies to Questions 27 and 29 of the Commission's Questionnaire to MRO customers (Q19) of 27 February 2012.

spare parts on the Boeing 787.[530] UTC has a large overall share of the components on the 787. MRO providers claimed that its share of components would increase further on several platforms as a result of the proposed transaction. They expressed concerns that the merged entity would have the incentive to leverage its enlarged position vis-à-vis MRO customers, and more particularly airlines, in order to grow its position in the lucrative aftermarkets, ultimately weakening competition from independent and airline-owned MRO suppliers with regard to MRO services for UTC components. Boeing also informed UTC and Goodrich of its concern that the transaction would give the merged entity greater control over the availability and price of aftermarket parts[531] as a result of its extended footprint on Boeing platforms, most notably the 787.

(757) To expand in the area of MRO services, OEMs have sought to convince customers to "carve out" MRO services for their own components rather than pursuing a complete NTT solution from a single provider.[532] Several respondents to the market investigation further indicated that OEMs have simultaneously sought to influence the MRO market in various manners such as charging different prices to different market participants (whereby some MRO providers pay higher prices than aircraft operators for OEM spare parts), introduction of licences for the use of OEM IP rights by MRO providers, or limitation of the information made available to certain MRO providers in the technical documentation.[533]

(758) However, a large majority of the airlines that responded to the market investigation explained that they deemed unlikely an OEM foreclosure strategy that would ultimately result in higher prices for MRO services given the disincentive resulting from reputational issues.[534] When purchasing an aircraft, airlines indeed base their decision on the total cost of ownership, including aftermarket costs. If the cost of MRO services for the components and systems of a given were to increase, airlines may switch supplier in their next purchase of aircraft or reduce their purchases.[535] It would therefore be in the interest of the airframers to avoid an increase in total cost of ownership and thus to monitor and discipline aftermarket costs.

(759) In addition, the Parties' internal documents […]*.[536] […]*.[537]

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530 Replies to Questions 7 and 35 of the Commission's Questionnaire to MRO service providers (Q30) of 5 April 2012 and replies to Question 40 of the Commission's Questionnaire to MRO service providers (Q30-bis) of 24 April 2012.

531 […]*.

532 […]*.

533 Replies to Questions 35 and 40 of the Commission's Questionnaire to MRO service providers (Q30) of 5 April 2012 and replies to Questions 35 and 40 of the Commission's Questionnaire to MRO service providers (Q30-bis) of 24 April 2012.

534 Replies to Questions 32 and 33 of the Commission's Questionnaire to MRO service customers (Q32) of 5 April 2012.

535 Replies to Question 34 of the Commission's Questionnaire to MRO service customers (Q32) of 5 April 2012.

536 The Notifying Party recognizes the existence of such long term agreements excluding the use of PMA parts (Notifying Party's response to Commission questions of 19 April 2012 – Spare parts and MRO services, paragraph 13).

Figure 13: […]*

[…]*

6.8.4. The Notifying Party's arguments

(760) In the Notifying Party's view, it is highly unlikely that the merging party would have an incentive to engage in a strategy of foreclosure in the aftermarket. Additionally, a theory of harm based on aftermarket foreclosure would not be merger specific. In support of its claims, the Notifying Party submitted an economic analysis of aftermarket issues.[538]

(761) This analysis emphasises the retaliation possibilities of aircraft manufacturers, in particular Airbus and Boeing. If the merged entity were to attempt an aftermarket foreclosure strategy (e.g. by refusing to supply spare parts to third-party MRO providers or excluding PMA suppliers through the use of exclusive dealing contracts), and if the result were a material increase in the aftermarket costs of the airlines who are the principal customers of the aircraft manufacturers, the OEM would be punished by the aircraft manufacturers in future competitions to have its components selected for new aircraft platforms. Therefore, in the Notifying Party's view, aftermarket foreclosure cannot be a profitable strategy and therefore the merged entity will not have the incentive to foreclose.

(762) Furthermore, the economic analysis submitted by the Notifying Party argues that there is no horizontal or vertical link between the merging parties' activities that could bring about any change in the likelihood of a hypothetical aftermarket foreclosure strategy. In the Notifying Party's view, the concerns put forward by certain third parties are based on conglomerate effects. Since OEMs such as UTC and Goodrich allegedly already have ex post market power in the supply of spare parts, they would therefore already have the ability and incentive to foreclose competition in the supply of MRO services on the components they manufacture. Similarly, to the extent it was feasible to exclude or marginalize PMA suppliers through the use of exclusive dealing contracts, UTC and Goodrich would already have the incentive to engage in this strategy. Therefore, in the Notifying Party's view, the proposed merger does not change the Parties' ability and/or incentive to foreclose.

(763) Against this background, the Notifying Party submitted that it will continue to face competition from a variety of sources, including (1) integrated MRO service providers, which are better placed to respond to increasing airline demand for simplified aftermarket sourcing structures and NTT MRO services, and (2) "alternative parts," including surplus parts, alternative (third-party) parts repairs, and to a lesser extent PMA parts.

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537 Replies to Questions 20 and 21 of the Commission's Questionnaire to PMA parts providers (Q31) of 16 April 2012.

538 Report prepared by Robert Stillman, Hans Zenger and Ugur Akgun (Charles River Associates) for UTC, submitted on 27 April 2012

(764) The Notifying Party further stated that the price and supply conditions of spare parts are to a large extent part of the negotiations between the airline as a buyer of aircraft and the airframe manufacturer and that reputational issues may exert important disciplinary pressure on OEMs aftermarket activities. In particular, according to the Notifying Party, up-front aftermarket commitments regarding pricing, supply conditions and warranties obliging the OEM to sell spare parts directly to the aircraft operator are commonly agreed with airlines and airframe manufacturers.

(765) Certain internal documents[539] of the Parties illustrate the merged entity's ability to provide a more extensive range of aftermarket services. In the Notifying Party's view however, these documents show that UTC does not envisage providing all the UTC and Goodrich aftermarket services together in a package, since such a model would not fit customer purchasing behaviour: in particular, the Parties' aftermarket services for wheels & brakes, aerostructures, landing gear, and engine components tend to be sourced independently from those for other components. […]*.

(766) As regards the foreclosure of inputs related to the supply of MRO services, the Notifying Party submits that a license from an original component supplier is not necessary for an MRO service provider to establish the capability to service that component. Independent MRO providers are able to access and use the CMMs for the Parties' products without entering into licensing arrangements with the Parties. Moreover, the Parties' published CMMs identify the tooling and test equipment required to repair their products in line with the applicable airworthiness and safety standards. […]*.

6.8.5. Merger specificity

(767) Generally, it may be observed that independently of the proposed transaction, once OEMs are selected as suppliers on a given platform, airframers and aircraft customers are locked-in to using this OEM to obtain spare parts for components. This implies that each component manufacturer has ex-post market power over the provision of spare parts, access to technical documentation, tools, etc. for the components it supplies.

Existing platforms

(768) The post-transaction ability of the combined entity to service more components on existing aircraft platforms is unlikely to affect the competitive position of competing aftermarket service providers that are independent from the OEMs. For these existing platforms, the access to spare parts and their supply conditions, including price, are governed by Product Support Agreements ("PSAs") that are in place for the lifetime of the aircraft. Equally so, aftermarket service providers have access to the manuals, tooling and IPR related issues.

(769) Even though the proposed transaction will enlarge the scope of components that can be serviced by the combined firm, it will not qualify as an MRO service provider that is capable of providing a full (nose to tail) service. Moreover, even when airlines

539 […]*.

may be incentivised to accept bundled offers or exclusive MRO contracts for some components or systems, the opportunity to do so will be dependent on the concentration of systems on a given aircraft platform. According to the market investigation, aircraft platforms where the merged entity will account for more than 30% of the systems / components are limited to the B787.

Table 51: Estimates of UTC's share (in value) of the recommended spare parts on Boeing platforms before and after the proposed transaction (Source: Boeing)

Platform	UTC pre-merger	UTC after Goodrich's acquisition
[…]*	[…]*	[…]*
[…]*	[…]*	[…]*
[…]*	[…]*	[…]*
[…]*	[…]*	[…]*

(770) Bundling and other exclusionary practices are common and do often not have any anticompetitive consequences.[540] However, under certain circumstances they may lead to concerns. Whilst bundled offers or exclusivity contracts could limit expansion of PMA suppliers (Parts Manufacturers Approval), this is unlikely to affect the competitive position of the Parties' competitors on the aftermarkets. Firstly, there is no indication that the use of such practices pre-merger is related to the share of components of the OEM on the aircraft. Secondly, the decision on whether or not to use PMA parts remains with the airlines that will preserve the use of PMA parts for high consumption items if this is the more economical proposition. Thirdly, the market investigation has indicated that some airlines and aircraft owners do not use PMA parts and that the use of PMA parts overall is limited (less than 5%). Finally, surplus parts seem to represent an available and growing source of spare parts for mature platforms.

Future platforms

(771) Given the importance of the aftermarket services cost to assure the operational condition of an aircraft during its lifetime, both airframe manufacturers and airlines have the incentive to set safeguards that limit the ability of a systems supplier in the aftermarkets at the moment of selecting the initial install supplier. Component suppliers would thus risk not being selected on the aircraft if it is not willing to provide such assurances. Equally so, airframe manufacturers could make the supply of a component dual sourced (buyer furnished equipment). Moreover, air framers are expected to become important MRO providers: although they mostly rely on outsourcing agreements with OEMs, they have a strong bargaining position to ensure that they are able to provide MRO services at competitive conditions on their platforms.

[540] See paragraph 93 of the Non horizontal Merger Guidelines.

(772) Quite apart from the above, the market investigation has shown that the competitive dynamics in the aftermarkets will not be affected by the proposed transaction itself. Indeed, to the extent that UTC engages and could continue to engage in more restrictive licensing of its IPR to competing aftermarket service providers, such is unrelated to the proposed transaction. The market investigation confirmed the Notifying Party's view that other OE suppliers use aftermarket arrangements similar to Hamilton Sundstrand's Boeing 787 aftermarket model, even when they account for a smaller "share of components" on a given platform.[541]

(773) The same applies to PMA parts since many customers of the Parties already enter into long-term agreements with them which provide for a negotiated discount off the catalogue price in return for which they agree to purchase spare parts for that OEM's components exclusively from the OEM. The Parties estimate that around […]* of their spare parts are sold through such long-term agreements and they expect to become more and more frequent independently of the proposed transaction. […]*.

(774) As a result, it appears that ability and incentives of foreclosing PMA part and MRO suppliers do not significantly change with the proposed transaction.

Conclusion

(775) Based on these elements, it can therefore be concluded that the concentration would not significantly impede effective competition with regards to MRO services, spare parts and other inputs related to the provision of MRO services.

7. CONDITIONS AND OBLIGATIONS

(776) Pursuant to the second subparagraph of Article 8(2) of the Merger Regulation, the Commission may attach to its decision conditions and obligations intended to ensure that the undertakings concerned comply with the commitments they have entered into vis-à-vis the Commission with a view to rendering the concentration compatible with the internal market.

(777) The fulfilment of the measure that gives rise to the structural change of the market is a condition, whereas the implementing steps which are necessary to achieve this result are generally obligations on the parties. Where a condition is not fulfilled, the Commission's Decision declaring the concentration compatible with the internal market is no longer applicable. Where the undertakings concerned commit a breach of an obligation, the Commission may revoke the clearance decision in accordance with Article 8(6) of the Merger Regulation. The undertakings concerned may also be subject to fines and periodic penalty payments under Articles 14(2) and 15(1) of the Merger Regulation.

(778) In accordance with the basic distinction described in recital (776) as regards conditions and obligations, this Decision should be made conditional on the full compliance by the Notifying Party with the Sections B (including the Schedules) of

[541] Replies to Questions 40 and 41 of the Commission's Questionnaire to MRO service providers (Q30-bis) of 24 April 2012.

the commitments submitted by the Notifying Party on 11 June 2012, as modified on 12 July 2012 and all other Sections should be obligations within the meaning of Article 8(2) of the Merger Regulation. The full text of the commitments is attached as Commitments Annex 1, Commitments Annex 2 and Commitments Annex 3 to this Decision and forms an integral part thereof.

