THE GROWTH OF AIRCRAFT MANUFACTURING IN LOW-WAGE ECONOMIES 2005-2009

New challenges to, and opportunities for, industries in the global aerospace supply chain

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Aerospace has always been a global business but in the last few years the nature of its global manufacturing footprint seems to have changed. Airliner manufacturing is no longer confined to its traditional heartlands of North America and Europe and states of the former Communist bloc; major Boeing and Airbus structures are now increasingly made in Mexico, Brazil, Poland and China.

Soon, the USA and Europe will no longer have a stranglehold on the large aircraft market (see table one below). China is rapidly becoming a formidable competitor. In November 2009, the deputy commander of Chinese People's Liberation Air Force (PLA) Ho Weirong announced that the air force would be operating a fifth generation fighter within the next eight to ten years. This was the fifth new Chinese aerospace programme to be announced in 2009. The COMAC C919 190-seat airliner was launched in March 2009; the KJ-2000 AWACS aircraft and Xi'an ASN-207 tactical unmanned air system (UAS) were unveiled in October 2009 and a 200-tonne class military airlifter was also due to make its first appearance before the end of the year.

The process of globalisation has taken some strange twists and turns over the last few months. Countries will little tradition of aircraft manufacturing is starting to become important players in the global market. Mexico's aerospace related exports have more than tripled since 2004, from $146.2 million to $683.2 million last year. Japanese companies are setting up low-wage manufacturing centres in Vietnam. Malaysia is becoming a global centre of composite manufacturing excellence. If you follow the money, all roads lead to the Middle East, the recent crisis in Dubai notwithstanding. Countries committed to diversifying industries from oil-based economies are rushing into aerospace manufacturing.

Table one – large aircraft, the next generation

Programme	Country of origin	Approximate entry in service
Sukhoi SuperJet	Russia	2010
Boeing 787	USA	2010
COMAC ARJ-21	China	2011
AVIC military transport	China	2012
Airbus A350 XWB	France, Germany, Spain, UK	2013
Embraer KC-390	Brazil	2015
COMAC C919	China	2016
Irkut MC-21	Russia	2016
Airbus A30X	France, Germany, Spain, UK	2019
Boeing 737 replacement	USA	2019

The Abu Dhabi-based Strata Manufacturing aircraft composites factory is due to open in late 2010, producing advanced structures for Airbus and ATR. On 23 September 2009 Emivest Aerospace Corporation (EAC) of San Antonio, Texas, USA delivered its first seven-seat SJ30 business jet. The SJ30 is the first civil jet aircraft to be built by a company with its roots in the Middle East. The SJ30's original developer Sino Swearingen of the USA was taken over by EAC in June 2008. EAC has its headquarters in Texas but is a subsidiary of Dubai's Emivest, or the Emirates Investment and Development PSC.

But it is the growth of aerospace manufacturing in low-wage economies – such as China and Mexico – that is perhaps the most noticeable characteristic of this new era of aerospace globalisation.

Some context is required. Aerospace manufacturers in North America and Europe may be outsourcing increasing amounts of high-skilled, labour intensive manufacturing to low-wage economies but they are retaining their near-monopoly of complete systems work – engines, avionics, fuel, hydraulics, aircraft controls, landing gear – where the real value in an aircraft programme lies. The difference between the value of structures and systems is startling. Chinese companies registered around $700 million worth of component and structural work on North American and European airliner programmes in 2007. In contrast, Honeywell will earn $23 billion from supplying its HTF7500-E engine to Embraer's new MSJ and MLJ business aircraft.

Money, of course, is not the only reason for outsourcing manufacturing capabilities to other countries.

"In the past, many companies have set up low-cost-country production for machining, and generally speaking, this is not an effective strategy," said Philip Toy, Managing Director of aerospace manufacturing consultants AlixPartners, quoted recently in *Aerospace America*. "Machining of aerospace components is typically highly automated, and so setting up a machining operation in China or Mexico typically does not pay, once you factor in the logistics. It is possible to make savings of between 10% to 20% by moving some work to low-cost country production - if it is correctly managed," said Toy.

Spirit AeroSystems Europe chose Kuala Lumpur for its new 242,000sq ft structures manufacturing facility but Rolls-Royce decided to expand its overseas manufacturing capacity in Singapore and Virginia, USA – rich in mature aerospace technologies but where the wage bill is also relatively high.

While there are plenty of new low cost manufacturing plants in Mexico there are very few in North Africa. While Chinese factories are ramping up production of Airbus and Boeing structures at a rate of 40% a year, in neighbouring India – where wage levels for skilled workers are a fraction of those in China – civil airline manufacturing activity is in the doldrums. If the globalization process is not all about money what is it about? Selling aeroplanes via offset agreements is one answer – moving closer to the fast moving end-user customer base. But this theory, too, fails the China v India test. And Indian airlines will be buying thousands more aircraft than Mexico.

The answer is that companies in the West are outsourcing work to high-wage and low-wage economies for different reasons. The "cluster" effect of Singapore, for example, has proved a powerful magnate for US and European companies wanting to build business in an economy which has, until now, been seen as the aerospace centre of the Far East.

The recession has also, it seems, acted as a catalyst to moving labour-intensive manufacturing work to low-wage areas. The dollar-Euro exchange rates had encouraged European manufacturers to set up new plants in Mexico. But by setting up new businesses in low wage areas - such as China in particular - will European and US aerospace companies help to develop a new generation of

competitors, skilled in advanced manufacturing methods and with access to a huge domestic aircraft operating market? Where is the real value in the supply chain? And if low-wage economies learn the skills to develop their own advanced programmes will this pose a threat or an opportunity to Western suppliers? These are some of the main issues this report seeks to answer.

Definitions

Defining a "low-wage" economy is complex (see section one). But the author has identified the following countries as featuring both an aerospace capability and wage levels which offer (see section one) a competitive advantage to rates experienced by companies based in Europe and North America.

* **Africa and the Middle East** Egypt, Morocco, South Africa, Tunisia
* **Central and Eastern Europe** Czech Republic, Hungary, Poland, Romania, Russia, Turkey
* **Far East** China, India, Indonesia, Korea, Malaysia, Pakistan, Taiwan, Thailand, Vietnam
* **Latin America** Argentina, Brazil, Mexico.

As table seven shows there are wide differences in the average rate of salaries for qualified engineers in these countries, generally with salaries in East and Central Europe being the "most competitive" for skilled engineers.

"Aircraft manufacturing" is defined as the full range of systems, structures, components, assemblies and equipment, including avionics and engine systems, below that of the main airframe and engine integrators (Airbus, Boeing, and Lockheed Martin).

All aircraft types have been considered, above the size of general aviation aircraft. Small turboprop aircraft have not been included but all jet aircraft, including single-engine jets, have been incorporated into the study.

The market has been further broken down into:

- Airliners (including regional jets)
- Military fast jets
- Military transports, maritime patrol aircraft, refuellers
- Rotorcraft
- Business jets
- Engines

This report concentrates solely on the aircraft and engine manufacturing sectors. Maintenance, repair and overhaul (MRO), weapon and space systems have not been included.

