Anticipated joint venture between Goodrich Corporation and Rolls-Royce plc

The OFT's decision on reference under section 33(1) given on 8 December 2008. Full text of decision published 6 January 2009.

Please note that square brackets indicate figures or text which have been deleted or replaced at the request of the parties for reasons of commercial confidentiality.

PARTIES

1. **Rolls-Royce plc** (RR), a wholly owned subsidiary of Rolls Royce Group plc, is a UK manufacturer and supplier of civil and military aircraft engines and of related maintenance and repair products and services.

2. **Goodrich Corporation** (Goodrich), headquartered in the United States, is a global manufacturer and supplier of a range of products and services used in civil and military aerospace applications. Its turnover during the fiscal year 2007 amounted to around £4.3 billion.

TRANSACTION

3. The parties are proposing to establish between them a joint venture (JV) company which will be active in the design and manufacture of engine control systems (described in further detail below).

4. Both parties will transfer UK-based assets and business operations to the JV.

5. The parties notified the proposed transaction on 25 September 2008. The extended administrative target date for the OFT's decision is 8 December 2008.

JURISDICTION

6. The components within each of Goodrich's and RR's respective businesses that are currently focussed on the design, manufacture and supply of engine control systems will, as a result of this proposed transaction, cease to be distinct enterprises (and each contributed enterprise will cease to be distinct from the other joint venture parent).

7. The parties submit that the assets being contributed to the JV by Goodrich generated a turnover of [greater than £70] million in the UK in 2007. They state that the turnover of the assets being contributed by RR is not readily calculable since these assets principally comprise engineering personnel and no particular revenue can be attributed to their activities.

8. Given that Goodrich and RR remain under the same ownership and control after the merger, the relevant turnover is calculated by taking the total value of all enterprises ceasing to be distinct (that is the parent entities and the entities contributed to the JV) and deducting the turnover of the parents (which remain under the same ownership and control after the merger). The relevant turnover is therefore that of the combined contributed entities.[1] Given that Goodrich's contribution alone exceeds £70 million, the OFT considers that the turnover test in section 23(1)(b) of the Enterprise Act 2002 (the Act) is satisfied. The OFT therefore believes that it is or may be the case that arrangements are in progress or in contemplation which, if carried into effect, will result in the creation of a relevant merger situation.

MARKET DEFINITION

Engine control systems

9. The anticipated JV will be active in the design and manufacture of engine control systems.

10. Engine controls provide for the flow and mix of fuel, air and other inputs that enable aircraft jet engines to function optimally and be operated safely at controlled speeds and temperatures in prevailing environmental conditions. Each engine control component is specified and custom built to work with a particular engine platform.

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[1] See in this respect paragraph 3.31 of the OFT's *Draft Mergers - jurisdictional and procedural guidance - Draft guidance consultation document* March 2008 which will, when finalized, supersede the interpretation set out in paragraph 1.17 of the OFT's Guidance note on the calculation of turnover for the purposes of Part 3 of the Enterprise Act 2002 (July 2003).

Vertical structure of the JV

11. Goodrich, one of the JV's parent companies, is already active in the manufacture and supply of engine control systems. It manufactures 'large engine controls' (for engines above 4000 lbs thrust) in the UK and 'small engine controls' in the US.

12. For its part, RR is active in the downstream manufacture of aircraft engines – incorporating engine control systems (the majority of which are currently supplied by Goodrich's UK subsidiary) into those engines' structures.

13. A description of the frames of reference relevant to the upstream supply of engine controls and the downstream supply of aircraft engines is set out below.

PRODUCT SCOPE

Upstream supply of engine control systems

14. The parties note that the European Commission (EC) has previously identified that engine controls comprise four distinct segments: (1) electronic engine controls (EEC), (2) hydro-mechanical units (HMU)/fuel-metering units (FMU), (3) fuel pumps and (4) engine actuators.[2] An explanation of these products is provided in the Annex to this decision.

15. The parties submit that the above categorisation reflects a lack of demand-side and supply-side substitutability between the four segments, given each of their high specification functionalities. In light of this EC predecent and its endorsement by a substantial number of third parties, the OFT agrees with this categorisation.

16. Also in line with the view taken by the EC in previous cases and with the views expressed by third parties in this case, the OFT also agrees with the parties' submission that it would not be appropriate to consider separate sub-segments of engine control systems according to the different sizes of jet engine since – although there can be variations in the specifications that apply to large and small aircraft engines – engine control components have either the same functionality across different sizes of engine, or are adapted from the same base architecture and simply scaled up or down as appropriate.

Engine control systems for military aircraft

17. Having consulted the MOD, the OFT agrees with the parties' submission that, in the case of each engine control component that will be manufactured by the JV, it is inappropriate to identify separate segments for installation within civil aircraft

[2] Comp/M.2738 - General Electric/Honeywell (2002), Comp/M.2892 – GEES/Unison (2002).

engines on the one hand and military aircraft engines on the other. Whilst in some instances there are differences between the civil and military segments in terms of the size, performance and functionality of the aircraft engines themselves, the engine control technology is, with one exception, effectively identical.

18. The exception comprises systems that control afterburners: engine components that are specific to military aircraft engines.[3] The parties submit that afterburner control functionality is by means of components adapted from the segments listed in the annex, specifically additional fuel pumps and FMUs and additional control performance from the EEC.

19. Given that all of Goodrich's afterburner control systems are procured by RR, the OFT considers that the JV does not bring about any change in market structure. It is therefore not necessary to reach any conclusions as to whether engine controls for afterburners are a segment separate from other categories of engine control component.

Downstream supply of aircraft engines

20. The intention is that RR will source engine control systems from the JV and incorporate them in RR's downstream manufacture of aircraft engines.

21. The parties submit that aircraft engines for civil and military applications constitute distinct product markets.

Civil aircraft engines

22. The parties point to previous decisions published by the EC in which civil aircraft engine markets have been categorised by reference to criteria such as the aircraft's seating capacity, flying range and price and operational cost.[4] This has led the EC to consider three separate segments of aircraft engine for (1) large commercial aircraft (LCA), (2) regional jet aircraft and (3) corporate jet aircraft.

LCA engines

23. LCA are generally capable of carrying more than 100 passengers over distances over 2,000 nautical miles. The EC has further considered distinctions between narrow-body aircraft (between 100 to 200 seats, single aisle, moving medium distances of up to around 4,000 nautical miles) and wide-body aircraft (more than 200 seats, two aisles, distances up to around 8,000 nautical miles). However, it

[3] Afterburner technology delivers significant amounts of extra thrust through combustion of fuel combined with gases expelled from the engine.
[4] IV/M.877 – Boeing/McDonnell Douglas; Comp/M.2220 – General Electric/Honeywell (2002).

has so far left open the question as to whether or not this distinction also applies to engines.