8. CONCLUSION

(779) The Commission expressed serious doubts in its Article 6(1)(c) decision notably with respect to the worldwide market for aircraft AC power generation, the worldwide market for engine controls for small engines and the worldwide market for fuel nozzles. The result of the in-depth market investigation confirmed these concerns (although additional issues arose during the in depth investigation with respect to Rolls-Royce). The offered commitments proposal as contained in the Commitments Annex 1, Commitments Annex 2 and Commitments Annex 3 to this Decision modify the proposed concentration that was notified to the Commission on 20 February 2012 to such an extent, in conjunction with the contract extensions entered into with Honeywell in the course of the investigation, that they remove the serious doubts of the Commission as to the compatibility of that concentration with the internal market.

(780) Following modification by the Notifying Party, the concentration would therefore not significantly impede effective competition in the internal market or in a substantial part of it and should therefore be declared compatible with the internal market and the functioning of the European Economic Area Agreement pursuant to Article 8(2) of the Merger Regulation and Article 57 of the EEA Agreement, subject to compliance with the commitments set out in the Commitments Annex 1, Commitments Annex 2 and Commitments Annex 3 which are an integral part of this Decision.

HAS ADOPTED THIS DECISION:

Article 1

The notified operation whereby United Technologies Corporation (United States) acquires sole control of Goodrich (United States) within the meaning of Article 3(1)(b) of the Merger Regulation is hereby declared compatible with the internal market and the EEA Agreement.

Article 2

Article 1 is subject to compliance with the conditions set out in Sections B of the Commitments Annex 1, Commitments Annex 2 and Commitments Annex 3.

Article 3

United Technologies Corporation shall comply with the obligations set out in the sections of the Commitments Annex 1, Commitments Annex 2 and Commitments Annex 3 not referred to in Article 2.

Article 4

This Decision is addressed to: United Technologies Corporation
United Technologies Building
One Financial Plaza
Hartford, Connecticut 06103
United States of America

Done at Brussels, 26.7.2012

For the Commission
(Signed)
Joaquín ALMUNIA
Vice-President

Commitments Annex 1

July 10, 2012

By hand and by fax: 00 32 2 296 4301
European Commission – Merger Task Force
DG Competition
Rue Joseph II 70
B-1000 BRUSSELS

CASE COMP/M.6410 – UTC/GOODRICH

COMMITMENTS TO THE EUROPEAN COMMISSION

Pursuant to Article 8(2) of Council Regulation (EC) No. 139/2004 (the "Merger Regulation"), United Technologies Corporation ("UTC") hereby provides the following Commitments (the "Commitments") in order to enable the European Commission (the "Commission") to declare the acquisition of Goodrich Corporation ("Goodrich" and, together with UTC, the "Parties") by UTC compatible with the common market and the EEA Agreement by its decision pursuant to Article 8(2) of the Merger Regulation (the "Decision").

The Commitments shall take effect upon the date of adoption of the Decision.

This text shall be interpreted in the light of the Decision to the extent that the Commitments are attached as conditions and obligations, in the general framework of Community law, in particular in the light of the Merger Regulation, and by reference to the Commission Notice on remedies acceptable under Council Regulation (EC) No 139/2004 and under Commission Regulation (EC) No 802/2004.

A. DEFINITIONS

For the purpose of the Commitments, the following terms shall have the following meaning:

Aerolec: Aerolec SAS, a joint venture between Goodrich (which has a 60% shareholding) and Thales (which has a 40% shareholding), incorporated under the laws of France, with its registered office at 106 rue Fourny, F-78530, Buc, France.

Aerolec Divestment Business: Goodrich's (undivided) 60% shareholding in Aerolec, together with Goodrich's rights and obligations pursuant to the Intellectual Property Agreement dated June 27, 2001, between TRW Limited and Thales Avionics Electrical

Systems SA, and Goodrich's rights and obligations pursuant to the Collaboration and Subcontract Agreement dated June 27, 2001, among TRW Limited, Thales Avionics Electrical Systems SA, and Newco SA.

Aerolec Shareholders' Agreement: Shareholders' Agreement of May 31, 2001, between TRW France Holding SAS and TRW Limited and Thales Avionics Electrical Systems SA.

Affiliated Undertakings: undertakings controlled by the Parties and/or by the ultimate parents of the Parties, whereby the notion of control shall be interpreted pursuant to Article 3 Merger Regulation and in the light of the Commission Consolidated Jurisdictional Notice under Council Regulation (EC) No 139/2004.

Closing: the transfer of the legal title of the Divestment Business to the Purchaser.

Divestment Business: the business or businesses as defined in Section B and the Schedule that the Parties commit to divest.

Divestiture Periods: the First Divestiture Period and the Second Divestiture Period.

Divestiture Trustee: one or more natural or legal person(s), independent from the Parties, who is approved by the Commission and appointed by UTC and who has received from UTC the exclusive Trustee Mandate to sell the Divestment Business to a Purchaser at no minimum price.

Effective Date: the date of adoption of the Decision.

First Divestiture Period: the period of […]* from the Effective Date, subject to any extensions granted in accordance with Section F (review) of these Commitments.

First Trustee Divestiture Period: the period of […]* from the end of the First Divestiture Period, subject to any extensions granted in accordance with Section F (review) of these Commitments.

Goodrich: Goodrich Corporation, incorporated under the laws of the State of New York, United States, with its principal executive office at Four Coliseum Centre, 2730 West Tyvola Road, in the City of Charlotte, North Carolina, 28217, U.S.

Goodrich Development Centre: Goodrich's Development Centre located at India Evacuation Systems, #14/1 and 15/1 Maruthi Industrial Estate, Phase 2, Hoodi Village, Whitefield Road, Bengaluru, 560 048, India, which provides engineering (and other support) for Goodrich's businesses.

Goodrich MRO Campuses: Goodrich's global repair facilities located at: 4115 Corporate Center Drive, Monroe, North Carolina 28110-1313, U.S.; 84-92 Epsom Road, Zetland, Sydney, NSW 2017, Australia; and, 39 Changi North Crescent, 499642, Singapore.

Hold Separate Manager: the person appointed by UTC for the Divestment Business to manage the day-to-day business under the supervision of the Monitoring Trustee.

Key Personnel: all personnel necessary to maintain the viability and competitiveness of the Divestment Business, as listed in **Annex 9**.

Monitoring Trustee: one or more natural or legal person(s), independent from the Parties, who is approved by the Commission and appointed by UTC, and who has the duty to monitor UTC compliance with the conditions and obligations attached to the Decision.

Parties: UTC together with Goodrich.

Personnel: all personnel currently employed by the Divestment Business, including Key Personnel, staff seconded to the Divestment Business, shared personnel and the additional personnel listed in the Schedule.

Pitstone Divestment Business. All tangible and intangible assets owned by Goodrich or Goodrich Affiliated Undertakings that contribute to the current operation or are necessary for the development, production, servicing, and sale of all electric systems products manufactured at the Pitstone facility located at Pitstone Business Park, Westfield Road, Pitstone, Bucks, LU7 9GT, U.K.

Proposed Transaction: the acquisition of Goodrich Corporation by United Technologies Corporation.

Purchaser: the entity approved by the Commission as acquirer of the Divestment Business in accordance with the criteria set out in Section D. Any singular reference to the Purchaser should be considered to refer to one or more Purchasers.

Second Divestiture Period: the period of […]* from the Effective Date, subject to any extensions granted in accordance with Section F (review) of these Commitments.

Second Trustee Divestiture Period: the period of […]* from the end of the Second Divestiture Period, subject to any extensions granted in accordance with Section F (review) of these Commitments.

Thales: Thales Avionics Electrical Systems SA.

Trustee(s): the Monitoring Trustee and the Divestiture Trustee.

Trustee Divestiture Periods: the First Trustee Divestiture Period and the Second Trustee Divestiture Period.

Twinsburg Divestment Business. All tangible and intangible assets owned by Goodrich or Goodrich Affiliated Undertakings that contribute to the current operation or are necessary for the development, production, servicing, and sale of all electric systems products manufactured at the Twinsburg facility located at 8380 Darrow Road, Twinsburg, Ohio 44087, U.S.

UTC: United Technologies Corporation, incorporated under the laws of the State of Delaware, United States, with its registered office at Corporation Trust Center, 1209 Orange Street, in the City of Wilmington, County of New Castle, Delaware, 19801, United States, and registered with the Delaware Division of Corporations under file number 0334827.

B. THE DIVESTMENT BUSINESS

Commitment to divest

1. In order to maintain effective competition in the market for aircraft AC electric generation systems, UTC commits:

   (a) To divest, or procure the divestiture of the Pitstone Divestment Business and the Twinsburg Divestment Business by the end of the First Trustee Divestiture Period as a going concern to a Purchaser and on terms of sale approved by the Commission in accordance with the procedure described in paragraph 15. To carry out the divestiture, UTC commits to find a purchaser and to enter into a final binding sale and purchase agreement for the sale of the Pitstone Divestment Business and the Twinsburg Divestment Business within the First Divestiture Period. If UTC has not entered into such an agreement at the end of the First Divestiture Period, UTC shall grant the Divestiture Trustee an exclusive mandate to sell the Pitstone Divestment Business and the Twinsburg Divestment Business in accordance with the procedure described in paragraph 15 in the First Trustee Divestiture Period; and

   (b) To divest, or procure the divestiture of the Aerolec Divestment Business by the end of the Second Trustee Divestiture Period as a going concern to a Purchaser and on terms of sale approved by the Commission in accordance with the procedure described in paragraph 15. To carry out the divestiture, UTC commits to find a purchaser and to enter into a final binding sale and purchase agreement for the sale of the Aerolec Divestment Business within the Second Divestiture Period. If UTC has not entered into such an agreement at the end of the Second Divestiture Period, UTC shall grant the Divestiture Trustee an exclusive mandate to sell the Aerolec Divestment Business in accordance with the procedure described in paragraph 15 in the Second Trustee Divestiture Period. […]*.

   (c) The Divestment Business will be sold to one and the same purchaser, unless […]*.

2. UTC shall be deemed to have complied with this commitment if, by the end of the Trustee Divestiture Periods, UTC has entered into a final binding sale and purchase agreement, if the Commission approves the Purchaser and the terms in accordance with the procedure described in paragraph 15 and if the closing of the sale of the Divestment Business takes place within a period not exceeding 3 months after the approval of the Purchaser and the terms of sale by the Commission.

3. In order to maintain the structural effect of the Commitments, the Parties shall, for a period of 10 years after the Effective Date, not acquire direct or indirect influence over the whole or part of the Divestment Business, unless the Commission has previously found that the structure of the market has changed to such an extent that the absence of influence over the Divestment Business is no longer necessary to render the proposed concentration compatible with the common market.