Methodology

The author has taken a "top-down" and "bottom-up" approach to estimating the size of the aircraft systems, equipment and structures market. Country profiles relying on, where available, national aerospace manufacturing association figures have been collated alongside data collected by PMI Media on individual contract awards 2005-2009.[1] This work tracks the supply chain of every major

[1] *See Aviation Supply Chain Intelligence, www.PMI-Media.com*

aircraft in production today, highlighting each major contract win in terms of value, location and expertise.

This is an imperfect measure because it does not take into account legacy workloads (that is, contracts won before 2005), accurate predictions of aircraft orders and deliveries or where work is moved internally within a company from one location to another. However, it is perhaps the most accurate way of estimating values because there is enough data within the public domain to understand broadly the overall value of work even if actual figures are not given. Thus when there is no value given for a contract award the author has estimated the value of the deal by comparing it to similar work where values have been given.

All relevant data has been sourced.

Author details

Philip Butterworth-Hayes is a consultant and writer on global aviation affairs with a particular interest in the aircraft manufacturing market. His aviation background includes posts as the director of communications and strategy at the Civil Aviation Navigation Organization(CANSO) in Amsterdam (2006-2007), the Manager of Jane's Air Transport Division and lead consultant for Jane's Information Group on civil aviation consultancy studies (1987-1992), founding editor of *Jane's Aircraft Component Manufacturers, Jane's World Airlines* and *Jane's Airport Review*, a former editor of *Interavia Aerospace Review*, *Airports International, Jane's Defence Industries*, *Jane's Military Aircraft* and several unmanned air system publications. He has been an aviation consultant to BBC Television and Time-Life books. He currently writes on aviation manufacturing for *Wall Street Journal* aerospace sponsored supplements. He has also authored the official Airbus publication to celebrate the first flight of the A380 and edited the Farnborough Air Show catalogue for three events.

Executive summary

During 2009 there has been a substantial increase in the amount of new contracts for aircraft systems, components and equipment placed with companies based in low-wage economies.

During 2009 an estimated $31,555 million of new business was awarded to the global aviation supply chain, of which $9,212 million was spent with companies based in low wage economies of the world. This represents 29.2% of the total market in new systems, components and equipment work, a very steep growth rate over the 6.2% share recorded in 2008. Most of this work takes place in the airliner sector, which is responsible for around 73% of the value of the total aviation supply chain.

But the value of work won by companies in low-wage economies on European and North American aircraft programmes is worth approximately the same as the work won by Western suppliers on new aircraft programmes pioneered by companies in low-wage economies (China, Brazil, Korea, Turkey *inter alia*). The value to Western suppliers of work on aircraft originating in low wage economies between 2005 and 2009 was $25,325 million, whereas suppliers in low-wage economies won $23,564 million of work over the same period from aircraft manufacturers in North America and Europe over the same time.

Total value of new contracts for aircraft systems, components and equipment

	Airliners	Rotorcraft	Business aircraft	Fast jets	Military transports	Total spend
2005	6,288	176	213.5	859	560	**8,096.5**
2006	1,735.5	754	898	1,450	1,013	**5,850.5**
2007	42,280	6,784	1,598	4,450	1,143	**56,255**
2008	39,223	6,157	13,850	3,240	890	**63,360**
2009	22,982	4,066	650	2,691	1,166	**31,555**

Note: All figures in millions of US dollars, valued at the time of contract award.

The number of low-wage economy countries now increasing their share of overall global aerospace spend is too many for it to be an isolated or a local phenomenon. Countries where the growth trend - in terms of turnover and employment is particularly strong – include:

- Poland
- Turkey
- India
- Malaysia
- Pakistan
- Vietnam
- Brazil
- Mexico

This list does not include China, which is growing its aerospace turnover at around 40% a year but restructuring its manufacturing industry to more closely align new production plants with markets. The workforce is currently being reduced from around 400,000 as workers involved in non-core aerospace activities are being reassigned.

But there are few signs that low-wage economy companies are starting to move their expertise up the supply chain. Until now the real value in the supply chain has been with systems integrators - such as fuel, pneumatic, electrical and environmental control systems, markets which are still dominated by the US majors Goodrich, General Electric and Parker, *inter alia*.

Chinese companies registered around $700 million worth of component and structural work on North American and European airliner programmes in 2007. In contrast, Honeywell will earn $23 billion from supplying its HTF7500-E engine to Embraer's new MSJ and MLJ business aircraft.

The setting up of operations in low-wage economies has both a positive and negative impact on manufacturing operations in traditional aerospace countries which, from the result of this study at least, suggests they tend to cancel each other out. In terms of money, at least, the loss of manufacturing work in Europe and North America to countries such as Brazil and China is balanced by the new work created on aircraft programmes emanating from these countries.

The value to Western companies of work on aircraft programmes originating in low-wage economies

Brazil	Embraer	Total value	2005-2009
	Regional airliners	12,973	87
	Business jets	45,060	24,863
China	COMAC		
	Airliners	16,885	350
Czech Republic	Aero Vodochody		
	L-159	1,384	-
India	HAL		
	Tejas	5,148	-
Russia	Airliners	6,020	3,969
	Helicopters	25	25

Note – values in US million

It is unlikely that the next generation of large aircraft being introduced into the market by companies based in low wage economies will feature systems integrated by indigenous suppliers of avionics, fuel systems, flight management systems etc. Or, at least, if they do they will struggle to develop an aircraft which will be competitive with Airbus and Boeing types.

The barriers to entry for newcomers into the "whole aircraft systems" market are large and growing daily. The next generation of airliners will require not just new engine concepts such as geared turbofans and open-rotors – offering 15% to 20% improvements in fuel burn over current types – but all-electric actuation systems and substantially lighter but more powerful and reliable air conditioning, fuel, lighting, electrical generating systems.

The technology behind these systems will be available to only a handful of Western suppliers who are heavily involved in the final stages of pre-competitive research studies with national and international research authorities.

The wage differentials between the richest and poorest nations of the world are in a state of constant flux as the strength or weakness of the dollar (particularly against the Euro) can be as much of a decisive competitive factor as the pay and conditions of local employees. Mexico has become a favoured destination for start-up and relocating aerospace companies because the savings per employs over US rates can be in excess of US$30,000[2]. According to French aerospace company SAFRAN every time the dollar falls a cent against the Euro it costs the company EUR22 million. In the middle of 2009 SAFRAN was reportedly paying its Mexican workers US$560 a month and its engineers between $925 and $1,390 a month.

The aviation systems, structures and components market 2005-2009 for airliners

	Total spend	Low wage manufacturing	Low wage manufacturing as a percentage
2005	6,288	1,047	16.6
2006	1,735.5	427	24.6
2007	42,280	1,657	3.9
2008	39,223	3,720	9.5
2009	22,982	8,060	35.0

In the 2009 airliner systems, structures and components market the new programmes being developed in China and Russia probably explained much of this rise in work-share from low-wage companies but there were other factors, too.