Regional jet engines

24. Regional jet aircraft generally transport fewer than 100 passengers over distances shorter than 2000 nautical miles. In *Boeing/McDonnell Douglas*, the EC considered further distinctions between two different classes of regional jet: small regional aircraft carrying around 30 to 50 passengers on the one hand, and large regional aircraft with a capacity of over 70 passengers on the other. According to the EC's reasoning and analysis, a similar distinction applies between engines for small regional jet aircraft and large regional jet aircraft.

Corporate jet engines

25. Corporate jets are considerably smaller than regional jets and, being focused principally on business requirements, serve different mission profiles. In *General Electric/Honeywell*, the EC considered the possibility, without drawing any conclusions, of categorising corporate jets into heavy, medium and light segments. However, to date, the EC's competition analysis has been limited to the supply of all jet engines for corporate aircraft.

Military aircraft engines

26. RR submits that, although some civil aircraft engines (that is, dual-use engines) are also used to power military aircraft, many military aircraft engines have differentiating features in terms of thrust-to-weight[5] and speed. RR also notes that the end customer in the UK is the Ministry of Defence (MoD) and that the relevant procurement processes differ significantly from the routes to market taken by civil aircraft engines. Moreover, while some manufacturers of civil aircraft (for example Boeing and Airbus) also produce military aircraft, there are a number of manufacturers (for example Lockheed Martin, BAE Systems and Saab) who are active only in the military aircraft sector.

27. RR proposes that military aircraft engines are in a market separate from civil aircraft engines and comprise three sub-segments of aircraft engine for (1) combat aircraft (fighter), (2) trainer aircraft and (3) cargo aircraft and special mission aircraft.

[5] Civil aircraft require a relatively long runway to achieve lift-off using wings (or in the case of helicopters, rotors) and engine propulsion to move horizontally and gain height. This amounts to, relatively speaking, a low thrust/weight ratio. Many modern fighter airplanes, however, with higher thrust/weight ratios, are capable of short-run or even vertical lift off.

Combat aircraft (fighter) engines

28. Such engines are installed in aircraft designed primarily for air-to-air combat with other aircraft. Fighters are built to be comparatively small, fast, and manoeuvrable.

Trainer engines

29. These engines are installed in light, typically two-seater (accommodating a trainee and instructor) aircraft used to develop piloting, navigational and combat skills.

Cargo aircraft and special mission aircraft engines

30. These comprise engines installed in aircraft used for missions such as reconnaissance and patrol or (as in the case of bombers and tankers) aircraft which are designed to carry a payload – including freight and/or warheads.

Upstream and downstream supply of aftermarket services

31. In addition to the markets for the supply of engine control systems and aircraft engines for both civil and military applications, third party comment endorses the the parties' view that the OFT's competition analysis should also be focused – at both upstream and downstream levels – on aftermarkets for (a) the supply of spare parts and (b) the provision of maintenance, repair and overhaul (MRO) services.

Spare parts

32. In a previous case concerning the supply of aircraft components and spare parts to airframe manufacturers,[6] the OFT's assessment included spare parts in the same frame of reference as the original components supplied by the merging parties. This was on the basis that (a) spare parts comprise a large proportion of the total maintenance costs during the relatively long life-cycle of aircraft components – including engines; (b) customers (engine or airframe[7] manufacturers) consider the whole life-cost of the aircraft components they purchase and typically put in place several contractual mechanisms that provide guarantees on availability and price of the spare parts that will be required after initial purchase; and (c) spare parts are usually produced and supplied by the manufacturers of the original equipment.

33. In this case, Goodrich noted that it was common for aftermarket services for engine control systems to be negotiated at the same time as the awarding of the

[6] Meggitt/K&F Industries - June 2007

original equipment contract for the engine control system so that the 'life-of-type' costs are locked in. On this basis, and consistent with the approach taken by the OFT in Meggitt/K&F and also by the EC in its decision on EADS,[8] the OFT's analysis proceeds on the basis that spare parts for both civil engine control systems and aircraft engines are in the same market as the corresponding original equipment.

MRO

34. MRO services comprise the supply of labour and expertise. In the case of civil aircraft, these services can be sourced from four different types of supplier: (1) aircraft operators who self-provide by maintaining their own aircraft; (2) aircraft operators providing MRO services to other aircraft operators; (3) original equipment manufacturers who provide MRO services on their own (and sometimes competitors' equipment); and (4) independent MRO providers who do not supply components or manufacture or operate aircraft. On this basis, and again consistent with previous OFT and EC decisions, the OFT considers that the supply of MRO services constitute a distinct product scope for civil aircraft applications.

35. As regards military applications, both spare parts and MRO services can be considered as part of the same product market as original equipment as they are an essential part of a package tendered by governments when initiating military aircraft programmes. If, as is the case in the UK, government is able to source military engines from a domestic manufacturer, that manufacturer will typically also be appointed as provider of the relevant aftermarket services. In the UK, RR provides the vast majority of the aftermarket (including spare parts and MRO services) for UK military aircraft – most of which are powered by RR engines. In addition, the aftermarket for its UK military aircraft relates to engine controls supplied by Goodrich, RR sub-contracts such work to Goodrich.

Relevant product scope for the purposes of this decision

36. Without reaching any conclusion as to the exact scope of the relevant product markets, the OFT conducts its analysis in this particular case on the following assumptions:

    (a) there is a lack of demand and supply side substitutability between each of the four segments of engine control component: EECs, HMUs/FMUs, fuel pumps and actuators

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[7]The airframe is the mechanical structure of an aircraft – it does not include the engine.
[8] EADS - Comp/M.1745

(b) there is no need to further segment each component by size of aircraft engine or according to whether the aircraft engine is installed in civil or military airframes

(c) it is appropriate in the context of the present case to take account of distinctions between LCA, regional jet and corporate jet engines but to discount the possibility for more granular segmentation (e.g. between narrow-body and wide-body aircraft in LCA; small and large regional jets; and heavy, medium and light corporate jets)

(d) military aircraft engines constitute a separate segment from civil aircraft engines although there is no need to distinguish narrower markets within military engines

(e) for civil applications the supply of spare parts (at both upstream and downstream levels) is indistinct from the supply of the corresponding original equipment; whereas the supply of MRO services (again at both levels) is a distinct segment from the original equipment, and

(f) in the case of military applications, the aftermarket includes both spare parts and MRO services which are also indistinct from the wider market for the supply of the original equipment (engine controls and aircraft engines).

GEOGRAPHIC SCOPE

37. In line with past EC decisions, the parties submit that the relevant geographic markets for all civil engine control products and aircraft engines are worldwide in scope. Third parties consulted by the OFT agreed with the proposed definition in this case.