Structure and definition of the Divestment Business

4. The Divestment Business consists of all of Goodrich's electric power systems activities (except for the limited customer support services for Goodrich's in-service electric systems products currently provided through the Goodrich MRO Campuses), consisting of: (i) Goodrich's facility located in Pitstone, U.K.; (ii) Goodrich's facility located in Twinsburg, U.S.; and, (iii) Goodrich's 60% shareholding in Aerolec, a joint venture between Goodrich and Thales Avionics Electrical Systems SA ("Thales"). The present legal and functional structure of the Divestment Business as operated to date is described in the Schedule. The Divestment Business, described in more detail in the Schedule, includes:

(a) All tangible and intangible assets (including intellectual property rights), which contribute to the current operation or are necessary to ensure the viability and competitiveness of the Divestment Business;

(b) All licenses, permits and authorizations issued by any governmental organization for the benefit of the Divestment Business (the Parties will make all reasonable efforts to ensure the transfer of any transferable licenses, permits and authorizations, as well as making all reasonable efforts to support the Purchaser's receipt of any non-transferrable licenses, permits, and authorizations required for the operation of the Divestment Business);

(c) All contracts, leases, commitments and customer orders of the Divestment Business and all customer, credit and other records of the Divestment Business (items referred to under (a)-(c) hereinafter collectively referred to as "Assets");

(d) The Personnel (including the employees identified in **Annex 7** and the key employees who would likely be considered as being indispensible for the operation of the Divestment Business identified in **Annex 9**);

(e) At the Purchaser's request, the benefit, for a transitional period of up to […]* after Closing, and on terms and conditions equivalent to those at present afforded to the Divestment Business, of all current arrangements under which Goodrich or Affiliated Undertakings currently supplies […]* to the Divestment Business, as detailed in the Schedule, unless otherwise agreed with the Purchaser;

(f) At the Purchaser's request, the benefit, for a transitional period of up to […]* after Closing, and on terms and conditions equivalent to those at present afforded to the Divestment Business, of all current arrangements under which Goodrich or Affiliated Undertakings currently supplies […]*, to the Divestment Business, as detailed in the Schedule, unless otherwise agreed with the Purchaser; and

(g) At the Purchaser's request, the benefit, for a transitional period of up to […]* after Closing, and on terms and conditions equivalent to those at present afforded to the Divestment Business, of all current arrangements under which Goodrich or Affiliated Undertakings currently […]* to the Divestment

Business, as detailed in the Schedule, unless otherwise agreed with the Purchaser.

C. RELATED COMMITMENTS

Preservation of Viability, Marketability and Competitiveness

5. From the Effective Date until Closing, the Parties shall preserve the economic viability, marketability and competitiveness of the Divestment Business, in accordance with good business practice, and shall minimise as far as possible any risk of loss of competitive potential of the Divestment Business. In particular, the Parties undertake:

   (a) Not to carry out any act upon its own authority that might have a significant adverse impact on the value, management or competitiveness of the Divestment Business or that might alter the nature and scope of activity, or the industrial or commercial strategy or the investment policy of the Divestment Business;

   (b) To make available sufficient resources for the development of the Divestment Business, on the basis and continuation of the existing business plans;

   (c) To take all reasonable steps, including appropriate incentive schemes (based on industry practice), to encourage all Key Personnel to remain with the Divestment Business.

Hold-separate obligations of Parties

6. The Parties commit, from the Effective Date until Closing, to keep the Divestment Business separate from the businesses it is retaining and to ensure that Key Personnel of the Divestment Business – including the Hold Separate Manager – have no involvement in any business retained and *vice versa*. The Parties shall also ensure that the Personnel does not report to any individual outside the Divestment Business.

7. Until Closing, the Parties shall assist the Monitoring Trustee in ensuring that the Divestment Business is managed as a distinct and saleable entity separate from the businesses retained by the Parties. The Parties shall appoint a Hold Separate Manager who shall be responsible for the management of the Divestment Business, under the supervision of the Monitoring Trustee. The Hold Separate Manager shall manage the Divestment Business independently and in the best interest of the business with a view to ensuring its continued economic viability, marketability and competitiveness and its independence from the businesses retained by the Parties.

8. To ensure that the Divestment Business is held and managed as a separate entity the Monitoring Trustee shall exercise Goodrich's rights as shareholder in Aerolec (except for its rights for dividends that are due before Closing), with the aim of acting in the best interest of the business, determined on a stand-alone basis, as an independent financial investor, and with a view to fulfilling Goodrich's obligations under the Commitments. Furthermore, the Monitoring Trustee shall have the power to replace

members of the supervisory board or non-executive directors of the board of directors, who have been appointed on behalf of Goodrich. Upon request of the Monitoring Trustee, Goodrich shall resign as member of the boards or shall cause such members of the boards to resign.

Ring-fencing

9. The Parties shall implement all necessary measures to ensure that they do not after the Effective Date obtain any business secrets, know-how, commercial information, or any other information of a confidential or proprietary nature relating to the Divestment Business. In particular, the participation of the Divestment Business in a central information technology network shall be severed to the extent possible, without compromising the viability of the Divestment Business. The Parties may obtain information relating to the Divestment Business which is reasonably necessary for the divestiture of the Divestment Business or whose disclosure to the Parties is required by law.

Non-solicitation clause

10. UTC undertakes, subject to customary limitations, not to solicit, and to procure that Affiliated Undertakings do not solicit, the Key Personnel transferred with the Divestment Business for a period of three years after Closing.

Due Diligence

11. In order to enable potential purchasers to carry out a reasonable due diligence of the Divestment Business, the Parties shall, subject to customary confidentiality assurances and dependent on the stage of the divestiture process:

    (a) Provide to potential purchasers sufficient information as regards the Divestment Business;

    (b) Provide to potential purchasers sufficient information relating to the Personnel and allow them reasonable access to the Personnel.

Reporting

12. UTC shall submit written reports in English on potential purchasers of the Divestment Business and developments in the negotiations with such potential purchasers to the Commission and the Monitoring Trustee no later than 10 days after the end of every month following the Effective Date (or otherwise at the Commission's request).

13. UTC shall from the Effective Date inform the Commission and the Monitoring Trustee on the preparation of the data room documentation and the due diligence procedure and shall submit a copy of an information memorandum to the Commission and the Monitoring Trustee before sending the memorandum out to potential purchasers.

D. THE PURCHASER

14. In order to ensure the immediate restoration of effective competition, the Purchaser, in order to be approved by the Commission, must:

    (a) Be independent of and unconnected to the Parties;

    (b) Have the financial resources, proven expertise (in particular by virtue of demonstrated capabilities in the aerospace sector) and incentive to maintain and develop the Divestment Business as a viable and active competitive force in competition with the Parties and other competitors;

    (c) Neither be likely to create, in the light of the information available to the Commission, *prima facie* competition concerns nor give rise to a risk that the implementation of the Commitments will be delayed, and must, in particular, reasonably be expected to obtain all necessary approvals from the relevant regulatory authorities for the acquisition of the Divestment Business (the before-mentioned criteria for the purchaser hereafter the "Purchaser Requirements").

15. The final binding sale and purchase agreement shall be conditional on the Commission's approval. When UTC has reached an agreement with a purchaser, it shall submit a fully documented and reasoned proposal, including a copy of the final agreement(s), to the Commission and the Monitoring Trustee. UTC must be able to demonstrate to the Commission that the purchaser meets the Purchaser Requirements and that the Divestment Business is being sold in a manner consistent with the Commitments. For the approval, the Commission shall verify that the purchaser fulfils the Purchaser Requirements and that the Divestment Business is being sold in a manner consistent with the Commitments. The Commission may approve the sale of the Divestment Business without one or more Assets or parts of the Personnel, if this does not affect the viability and competitiveness of the Divestment Business after the sale, taking account of the proposed purchaser.

E. TRUSTEE

I. Appointment Procedure

16. UTC shall appoint a Monitoring Trustee to carry out the functions specified in the Commitments for a Monitoring Trustee:

    (a) If UTC has not entered into a binding sale and purchase agreement for the Pitstone Divestment Business and the Twinsburg Divestment Business […]* before the end of the First Divestiture Period or if the Commission has rejected a purchaser proposed by UTC at that time or thereafter, UTC shall appoint a Divestiture Trustee to carry out the functions specified in the Commitments for a Divestiture Trustee. The appointment of the Divestiture Trustee shall take effect upon the commencement of the First Trustee Divestiture Period.

(b) If UTC has not entered into a binding sale and purchase agreement for the Aerolec Divestment Business […]* before the end of the Second Divestiture Period or if the Commission has rejected a purchaser proposed by UTC at that time or thereafter, UTC shall appoint a Divestiture Trustee to carry out the functions specified in the Commitments for a Divestiture Trustee. The appointment of the Divestiture Trustee shall take effect upon the commencement of the Second Trustee Divestiture Period.

17. The Trustee shall be independent of the Parties, possess the necessary qualifications to carry out its mandate, for example as an investment bank or consultant or auditor, and shall neither have nor become exposed to a conflict of interest. The Trustee shall be remunerated by the Parties in a way that does not impede the independent and effective fulfillment of its mandate. In particular, where the remuneration package of a Divestiture Trustee includes a success premium linked to the final sale value of the Divestment Business, the fee shall also be linked to a divestiture within the Trustee Divestiture Periods.

Proposal by the Parties

18. No later than one week after the Effective Date, UTC shall submit a list of one or more persons whom UTC proposes to appoint as the Monitoring Trustee to the Commission for approval. No later than […]* before the end of the First Divestiture Period for the Pitstone Divestment Business and the Twinsburg Divestment Business, and no later than […]* before the end of the Second Divestiture Period for the Aerolec Divestment Business, UTC shall submit a list of one or more persons whom UTC proposes to appoint as Divestiture Trustee to the Commission for approval. The proposal shall contain sufficient information for the Commission to verify that the proposed Trustee fulfils the requirements set out in paragraph 17 and shall include:

(a) The full terms of the proposed mandate, which shall include all provisions necessary to enable the Trustee to fulfill its duties under these Commitments;

(b) The outline of a work plan which describes how the Trustee intends to carry out its assigned tasks;

(c) An indication whether the proposed Trustee is to act as both Monitoring Trustee and Divestiture Trustee or whether different trustees are proposed for the two functions.

Approval or rejection by the Commission

19. The Commission shall have the discretion to approve or reject the proposed Trustee(s) and to approve the proposed mandate subject to any modifications it deems necessary for the Trustee to fulfill its obligations. If only one name is approved, UTC shall appoint or cause to be appointed, the individual or institution concerned as Trustee, in accordance with the mandate approved by the Commission. If more than one name is approved, UTC shall be free to choose the Trustee to be appointed from among the names approved. The Trustee shall be appointed within one week of the Commission's approval, in accordance with the mandate approved by the Commission.

New proposal by the Parties

20. If all the proposed Trustees are rejected, UTC shall submit the names of at least two more individuals or institutions within one week of being informed of the rejection, in accordance with the requirements and the procedure set out in paragraphs 16 and 19.

Trustee nominated by the Commission

21. If all further proposed Trustees are rejected by the Commission, the Commission shall nominate a Trustee, whom UTC shall appoint, or cause to be appointed, in accordance with a trustee mandate approved by the Commission.

II. Functions of the Trustee

22. The Trustee shall assume its specified duties in order to ensure compliance with the Commitments. The Commission may, on its own initiative or at the request of the Trustee or UTC, give any orders or instructions to the Trustee in order to ensure compliance with the conditions and obligations attached to the Decision.

Duties and obligations of the Monitoring Trustee

23. The Monitoring Trustee shall:

(i) Propose in its first report to the Commission a detailed work plan describing how it intends to monitor compliance with the obligations and conditions attached to the Decision.