On programmes originating in the West, low-wage companies featured the following programme wins

- **The A350 XWB** - Airbus signed a contract with Chinese partners to create a joint venture to make carbon composite parts in China for its A350 XWB and A320 aircraft. Airbus's Chinese business will hold a 20% stake in the joint venture, based in Harbin, and China's Harbin Aircraft Industry Group will hold a further 50% stake, while other local players HAI, AviChina and HELI will each own 10%. Fokker Elmo has set up a plant in China to build wiring for the Trent XWB. Esterline has a new facility in Mexico supplying vanes to the Trent XWB.

- **Bombardier CSeries** – wiring Will be made in China by Fokker Elmo for the project.

[2] Source: *MexicoNow, Mexico's Aeronautical Industry, June 2009*

- **Airbus and Bombardier airliners -** Composites Technology Research Malaysia (CTRM) has signed **a** 3.5 billion ringgit, $1.03 billion for 20 years with Goodrich to produce nacelle components for a range of airliners.

- **Boeing 737 –** flaps will be made by MHIVA Aerospace Vietnam Co., Ltd. (MHIVA) of Hanoi, a subsidiary of Mitsubishi Heavy Industries, Ltd. (MHI) The new plant is situated at the Thang Long Industrial Park (TLIP) approximately 16 kilometres northwest of central Hanoi and occupies 4,500 square meters (m2) in floor area within the 19,100sq m plant. Initially, the flaps for the Boeing 737 will be shipped to MHI's Nagoya Aerospace Systems Works for painting and final inspection, and then delivered to the Renton, US site. Once production gathers momentum, MHIVA will deliver the flaps to the US directly, according to the company.

- **Mitsubishi MRJ70/90** - Aerospace Industrial Development Corporation (AIDC) of Taiwan is making slats, flaps, belly fairings, rudders as well as horizontal stabiliser rotating blades for the aircraft.

There has been substantial investment by companies in low-wage economies into new aerospace structures and materials, especially composites. Brazil, the Czech Republic, China, Malaysia, Mexico and Turkey all have advanced composite manufacturing facilities.

The most successful of these are companies who have been able to combine development of an indigenous composite manufacturing capability with a national strategic approach to accessing the market.

Thus Turkey has obtained more than $3 billion worth of structures work on the F-35, with TAI opening a new 74,000sq ft facility to make at least 400 composite subassemblies in the low rate initial production (LRIP) phases of the programme.

And Malaysia’s government investment on Composites Technology Research Malaysia (CTRM) Incorporated has seen the company develop substantial business from Airbus, Boeing and Goodrich

1. Trends in outsourcing aircraft systems, components and equipment work to low-wage economies

1.1 The growing value of aerospace manufacturing work in low-wage economies

During 2009 there has been a substantial increase in the amount of new contracts for aircraft systems, components and equipment placed with companies based in low-wage economies.

During 2009 an estimated $31,555 million of new business was awarded to the global aviation supply chain (see table two), of which $9,212 million was spent with companies based in low wage economies of the world (see table three). This represents 29.2% of the total market in new systems, components and equipment work, a very steep growth rate over the 6.2% share recorded in 2008 (see table four). Most of this work takes place in the airliner sector, which is responsible for around 73% of the value of the total aviation supply chain.

Was this jump in outsourcing work the result of a statistical quirk or does it signify a more general trend of increased aerospace manufacturing work in low-wage economies? The statistical picture is confusing because of the widely-fluctuating amounts of work being assigned to low wage economy countries (see table three) over the last few years and the fact that one or two major contracts (such as the JSF work assigned to Turkey) can distort the overall picture.

This study, however, suggests there has yet to be a fundamental shift within the market which could spell a substantial change to the entire dynamics of the global aerospace supply chain. There are a number of factors to suggest this.

The value of work won by companies in low-wage economies on European and North American aircraft programmes is worth approximately the same as the work won by Western suppliers on new aircraft programmes pioneered by companies in low-wage economies (China, Brazil, Korea, Turkey *inter alia*). The value to Western suppliers of work on aircraft originating in low wage economies between 2005 and 2009 was $25,325 million (see table six), whereas suppliers in low-wage economies won $23,564 million of work over the same period from aircraft manufacturers in North America and Europe over the same time(see table five).

Table two: Total value of new contracts for aircraft systems, components and equipment

	Airliners	Rotorcraft	Business aircraft	Fast jets	Military transports	Total spend
2005	6,288	176	213.5	859	560	**8,096.5**
2006	1,735.5	754	898	1,450	1,013	**5,850.5**
2007	42,280	6,784	1,598	4,450	1,143	**56,255**
2008	39,223	6,157	13,850	3,240	890	**63,360**
2009	22,982	4,066	650	2,691	1,166	**31,555**

Note: All figures in millions of US dollars, valued at the time of contract award.

But low-wage manufacturing companies are now starting to invest in high-wage areas. For example, at the end of July 2008 Brazil's Embraer said it would invest EUR148 million in two new plants in Portugal to make wings and tailpieces for export. The two plants will be based in Evora in the south of the country. One, which will cost EUR100 million, will build large metallic parts for aircraft, such as wings, while the other will work with composite materials for tailpieces. The wing production plant should start producing in 2011, and the second plant would become operational in 2012.

It is true that the number of low-wage economy countries now increasing their share of overall global aerospace spend is too many for it to be an isolated or a local phenomenon. Countries where the growth trend - in terms of turnover and employment is particularly strong – include:

- Poland
- Turkey
- India
- Malaysia
- Pakistan
- Vietnam
- Brazil
- Mexico

This list does not include China, which is growing its aerospace turnover at around 40% a year but restructuring its manufacturing industry to more closely align new production plants with markets. The workforce is currently being reduced from around 400,000 as workers involved in non-core aerospace activities are being reassigned.

But there are few signs that low-wage economy companies are starting to move their expertise up the supply chain. Until now the real value in the supply chain has been with systems integrators - such as fuel, pneumatic, electrical and environmental control systems, markets which are still dominated by the US majors Goodrich, General Electric and Parker, *inter alia*.

As noted in the introduction, Chinese companies registered around $700 million worth of component and structural work on North American and European airliner programmes in 2007. In contrast, Honeywell will earn $23 billion from supplying its HTF7500-E engine to Embraer's new MSJ and MLJ business aircraft.

Table three: Total value of new contracts placed in low-wage economies for aircraft systems, components and equipment

	Airliners	Rotorcraft	Business aircraft	Fast jets	Military transports	Total spend
2005	1,047	-	-	-	-	**1,047**
2006	427	-	1.9	-	-	**428.9**
2007	1,657	3,600	700	3,000	-	**8,957**
2008	3,720	160	40	-	-	**3,920**

2009	8,060	1,110	-	42	-	**9,212**

Note: All figures in millions of US dollars, valued at the time of contract award.