38. As to the supply of spare parts for engine controls and engines, the parties submit that the scope is worldwide, since they do not form a distinct market from the corresponding original equipment. As to MRO services, the parties noted that the EC has left open the question of whether these markets are worldwide or narrower (for example regional).[9] In Meggitt/K&F Industries, the OFT concluded that the provision of MRO services for aircraft wheels and brakes is global in geographic scope.

39. The parties noted that the competitive assessment in this case is not affected by the choice of the geographic scope. On this basis, and given the lack of horizontal

[9] See case IV/M.1449, *SABENA / SNECMA*, of 29 April 1999, and case IV/M.1506, *Singapore Airlines / Rolls-Royce*, of 10 May 1999.

overlap between the parties, the exact delineation of the geographic scope of the market for MRO services for engine controls and engines may be left open.

40. RR submits that the exact delineation of the geographic scope for military engines can be left open in this case. The OFT considers, however, that the most plausible delineation is national, given the UK Government's past practice to source military aircraft/engines from domestic producers (where RR has a [-] position due to the absence of alternative domestic producers).[10]

41. As to the geographic scope for engine controls used in military aircraft, the parties note that, since control products are an integral part of the engine, they are affected by the procurement models used for military engines. According to the parties, this is because for certain military programmes the sourcing decision of key components of the aircraft systems, including the engine and control systems, is taken with reference to capabilities of entities in the programme's sponsoring nations and allies. This would then imply that the relevant geographic scope is national.

42. Lastly, in respect of aftermarket services (which, in the case of military applications, includes both spare parts and MRO services, as noted above), the same analysis for original equipment applies. As a result, the geographic scope for aftermarket services in military applications is considered to be national.

HORIZONTAL ISSUES

43. As noted above, Goodrich is active in the upstream manufacture of control systems for aircraft engines, whereas RR is active in the downstream manufacture of aircraft engines. On this basis, there are no horizontal overlaps between the parties.

44. The OFT's analysis therefore focuses on the vertical issues attributable to the JV to the extent that it brings about any changes in the market structure.

[10] Rolls-Royce notes that, unlike the US Government (which continues to procure engines domestically), the UK Government has started to change its policy and, as a consequence, Rolls-Royce increasingly competes with the military aircraft engines worldwide or, at least, those produced in the Western hemisphere for the UK Government orders. Note also that even in the narrower (that is, national) frame of reference, the impact of the joint venture is limited (if any), since the majority of Rolls-Royce's military engines are currently equipped with engine controls manufactured by Goodrich.

VERTICAL ISSUES

MILITARY SECTOR

45. The OFT considers, and the MoD, the sole customer in the UK, agrees that the JV will have no adverse impact on military applications even on the basis of the UK constituting a cautiously narrow geographic market delineation. The majority of RR's military engines are currently equipped with engine controls manufactured by Goodrich, not least given that it is UK government policy, where feasible, to source military aircraft engines, the relevant engine control products and aftermarket products and services from UK suppliers. In addition, to the limited extent that Goodrich does not supply engine control components for RR's military engine programmes, these are not being transferred to the JV (that is RR will retain its current suppliers). As a result, the creation of the JV will not bring about any changes to RR's procurement practices from Goodrich's competitors.

46. On this basis, the OFT considers that the JV will not bring about any change in the market structure and that consequently there is no significant lessening of competition attributable to its operations going forward. The military sector is therefore given no further consideration in this assessment.

CIVIL SECTOR

47. The OFT received a small body of adverse third party comment from the non-military segment in relation to the possibility of the JV reducing demand for third-party engine control components in its own manufacture of aircraft engines (customer foreclosure). The bulk of the OFT's analysis in this decision is therefore focused on the theories of harm levelled at the vertical impact of the JV to the extent or otherwise that it affects any changes in the current market structure. This includes an assessment of the possibility of the JV foreclosing supply of engine control components to competing manufacturers of aircraft engines (input foreclosure).

Functioning and structure of the relevant market

48. The parties submit that the manufacture of engine control systems and aircraft engines are both characterised by high development costs, long product cycles and high risk.

49. The life-cycle for both products begins when an airframe manufacturer embarks on the development of new airframe design and begins negotiating with one or more engine manufacturers in relation to technical specifications, performance, costs, delivery terms etc. of a new model of engine to be installed in the airframe.

50. On being selected, an engine manufacturer then engages with (typically several) engine control suppliers in conducting initial studies of the design specification of the control systems that will interface with the engine's own design specifications. The engine manufacturer then undertakes the selection of one or more engine control suppliers through a tender process that can take several months to complete.

51. Goodrich indicated that the key factors in an engine manufacturer's selection of an engine controls supplier include fuel consumption, weight, reliability, performance, price and running costs.

52. The selected engine control supplier usually participates in a 'Risk and Revenue Sharing Partner (RRSP) programme, whereby it pays the engine manufacturer an 'entry fee' during the new engine's development phase. This is in return for a negotiated percentage of the revenues that the engine manufacturer earns on the sales of engines, spare parts and maintenance operations during the lifetime (generally between 25 and 50 years) of that particular proprietary design of engine.

53. In the case of both engine controls and of aircraft engines themselves, the parties provided evidence indicating that margins in the aftermarket (the supply of spare parts and particularly of MRO services) are higher than the margins achieved in the sale of the original equipment.

54. Against a background of high development costs and risks, but also given the long lifespan of the successful finished engine design, the industry is characterised by long term, non-exclusive, vertical relationships between upstream engine controls manufacturers and downstream aircraft engines manufacturers. In particular (see also Figure 1):

    (a) Hispano-Suiza (part of the SAFRAN group) supplies engine control systems (in practice the vast majority of its sales of HMUs/FMUs) to aircraft engine manufacturers Turbomeca and SNECMA.

    (b) FADEC International – a joint venture between BAE Systems and Hispano-Suiza – produces EECs for certain engines manufactured by General Electric (GE) on the one hand and CFM (which is itself a joint venture between GE and SNECMA) on the other.

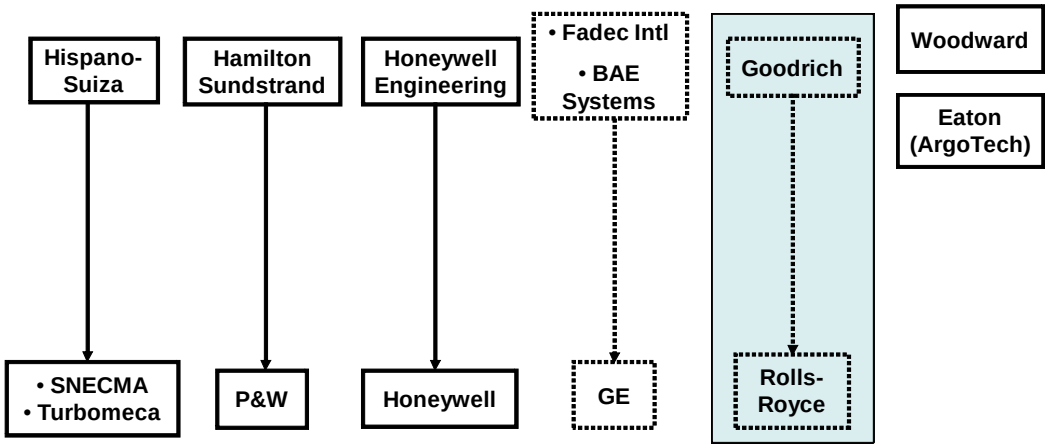
    (c) BAE Systems itself is also a major supplier of GE, although it also sells EECs to other engine manufacturers.