(ii) Oversee the on-going management of the Divestment Business with a view to ensuring its continued economic viability, marketability and competitiveness and monitor compliance by UTC with the conditions and obligations attached to the Decision. To that end the Monitoring Trustee shall:

(a) Monitor the preservation of the economic viability, marketability and competitiveness of the Divestment Business, and the keeping separate of the Divestment Business from the business retained by the Parties, in accordance with paragraphs 5 and 6 of the Commitments;

(b) Supervise the management of the Divestment Business as a distinct and saleable entity, in accordance with paragraph 7 of the Commitments;

(c) (i) in consultation with UTC, determine all necessary measures to ensure that UTC does not after the Effective Date obtain any business secrets, know-how, commercial information, or any other information of a confidential or proprietary nature relating to the Divestment Business, in particular strive for the severing of the Divestment Business' participation in a central information technology network to the extent possible, without compromising the viability of the Divestment Business, and (ii) decide whether such information may be disclosed to UTC as the disclosure is reasonably necessary to allow UTC to carry out the divestiture or as the disclosure is required by law;

(d) Monitor the splitting of assets and the allocation of Personnel between the Divestment Business and UTC or Affiliated Undertakings;

(iii) Assume the other functions assigned to the Monitoring Trustee under the conditions and obligations attached to the Decision;

(iv) Propose to UTC such measures as the Monitoring Trustee considers necessary to ensure UTC's compliance with the conditions and obligations attached to the Decision, in particular the maintenance of the full economic viability, marketability or competitiveness of the Divestment Business, the holding separate of the Divestment Business and the non-disclosure of competitively sensitive information;

(v) Review and assess potential purchasers as well as the progress of the divestiture process and verify that, dependent on the stage of the divestiture process, (a) potential purchasers receive sufficient information relating to the Divestment Business and the Personnel in particular by reviewing, if available, the data room documentation, the information memorandum and the due diligence process, and (b) potential purchasers are granted reasonable access to the Personnel;

(vi) Provide to the Commission, sending UTC a non-confidential copy at the same time, a written report within 15 days after the end of every month. The report shall cover the operation and management of the Divestment Business so that the Commission can assess whether the business is held in a manner consistent with the Commitments and the progress of the divestiture process as well as potential purchasers. In addition to these reports, the Monitoring Trustee shall promptly report in writing to the Commission, sending UTC a non-confidential copy at the same time, if it concludes on reasonable grounds that UTC is failing to comply with these Commitments;

(vii) Within one week after receipt of the documented proposal referred to in paragraph 15, submit to the Commission. sending UTC a non-confidential copy at the same time, a reasoned opinion as to the suitability and independence of the proposed purchaser and the viability of the Divestment Business after the Sale and as to whether the Divestment Business is sold in a manner consistent with the conditions and obligations attached to the Decision, in particular, if relevant, whether the sale of the Divestment Business without one or more Assets or not all of the Personnel affects the viability of the Divestment Business after the sale, taking account of the proposed purchaser.

Duties and obligations of the Divestiture Trustee

24. Within the First Trustee Divestiture Period, for the Pitstone Divestment Business and the Twinsburg Divestment Business, and the Second Trustee Divestiture Period, for the Aerolec Divestment Business, the Divestiture Trustee shall sell at no minimum price the Divestment Business to a purchaser, provided that the Commission has approved both the purchaser and the final binding sale and purchase agreement in accordance with the procedure laid down in paragraph 15. The Divestiture Trustee

shall include in the sale and purchase agreement such terms and conditions as it considers appropriate for an expedient sale in the applicable Trustee Divestiture Period. In particular, the Divestiture Trustee may include in the sale and purchase agreement such customary representations and warranties and indemnities as are reasonably required to effect the sale. The Divestiture Trustee shall protect the legitimate financial interests of UTC, subject to the Parties' unconditional obligation to divest at no minimum price in the applicable Trustee Divestiture Period.

25. In the Trustee Divestiture Periods (or otherwise at the Commission's request), the Divestiture Trustee shall provide the Commission with a comprehensive monthly report written in English on the progress of the divestiture process. Such reports shall be submitted within 15 days after the end of every month with a simultaneous copy to the Monitoring Trustee and a non-confidential copy to the Parties.

III. Duties and obligations of the Parties

26. The Parties shall provide and shall cause their advisors to provide the Trustee with all such cooperation, assistance and information as the Trustee may reasonably require to perform its tasks. The Trustee shall have full and complete access to any of the Parties' or the Divestment Business' books, records, documents, management or other personnel, facilities, sites and technical information necessary for fulfilling its duties under the Commitments and the Parties and the Divestment Business shall provide the Trustee upon request with copies of any document. The Parties and the Divestment Business shall make available to the Trustee one or more offices on their premises and shall be available for meetings in order to provide the Trustee with all information necessary for the performance of its tasks.

27. The Parties shall provide the Monitoring Trustee with all managerial and administrative support that it may reasonably request on behalf of the management of the Divestment Business. This shall include all administrative support functions relating to the Divestment Business which are currently carried out at headquarters level. UTC shall provide and shall cause its advisors to provide the Monitoring Trustee, on request, with the information submitted to potential purchasers, in particular give the Monitoring Trustee access to the data room documentation and all other information granted to potential purchasers in the due diligence procedure. UTC shall inform the Monitoring Trustee on possible purchasers, submit a list of potential purchasers, and keep the Monitoring Trustee informed of all developments in the divestiture process.

28. UTC shall grant or procure Affiliated Undertakings to grant comprehensive powers of attorney, duly executed, to the Divestiture Trustee to effect the sale, the Closing and all actions and declarations which the Divestiture Trustee considers necessary or appropriate to achieve the sale and the Closing, including the appointment of advisors to assist with the sale process. Upon request of the Divestiture Trustee, UTC shall cause the documents required for effecting the sale and the Closing to be duly executed.

29. UTC shall indemnify the Trustee and its employees and agents (each an "Indemnified Party") and hold each Indemnified Party harmless against, and hereby agrees that an Indemnified Party shall have no liability to UTC for any liabilities arising out of the

performance of the Trustee's duties under the Commitments, except to the extent that such liabilities result from the willful default, recklessness, gross negligence or bad faith of the Trustee, its employees, agents or advisors.

30. At the expense of UTC, the Trustee may appoint advisors (in particular for corporate finance or legal advice), subject to UTC's approval (this approval not to be unreasonably withheld or delayed) if the Trustee considers the appointment of such advisors necessary or appropriate for the performance of its duties and obligations under the mandate, provided that any fees and other expenses incurred by the Trustee are reasonable. Should UTC refuse to approve the advisors proposed by the Trustee the Commission may approve the appointment of such advisors instead, after having heard UTC. Only the Trustee shall be entitled to issue instructions to the advisors. Paragraph 29 shall apply mutatis mutandis. In the Trustee Divestiture Periods, the Divestiture Trustee may use advisors who served UTC during the Divestiture Periods if the Divestiture Trustee considers this in the best interest of an expedient sale.

IV. Replacement, discharge and reappointment of the Trustee

31. If the Trustee ceases to perform its functions under the Commitments or for any other good cause, including the exposure of the Trustee to a conflict of interest:

    (a) The Commission may, after hearing the Trustee, require UTC to replace the Trustee; or

    (b) UTC, with the prior approval of the Commission, may replace the Trustee.

32. If the Trustee is removed according to paragraph 31, the Trustee may be required to continue in its function until a new Trustee is in place to whom the Trustee has effected a full hand over of all relevant information. The new Trustee shall be appointed in accordance with the procedure referred to in paragraphs 16-21.

33. Besides the removal according to paragraph 31, the Trustee shall cease to act as Trustee only after the Commission has discharged it from its duties after all the Commitments with which the Trustee has been entrusted have been implemented. However, the Commission may at any time require the reappointment of the Monitoring Trustee if it subsequently appears that the relevant remedies might not have been fully and properly implemented.

F. THE REVIEW CLAUSE

34. The Commission may, where appropriate, in response to a request from UTC showing good cause and accompanied by a report from the Monitoring Trustee:

    (i) Grant an extension of the time periods foreseen in the Commitments, or

    (ii) Waive, modify or substitute, in exceptional circumstances, one or more of the undertakings in these Commitments.

    Where UTC seeks an extension of a time period, it shall submit a request to the Commission no later than one month before the expiry of that period, showing good

cause. Only in exceptional circumstances shall UTC be entitled to request an extension within the last month of any period.

Signed July 10, 2012

[…]*

SCHEDULE

1. The Divestment Business as operated to date has the following legal and functional structure.

   (a) The Pitstone Divestment Business comprises Goodrich's electric power systems facility located in Pitstone, U.K. The Pitstone Divestment Business currently forms part of Goodrich Control Systems Ltd., a company registered in England and Wales, which is a wholly owned subsidiary of Goodrich Corporation. Except as specified elsewhere in this Schedule, the Pitstone Divestment Business includes all facilities and related assets located at Pitstone Business Park, Westfield Road, Pitstone, Bucks, LU7 9GT, U.K.

   (b) The Twinsburg Divestment Business comprises Goodrich's electric power systems facility located in Twinsburg, U.S. The Twinsburg Divestment Business currently forms part of Goodrich Corporation, a company registered in New York, U.S. Except as specified elsewhere in this Schedule, the Twinsburg Divestment Business includes all facilities and related assets located at 8380 Darrow Road, Twinsburg, Ohio 44087, U.S.

   (c) Aerolec SAS is a joint venture between Goodrich and Thales. Aerolec is a French-registered company in which Goodrich has a 60% shareholding of the shares in Aerolec, and Thales has a 40% shareholding. The Divestment Business includes Goodrich's 60% shareholding in Aerolec.

2. Following paragraph 4 of these Commitments, the Divestment Business comprises all of Goodrich's electric power systems activities (except for the limited customer support services for Goodrich's in-service electric systems products currently provided through the Goodrich MRO Campuses), and everything that is required to ensure the viability and competitiveness of the Divestment Business, including but not limited to:

   (a) All tangible and intangible assets owned by Goodrich or Goodrich Affiliated Undertakings (including but not limited to the tangible assets listed in **Annex 5** and all intellectual property which is owned by the Divestment Business at the effective date, in particular the patents listed in **Annex 6**), which contribute to the current operation or are necessary to ensure the viability and competitiveness of the Divestment Business;

   (b) All contracts, agreements, leases, commitments and understandings relating to the development, production, servicing, and sale of the electric systems products manufactured at the Pitstone facility and the Twinsburg facility, including but not limited to the customer contracts identified in **Annex 10**;

   (c) All customer lists, accounts, orders, and credit records relating to the Divestment Business that are owned by Goodrich or a Goodrich Affiliated Undertaking;

(d) The Personnel listed exclusively or primarily involved in the development, production, servicing, and sale of the electric systems products manufactured at the Pitstone facility and the Twinsburg facility, as identified in **Annex 7**;

(e) The identified Key Personnel exclusively or primarily involved in the development, production, servicing, and sale of the electric systems products manufactured at the Pitstone facility, as identified in **Annex 9**;

(f) Goodrich's (undivided) 60% shareholding in Aerolec;

(g) Goodrich's rights and obligations pursuant to the Intellectual Property Agreement dated June 27, 2001, between TRW Limited and Thales Avionics Electrical Systems SA; and

(h) Goodrich's rights and obligations pursuant to the Collaboration and Subcontract Agreement dated June 27, 2001, among TRW Limited, Thales Avionics Electrical Systems SA, and Newco SA.

3. In addition to the assets and Personnel comprising the Divestment Business as described above, UTC is prepared to enter into the following arrangements for the supply of products or services by UTC or UTC Affiliated Undertakings to the Purchaser:

(a) If desired by the Purchaser, UTC is willing to enter into an agreement, for a transitional period not exceeding […]* after Closing and on terms and conditions equivalent to those provided at present, to supply […]* currently supplied to the Divestment Business by other Goodrich facilities;

(b) If desired by the Purchaser, UTC is willing to enter into an agreement, for a transitional period not exceeding […]* after Closing and on terms and conditions equivalent to those provided at present, to supply […]* currently provided to the Divestment Business by […]* to the Purchaser for use in the Divestment Business; and

(c) If desired by the Purchaser, UTC is willing to enter into an agreement, for a transitional period not exceeding […]* after Closing and on terms and conditions equivalent to those provided at present, to supply […]* currently provided to the Divestment Business by […]* to the Purchaser for use in the Divestment Business.

(d) Besides the transitional products and services described in paragraphs 3(a), 3(b) and 3(c) of the Schedule, the Purchaser of the Divestment Business shall have the option at its sole discretion to require from UTC the provision of certain transition products and services, for a limited period of time not exceeding […]*, in so far as these product and services are necessary for the Purchaser to operate the Divestment Business. These transition services shall give the Purchaser enough time to build or develop the assets required to operate the Divestment Business in house.

4. In addition, notwithstanding the transfer of the Divestment Business, UTC is permitted to enter into an agreement with the Purchaser on terms and conditions

equivalent to those provided at present pursuant to which the Divestment Business will continue to supply […]*.

5. The Divestment Business shall not include:

(a) Any tangible assets, intangible assets, personnel, contracts, agreements, or authorizations located at or applicable to the Pitstone facility that contribute to the current operation of or are necessary for Goodrich's […]*activities; except, at the purchaser's option, any such tangible assets, intangible assets, personnel, contracts, agreements, or authorizations that are currently supporting the Divestment Business and are required to ensure the viability and competitiveness of the Divestment Business pursuant to paragraph 2 of the Schedule;

(b) Any tangible assets or personnel relating to the engineering support currently provided to the Divestment Business by […]*; and

(c) Any tangible assets or personnel relating to the customer support services currently provided to the Divestment Business by […]*.