Table four: Aircraft systems, components and equipment manufacturing in low-wage economies

	Total spend	**Low wage manufactu ring**	**Percentage spend of the market**
2005	8,096.5	1,047	**12.9**
2006	5,850.5	428.9	**7.3**
2007	55,555	8,257	**15.9**
2008	63,360	8,100	**6.2**
2009	31,555	9,212	**29.2**

Note: All figures in millions of US dollars, valued at the time of contract award.

1.2 North American/European manufacturers are retaining their technical and market dominance of supply chain integration

It is unlikely that the next generation of large aircraft being introduced into the market by companies based in low wage economies (see table one) will feature systems integrated by indigenous suppliers of avionics, fuel systems, flight management systems etc. Or, at least, if they do they will struggle to develop an aircraft which will be competitive with Airbus and Boeing types.

The barriers to entry for newcomers into the "whole aircraft systems" market are large and growing daily. The next generation of airliners will require not just new engine concepts such as geared turbofans and open-rotors – offering 15% to 20% improvements in fuel burn over current types – but all-electric actuation systems and substantially lighter but more powerful and reliable air conditioning, fuel, lighting, electrical generating systems.

The technology behind these systems will be available to only a handful of Western suppliers who are heavily involved in the final stages of pre-competitive research studies with national and international research authorities.

NASA, for example, suggests that by implementing technologies to replace heavy hydraulic flight control systems with light electric units will cut the fuel bill by 9%. According to some manufacturers' figures, by using distributed power systems, the number of electrical components can be cut by 35%; wire segments by 40%; weight can be reduced by 40%; installation time reduced by 60%; and reliability improved by 20%.. According to Hamilton Sundstrand "The benefits (of distributed electrical power management system)...will be seen across a number of areas with estimated reductions in take-off weight (3%), life cycle-costs (4%) and maintenance (5%)."

Replacing separate power generation/storage systems - batteries, emergency power, tank and cargo bay inerting systems, APUs - with new technology fuel cells will reduce engine off-take requirements by around 3% of fuel burn in the cruise, according to Airbus.

"On average, gas turbine APUs are 15% efficient at converting jet fuel into electricity. In contrast, fuel cell APUs will be 60% efficient, which will reduce by three quarters the amount of fuel an airplane uses to generate ground power," says Boeing.

It is difficult to see how companies entering this market now will have the time, resources or technical expertise to catch up with the West in the next 10 years in these domains. China, with 300,000 highly skilled engineers entering the market every year, might come close, however.

Boeing has had an uneven experience of outsourcing large amounts of its supply chain to partners outside North America and now both Boeing and Airbus want to deal with fewer, but larger and more capable, partners. This militates again towards Western integrators playing larger roles in managing systems integration work, and in particular US companies. The large amount of work obtained by US suppliers on the Airbus A350 XWB (see section 1.4) is in some large measure down the dominance of these manufacturers in technology and management of suppliers, especially as a result of the experience these manufacturers have gained in developing lighter but more efficient systems for the Boeing 787.

Table five: Aircraft systems manufacturing contract win values by companies based in low-wage economies

	2005	2006	2007	2008	2009	Total
Mexico	**-**	**-**	200	**-**	**-**	**200**
Brazil	-	1.9	-	**-**	**-**	**1.9**
China	600	397	800	2,950	4,090	**8,837**
Russia	200	20	-	118	2,810	**3,148**
Poland	-	-	600	160	-	**760**
Korea	200	-	-	-	-	**200**
Turkey	47	-	6,000	-	42	**6,089**[3]
Thailand	-	10	-	-	-	**10**
Czech Rep	**-**	**-**	57	-	-	**57**
Malaysia	**-**	**-**	**-**	650	1,030	**1,680**
Indonesia	**-**	**-**	**-**	42	-	**42**
Vietnam	**-**	**-**	**-**	**-**	290	**290**
Taiwan	**-**	**-**	**-**	**-**	450	**450**
India	**-**	**-**	700	**-**	500	**1,200**
Total	**1,047**	**428.9**	**8,357**	**3,920**	**9,212**	**22,864.9**

There has been substantial investment by companies in low-wage economies into new aerospace structures and materials, especially composites. Brazil, the Czech Republic, China, Malaysia, Mexico and Turkey all have advanced composite manufacturing facilities.

The most successful of these are companies who have been able to combine development of an indigenous composite manufacturing capability with a national strategic approach to accessing the market.

Thus Turkey has obtained more than $3 billion worth of structures work on the F-35, with TAI opening a new 74,000sq ft facility to make at least 400 composite subassemblies in the low rate initial production (LRIP) phases of the programme.

And Malaysia's government investment on Composites Technology Research Malaysia (CTRM) Incorporated has seen the company develop substantial business from Airbus, Boeing and Goodrich.

[3] Includes $3,000 million of licensed assembly contracts

1.3 The impact of wage differentials and currency fluctuations

There are broadly three types of country offering new low-wage opportunities to the global aerospace supply chain:

- Former Communist countries with substantial experience in developing and producing aircraft in large numbers, now restructuring their industries to exploit global market opportunities while, in some cases, re-building indigenous military capabilities with network enabled capabilities (China, Russia and the countries of central and eastern Europe)
- Countries which have an established tradition of aerospace industry, mainly through the licensed assembly of Western products or having set up joint ventures with Western companies, are now seeking to expand their capabilities further within the global market (Turkey, Korea, and South Africa).
- Countries with little or no aerospace tradition but whose governments are promoting new aerospace manufacturing initiatives (Mexico, Malaysia, and Vietnam) mainly though attracting new investment from established companies.

For countries wanting to access the market for the first time the strategic route of entry is normally:

- Begin system assembly under a licence agreement with foreign companies and develop a support MRO capability to maintain civil and military aircraft bought from Western manufacturers
- Begin airframe parts manufacturing and subassemblies
- Start sub-assembly development
- Start system development by indigenous capabilities.

However, the road is not always straight. Indonesia developed a strong indigenous capability to assemble aircraft in the 1990s, but since then economic problems have forced a cut-back in its strategy. The amount of government funding required to build a competitive edge in this business is substantial and needs to be applied consistently over 10 to 15 years – relying on low wages is simply no longer enough.

Anyway, the wage differentials between the richest and poorest nations of the world are in a state of constant flux as the strength or weakness of the dollar (particularly against the Euro) can be as much of a decisive competitive factor as the pay and conditions of local employees. Mexico has become a favoured destination for start-up and relocating aerospace companies because the savings per employs over US rates can be in excess of US$30,000[4]. According to French aerospace company SAFRAN every time the dollar falls a cent against the Euro it costs the company EUR22 million. In the middle of 2009 SAFRAN was reportedly paying its Mexican workers US$560 a month and its engineers between $925 and $1,390 a month.

When the first major A350 XWB contracts were being awarded at the start of 2008 Airbus manufacturing managers were keen to mitigate the problem of a strong Euro. As Ake Svensson, then president of the European AeroSpace and Defence industries' association (ASD Europe) highlighted at the association's July 2008 AGM… ."the current situation to leading to a loss of skilled

[4] Source: *MexicoNow, Mexico's Aeronautical Industry, June 2009*

employment in Europe and destroying future job opportunities…Despite efforts to develop new production strategies and encourage greater productivity, each 10 cents devaluation of the US dollar against the euro produces a loss of margin of €1 billion to majors such as Airbus, with proportional losses being inflicted throughout the supply chain of at least another half billion."