    (d) United Technologies Corporation (UTC) is a large conglomerate company which includes, among others, Hamilton Sundstrand which

supplies engine control systems to, among others, its downstream associate company, the aircraft engine manufacturer, Pratt & Whitney.

(e) Honeywell Engineering supplies engine control systems to its downstream associate manufacturer of aircraft engines, Honeywell.

Figure 1 – Vertical relationships between manufacturers of engine control systems and aircraft engines



Source: The parties

Note: Solid lines indicate that companies are part of the same group, whereas dotted lines denote a 'preferred supplier' relationship (although not exclusive in either case). Woodward and Eaton (ArgoTech) are independent producers of engine control systems, with no specific ties to any engine manufacturers.

Scope for input foreclosure (raising rivals' costs)

55. Given the vertical nature of the proposed transaction, the OFT has considered whether the JV would in the future restrict access to Goodrich's engine control products to all downstream aircraft engine manufacturers other than RR. In such cases, the OFT in general assesses whether the transaction confers the ability and incentive to foreclose rivals or to raise their costs. It also assesses whether rivals would be foreclosed to an extent that compromises their ability compete such that there is a realistic prospect of a substantial lessening of competition in the affected market.[11] As explained further below, the OFT considers that the JV does not have the ability to implement such a strategy. While, on this basis, no competition concerns would arise in relation to input foreclosure, the OFT has also considered (a) whether the JV would have the incentive to foreclose access

[11] This third stage may include an assessment of any merger-specific (or indeed JV-specific) pricing efficiencies. As the stages in this assessment are interrelated, the OFT may undertake them simultaneously rather than sequentially.

to engine control systems and (b) the overall effects of the transaction in the downstream market – including whether the JV may give rise to any pricing efficiencies.

Ability to foreclose access to engine control systems

56. On the basis that engine control products are essential for the functioning of an aircraft engine, and given their relatively high cost (engine control systems account for 15 to 30 per cent of the total engine cost), several third parties raised the issue of the JV's ability – in theory at least – to foreclose third parties' access to the supply of engine control systems currently produced by Goodrich.

57. Consistent with the European Commission's notice on the assessment of non-horizontal mergers (cf. paragraph 35),[12] the OFT considers that, for input foreclosure to be a concern, the vertically integrated firm resulting from the merger will typically have a significant degree of market power in the upstream market. In such circumstances, the merged firm can be expected to have a significant influence on the conditions of competition in the upstream market and thus, possibly, on prices and supply conditions in the downstream market.'

58. In this case, the shares of supply attributed to Goodrich UK (that is, the business contributed to the joint venture) in the upstream markets in 2007 range between a minimum of [5-15] per cent (for HMUs/FMUs and fuel pumps) and a maximum of [10-20] per cent (for actuators).[13] In addition, in each segment there are several strong and established rivals with sizeable market shares (e.g. FADEC International, Hamilton Sundstrand, BAE Systems, Hispano-Suiza, Turbomeca, and Honeywell) capable of implementing timely and effective counter-strategies. On this basis, the OFT does not consider that Rolls-Royce's competitors in the downstream market (e.g. General Electric, Pratt & Whitney) will see their access to engine control systems foreclosed after the creation of the JV.

[12] Guidelines on the assessment of non-horizontal mergers under the Council Regulation on the control of concentrations between undertakings

[13] The Commission notes that competition concerns are unlikely to arise, if the merged entity has a market share of less than 30 per cent and the HHI in the relevant market is below 2,000; see the Commission's notice on the assessment of non-horizontal mergers, paragraph 25. In this case, while Goodrich's market share is significantly below 30 per cent in all markets, the HHI is significantly above 2,000 in the market for the supply of actuators. As we discuss in the text, however, in this case the change in the market structure following the creation of the JVCo is limited, since Goodrich and Rolls-Royce already trade between themselves to a large extent for engine control components.

59. The OFT has also given consideration to the possibility of the JV being able to implement an input foreclosure strategy within a market structure characterised by the vertical relationships illustrated in Figure 1 – in other words, focusing on the residual and (hypothetically at least) 'contestable' upstream markets once sales made between vertically integrated players are excluded. Even in this conservative scenario, however, the evidence indicates that Goodrich already makes the vast majority (in excess of [70-80] per cent) of its sales of EECs and fuel pumps, and [-] of its sales of HMUs/FMUs and actuators to RR. On such a basis, the OFT considers that it can discount the possibility that the JV would have the ability to foreclose access to engine control systems in future.

Incentive to foreclose access to engine control systems

60. Notwithstanding that the JV does not appear to have the ability to foreclose, the OFT has considered, for the sake of completeness, whether the JV has the incentive to do so. This will depend on whether foreclosure is profit maximising, which in turn depends on whether the profit foregone from selling fewer Goodrich engine control systems to GE, P&W and others is more than outweighed by the extra profit that RR would gain from selling more aircraft engines – on the basis that GE, P&W and others would sell fewer aircraft engines.

61. In practice, in order to evaluate whether a foreclosure strategy is profitable or not, it is necessary to assess the relative importance of four parameters:

    (a) The gross margins that Goodrich earns on engine control systems (and which would be lost in case of foreclosure)

    (b) The pass-through rate, that is, the extent to which the increase in price of engine controls following the foreclosure is transferred to airframe manufacturers (rather than being absorbed by engine manufacturers)

    (c) The gross margins that Rolls-Royce earns on sales of aircraft engines to airframe manufacturers[14], and

    (d) The extent to which demand in the downstream market is likely to be diverted away from Rolls-Royce's foreclosed rivals, and the share of that diverted demand which goes to Rolls-Royce (that is the diversion ratio) following the increase in the cost of engine controls brought about by the foreclosure strategy.

[14] The relevant upstream and downstream margins post-merger might be different from the prevailing levels before the transaction.

62. The parties, however, have not provided the OFT with all the information necessary to carry out a fully-fledged 'vertical arithmetic' exercise in this case. As a result, the assessment must necessarily be more qualitative in nature.