(d) If it becomes clear within the first divestiture period (or, if relevant, within the Trustee Divestiture Period) that any of the tangible assets or personnel referred in paragraph 5(b) or 5(c) are required for the operation and viability of the Divestment Business, at the Purchaser's option, these tangible assets or personnel would also form part of the Divestment Business.

Annex 5: Principal Tangible Assets used in the Divestment Business

The principal tangible assets owned by Goodrich or Goodrich Affiliated Undertakings used in the development, production, servicing, and sale of all electric systems products manufactured by the Divestment Business are summarized below.

1. The main tangible assets of the Pitstone facility, located at Pitstone Business Park, Westfield Road, Pitstone, Bucks, LU7 9GT, U.K., including but not limited to:

[…]*;

;[542]

[…]*.

2. The main tangible assets of the Twinsburg facility, located at located at 8380 Darrow Road, Twinsburg, Ohio 44087, U.S., including but not limited to:

[…]*.

[542] […]*.

Annex 6: Patents used in Divestment Business
Power Systems (UK)

[…]

Annex 7: Overview of employees engaged in Divestment Business

[…]

Annex 9: Key Employees considered indispensible for the operation of the Divestment Business

[…]

Annex 10 Major OE Customers of the Divestment Business

[…]

Commitments Annex 2

July 10, 2012

By hand and by fax: 00 32 2 296 4301

European Commission – Merger Task Force
DG Competition
Rue Joseph II 70
B-1000 BRUSSELS

Case M.6410 – UTC/GOODRICH

COMMITMENTS TO THE EUROPEAN COMMISSION

Pursuant to Article 8(2) of Council Regulation (EC) No. 139/2004 (the "Merger Regulation"), United Technologies Corporation ("UTC") hereby provides the following Commitments (the "Commitments") in order to enable the European Commission (the "Commission") to declare the acquisition of Goodrich Corporation ("Goodrich" and, together with UTC, the "Parties") by UTC compatible with the common market and the EEA Agreement by its decision pursuant to Article 8(2) of the Merger Regulation (the "Decision").

The Commitments shall take effect upon the date of adoption of the Decision.

This text shall be interpreted in the light of the Decision to the extent that the Commitments are attached as conditions and obligations, in the general framework of Community law, in particular in the light of the Merger Regulation, and by reference to the Commission Notice on remedies acceptable under Council Regulation (EC) No 139/2004 and under Commission Regulation (EC) No 802/2004.

A. DEFINITIONS

For the purpose of the Commitments, the following terms shall have the following meaning:

Affiliated Undertakings: undertakings controlled by the Parties and/or by the ultimate parents of the Parties, whereby the notion of control shall be interpreted pursuant to Article 3 Merger Regulation and in the light of the Commission Consolidated Jurisdictional Notice under Council Regulation (EC) No 139/2004.

Closing: the transfer of the legal title of the Divestment Business to the Purchaser.

Divestment Business: the business or businesses as defined in Section B and the Schedule that the Parties commit to divest.

Divestiture Trustee: one or more natural or legal person(s), independent from the Parties, who is approved by the Commission and appointed by UTC and who has received from UTC the exclusive Trustee Mandate to sell the Divestment Business to a Purchaser at no minimum price.

Effective Date: the date of adoption of the Decision.

First Divestiture Period: the period of […]* from the Effective Date, subject to any extensions granted in accordance with Section F (Review) of these Commitments.

Hold Separate Manager: the person appointed by UTC for the Divestment Business to manage the day-to-day business under the supervision of the Monitoring Trustee.

Goodrich: Goodrich Corporation, incorporated under the laws of the State of New York, United States, with its principal executive office at Four Coliseum Centre, 2730 West Tyvola Road, in the City of Charlotte, North Carolina, 28217, U.S.

Key Personnel: all personnel necessary to maintain the viability and competitiveness of the Divestment Business, as listed in **Annex 6**.

Monitoring Trustee: one or more natural or legal person(s), independent from the Parties, who is approved by the Commission and appointed by UTC, and who has the duty to monitor UTC's compliance with the conditions and obligations attached to the Decision.

Parties: UTC together with Goodrich.

Personnel: all personnel currently employed by the Divestment Business, including the Key Personnel.

Proposed Transaction: the acquisition of Goodrich Corporation by United Technologies Corporation.

Purchaser: the entity approved by the Commission as acquirer of the Divestment Business in accordance with the criteria set out in Section D.

Qualifying Customer Contracts: Any long-term contracts to which the Divestment Business is a party for the supply of engine controls components used in aircraft engines produced by […]*with regard to engines that directly compete with aircraft engines produced by UTC's Pratt & Whitney subsidiary.

Trustee(s): the Monitoring Trustee and the Divestiture Trustee.

Trustee Divestiture Period: the period of […]* from the end of the First Divestiture Period, subject to any extensions granted in accordance with Section F (Review) of these Commitments.

UTC: United Technologies Corporation, incorporated under the laws of the State of Delaware, United States, with its registered office at Corporation Trust Center, 1209 Orange

Street, in the City of Wilmington, County of New Castle, Delaware, 19801, United States, and registered with the Delaware Division of Corporations under file number 0334827.

B. THE DIVESTMENT BUSINESS

Commitment to divest

1. In order to restore effective competition in the markets for engine controls, UTC commits to divest, or procure the divestiture of the Divestment Business by the end of the Trustee Divestiture Period as a going concern to a Purchaser and on terms of sale approved by the Commission in accordance with the procedure described in paragraph 15. To carry out the divestiture, UTC commits to find a purchaser and to enter into a final binding sale and purchase agreement for the sale of the Divestment Business within the First Divestiture Period. If UTC has not entered into such an agreement at the end of the First Divestiture Period, UTC shall grant the Divestiture Trustee an exclusive mandate to sell the Divestment Business in accordance with the procedure described in paragraph 24 in the Trustee Divestiture Period.

2. UTC shall be deemed to have complied with this commitment if, by the end of the Trustee Divestiture Period, UTC has entered into a final binding sale and purchase agreement, if the Commission approves the Purchaser and the terms in accordance with the procedure described in paragraph 15 and if the closing of the sale of the Divestment Business takes place within a period not exceeding 3 months after the approval of the purchaser and the terms of sale by the Commission.

3. In order to maintain the structural effect of the Commitments, the Parties shall, for a period of 10 years after the Effective Date, not acquire direct or indirect influence over the whole or part of the Divestment Business, unless the Commission has previously found that the structure of the market has changed to such an extent that the absence of influence over the Divestment Business is no longer necessary to render the proposed concentration compatible with the common market.

Structure and definition of the Divestment Business

4. The Divestment Business consists of the Goodrich engine control OEM, spares, and MRO business that operates from the West Hartford facility, which includes the manufacture and sale of EECs, FMUs and MFPs, and ancillary engine control products including, but not limited to, engine actuators, ejector pumps and tanks, hot oil valves, shut off valves, flow dividers, start flow control valves, lube pumps, and lube and scavenge pumps, as well as the commercial engine controls OEM and spares business currently operated from the Montreal facility that will be transitioned to the West Hartford facility. The present legal and functional structure of the Divestment Business as operated to date is described in the Schedule. The Divestment Business, described in more detail in the Schedule, includes:

   (a) All tangible and intangible assets (including intellectual property rights), which contribute to the current operation or are necessary to ensure the viability and competitiveness of the Divestment Business;

   (b) All licenses, permits and authorisations issued by any governmental organisation for the benefit of the Divestment Business (the Parties will make

all reasonable efforts to ensure the transfer of any transferable licenses, permits and authorizations, as well as making all reasonable efforts to support the Purchaser's receipt of any non-transferrable licenses, permits, and authorizations required for the operation of the Divestment Business);

(c) All contracts, leases, commitments and customer orders of the Divestment Business, including (for the avoidance of doubt) […]*, and all customer, credit and other records that relate to the Divestment Business. […]*. (Items referred to under (a)-(c) hereinafter collectively referred to as "Assets"); and

(d) The Personnel.

5. In addition, notwithstanding the transfer of the Divestment Business, UTC is permitted to enter into an agreement with the Purchaser on terms and conditions equivalent to those provided at present, pursuant to which the Divestment Business will continue to supply […]*.

C. RELATED COMMITMENTS

Preservation of Viability, Marketability and Competitiveness

6. From the Effective Date until Closing, the Parties shall preserve the economic viability, marketability and competitiveness of the Divestment Business, in accordance with good business practice, and shall minimise as far as possible any risk of loss of competitive potential of the Divestment Business. In particular the Parties undertake:

(a) Not to carry out any act upon its own authority that might have a significant adverse impact on the value, management or competitiveness of the Divestment Business or that might alter the nature and scope of activity, or the industrial or commercial strategy or the investment policy of the Divestment Business;

(b) To make available sufficient resources for the development of the Divestment Business, on the basis and continuation of the existing business plans; and

(c) To take all reasonable steps, including appropriate incentive schemes (based on industry practice), to encourage all Key Personnel to remain with the Divestment Business.

Hold-separate obligations of Parties

7. The Parties commit, from the Effective Date until Closing, to keep the Divestment Business separate from the businesses UTC is retaining and to ensure that Key Personnel of the Divestment Business – including the Hold Separate Manager – have no involvement in any business retained and vice versa. The Parties shall also ensure that the Personnel do not report to any individual outside the Divestment Business.

8. Until Closing, the Parties shall assist the Monitoring Trustee in ensuring that the Divestment Business is managed as a distinct and saleable entity separate from the businesses retained by the Parties. The Parties shall appoint a Hold Separate Manager

who shall be responsible for the management of the Divestment Business, under the supervision of the Monitoring Trustee. The Hold Separate Manager shall manage the Divestment Business independently and in the best interest of the business with a view to ensuring its continued economic viability, marketability and competitiveness and its independence from the businesses retained by the Parties.

Ring-fencing

9. The Parties shall implement all necessary measures to ensure that it does not after the Effective Date obtain any business secrets, know-how, commercial information, or any other information of a confidential or proprietary nature relating to the Divestment Business. In particular, the participation of the Divestment Business in a central information technology network shall be severed to the extent possible, without compromising the viability of the Divestment Business. The Parties may obtain information relating to the Divestment Business which is reasonably necessary for the divestiture of the Divestment Business or whose disclosure to the Parties is required by law.

Non-solicitation clause

10. UTC undertakes, subject to customary limitations, not to solicit, and to procure that Affiliated Undertakings do not solicit, the Key Personnel transferred with the Divestment Business for a period of three years after Closing.

Due Diligence

11. In order to enable potential purchasers to carry out a reasonable due diligence of the Divestment Business, the Parties shall, subject to customary confidentiality assurances and dependent on the stage of the divestiture process:

    (a) Provide to potential purchasers sufficient information as regards the Divestment Business;

    (b) Provide to potential purchasers sufficient information relating to the Personnel and allow them reasonable access to the Personnel.

Reporting

12. UTC shall submit written reports in English on potential purchasers of the Divestment Business and developments in the negotiations with such potential purchasers to the Commission and the Monitoring Trustee no later than 10 days after the end of every month following the Effective Date (or otherwise at the Commission's request).

13. The Parties shall inform the Commission and the Monitoring Trustee on the preparation of the data room documentation and the due diligence procedure and shall submit a copy of an information memorandum to the Commission and the Monitoring Trustee before sending the memorandum out to potential purchasers.

D. THE PURCHASER

14. In order to ensure the immediate restoration of effective competition, the Purchaser, in order to be approved by the Commission, must:

    (a) Be independent of and unconnected to the Parties;

    (b) Have the financial resources, proven expertise and incentive to maintain and develop the Divestment Business as a viable and active competitive force in competition with the Parties and other competitors;

    (c) Neither be likely to create, in the light of the information available to the Commission, *prima facie* competition concerns nor give rise to a risk that the implementation of the Commitments will be delayed, and must, in particular, reasonably be expected to obtain all necessary approvals from the relevant regulatory authorities for the acquisition of the Divestment Business (the before-mentioned criteria for the purchaser hereafter the "Purchaser Requirements").