While Airbus retained the most valuable integration and final assembly work in Europe it looked increasingly outside Europe for sub-systems and structural work. In January 2009 Airbus and a group of Chinese companies established a joint venture manufacturing centre in Harbin, China to manufacture Airbus A350 XWB composite parts.

Does one new job in Mexico or China created by Boeing or Airbus mean one lost job in Seattle or Toulouse?

Not necessarily.

When Cessna, based in Wichita, Kansas, opened a 62,000sq ft wire assembly in Mexico in 2006 it gave its employees retraining opportunities and offered relocation packages. It actually expanded overall its US workforce during the year. Creating new jobs in low-cost economies argue some companies, allows the organisation to become more competitive and retain workforce levels in high-wage areas of the world.

The setting up of operations in low-wage economies has both a positive and negative impact on manufacturing operations in traditional aerospace countries which, from the result of this study at least, suggests they tend to cancel each other out. In terms of money, at least, the loss of manufacturing work in Europe and North America to countries such as Brazil and China is balanced by the new work created on aircraft programmes emanating from these countries.

Table six: The value to Western companies of work on aircraft programmes originating in low-wage economies

Brazil	Embraer	Total value	2005-2009
	Regional airliners	12,973	87
	Business jets	45,060	24,863
China	COMAC		
	Airliners	16,885	350
Czech Republic	Aero Vodochody		
	L-159	1,384	-
India	HAL		
	Tejas	5,148	-
Russia	Airliners	6,020	3,969
	Helicopters	25	25

Note – this does not take into account joint venture programmes such as the Lockheed Martin AT-63 Pampa, Eurocopter EC175/ HAIG Z15 etc

The evidence of this study at least seems to suggest that North American and European countries are retaining the high-value programme work and exporting the lower-value structure and components work to organisations on low wage economies and that this process, probably as a result of the financial recession, accelerated rapidly in 2009.

Table seven: comparing engineering salaries worldwide[5]

Country	Net Monthly Income constant 2005 US$ [a] [d]		Notes and sources	Compulsory deductions	Weekly Hours
U.S. average salary	PPP $ 4,710	$ 4,710	Chemical engineer, Full-time and part-time employees, 2005. U.S. Department of Labor,	24%	40.0
Taiwan average income	PPP $ 4,070	$ 2,179	Full-time and part-time employees, 2004. Petroleum and natural gas engineer. National Statistics Republic of China,	13%	41.4
UK median salary	PPP $ 3,832	$ 4,225	Chemical engineer, April 2004. UK Employment Department,	30%	36.8
Brazil average income	PPP $ 3,687	$ 1,481	Employees, petroleum and natural gas engineer, Dec 2004. Ministerial do Trabalho e da Previdência Social,	20%	44.0
Australia average income	PPP $ 3,375	$ 3,312	Chemical engineer, May 2004. Normal hours from collective agreements. Australian Bureau of Statistics.	25%	38.9
Germany average salary	PPP $ 3,146	$ 3,397	Chemical engineer, Minimum per month, 2005, normal hours of work. Federal Statistical Office of Germany,	35%	37.5
Canada average income	PPP $ 2,967	$ 2,965	Power distribution and transmission engineer, 2005. Statistics Canada,	36%	31.5
Korea average salary	PPP $ 2,762	$ 2,190	Excl. overtime and bonus, June 2005. All engineers. Korea Ministry of Labour,.	11%	39.8
Portugal average salary	PPP $ 2,594	$ 2,080	Chemical engineers, 2003. Instituto Nacional de Estatística,	27%	38.7
Peru average	PPP $	$	Employees, power distribution and transmission engineer, June 2005. Men only. Instituto Nacional de Estadística e	24%	

[5] Source*: http://www.worldsalaries.org/engineer.shtml*

salary	2,560	1,176	Informatica,		
Finland average salary	PPP $ 2,544	$ 3,038	Chemical engineer, normal hours of work, 2004. Men only. Women make 3,540 euros per month. Statistics Finland,	36%	37.9
Thailand average salary	PPP $ 2,369	$ 756	Chemical engineer. Men employees, 2005. Women make 30,000 bahts per month. Thailand National Statistical Office,	7%	48.0
Italy average salary	PPP $ 2,332	$ 2,518	Power distribution and transmission engineer, normal hours of work, 2005. Istituto Nazionale di Statistica	36%	38.0
Japan average salary	PPP $ 2,152	$ 2,530	Excl. overtime and bonus, 2005. System engineer. Men only; women: 293,000 yens/month. Private establishments with 10 or more regular employees. Japan Statistical Yearbook	17%	
Kuwait average income	PPP $ 2,104	$ 2,627	Power distribution and transmission engineer. Men employees, 2004. Kuwait Ministry of Planning,	0%	42.0
Hungary average salary	PPP $ 2,055	$ 1,304	Chemical engineers, May 2005. Hungarian Central Statistical Office,	45%	
Singapore average salary	PPP $ 1,889	$ 1,731	Chemical engineer, employees, private sector, 2004. Ministry of Manpower,	22%	
Austria average salary	PPP $ 1,882	$ 1,499	Chemical engineer, 2001. Men only. Austrian Central Statistical Office (ÖSTAT),	32%	38.0
Philippines average salary	PPP $ 1,827	$ 406	Employees, chemical engineer, 2004. National Statistics Office,	21%	
Mexico average income	PPP $ 1,562	$ 1,081	Employees, chemical engineer, 2002. Instituto Nacional de Estadística, Geografía e Informatica (INEGI),	16%	51.0
Czech Republic average income	PPP $ 1,540	$ 1,006	Chemical engineer, Excl. bonuses, 2005. Czech Statistical Office,	29%	36.9
Latvia average income	PPP $ 1,397	$ 621	Chemical engineer, adult full-time and part-time employees, 2005. Central Statistical Bureau of Latvia,	29%	39.7
Slovakia average	PPP $	$ 699	Employees, chemical engineer, 2004. Štatistický úrad	22%	32.6

income	1,359		Slovenskej republiky,		
Poland average income	PPP $ 1,240	$ 664	Employees, power distribution and transmission engineer, 2004. Poland Central Statistical Office,	35%	41.0
China average salary	PPP $ 1,076	$ 252	Employees, power distribution and transmission engineer, 2005. National Bureau of Statistics of China,	8%	
Lithuania average salary	PPP $ 1,012	$ 385	Employees, power distribution and transmission engineer, men, 2002. Statistics Lithuania,	29%	
Russia average salary	PPP $ 813	$ 325	Employees, petroleum and natural gas engineer, men, 2004. Federal State Statistics Office,.	13%	40.0
Romania average salary	PPP $ 712	$ 365	Chemical engineer. Men employees, 2005. Women make 1,384 new lei per month. Romania National Institute of Statistics,	30%	38.8

1.4 Sector by sector analysis: airliners, rotorcraft, business aircraft, fast jets and military transports

The extraordinary rise in the value of contracts awarded to companies in low-wage economies in 2009 compared with 2008 can partly be explained by the emergence of new programmes from China and Russia.