63. In respect of margins, Goodrich calculated a gross margin (for all its engine control systems combined together; no breakdown by component is available) in 2007 of [0-20] per cent (up from [-10-10] per cent in 2006) on sales of original equipment (OE), and of [50-70] per cent (down from [50-70] per cent in 2006) on aftermarket services.[15]

64. Rolls-Royce noted that its customers typically purchase original equipment (OE) and aftermarket services together, and as a result OE and aftermarket services are typically priced on a unified basis.[16] According to Rolls-Royce, then, margins are only meaningful at the level of the combined OE sales and aftermarket sales. On this basis, Rolls-Royce's margins for the Civil Engine Segment (which include all revenues and costs in the supply chain associated with the civil product, e.g. R&D costs, labour costs and revenues associated with the provision of aftermarket services) amounted in 2007 to [10-20] per cent (up from [10-20] per cent in 2006).

65. Given these figures, the OFT does not consider that the JVCo would forego selling an engine control product to Rolls-Royce's competitors in the downstream market, with a view to increasing market shares in the downstream market at the expense of foreclosed rivals (where margins appear to be significantly lower than for engine control components, inclusive of aftermarket services). On this basis, we take the view that the JVCo would not have the incentive to foreclose access to engine control systems by withholding them from competitors.

66. There are additional factors which indicate that a partial input foreclosure strategy, or raising rivals' costs strategy, might not be profitable in this case. For example, as noted above, engine controls account for about 15-30 per cent of the cost of an engine.[17] Although this percentage is significant, prices of engine

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[15] The margin is [60-80] per cent and [40-60] per cent for sales of spare parts and repairs, respectively.

[16] Rolls-Royce notes that in the civil aircraft engine segment, the majority (that is, [-] per cent in the case of Rolls-Royce's total civil aftermarket, and a greater proportion of new engine sales) of the aftermarket services are provided on a *TotalCare* basis. Within this framework, customers pay a fixed amount per hour the engine is operated and Rolls-Royce then meets the cost of maintaining the engine. According to Rolls-Royce, this transfers the engine reliability risk from the operator to Rolls-Royce and also creates an even payment profile which is generally preferred by customers.

[17] The parties also note that engine control systems account for approximately [-] per cent of the total cost of an LCA engine.

controls would nevertheless have to increase substantially, and be passed on, in order to have an effect on the downstream market.[18]

67. Moreover, given the long life-time of engine controls and engines and the long-term relationships existing between engine control suppliers and engine manufacturers on one hand, and between engine manufacturers and airframe manufacturers on the other, it appears that there is limited scope for price increases of engine controls and engines following foreclosure.[19] This would, in the view of the OFT, further undermine the profitability of foreclosing access to inputs.

68. Indeed, the available evidence indicates that it is industry practice that the engine manufacturers seek from engine control suppliers price guarantees and other price-adjustment mechanisms (as well as guarantees in relation to the availability of spare parts and MRO services) for the duration of the engine programme. Similar mechanisms are put in place between engine manufacturers and airframe manufacturers. In other words, an increase in the price of engine controls might not be fully passed on to engine manufacturers, and in turn from these to airframe manufacturers.

69. Furthermore, on the extent to which demand for aircraft engines might move away from GE or P&W (or smaller producers) to Rolls-Royce following an attempt of input foreclosure, it is worth noting that aircraft engines are not commoditised products. They may, instead, be considered to a large extent as differentiated products, since engine and airframe manufacturers intensively collaborate to design and develop a new airframe. This is reflected in that airframe manufacturers usually select only one or two engines to power a new airframe. As a result, it is presumable that a limited amount of demand would switch to Rolls-Royce following the foreclosure.

70. On the basis of the above, the OFT considers that the JV does not have the incentive to foreclose access to inputs in this case.

71. Lastly, the OFT has considered whether any downstream rival to RR could be foreclosed to such an extent that its ability to compete in the aircraft engines market would be adversely affected, such that there was a realistic prospect that

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[18] For example, a 10 per cent price increase for engine controls would translate into a [-] per cent price increase for engines (at most) assuming a pass-through rate of 100 per cent, and even less if the pass-through rate is below unity. Note also that full foreclosure might not be feasible because of Goodrich's inability to commit to such strategy.

[19] In theory, however, it is also possible that the existence of long-term relationships makes switching away from Goodrich to its competitors more difficult in case of price increases (e.g. because it takes more time to find a suitable replacement), and this may in turn increase the profitability of foreclosure. As noted in the text above, this appears unlikely in this industry.

competition in that market as a whole would be substantially lessened (including whether the JV may give rise to offsetting pro-competitive pricing efficiencies.

72. In this respect, the OFT has regard to the fact that Goodrich and Rolls-Royce already trade between themselves to a large extent (in excess of [70-80] per cent), and therefore the joint venture does not significantly alter the prevailing market structure. Moreover, since other engine manufacturers (e.g. P&W and GE) are also 'vertically integrated' to varying degrees, the OFT considers that the extent to which they might be foreclosed in the future, is limited. In addition, the available evidence indicates that airframe manufacturers are sophisticated and resourceful buyers.

73. Moreover, the transaction may lead to efficiencies, for example, in the form of elimination of double marginalisation, and/or better coordination between the parties to design and develop new products. Overall, then, while the prospects of anti-competitive foreclosure effects of the joint venture appear to be negligible, there seems to be scope for significant benefits accruing to the end-customers (that is, airframe manufacturers and airlines), although it has not been necessary to verify or quantify them in order to decide this case.

Scope for customer foreclosure (reducing rivals' revenues)

74. The OFT has also considered whether the JV would foreclose actual (or potential) competitors of Goodrich in the manufacturing of engine control systems from the downstream market (that is, the manufacturing of aircraft engines).

Ability to foreclose access to the market for aircraft engines

75. Consistent with the EC's notice on the assessment of non-horizontal mergers, the OFT considers that the extent to which customer foreclosure is a concern depends on whether the vertical merger involves a company which is an important customer with a significant degree of market power in the downstream market. The loss of the integrated firm as a customer is normally less significant, the OFT's view, if that firm's pre-merger purchases from non-integrated firms are a small share of the available sales base for those firms.

76. The following considerations are therefore relevant to an assessment as to whether the JV would be able to successfully implement a foreclosure strategy.

Market shares in the manufacturing of aircraft engines

77. Aircraft engine manufacture is concentrated to the extent that there are only a very limited number of suppliers (see Table 1 below). In addition to the three

major manufacturers: GE (the market leader), RR and Pratt & Whitney (P&W), the supply side is also composed of several joint ventures, notably:

(a) CFM, a joint venture between GE and SNECMA

(b) International Aero-Engines (IAE), a joint venture in which RR and P&W hold shares of 32.5 per cent each, and

(c) The Engine Alliance, a 50-50 joint venture between GE and P&W.

Table 1: List of manufacturers of aircraft engines

Type of engine	Manufacturers
LCA	GE; RR; P&W
Regional jet	GE; RR; P&W; Honeywell; SNECMA
Corporate jet	GE; RR; P&W; Honeywell; Williams

Source: The parties.