15. The final binding sale and purchase agreement shall be conditional on the Commission's approval. When UTC has reached an agreement with a purchaser, it shall submit a fully documented and reasoned proposal, including a copy of the final agreement(s), to the Commission and the Monitoring Trustee. UTC must be able to demonstrate to the Commission that the purchaser meets the Purchaser Requirements and that the Divestment Business is being sold in a manner consistent with the Commitments. For the approval, the Commission shall verify that the purchaser fulfils the Purchaser Requirements and that the Divestment Business is being sold in a manner consistent with the Commitments. The Commission may approve the sale of the Divestment Business without one or more Assets or parts of the Personnel, if this does not affect the viability and competitiveness of the Divestment Business after the sale, taking account of the proposed purchaser.

E. TRUSTEE

I. Appointment Procedure

16. UTC shall appoint a Monitoring Trustee to carry out the functions specified in the Commitments for a Monitoring Trustee. If UTC has not entered into a binding sales and purchase agreement […]* before the end of the First Divestiture Period or if the Commission has rejected a purchaser proposed by UTC at that time or thereafter, UTC shall appoint a Divestiture Trustee to carry out the functions specified in the Commitments for a Divestiture Trustee. The appointment of the Divestiture Trustee shall take effect upon the commencement of the Trustee Divestiture Period.

17. The Trustee shall be independent of the Parties, possess the necessary qualifications to carry out its mandate, for example as an investment bank or consultant or auditor, and shall neither have nor become exposed to a conflict of interest. The Trustee shall be remunerated by the Parties in a way that does not impede the independent and effective fulfillment of its mandate. In particular, where the remuneration package of a Divestiture Trustee includes a success premium linked to the final sale value of the

Divestment Business, the fee shall also be linked to a divestiture within the Trustee Divestiture Period.

Proposal by the Parties

18. No later than one week after the Effective Date, UTC shall submit a list of one or more persons whom UTC proposes to appoint as the Monitoring Trustee to the Commission for approval. No later than […]* before the end of the First Divestiture Period, UTC shall submit a list of one or more persons whom UTC proposes to appoint as Divestiture Trustee to the Commission for approval. The proposal shall contain sufficient information for the Commission to verify that the proposed Trustee fulfils the requirements set out in paragraph 17 and shall include:

    (a) The full terms of the proposed mandate, which shall include all provisions necessary to enable the Trustee to fulfill its duties under these Commitments;

    (b) The outline of a work plan which describes how the Trustee intends to carry out its assigned tasks;

    (c) An indication whether the proposed Trustee is to act as both Monitoring Trustee and Divestiture Trustee or whether different trustees are proposed for the two functions.

Approval or rejection by the Commission

19. The Commission shall have the discretion to approve or reject the proposed Trustee(s) and to approve the proposed mandate subject to any modifications it deems necessary for the Trustee to fulfill its obligations. If only one name is approved, UTC shall appoint or cause to be appointed, the individual or institution concerned as Trustee, in accordance with the mandate approved by the Commission. If more than one name is approved, UTC shall be free to choose the Trustee to be appointed from among the names approved. The Trustee shall be appointed within one week of the Commission's approval, in accordance with the mandate approved by the Commission.

New proposal by the Parties

20. If all the proposed Trustees are rejected, UTC shall submit the names of at least two more individuals or institutions within one week of being informed of the rejection, in accordance with the requirements and the procedure set out in paragraphs 16 and 19.

Trustee nominated by the Commission

21. If all further proposed Trustees are rejected by the Commission, the Commission shall nominate a Trustee, whom UTC shall appoint, or cause to be appointed, in accordance with a trustee mandate approved by the Commission.

II. <u>Functions of the Trustee</u>

22. The Trustee shall assume its specified duties in order to ensure compliance with the Commitments. The Commission may, on its own initiative or at the request of the

Trustee or UTC, give any orders or instructions to the Trustee in order to ensure compliance with the conditions and obligations attached to the Decision.

Duties and obligations of the Monitoring Trustee

23. The Monitoring Trustee shall:

(i) Propose in its first report to the Commission a detailed work plan describing how it intends to monitor compliance with the obligations and conditions attached to the Decision.

(ii) Oversee the on-going management of the Divestment Business with a view to ensuring its continued economic viability, marketability and competitiveness and monitor compliance by UTC with the conditions and obligations attached to the Decision. To that end the Monitoring Trustee shall:

(a) Monitor the preservation of the economic viability, marketability and competitiveness of the Divestment Business, and the keeping separate of the Divestment Business from the business retained by the Parties, in accordance with paragraphs 5 and 6 of the Commitments;

(b) Supervise the management of the Divestment Business as a distinct and saleable entity, in accordance with paragraph 7 of the Commitments;

(c) (i) in consultation with UTC, determine all necessary measures to ensure that UTC does not after the effective date obtain any business secrets, know-how, commercial information, or any other information of a confidential or proprietary nature relating to the Divestment Business, in particular strive for the severing of the Divestment Business' participation in a central information technology network to the extent possible, without compromising the viability of the Divestment Business, and (ii) decide whether such information may be disclosed to UTC as the disclosure is reasonably necessary to allow UTC to carry out the divestiture or as the disclosure is required by law;

(d) Monitor the splitting of assets and the allocation of Personnel between the Divestment Business and UTC or Affiliated Undertakings;

(iii) Assume the other functions assigned to the Monitoring Trustee under the conditions and obligations attached to the Decision;

(iv) Propose to UTC such measures as the Monitoring Trustee considers necessary to ensure UTC's compliance with the conditions and obligations attached to the Decision, in particular the maintenance of the full economic viability, marketability or competitiveness of the Divestment Business, the holding separate of the Divestment Business and the non-disclosure of competitively sensitive information;

(v) Review and assess potential purchasers as well as the progress of the divestiture process and verify that, dependent on the stage of the divestiture process, (a) potential purchasers receive sufficient information relating to the

Divestment Business and the Personnel in particular by reviewing, if available, the data room documentation, the information memorandum and the due diligence process, and (b) potential purchasers are granted reasonable access to the Personnel;

(vi) Provide to the Commission, sending UTC a non-confidential copy at the same time, a written report within 15 days after the end of every month. The report shall cover the operation and management of the Divestment Business so that the Commission can assess whether the business is held in a manner consistent with the Commitments and the progress of the divestiture process as well as potential purchasers. In addition to these reports, the Monitoring Trustee shall promptly report in writing to the Commission, sending UTC a non-confidential copy at the same time, if it concludes on reasonable grounds that UTC is failing to comply with these Commitments;

(vii) Within one week after receipt of the documented proposal referred to in paragraph 15, submit to the Commission a reasoned opinion as to the suitability and independence of the proposed purchaser and the viability of the Divestment Business after the Sale and as to whether the Divestment Business is sold in a manner consistent with the conditions and obligations attached to the Decision, in particular, if relevant, whether the Sale of the Divestment Business without one or more Assets or not all of the Personnel affects the viability of the Divestment Business after the sale, taking account of the proposed purchaser.

Duties and obligations of the Divestiture Trustee

24. Within the Trustee Divestiture Period, the Divestiture Trustee shall sell at no minimum price the Divestment Business to a purchaser, provided that the Commission has approved both the Purchaser and the final binding sale and purchase agreement in accordance with the procedure laid down in paragraph 15. The Divestiture Trustee shall include in the sale and purchase agreement such terms and conditions as it considers appropriate for an expedient sale in the Trustee Divestiture Period. In particular, the Divestiture Trustee may include in the sale and purchase agreement such customary representations and warranties and indemnities as are reasonably required to effect the sale. The Divestiture Trustee shall protect the legitimate financial interests of UTC, subject to the Parties' unconditional obligation to divest at no minimum price in the Trustee Divestiture Period.

25. In the Trustee Divestiture Period (or otherwise at the Commission's request), the Divestiture Trustee shall provide the Commission with a comprehensive monthly report written in English on the progress of the divestiture process. Such reports shall be submitted within 15 days after the end of every month with a simultaneous copy to the Monitoring Trustee and a non-confidential copy to the Parties.

III. Duties and obligations of the Parties

26. The Parties shall provide and shall cause its advisors to provide the Trustee with all such cooperation, assistance and information as the Trustee may reasonably require to perform its tasks. The Trustee shall have full and complete access to any of the

Parties' or the Divestment Business' books, records, documents, management or other personnel, facilities, sites and technical information necessary for fulfilling its duties under the Commitments and the Parties and the Divestment Business shall provide the Trustee upon request with copies of any document. The Parties and the Divestment Business shall make available to the Trustee one or more offices on their premises and shall be available for meetings in order to provide the Trustee with all information necessary for the performance of its tasks.

27. The Parties shall provide the Monitoring Trustee with all managerial and administrative support that it may reasonably request on behalf of the management of the Divestment Business. This shall include all administrative support functions relating to the Divestment Business which are currently carried out at headquarters level. UTC shall provide and shall cause its advisors to provide the Monitoring Trustee, on request, with the information submitted to potential purchasers, in particular give the Monitoring Trustee access to the data room documentation and all other information granted to potential purchasers in the due diligence procedure. UTC shall inform the Monitoring Trustee on possible purchasers, submit a list of potential purchasers, and keep the Monitoring Trustee informed of all developments in the divestiture process.

28. UTC shall grant or procure Affiliated Undertakings to grant comprehensive powers of attorney, duly executed, to the Divestiture Trustee to effect the sale, the Closing and all actions and declarations which the Divestiture Trustee considers necessary or appropriate to achieve the sale and the Closing, including the appointment of advisors to assist with the sale process. Upon request of the Divestiture Trustee, UTC shall cause the documents required for effecting the sale and the Closing to be duly executed.

29. UTC shall indemnify the Trustee and its employees and agents (each an "Indemnified Party") and hold each Indemnified Party harmless against, and hereby agrees that an Indemnified Party shall have no liability to UTC for any liabilities arising out of the performance of the Trustee's duties under the Commitments, except to the extent that such liabilities result from the willful default, recklessness, gross negligence or bad faith of the Trustee, its employees, agents or advisors.

30. At the expense of UTC, the Trustee may appoint advisors (in particular for corporate finance or legal advice), subject to UTC's approval (this approval not to be unreasonably withheld or delayed) if the Trustee considers the appointment of such advisors necessary or appropriate for the performance of its duties and obligations under the Mandate, provided that any fees and other expenses incurred by the Trustee are reasonable. Should UTC refuse to approve the advisors proposed by the Trustee the Commission may approve the appointment of such advisors instead, after having heard UTC. Only the Trustee shall be entitled to issue instructions to the advisors. Paragraph 29 shall apply mutatis mutandis. In the Trustee Divestiture Period, the Divestiture Trustee may use advisors who served UTC during the Divestiture Period if the Divestiture Trustee considers this in the best interest of an expedient sale.

IV. Replacement, discharge and reappointment of the Trustee

31. If the Trustee ceases to perform its functions under the Commitments or for any other good cause, including the exposure of the Trustee to a conflict of interest:

    (a) The Commission may, after hearing the Trustee, require UTC to replace the Trustee; or

    (b) UTC, with the prior approval of the Commission, may replace the Trustee.

32. If the Trustee is removed according to paragraph 31, the Trustee may be required to continue in its function until a new Trustee is in place to whom the Trustee has effected a full hand over of all relevant information. The new Trustee shall be appointed in accordance with the procedure referred to in paragraphs 16-21.

33. Beside the removal according to paragraph 31, the Trustee shall cease to act as Trustee only after the Commission has discharged it from its duties after all the Commitments with which the Trustee has been entrusted have been implemented. However, the Commission may at any time require the reappointment of the Monitoring Trustee if it subsequently appears that the relevant remedies might not have been fully and properly implemented.