In terms of aircraft systems, structures and components contract awards, 2007 was the year of A350 XWB and the Boeing 787 (see appendix one), 2008 the year of the A350 XWB, Bombardier CSeries and Mitsubishi MJ 70/90 and 2009 was dominated (still) by A350 XWB and Bombardier CSeries contract awards supplemented by COMAC C919 and Irkut MC-21 work.

Table eight: The aviation systems, structures and components market 2005-2009 for airliners

	Total spend	Low wage manufacturing	Low wage manufacturing as a percentage
2005	6,288	1,047	16.6
2006	1,735.5	427	24.6
2007	42,280	1,657	3.9
2008	39,223	3,720	9.5
2009	22,982	8,060	35.0

The new programmes from China and Russia probably explained much of this rise in work-share from low-wage companies but there were other factors, too.

On programmes originating in the West, low-wage companies featured the following programme wins

- **The A350 XWB** - Airbus signed a contract with Chinese partners to create a joint venture to make carbon composite parts in China for its A350 XWB and A320 aircraft. Airbus's Chinese business will hold a 20% stake in the joint venture, based in Harbin, and China's Harbin Aircraft Industry Group will hold a further 50% stake, while other local players HAI, AviChina and HELI will each own 10%. Fokker Elmo has set up a plant in China to build wiring for the Trent XWB **.** Esterline has a new facility in Mexico supplying vanes to the Trent XWB.

- **Bombardier CSeries** – wiring will be made in China by Fokker Elmo for the project.

- **Airbus and Bombardier airliners -** Composites Technology Research Malaysia (CTRM) has signed **a** 3.5 billion ringgit, $1.03 billion for 20 years with Goodrich to produce nacelle components for a range of airliners.

- **Boeing 737 –** flaps will be made by MHIVA Aerospace Vietnam Co., Ltd. (MHIVA) of Hanoi, a subsidiary of Mitsubishi Heavy Industries, Ltd. (MHI) The new plant is situated at the Thang Long Industrial Park (TLIP) approximately 16 kilometers northwest of central Hanoi and occupies 4,500 square meters (m2) in floor area within the 19,100sq m plant. Initially, the flaps for the Boeing 737 will be shipped to MHI's Nagoya Aerospace Systems Works for painting and final inspection, and then delivered to the Renton, US site. Once production

gathers momentum, MHIVA will deliver the flaps to the US directly, according to the company.

- **Mitsubishi MRJ70/90** - Aerospace Industrial Development Corporation (AIDC) of Taiwan is making slats, flaps, belly fairings, rudders as well as horizontal stabiliser rotating blades for the aircraft.

During 2009 there has also been a dramatic increase in the amount of work on rotorcraft programmes being undertaken by low-wage aerospace companies. While the launch of the Russian Helicopters Sapsan (Mi-34S2) accounts for some of this increase Sikorsky has outsourced considerable amounts of structural work to central European suppliers and others. In 2009 India's Tata Advanced Systems and Sikorsky signed an agreement for the Indian enterprise to build cabins for the S-92 helicopter at a greenfield site in Hyderabad, and is due to begin deliveries from late 2010. This follows on from earlier agreements with Aero Vodochody to produce S-76 structures (more than 30 % out of a total of 8,500 parts of the helicopter assembly are produced by the manufacturer, with the rest, around 200, being sourced mainly by US and Canadian subcontractors) and Poland's PZL Mielec. The first Black Hawk cabin produced at the Mielec facility was rolled out in March 2009. The first cabin was built for the S-70i while the second will be assembled into a US Army UH-60M. Delivery of the first S-70i helicopter from Mielec is expected to occur by the end of 2011. Production is expected to ramp up to as many as 36 S-70i helicopters per year.

Poland has become a centre of excellence for helicopter structures from Western suppliers following decades of producing helicopters for Warsaw Pact countries. PZL-Swidnik and AgustaWestland have been co-operating for over 10 years with production of the AgustaWestland Grand, A119 Koala, A109 Power, A109 LUH and AW139 airframes all being carried out in Poland, with over 1000 jobs at its Swidnik plant being supported by AgustaWestland programmes.

Table nine: The aviation systems, structures and components market 2005-2009 for rotorcraft

	Total spend	Low wage manufacturing	Low wage manufacturing as a percentage
2005	176	-	0
2006	754	-	0
2007	6,784	3,600	53
2008	6,157	160	2.6
2009	4,066	1,110	27

In the business jet market most of the activity underway by companies based in low wage economies is centred on Brazil's Embraer and associated Brazilian concerns alongside US business jet manufacturers who have relocated to Mexico. China, Russia and the countries of the former Communist bloc have made little headway in this market – perhaps understandable given the lack of a business aircraft tradition and the current volatility of the market. However, this could soon change, given the relatively low barriers of entry into the personal and very light jet market in terms of technology and financing, and new entrants from the Far East into this market should be expected once the current depressed economic conditions improve.

Table ten: The aviation systems, structures and components market 2005-2009 for business aircraft

	Total spend	Low wage manufacturing	Low wage manufacturing as a percentage
2005	213.5	-	0
2006	898	1.9	0.2
2007	1,598	700	43.8
2008	13,850	40	0.3
2009	650	-	0

The drive by India, Brazil, Argentina, Korea and Taiwan to develop an indigenous fast-jet capability has provided plenty of work for Western manufacturers – joint-programmes between national aerospace champions in low-wage economies with legacy suppliers in the West have, in general, produced aircraft closer to the original specifications and budgets than projects built around indigenous engines, avionics and weapon systems. China's development of a robust third-generation fighter with the performance approximating an early F-16 suggests an impressive leap in capabilities and, for the first time, genuine competition in export markets beyond legacy suppliers within Europe, North America and Russia.

Table eleven: The aviation systems, structures and components market 2005-2009 for fast jets

	Total spend	Low wage manufacturing	Low wage manufacturing as a percentage
2005	859	-	0
2006	1,450	-	0
2007	4,450	3,000	67
2008	3,240	-	0
2009	2,691	42	0.1

Companies have yet to make an impact on the global military transport market – outside the licensed built assembly of small transports now obsolete in the West. However, this will change with the development of an indigenous 200-tonne Chinese military transport – due to fly before the end of 2009 and a potential new military programme in Brazil.

Table twelve: The aviation systems, structures and components market 2005-2009 for military transports

	Total spend	Low wage manufacturing	Low wage manufacturing as a percentage
2005	560	-	0
2006	1,013	-	0
2007	1,143	-	0
2008	890	-	0
2009	1,166	-	0

2. Africa and the Middle East

2.1 Introduction

North Africa combines low labour costs, a skilled workforce and a Francophone population with close proximity to major European manufacturing centres. French structures company Latecoere will be employing 700 skilled staff by the end of 2009 in its manufacturing plant near Tunis, while Snecma Morocco Engine Services (SMES), a joint venture between SAFRAN and Royal Air Maroc, is also growing rapidly.