78. The parties' estimates of the above manufacturers' market shares (discussed further below) reflect the EC's approach in *GE/Honeywell* and attribute the share held by CFM entirely to GE and split the share held by IAE between RR and P&W and the share held by The Engine Alliance between GE and P&W.

79. Based on the type of aircraft in which the engines are installed (that is, LCA, regional jets and corporate jets) the parties have provided market share information on the basis of:

(a) the 'installed base' of engines currently in service

(b) the engine 'order backlog' on aircraft currently under construction, and

(c) annual engine orders.

80. As the EC noted in *Engine Alliance*,[20] the number of engines in the 'installed base' gives an indication of the market shares attributable to each manufacturer in the sector as a whole. The engine 'order backlog' reflects the development of net orders (new firm orders minus previous orders that have since been cancelled) over a certain period. Finally, the number of orders received annually reflects the situation at a given yearly point.

[20] Case IV/36.213/F2 — GEAE/P&W – 14 September 1999.

81. Based on its analysis of the data provided by the parties, the OFT considers that the prevailing competitive scenario can be summarised as follows:

LCA engines

(a) in the manufacture of LCA engines, GE is the strongest player with shares of supply of [55-65] per cent or more, depending on the measure applied

(b) P&W and RR, are the second and third players respectively with market shares of around [10-20] and [10-20] per cent of the total installed base, and

(c) RR's competitive position looks more favourable in the the future on the basis of its share of order backlog ([25-35] per cent by value – compared with P&W's [5-15] per cent).

Regional jet engines

(d) GE is also the strongest player in the manufacture of regional jet engines, not only in terms of installed base (the parties estimate a market share of around [65-75] per cent) but also in terms of order backlog (GE's market share by value is estimated to be [90-100] per cent).

(e) RR accounts for around [25-35] per cent of the supply of regional jet engines in terms of installed base. Its share measured by order backlog is, however, only very small at around [0-10] per cent.

Corporate jet engines

(f) The largest manufacture of engines for corporate jets is P&W with a [25-35] per cent share of supply of the installed base. Honeywell, RR and Williams each account for [20-30] per cent, [15-25] per cent and [15-25] per cent respectively. Conversely, GE has only an [5-15] per cent share of supply in this segment.

Overall

(g) The OFT considers, however, that – consistent with its view that is not appropriate to consider separate sub-segments of engine control systems according to the different jet engine sizes – it is more meaningful for the purposes of its competition analysis to assess the impact of the JV in terms of the wider market for aircraft engines as whole. Table 2 below indicates that RR is the second largest player after GE with a market share in 2008 of [10-

30] per cent (down from [20-30] per cent in 2002) in terms of installed base and a market share of [25-35] per cent by value (up from [20-30] per cent in 2002) of order backlog.[21]

82. The parties submit that the proportion of engine control systems that RR is committed to source from the JV is merely a subset of its overall requirement for the engine control systems needed (such as those it procures from Hamilton – see Table 3) for its complete engine catalogue. On this basis, the parties argue that the JV would not be able to implement a customer foreclosure strategy.

83. Whilst considering that there is some merit in the parties' argument specifically in relation to the market for the manufacture of aircraft engines (where the supply side is highly concentrated), the OFT also has regard to the fact that RR is the second largest customer, after GE, for engine control systems. Albeit accepting that RR lacks market power in the downstream market, the OFT takes the view that further analysis is required before any conclusions on the likelihood of customer foreclosure can be reached.

The JV does not affect existing RR engine programmes

84. The parties submit that no foreclosure effects arise in relation to the on-going production of RR engines designed to be used with engine control components manufactured by suppliers other than Goodrich, because such components will continue to be provided by that supplier and will not transfer to the JV. In this regard, the parties provided information on existing RR civil engine programmes (with details of the supplier of the engine control components and of the current positions in overall engine life-cycles) where current suppliers other than Goodrich will continue to provide engine control components, as set out in Table 2 below.

[21] RR's market share in terms of order backlog is overstated. This is because order backlog does not apply to corporate jet engines (a segment in which P&W, Honeywell and Williams are all sizeable players. In respect of **orders** for all types of aircraft engine, RR's market share in 2007 was [30-40] per cent and [20-30] per cent in terms of value and volume units respectively.

Table 2: List of existing Rolls-Royce's civil engine programmes not transferred to the JV

Engine programme	Entry into service	Expected life expiry	Actuator	EEC	HMU/FMU	Fuel pump
RB 211-524	1977	[-]	**Woodward**	Goodrich	Goodrich	Goodrich
RB 211-535	1983	[-]	-	**Various (incl. Goodrich, BAE Systems, and Hamilton Sundstrand)**	**Woodward**	**Goodrich / Eaton (ArgoTech)**
IAE V2500	1988	[-]	Goodrich	**Hamilton Sundstrand**	**Woodward**	**Hamilton Sundstrand**
Trent 700	1994	[-]	Goodrich	Goodrich	Goodrich	**Eaton (ArgoTech)**
Trent 800	1995	[-]	Goodrich	Goodrich	Goodrich	**Eaton (ArgoTech)**
BR 710	1997	[-]	**Woodward**	Goodrich	**Woodward**	**Eaton (ArgoTech)**
BR 715	1999	[-]	**Woodward**	**BAE Systems**	**Woodward**	**Eaton (ArgoTech)**
Trent 900	2007	[-]	**Hamilton Sundstrand**	**Hamilton Sundstrand**	**Hamilton Sundstrand**	**Hamilton Sundstrand**

Source: The parties.

85. The evidence before the OFT indicates that, once a supplier has been selected for a particular programme, it will remain so for the life of the programme. The OFT therefore agrees with the parties that no foreclosure concerns can arise in relation to RR's existing engine programmes.

Future engine programmes in which RR is not involved

86. The parties submit that any concerns for the possibility of future foreclosure can be offset by the fact that RR will not be participating in a number of engine programmes that are due to be rolled out in future.

87. In particular, the parties point to (a) two upcoming regional jet platforms in Mitsubishi's MRJ and in Bombardier's C Series [*text deleted*] and (b) three new aircraft platforms in the corporate jet segment: Gulfstream's G250, Cessna's Colombus and Embraer's Legacy 500 in which neither RR or Goodrich are involved.

88. The OFT agrees with the parties' submission that such future programmes represent realistic opportunities for the JV's competitors in the supply of engine control systems and are not representative of a market characterised by foreclosure.

No significant impact on market structure

89. Given that Goodrich has been RR's principal supplier of engine control systems for decades, the parties submit that the creation of the JV does not bring about any appreciable change in the existing market structure. Rather it reflects existing commercial reality whilst giving RR a greater degree of control over its supply chain.

90. At the OFT's request, the parties provided further information (see Table 3) on RR's top suppliers for each engine control component, and the corresponding volume of purchases, during each of the last three years.