F. THE REVIEW CLAUSE

34. The Commission may, where appropriate, in response to a request from UTC showing good cause and accompanied by a report from the Monitoring Trustee:

    (i) Grant an extension of the time periods foreseen in the Commitments, or

    (ii) Waive, modify or substitute, in exceptional circumstances, one or more of the undertakings in these Commitments.

    Where UTC seeks an extension of a time period, it shall submit a request to the Commission no later than one month before the expiry of that period, showing good cause. Only in exceptional circumstances shall UTC be entitled to request an extension within the last month of any period.

Signed July 10, 2012

[…]*

SCHEDULE

1. The Divestment Business as operated to date has the following legal and functional structure.

   (a) GPECS, which is wholly owned by Goodrich;

   (b) The assets and intellectual property used for engine controls activities in Montreal, Canada that are currently being transferred to GPECS (the "Montreal Assets").

2. Following paragraph 4 of these Commitments, the Divestment Business comprises:

   (a) All tangible and intangible assets (including but not limited to the fixed assets listed in **Annex 2**, all the intellectual property which is owned by the Divestment Business at the Effective Date and in particular the patents identified in **Annex 3**, and the permits identified in **Annex 4**) which contribute to the current operation of the Divestment Business (as defined in paragraph 4), or are needed to ensure its viability and competitiveness, or are necessary for the development, production, servicing, maintenance, repair, overhaul, airworthiness and sale of its engine control products. For the avoidance of doubt, this does not include the assets used in […]*;

   (b) All contracts, agreements, leases, commitments and understandings relating to the development, production, servicing, and sale of the engine control products manufactured at the West Hartford facility, including but not limited to the customer contracts identified in **Annex 5**;

   (c) All customer lists, accounts, orders, and credit records relating to the Divestment Business that are owned by Goodrich or a Goodrich Affiliated Undertaking; and

   (d) The Personnel, including the Key Personnel identified in **Annex 6** (see also the organizational chart supplied in **Annex 7**).

Annex 2: Fixed Assets

[…]

Annex 3: Patents and Active Applications

[…]

Annex 4: Divestment Business – Permits

[…]

Annex 5: Divestment Business – Customer Contracts

[…]

Annex 6: Divestment Business – Key Personnel

[…]

Annex 7: Organization Chart of Management-Level Employees in the Divestment Business

[…]

Commitments Annex 3

June 29, 2012

By hand and by fax: 00 32 2 296 4301

European Commission – Merger Task Force
DG Competition
Rue Joseph II 70
B-1000 BRUSSELS

Case M.6410 – UTC/GOODRICH

COMMITMENTS TO THE EUROPEAN COMMISSION

Pursuant to Article 8(2) of Council Regulation (EC) No. 139/2004 (the "Merger Regulation"), United Technologies Corporation ("UTC") hereby provides the following Commitments (the "Commitments") in order to enable the European Commission (the "Commission") to declare the acquisition of Goodrich Corporation ("Goodrich" and, together with UTC, the "Parties") by UTC compatible with the common market and the EEA Agreement by its decision pursuant to Article 8(2) of the Merger Regulation (the "Decision").

The Commitments shall take effect upon the date of adoption of the Decision.

This text shall be interpreted in the light of the Decision to the extent that the Commitments are attached as conditions and obligations, in the general framework of Community law, in particular in the light of the Merger Regulation, and by reference to the Commission Notice on remedies acceptable under Council Regulation (EC) No 139/2004 and under Commission Regulation (EC) No 802/2004.

A. DEFINITIONS

For the purpose of the Commitments, the following terms shall have the following meaning:

Affiliated Undertakings: undertakings controlled by UTC and/or by the ultimate parents of UTC, whereby the notion of control shall be interpreted pursuant to Article 3 Merger Regulation and in the light of the Commission Consolidated Jurisdictional Notice under Council Regulation (EC) No 139/2004.

Closing: the transfer of the legal title of the Divestment Business to Rolls-Royce.

Delavan: Delavan, Inc, whose registered office is at 811, 4th Street, P.O. Box 65100, West Des Moines, IA 50265-0100, U.S.A.

Divestment Business: the business or businesses as defined in Section B and the Schedule that UTC commits to divest.

Divestiture Trustee: one or more natural or legal person(s), independent from UTC, who is approved by the Commission and appointed by UTC and who has received from UTC the exclusive Trustee Mandate to sell the Divestment Business to Rolls-Royce at no minimum price.

Effective Date: the date of adoption of the Decision.

First Divestiture Period: the period of […]* from the exercise by Rolls-Royce of the Lean Burn R&D Option, subject to any extensions granted in accordance with Section F (Review) of these Commitments.

Goodrich: Goodrich Corporation, incorporated under the laws of the State of New York, United States, with its principal executive office at Four Coliseum Centre, 2730 West Tyvola Road, in the City of Charlotte, North Carolina, 28217, U.S.

Hold Separate Manager: the person appointed by UTC for the Divestment Business to manage the day-to-day business under the supervision of the Monitoring Trustee.

Lean Burn R&D Agreement: the Research and Development Agreement between Rolls-Royce plc, Rolls-Royce North America, Inc, Rolls-Royce Deutschland Ltd & Co KG, and Delavan, with an Effective Date of January 1, 2008.

Lean Burn R&D Background Intangible Assets: […]*.

Lean Burn R&D Foreground Intangible Assets: […]*.

Lean Burn R&D Option Exercise Date: The date of the exercise by Rolls-Royce of the Lean Burn R&D Option during the Lean Burn R&D Option Period.

Lean Burn R&D Option Period: […]* from the date of the completion of the Proposed Transaction.

Lean Burn R&D Project: the research and development project performed by Delavan pursuant to the Lean Burn R&D Agreement.

Lean Burn R&D Tangible Assets: […]*.

Monitoring Trustee: one or more natural or legal person(s), independent from UTC, who is approved by the Commission and appointed by UTC, and who has the duty to monitor UTC's compliance with the conditions and obligations attached to the Decision.

Proposed Transaction: the acquisition of Goodrich Corporation by United Technologies Corporation.

Rolls-Royce: Rolls-Royce plc, whose registered office is at 65 Buckingham Gate, London, SW1E 6AT.

Trustee(s): the Monitoring Trustee and the Divestiture Trustee.

Trustee Divestiture Period: the period of […]* from the end of the First Divestiture Period, subject to any extensions granted in accordance with Section F (Review) of these Commitments.

UTC: United Technologies Corporation, incorporated under the laws of the State of Delaware, United States, with its registered office at Corporation Trust Center, 1209 Orange Street, in the City of Wilmington, County of New Castle, Delaware, 19801, United States, and registered with the Delaware Division of Corporations under file number 0334827.

B. THE DIVESTMENT BUSINESS

Commitment to divest

1. In order to restore effective competition, at the option of Rolls-Royce, exercisable during the Lean Burn R&D Option Period (the "Lean Burn R&D Option"), UTC commits to divest, or procure the divestiture of the Divestment Business to Rolls-Royce, with reference to the Memorandum of Understanding between UTC and Rolls Royce of June 7, 2012.

   UTC commits to enter into a final binding sale and purchase agreement for the sale of the Divestment Business subject to and in accordance with the process and time-frames set out in paragraph 2.

2. UTC shall be deemed to have complied with this commitment if: (i) Rolls-Royce does not exercise the Lean Burn R&D Option; or (ii) if, by the end of the Trustee Divestiture Period UTC has entered into a final binding sale and purchase agreement with Rolls-Royce, and if the Closing takes place within a period not exceeding 3 months following UTC and Rolls-Royce entering into such a sale and purchase agreement.

   If RR exercises the Lean Burn R&D Option but UTC has not entered into such an agreement by the end of the First Divestiture Period, UTC shall grant the Divestiture Trustee an exclusive mandate to sell the Divestment Business in accordance with the procedure described in paragraph 21 in the Trustee Divestiture Period.

3. In order to maintain the structural effect of the Commitments, if after completion of the Proposed Transaction, Rolls-Royce acquires the Divestment Business by exercising the Lean Burn R&D Option, UTC shall, for a period of 10 years after the Effective Date, not re-acquire direct or indirect influence over the whole or part of the Divestment Business, unless the Commission has previously found that the structure of the market has changed to such an extent that the absence of influence over the Divestment Business is no longer necessary to render the proposed concentration compatible with the common market.

Structure and definition of the Divestment Business

4. The Divestment Business consists of the Lean Burn R&D Project. The present legal and functional structure of the Divestment Business as operated to date is described in the Schedule. The Divestment Business, described in more detail in the Schedule, includes:

   (a) The Lean Burn R&D Foreground Intangible Assets;

   (b) The Lean Burn R&D Tangible Assets;

   (c) The Lean Burn R&D Background Intangible Assets; and

   (d) […]*.

C. RELATED COMMITMENTS

Preservation of Viability, Marketability and Competitiveness

5. From the Effective Date until the end of the Lean Burn R&D Option Period, UTC shall preserve the economic viability, marketability and competitiveness of the Divestment Business, in accordance with good business practice, and shall minimise as far as possible any risk of loss of competitive potential of the Divestment Business. In particular UTC undertakes:

   (a) Not to carry out any act upon its own authority that might have a significant adverse impact on the value, management or competitiveness of the Divestment Business or that might alter the nature and scope of activity, or the industrial or commercial strategy or the investment policy of the Divestment Business; and

   (b) To make available sufficient resources for the development of the Divestment Business, on the basis and continuation of the existing business plans.

Hold-separate obligations

6. From the Lean Burn R&D Option Exercise Date until Closing, UTC commits to keep the Divestment Business separate from the businesses UTC is retaining and to ensure that the Delavan personnel dedicated to the Lean Burn R&D Project – including the Hold Separate Manager – have no involvement in any business retained and vice versa. UTC shall also ensure that those personnel do not report to any individual outside the Divestment Business.

7. From the Lean Burn R&D Option Exercise Date until Closing, UTC shall assist the Monitoring Trustee in ensuring that the Divestment Business is managed as a distinct and saleable entity separate from the businesses retained by UTC. UTC shall appoint a Hold Separate Manager who shall be responsible for the management of the Divestment Business, under the supervision of the Monitoring Trustee. The Hold Separate Manager shall manage the Divestment Business independently and in the best interest of the business with a view to ensuring its continued economic viability,

marketability and competitiveness and its independence from the businesses retained by UTC.

Ring-fencing

8. From the Lean Burn R&D Option Exercise Date until Closing, UTC shall implement and/or enforce all necessary measures to ensure that it does not after the Lean Burn R&D Option Exercise Date obtain any business secrets, know-how, commercial information, or any other information of a confidential or proprietary nature relating to the Divestment Business. In particular, the participation of the Divestment Business in a central information technology network shall be severed to the extent possible, without compromising the viability of the Divestment Business. UTC may obtain information relating to the Divestment Business which is reasonably necessary for the divestiture of the Divestment Business or whose disclosure to UTC is required by law.

Due Diligence

9. In order to enable Rolls-Royce to carry out a reasonable due diligence of the Divestment Business, UTC shall, subject to customary confidentiality assurances and dependent on the stage of the divestiture process:

   (a) provide to Rolls-Royce sufficient information as regards the Divestment Business; and

   (b) provide to Rolls-Royce sufficient information relating to the Delavan personnel dedicated to the Lean Burn R&D Project, and allow Rolls-Royce reasonable access to those personnel.

Reporting

10. UTC shall submit written reports in English on developments in the negotiations with Rolls-Royce to the Commission and the Monitoring Trustee no later than 10 days after the end of every month following the Lean Burn R&D Option Exercise Date (or otherwise at the Commission's request).

11. UTC shall inform the Commission and the Monitoring Trustee on the preparation of any data room documentation and due diligence procedure and shall submit a copy of any information memorandum to the Commission and the Monitoring Trustee before sending the memorandum to Rolls-Royce.