Links across the Mediterranean have been boosted recently by the July 2008 formation of "The Union for the Mediterranean", an initiative by French president Nicolas Sarkozy to strengthen economic ties between 43 member nations surrounding the sea.

Abu Dhabi, Dubai and Saudi Arabia are rapidly developing aerospace businesses to support new civil and military aircraft fleets and developing their own indigenous aerospace manufacturing capabilities. But they cannot be regarded as "low-wage" manufacturing centres.

2.2 Egypt

Egypt's major aerospace manufacturer is the **Arab Organization for Industrialization (AOI),** a company, whose core business is military systems, including the construction and assembly of armoured vehicles. The AOI subsidiary Arab British Helicopter Company (ABHCO) is an Anglo-Italian-Egyptian joint venture which manufactures the Westland Gazelle under licence in Egypt. AgustaWestland controls half of the company.

2.3 Morocco

Morocco is vying with Tunisia to become a new low-wage aerospace manufacturing centre in much the same way Mexico become a favoured base for North American suppliers. SAFRAN has set up **Snecma Morocco Engine Services (SMES),** a joint venture between Snecma Services (with 51%) and Royal Air Maroc (49%), to handle the CFM56-7 engine tests and repairs.

Probably the largest manufacturer is **Atlas Productions** of Tangier, a supplier of position sensors and brake measurement units. In 2009 Atlas was acquired by CIRCOR Aerospace Products of the USA which bought all operating units Groupe BMP, which previously owned Atlas Productions.

2.4 South Africa

South African aerospace companies have considerable expertise in the design, development and production of military aircraft. **Denel Aviation** is primarily focused on maintenance, repair and overhaul of both rotary and fixed wing aircraft in operation with the South African Air Force.

The purchase of 26 Saab JAS39 Gripen fighters has propelled South African companies into the global aerospace supply chain. BAE Systems and its partner Saab are delivering US$8.7 billion in Industrial Participation benefits to South Africa through investments and other stimulation of the country's mining and manufacturing sector as a result of the purchase of the aircraft. Saab has transferred manufacturing of the Gripen main landing gear unit fuselage section to Denel. South Africa's Avitronics – now part of **Saab Avitronics** - is supplying helicopter electronic warfare to Switzerland, also as a consequence of the Saab-Denel tie-up.

Table thirteen: Aircraft systems, structures and equipment contract awards 2005-2009 by South African companies

Contractor	Supplier	Work package	Value	Comment
Saab JAS39 Gripen				
Saab	Denel	Structures	Around $240 million	Products include the rear fuselage section, the main landing gear fuselage unit and the pylons for carrying missiles, bombs, and reconnaissance sensors. Saab and Denel have set up a joint company, based in South Africa to undertake aero-structures work globally.
Saab	Grintek	Audio management system	R56 million; $10 million	The system comprises an audio management unit and an audio control panel. The suite is based on the South African-developed Grintek GUS 1000 system. The AMS is a fully digital system allowing audio and radio communications to become highly integrated to the Gripen avionics. Saab has a 21.2% stake in the company.
Agusta A109 LUH, the A109 Power and the A119 Koala				
AgustaWestland	Denel	Licensed production		In 2002 Agusta SpA and South Africa's Denel Group, signed an agreement for license production and marketing of the Agusta A109 LUH, the A109 Power and the A119 Koala helicopters in South Africa. The helicopters are built at Denel Aviation's manufacturing facilities in Kempton Park, South Africa. The license production agreement allows Denel to both manufacture and market the A109 and A119 Koala helicopters in specified countries around the world, including South East Asia, the Middle East, South America and Africa. The Agusta and Denel partnership dates back to the Product Supply Agreement for the A109 Light Utility Helicopter programme signed in 1999. The agreement provides for a phased multiple year programme for the manufacturing of the complete A109 LUH airframe and systems installation in South Africa. Denel is involved in the integration of subsystems, manufacture, final assembly, customisation engineering and flight-testing of the SAAF's helicopters.
Super Lynx 300/AW159				
AgustaWestland	Denel Saab	Steels and components		Under the National Industrial Participation (NIP) agreement drawn up by the South African government Denel is participating in the upgrade of Lynx platforms for the RAF and is exporting components for the Lynx Refit programme. According to the agreement:"Denel's current structural work for the Lynx would be extended to include all AW159 programmes. Denel will attain the higher profile internationally by supply contracts. Export of Special Steels for use by GKN Group, from Iskor and proposed new Speciality Steel Mill (Agusta). Under this initiative, GKN would commit to purchasing 25% of its steel requirements from South Africa, provided the supply criteria are met."

Denel-Saab has acquired extensive capabilities in the defence aerospace market, with a particular focus on helicopter systems manufacturing. As well as gaining knowledge through the development of the Rooivalk attack helicopter the company also assembled 23 Agusta A109 LUHs in South Africa under a 2000 contract. The company became a credited supplier dynamic helicopter part assemblies for the civil and military market (main rotor blades and main rotor heads) and structural assemblies (such as fuselages and tail booms).

As part of a company restructuring announced in 2006 Denel is seeking to expand its commercial aerospace portfolio, its **Turbomeca Africa** has continued to grow its profits year-on-year and Denel Aviation has become Africa's first accredited Lockheed Martin service centre. Denel is seeking to build on its established joint ventures - Carl Zeiss Optronics South Africa, Denel Saab Aerostructures

and Rheinmetall Denel Munitions - with particular expertise in military markets. **Denel Saab Aerostructures** is a designer and manufacturer of complex metallic and composite aerostructures for the military and commercial aviation industry. It supplies these aerostructures to OEM's and other aerostructure suppliers in cooperation with aircraft manufacturers, such as Airbus, AgustaWestland, Boeing and Saab. This business specialises in manufacturing aircraft detail components and aerostructure sub-assemblies. It designs and builds elements of the Airbus A400M military transport aircraft, the Gripen advanced fighter, the SAAF's Agusta A109 LUH helicopter and parts for Boeing commercial airliners.

2.5 Tunisia

SEA-LATelec, a wholly-owned subsidiary of French wiring company LATelec, opened a second factory was opened in June 2005.

3. Central and Eastern Europe

3.1 Czech Republic

The Czech Republic's aerospace turnover is currently around €300 million[6]; it employs around 10,000 staff. The country's aerospace technical heritage including over 6 600 jet trainers designed, developed, manufactured and marketed and over 3 600 MiG fighter jets produced under licence.