Table 3: Ranking of Rolls-Royce's top suppliers of engine control systems (and corresponding market shares), for the period 2005 – 2007

Rank	EECs	HMUs/FMUs	Fuel pumps	Actuators	All controls
1	[-]	[-]	[-]	[-]	[-]
2	[-]	[-]	[-]	[-]	[-]
3	[-]	[-]	[-]	[-]	[-]
Rolls-Royce's value of purchases (US$ million)	[-]	[-]	[-]	[-]	[-]

Source: OFT calculations based on parties' data. Note: Figures for individual years are similar to those for the entire period 2005 – 2007 presented in the table.

91. The OFT considers that this data corroborates the parties' submission that Goodrich is RR's principal supplier of all categories of engine control component, with shares of supply ranging from a minimum of [65-75] per cent (HMUs/FMUs) to a maximum of [85-95] per cent (actuators). The only other suppliers with shares of supply in excess of [5-15] per cent are Woodward ([20-30] per cent in HMUs/FMUs), and Eaton ([10-20] per cent in fuel pumps). The evidence available indicates that these competing engine controls suppliers will retain their sales to RR going forward.

Other engine manufacturers buy from multiple suppliers

92. The parties submit that several engine manufacturers each have their preferred suppliers of engine control components. They also argue, however, that this does not imply that each engine manufacturer is totally aligned with any particular supplier of engine controls. Conversely, according to the parties, there is '*a material level of cross-purchasing for engine control products by these engine manufacturers for the purpose of sourcing the most effective engine control systems*.'

93. In support of this proposition – in addition to the data on RR's procurement of engine control components from Goodrich's competitors (see table 3) – the parties provided examples of Goodrich having been successful in bidding to supply engine control systems to Honeywell, GE and P&W, in the face of competition with Honeywell's in-house operations, BAE Systems and Hamilton Sundstrand respectively.

94. Third parties also supported the parties' argument that multi-sourcing was a feature of the market. One example given was that of Hamilton Sundstrand, the bulk of whose sales in 2008 was to its sister company P&W, whilst also selling original equipment that year to RR and GE.

Conclusion on the JV's ability to foreclose access to the market

95. The OFT considers that the JV does not have the ability to foreclose access to markets for aircraft engines for the following reasons:

    (a) RR's existing engine procurement programmes will not be transferred to the JV. Consequently Goodrich's competitors will continue to supply engine control products to RR for the duration of the programmes ([for at least two more decades]).

    (b) The available evidence indicates that several new engine programmes, in which RR is not involved, are now underway. These programmes are opportunities for Goodrich's rivals to compete for the supply of engine control systems.

    (c) Goodrich is already RR's principal supplier of all categories of engine control component. However, the available evidence indicates that RR will continue to be supplied with engine controls from a number of Goodrich's competitors going forward. Consequently, the creation of the proposed JV will not bring about any material change in the existing market structure.

    (d) Although (as discussed above) each aircraft engine manufacture has typically established a preferred relationship with a specific engine control manufacturer, it does not follow that such relationships are exclusive. The

OFT has been provided with several examples of engine manufacturers procuring engine control products from multiple suppliers.

Incentive to foreclose access to the market for aircraft engines

96. The parties submit that it would not be in RR's best interest to procure engine control systems from the JVCo when better (that is, cheaper, more efficient or reliable) components are available from Goodrich's competitors. In this respect, they note that the JVCo will only supply RR '*to the extent that it is able to meet the requirements of the engine control design. To the extent that the Joint Venture is not able to meet these requirements, the Joint Venture will subcontract components from alternative suppliers.*' As an example, they note [*text deleted*].

97. The OFT considers this argument plausible since airframe manufacturers are sophisticated buyers and pay great attention to the technical characteristics of an engine (which partly depend on the efficiency and reliability of engine control systems). The argument, however, does not take into account that by buying engine control systems from Goodrich's rivals, RR could incur additional costs (or face delays) to integrate such components with its engines. Furthermore, by doing so Rolls-Royce would forego (or delay) any synergy (or 'learning effect') which would result from its stricter collaboration with Goodrich within the joint venture.

98. Similar considerations apply here to those made in the 'Incentives' section relating to input foreclosure. In particular, even if prices in the upstream market (engine controls) were to increase and this would in turn affect prices in the downstream market (engines), then:

    a) Such price increases might not be passed on, and even so, the price increase to airframe manufacturers might not be sizeable (as engine controls account for up to 15 per cent to 30 per cent of the cost of aircraft engines), and

    b) There appears to be limited scope for demand for aircraft engines switching from GE or P&W to Rolls-Royce.

99. On this basis, the OFT considers that the JV does not have the incentives to foreclose access to markets.

Impact of the proposed JV on the supply of MRO services

100. The OFT considers that creation of the JV will have no adverse impact on the provision of MRO services. First, as noted above, Goodrich will retain its

aftermarket business (that is, it is not being transferred to the JV). In addition, it does not appear plausible that Goodrich would (fully or partially) foreclose access to such services for components supplied to RR's competitors, especially taking into account that the provision of such services is highly profitable (margins are higher than for the original equipment). Moreover, given the long life-cycle of such components, Goodrich is – contractually or through less formal mechanisms – committed to supply MRO services to existing customers. Lastly, the extent to which Goodrich provides MRO services to engine manufacturers other than RR is already limited, which further limits any gains from foreclosure.

101. Similarly, the OFT takes the view that the JV does not provide for RR's ability to reduce the MRO services it currently sources from Goodrich's competitors. Given that engine controls are sophisticated and customised products whose maintenance is typically undertaken by their original manufacturers, the OFT does not consider it feasible or commercially rational for RR to divert the purchase of such services from Goodrich's competitors to Goodrich.

Access to commercially sensitive information

102. One other theory of harm attributable to the creation of the JV relates to the possibility that Goodrich and RR might be in a position, on the basis of standard business interactions, to garner commercially sensitive information from their customers and suppliers respectively and pass on such business secrets to each other using the JV as a channel of communication.

103. However, given that Goodrich is RR's principal supplier and that RR is Goodrich's largest customer, the OFT considers that the parties currently have access to only a very limited amounts of information that each of their respective competitors would consider sensitive – and that the JV does not bring about any material change to the structural basis on which such information would flow between the parties. Finally, the parties submit that appropriate provisions in relation to third party manufacturers' confidential information are already in place, and will remain so after the JV is created.

104. On this basis, and given the absence of concerns from third parties in relation to this theory of harm, the OFT considers the JV raises no competition concerns in this regard.

CO-ORDINATED EFFECTS

105. Although, as previously discussed, the JV does not appreciably alter the market structure, it does however increase the degree of symmetry on the supply side to

the extent that it creates another vertically integrated player on the supply side – in addition to Hamilton Sundstrand and P&W.