D. THE PURCHASER

12. The final binding sale and purchase agreement shall be conditional on the Commission's approval. When UTC has reached an agreement with Rolls-Royce, it shall submit a fully documented and reasoned proposal, including a copy of the final agreement(s), to the Commission and the Monitoring Trustee. UTC must be able to demonstrate to the Commission that the Divestment Business is being sold in a manner consistent with the Commitments. For the approval, the Commission shall verify that the Divestment Business is being sold in a manner consistent with the

Commitments. The Commission may approve the sale of the Divestment Business without one or more assets, if this does not affect the viability and competitiveness of the Divestment Business after the sale, taking account of Rolls-Royce.

E. TRUSTEE

I. Appointment Procedure

13. UTC shall appoint a Monitoring Trustee to carry out the functions specified in the Commitments for a Monitoring Trustee. If UTC has not entered into a binding sales and purchase agreement […]* before the end of the First Divestiture Period, UTC shall appoint a Divestiture Trustee to carry out the functions specified in the Commitments for a Divestiture Trustee. The appointment of the Divestiture Trustee shall take effect upon the commencement of the Trustee Divestiture Period.

14. The Trustee shall be independent of UTC, possess the necessary qualifications to carry out its mandate, for example as an investment bank or consultant or auditor, and shall neither have nor become exposed to a conflict of interest. The Trustee shall be remunerated by UTC in a way that does not impede the independent and effective fulfillment of its mandate. In particular, where the remuneration package of a Divestiture Trustee includes a success premium linked to the final sale value of the Divestment Business, the fee shall also be linked to a divestiture within the Trustee Divestiture Period.

Proposal by UTC

15. No later than […]* after the Lean Burn R&D Option Exercise Date, UTC shall submit to the Commission for approval a list of one or more persons whom UTC proposes to appoint as the Monitoring Trustee. No later than […]* before the end of the First Divestiture Period, UTC shall submit a list of one or more persons whom UTC proposes to appoint as Divestiture Trustee to the Commission for approval. The proposal shall contain sufficient information for the Commission to verify that the proposed Trustee fulfils the requirements set out in paragraph 14 and shall include:

(a) The full terms of the proposed mandate, which shall include all provisions necessary to enable the Trustee to fulfill its duties under these Commitments;

(b) The outline of a work plan which describes how the Trustee intends to carry out its assigned tasks; and

(c) An indication whether the proposed Trustee is to act as both Monitoring Trustee and Divestiture Trustee or whether different trustees are proposed for the two functions.

Approval or rejection by the Commission

16. The Commission shall have the discretion to approve or reject the proposed Trustee(s) and to approve the proposed mandate subject to any modifications it deems necessary for the Trustee to fulfill its obligations. If only one name is approved, UTC shall appoint or cause to be appointed, the individual or institution concerned as Trustee, in accordance with the mandate approved by the Commission. If more than one name is

approved, UTC shall be free to choose the Trustee to be appointed from among the names approved. The Trustee shall be appointed within one week of the Commission's approval, in accordance with the mandate approved by the Commission.

New proposal by UTC

17. If all the proposed Trustees are rejected, UTC shall submit the names of at least two more individuals or institutions within one week of being informed of the rejection, in accordance with the requirements and the procedure set out in paragraphs 13 and 16.

Trustee nominated by the Commission

18. If all further proposed Trustees are rejected by the Commission, the Commission shall nominate a Trustee, whom UTC shall appoint, or cause to be appointed, in accordance with a trustee mandate approved by the Commission.

II. Functions of the Trustee

19. The Trustee shall assume its specified duties in order to ensure compliance with the Commitments. The Commission may, on its own initiative or at the request of the Trustee or UTC, give any orders or instructions to the Trustee in order to ensure compliance with the conditions and obligations attached to the Decision.

Duties and obligations of the Monitoring Trustee

20. The Monitoring Trustee shall:

(i) Propose in its first report to the Commission a detailed work plan describing how it intends to monitor compliance with the obligations and conditions attached to the Decision.

(ii) Monitor compliance by UTC with the conditions and obligations attached to the Decision. To that end the Monitoring Trustee shall:

(a) Monitor the keeping separate of the Divestment Business from the business retained by UTC, in accordance with paragraphs 6 and 7 of the Commitments;

(b) Supervise the management of the Divestment Business as a distinct and saleable entity, in accordance with paragraph 8 of the Commitments;

(c) (i) in consultation with UTC, determine all necessary measures to ensure that UTC does not after the Lean Burn R&D Option Exercise Date obtain any business secrets, know-how, commercial information, or any other information of a confidential or proprietary nature relating to the Divestment Business, in particular strive for the severing of the Divestment Business' participation in a central information technology network to the extent possible, without compromising the viability of the Divestment Business, and (ii) decide whether such information may

be disclosed to UTC as the disclosure is reasonably necessary to allow UTC to carry out the divestiture or as the disclosure is required by law;

(d) Monitor the splitting of assets between the Divestment Business and UTC or Affiliated Undertakings;

(iii) Assume the other functions assigned to the Monitoring Trustee under the conditions and obligations attached to the Decision;

(iv) Propose to UTC such measures as the Monitoring Trustee considers necessary to ensure UTC's compliance with the conditions and obligations attached to the Decision, in particular the holding separate of the Divestment Business and the non-disclosure of competitively sensitive information in accordance with paragraphs 6 and 7 of the Commitments;

(v) Review and assess the progress of the divestiture process and verify that, dependent on the stage of the divestiture process, (a) Rolls-Royce receives sufficient information relating to the Divestment Business and the Delavan personnel dedicated to the Lean Burn R&D Project in particular by reviewing, if appropriate, the data room documentation, the information memorandum and the due diligence process, and (b) Rolls-Royce is granted reasonable access to the Delavan personnel dedicated to the Lean Burn R&D Project;

(vi) Provide to the Commission, sending UTC a non-confidential copy at the same time, a written report within 15 days after the end of every month. The report shall cover the operation and management of the Divestment Business so that the Commission can assess whether the business is held in a manner consistent with the Commitments and the progress of the divestiture process as well as potential purchasers. In addition to these reports, the Monitoring Trustee shall promptly report in writing to the Commission, sending UTC a non-confidential copy at the same time, if it concludes on reasonable grounds that UTC is failing to comply with these Commitments;

(vii) Within one week after receipt of the documented proposal referred to in paragraph 12, submit to the Commission a reasoned opinion as to the viability of the Divestment Business after the Sale and as to whether the Divestment Business is sold in a manner consistent with the conditions and obligations attached to the Decision, in particular, if relevant, whether the Sale of the Divestment Business without one or more assets affects the viability of the Divestment Business after the sale, taking account of Rolls-Royce.

Duties and obligations of the Divestiture Trustee

21. Within the Trustee Divestiture Period, the Divestiture Trustee shall sell at no minimum price the Divestment Business, provided that the Commission has approved the final binding sale and purchase agreement in accordance with the procedure laid down in paragraph 12. The Divestiture Trustee shall include in the sale and purchase agreement such terms and conditions as it considers appropriate for an expedient sale in the Trustee Divestiture Period. In particular, the Divestiture Trustee may include in the sale and purchase agreement such customary representations and warranties and

indemnities as are reasonably required to effect the sale. The Divestiture Trustee shall protect the legitimate financial interests of UTC, subject to UTC's unconditional obligation to divest at no minimum price in the Trustee Divestiture Period.

22. In the Trustee Divestiture Period (or otherwise at the Commission's request), the Divestiture Trustee shall provide the Commission with a comprehensive monthly report written in English on the progress of the divestiture process. Such reports shall be submitted within 15 days after the end of every month with a simultaneous copy to the Monitoring Trustee and a non-confidential copy to UTC.

III. Duties and obligations of UTC

23. UTC shall provide and shall cause its advisors to provide the Trustee with all such cooperation, assistance and information as the Trustee may reasonably require to perform its tasks. The Trustee shall have full and complete access to any of the UTC's or the Divestment Business' books, records, documents, management or other personnel, facilities, sites and technical information necessary for fulfilling its duties under the Commitments and UTC and the Divestment Business shall provide the Trustee upon request with copies of any document. UTC and the Divestment Business shall make available to the Trustee one or more offices on their premises and shall be available for meetings in order to provide the Trustee with all information necessary for the performance of its tasks.

24. UTC shall provide the Monitoring Trustee with all managerial and administrative support that it may reasonably request on behalf of the management of the Divestment Business. This shall include all administrative support functions relating to the Divestment Business which are currently carried out at headquarters level. UTC shall provide and shall cause its advisors to provide the Monitoring Trustee, on request, with the information submitted to Rolls-Royce, in particular give the Monitoring Trustee access to any data room documentation and other information granted to Rolls-Royce in any due diligence procedure. UTC shall keep the Monitoring Trustee informed of all developments in the divestiture process.

25. UTC shall grant or procure Affiliated Undertakings to grant comprehensive powers of attorney, duly executed, to the Divestiture Trustee to effect the sale, the Closing and all actions and declarations which the Divestiture Trustee considers necessary or appropriate to achieve the sale and the Closing, including the appointment of advisors to assist with the sale process. Upon request of the Divestiture Trustee, UTC shall cause the documents required for effecting the sale and the Closing to be duly executed.

26. UTC shall indemnify the Trustee and its employees and agents (each an "Indemnified Party") and hold each Indemnified Party harmless against, and hereby agrees that an Indemnified Party shall have no liability to UTC for any liabilities arising out of the performance of the Trustee's duties under the Commitments, except to the extent that such liabilities result from the willful default, recklessness, gross negligence or bad faith of the Trustee, its employees, agents or advisors.

27. At the expense of UTC, the Trustee may appoint advisors (in particular for corporate finance or legal advice), subject to UTC's approval (this approval not to be

unreasonably withheld or delayed) if the Trustee considers the appointment of such advisors necessary or appropriate for the performance of its duties and obligations under the Mandate, provided that any fees and other expenses incurred by the Trustee are reasonable. Should UTC refuse to approve the advisors proposed by the Trustee the Commission may approve the appointment of such advisors instead, after having heard UTC. Only the Trustee shall be entitled to issue instructions to the advisors. Paragraph 26 shall apply mutatis mutandis. In the Trustee Divestiture Period, the Divestiture Trustee may use advisors who served UTC during the Divestiture Period if the Divestiture Trustee considers this in the best interest of an expedient sale.

IV. Replacement, discharge and reappointment of the Trustee

28. If the Trustee ceases to perform its functions under the Commitments or for any other good cause, including the exposure of the Trustee to a conflict of interest:

    (a) The Commission may, after hearing the Trustee, require UTC to replace the Trustee; or

    (b) UTC, with the prior approval of the Commission, may replace the Trustee.

29. If the Trustee is removed according to paragraph 28, the Trustee may be required to continue in its function until a new Trustee is in place to whom the Trustee has effected a full hand over of all relevant information. The new Trustee shall be appointed in accordance with the procedure referred to in paragraphs 13-18.

30. Beside the removal according to paragraph 28, the Trustee shall cease to act as Trustee only after the Commission has discharged it from its duties after all the Commitments with which the Trustee has been entrusted have been implemented. However, the Commission may at any time require the reappointment of the Monitoring Trustee if it subsequently appears that the relevant remedies might not have been fully and properly implemented.

F. THE REVIEW CLAUSE

31. The Commission may, where appropriate, in response to a request from UTC showing good cause and accompanied by a report from the Monitoring Trustee:

    (i) Grant an extension of the time periods foreseen in the Commitments, or

    (ii) Waive, modify or substitute, in exceptional circumstances one or more of the undertakings in these Commitments.

    Where UTC seeks an extension of a time period, it shall submit a request to the Commission no later than one month before the expiry of that period, showing good cause. Only in exceptional circumstances shall UTC be entitled to request an extension within the last month of any period.

    Signed June 29, 2012

    […]*

SCHEDULE

1. The Divestment Business comprises the Lean Burn R&D Project. Specifically, following paragraph 4 of these Commitments, the Divestment Business comprises:

   (a) The Lean Burn R&D Foreground Intangible Assets;

   (b) The Lean Burn R&D Tangible Assets;

   (c) The Lean Burn R&D Background Intangible Assets; and

   (d) […]*.

Annex 3
Amendment to the Research and Development Agreement between Rolls-Royce and Delavan Inc

[…]