106. Notwithstanding this form of symmetry, engine control products and aircraft engines are complex and highly engineered products. Given the lack of homogeneity across the total range of upstream engine control components (which fall into four distinct segments) and across downstream engines (each of which is tailored to one of three distinct aircraft platforms), the OFT considers that the JV will not facilitate or enhance the parties' ability to align their behaviour by reaching terms of coordination. Nor does the OFT take the view, on the basis of the evidence received during its investigation, that the creation of the JV removes a maverick player from the supply side.

107. Furthermore, since the JV does not, in the view of the OFT, affect the prevailing low level of market transparency, it does not make it any easier to monitor deviations from any tacitly understood commercial strategy.

108. Finally, the OFT considers, on the basis that contracts for the supply of engine control systems and of engines are of long (25 years or more) duration, that there is little or no scope for any such deviation to be punished.

109. For these foregoing reasons, the OFT takes the view that the creation of the JV between Goodrich and RR will not lead to a higher probability of either party (or both of them) coordinating their commercial behaviour with rivals upstream or downstream in order to raise prices, reduce quality or curtail output.

BARRIERS TO ENTRY AND EXPANSION

110. Several third parties informed the OFT that the barriers to entering the market for the manufacture and supply of both engine control products and aircraft engines are very substantial. These include:

(a) both the very high capital costs and substantial technical know-how required to develop new products in this industry

(b) significant lead times from inception to delivery

(c) stringent regulatory controls and certification processes[22]

(d) the need to provide an effective aftermarket customer support infrastructure

[22] Examples given to the OFT include the US Federal Aviation Administration (FAA) and the Eureopean Aviation Safety Agency (EASA).

(e) a proven track record in meeting certification, specifications and production delivery schedules.

111. The OFT takes account of the available evidence that virtually all the recent new entry into this industry has been effected by joint ventures between existing manufacturers. One third party indicated that the existing vertical relationships that characterise the industry also raise significant entry barriers.

112. The OFT considers, however, that it does not need to reach any conclusions on such issues since the transaction does not give rise to prima facie competition concerns.

BUYER POWER

113. In *GE/Honeywell*, the EC noted that, in the first place, aircraft engine manufacturers compete in order to be certified in a given airframe platform under development (competition *for* the market). If more than one engine is certified for a given airframe platform, engine manufacturers may also compete in order to win the contract for supply (competition *within* the market).

114. Given that the OFT considers that the creation of the JV does not give rise to prima facie competition concerns, it is also of the view that there is no need to conclude on the extent to which such tender and bid mechanisms allow customers to exert buyer power.

EFFICIENCIES

115. The parties submit that the formation of the JV will generate significant efficiencies by streamlining the technical processes and the resolution of issues that frequently arise in the development of new and/or improved engine control systems. They also argue that the JV will enhance the cost-efficiency mechanisms that each of the parties is currently developing.

116. The parties submitted internal documents which report calculations of substantial NPV benefits accruing to the JV over a 15 year period. Comments received from several third parties also support the parties' propositions for significant efficiencies attributable to the JV. On such a basis, the OFT considers that, whilst the parties' claims are plausible, it cannot quantify the efficiencies that will eventually accrue to the JV or the extent to which customer will benefit from them.

THIRD PARTY VIEWS

117. The OFT received comments from a total of 12 third parties: five competing aircraft controls manufacturers, two aircraft engine manufacturers and five aircraft manufacturers. The vast majority of these commentators did not express any concerns and also supported the proposition that the JV formalises a pre-existing contractual relationship between Goodrich and RR. Two third parties posited theories of harm in relation to potential customer foreclosure (specifically the loss of RR as a possible customer in the future). These issues have been discussed in this decision.

ASSESSMENT

118. Goodrich and RR and proposing to form a 50-50 joint venture company which will be active in the design and manufacture of engine control systems: highly technical products which interface with and regulate the performance of aircraft engines.

119. The proposed JV consolidates an existing vertical relationship between the parties. At present, Goodrich is already the principal supplier of the upstream engine control systems that RR incorporates with its downstream catalogue of aircraft engines.

120. There is no horizontal overlap between the parties. Any concerns attributable to the creation of the JV are limited to the possibility or otherwise of any upstream or downstream foreclosure issues.

121. As regards any potential for input foreclosure, Goodrich's shares of the supply of the segments of engine controls range between [5-15] and [10-20] per cent. Within each segment there are several strong and established rivals with appreciable market shares. Consequently, the OFT does not consider that the JV will have the ability to foreclose access to engine control systems.

122. In relation to any potential for customer foreclosure, there are several RR aircraft engine programmes excluded from the scope of the JV and for which RR will retain Goodrich's competitors as the incumbent suppliers of engine control systems. There are also currently engine aircraft engine programmes being developed in which RR is not involved and the available evidence indicates that engine manufacturers multi-source their supplies of engine control components from a range of manufacturers. In any case, a large body of third party comment supports a proposition that, given the pre-existing vertical relationship between Goodrich and RR, the JV does not bring about any material change in the market structure. Given such circumstances, the OFT considers that the JV will not have the ability to foreclose access to customers.

123. In light of the complex and tailored nature of both aircraft engines and aircraft control systems, the fact that the JV does not remove a maverick or affect the level of transparency in the market (meaning monitoring deviations is no easier), and the long-term nature of contracts (making punishment difficult), the OFT considers that the creation of the JV between Goodrich and RR will not lead to a higher probability of either party (or both of them) coordinating their commercial behaviour with rivals upstream or downstream in order to raise prices, reduce quality or curtail output.

124. Consequently, the OFT does not believe that it is or may be the case that the creation of the JV may be expected to result in a substantial lessening of competition within a market or markets in the United Kingdom.

DECISION

125. This merger will therefore not be referred under section 33(1) of the Act.

Annexe

EECs

EECs are complex electronic units that relay commands from and information to the cockpit and control the operation of the engine. They are designed for minimum weight and size and also for high reliability and durability in a hostile environment.

HMUs/FMUs

These units comprise engine-mounted servo-valves[23] designed to control the quantity of fuel being delivered to the engine combustors in order to safely start, operate and shut the engine down. In automated systems, these units respond to electrical commands received from the EEC and accordingly set the position of valves to allow for the correct intake of fuel.

Fuel pumps

The fuel pumping system on each engine typically consists of two pumps mounted on the engine gearbox and driven by a gearbox shaft. The precise technology varies by application, but in general terms the first fuel pump takes fuel at low pressure from the aircraft tank. The second fuel pump then increases the pressure on the fuel so that it can be delivered to the engine's combustor.

Engine actuators

Engine actuators are axial rams that vary the position of linkages connected to other engine parts. They are often used to vary the angle of vanes in the gas path of the engine to create alterations in the engine's performance characteristics.

[23] Such valves typically consist of a two-stage spool whose position is controlled by electromagnetic coils. Energizing the coils allows fluid flow in one direction or the other depending on the electrical input signal.