The major companies active in the global marketplace are Aero Vodochody, Letov and other, primarily engineering, firms such as Walter, PBS, Jihlavan, Strojcar, Frencken, SEKOedm and Fimes. Joint ventures, according to the trade association CzechInvest, have been signed with EADS, Honeywell, S.A.B.C.A., Israel Aircraft Industries, Cyclone, Turkish Aircraft Industries, Vought Aircraft Industries, BAE Systems, Boeing, Piaggio Aero, SAAB, Rolls-Royce and others. Airbus is currently outsourcing its engineering services to the Czech Republic in work worth EUR 14 million per year. Key global players are listed below:

Moravan Aviation

Moravan Aviation is 100% owned by the Irish investment company QucomHaps Holding. The company makes ejection seats and ejection-seat rocket motors, parachute components, undercarriages, brakes, wheels and parts for the Czech L-410 transport aircraft and Polish M28 aircraft manufactured by PZL Mielec.

LET Aircraft Industries

The company has a 6,090 sq m assembly hall and three other halls for shaping and machining large metal components, welding and riveting, and chemical and heat surface treatment, and a 2,470 m2 hall for final painting.

Letov

Letov is an aerostructures manufacturer focusing on assembly of passenger, service and cargo doors, door mechanism and composite parts for door structure for Airbus, Boeing, Dassault and Embraer aircraft. Part of the Latecoere Group.

Aero Vodochody

AERO is the largest aviation technology producer in the Czech Republic and historically the largest jet training aircraft producer in the world. 100 % of the shares of Aero are owned by the private equity group Penta. Aero has agreements with Sikorsky Aircraft Corporation (S-76C helicopter), Alenia Aeronautica (C-27J Spartan center wing box), Latecoere (Embraer 170/190 subassemblies), Saab (JAS-39 Gripen pylons), Spirit Aerosystems (B767 fixed leading edge kits), EADS (A320/340 subassemblies), etc. It manufactures the L-159 jet trainer. AERO Vodochody is a 100% holder of the shares of Technometra Radotín, a producer of landing gears and other assemblies, and Letiště Vodochody (Vodochody Airport), a private international airport. In recent years Aero has built up its composite manufacturing technology expertise. In October 2009 Rotortech Aero Composites Limited (Rotortech), part of Aero Vodochody, announced today a threefold expansion of its manufacturing capacity at its site based near Cambridge, UK.

[6] Source: *www.dlr.de/aeronautics-conference/Speeches/Session1_Ruzicka.pdf*

Walter Engines

Walter Engines manufactures high precision machined parts for the aviation industry with customers worldwide. The company and its sister company Prague Casting Services employ together about 520 employees. In 2007, General Electric Company entered into an agreement to acquire certain assets of Walter Engines and Prague Casting Services. Walter Engines manufactures various parts and subassemblies of turbine aircraft engines and other high technology engineering products.

PBS Velká Bíteš

PBS's production plant covers an area of 183,996sq m and makes APUs, air-conditioning systems (ECS), air starters**, c**omponents for aircraft and helicopter systems such as turbo-cooling units, heat exchangers, water separators, special fittings and parts for pneumatic regulation, actuators, shut-off valves, high-speed gearboxes, helium expansion turbines used in the gas-liquefaction process and **c**old compressor unit for aspiration of helium vapours in superconductive arrangements.

TL elektronic

TL elektronic in involved in the design and development of aircraft instruments and onboard aircraft systems.

MESIT Instruments

MESIT Instruments customers include Let Kunovice, Moravan Otrokovice and Aero Vodochody. The company supplies 20 components for the M601 aircraft engine produced by the Czech company Walter Engines and replacement avionics for Czech L-39 and L-410 aircraft operating in Russia and Asia.

Ray Service

Ray Service provides wire harnesses and cable components.

Quittner & Schimek

Quittner & Schimek (QS) is a supplier of interconnections.

Jihostroj

Hydraulic and fuel systems. Jihostroj has cooperated with Parker Hannifi n on development and production of complete hydraulic systems for end producers of aircraft.

Jihlavan

The company develops and produces components for rudder and elevator hydraulic control mechanisms, hydraulic power control, hydraulic valves, hydraulic cylinders, brake-system components, landing-gear control, etc. The company is involved in cooperative programmes with Letov/Latecoere (door components for Airbus aircraft) and has cooperated closely with GE since 2000.

LA Composite

Production of composite and sandwich parts

CompoTech

Produces structural composite tubes

Frencken Brno

Supplies precision mechanical parts and mechanical assemblies.

Table fourteen: Aircraft systems, structures and equipment contract awards 2005-2009 by Czech companies

Contractor	Supplier	Work package	Value	Comment
Saab JAS39 Gripen				
Saab	Jihlavan as	Hydraulic actuators		Gripen International has committed to generate offset and industrial cooperation with the Czech government to a value of 130% of the aircraft lease agreement. The offset agreement requires a minimum of direct offset equalling 20% of the offset agreement's value to support and develop the Czech aerospace and defence industry. The offset programme will be fulfilled by 2014, 10 years from the contract signature.
Saab	Jihlavan as	Airbrake and scoop actuators		A follow-on order for Gripen airbrake and scoop actuators was awarded in 2002. This follows successful completion of an initial contract to manufacture five sets, placed in June 1999. Jihlavan is now the sole supplier of airbrake and scoop actuators for Gripen.
Volvo	Mora Aerospace as	Aero engine components including combustion chamber sub-assemblies		Contract signed March 2001
Volvo	Walter as	Castings and manufacture d aero engine parts		Contract signed March 2001
Boeing F/A-18				
Boeing	Aero	Gun bay doors		Aero has been producing gun-bay doors for the F/A-18 since 2001l including part fabrication, special processes and painting. On January 12 2007 the company completed the first unit for the F/A-18G version.
Sikorsky S-76				
Sikorsky	Aero Vodochody	The Sikorsky S-76 helicopter frame excluding dynamic parts and final interior installations.		After completion, the helicopter assembly is taken by road to Bremerhaven, Germany and then is by ship to Stratford, Connecticut where Sikorsky undertakes the final integrations and completions. The S-76 is Aero Vodochody largest airframe programme and is responsible for around 75 % of the total revenue of the company. The first S-76 was completed by Aero Vodochody on December 21, 2000. More than 30 % out of a total of 8,500 parts of the helicopter assembly are produced by the manufacturers, with the rest, around 200, being sourced mainly by US and Canadian subcontractors.

3.2 Hungary

The Hungarian aerospace industry comprises over 130 companies (80 MRO concerns)[7] and employs about 2,300 people. While most of these are involved in the general aviation sector there are some larger companies producing parts and assemblies for the global aerospace market, namely **Elektrometall Paks Ltd** (suppliers of wire harnesses to Airbus), **Hungarotech** (turbine parts), **Alcoa-Kofem Nemenesvamous** (fasteners).

Table fifteen: Aircraft systems, structures and equipment contract awards 2005-2009 by Hungarian companies

Contractor	Supplier	Work package	Value	Comment
Saab JAS39 Gripen				
Saab	Danube Aerospace	Fuselage components		In November 2007 the Hungarian Offset Committee approved further offset agreements worth SEK 251million (Euro 27.1million), of which SEK 12 million (Euro 1.3million) cover investments and SEK 239 million (Euro 25.8million) represent exports.

3.3 Poland

There has been a recent surge in opening up new aerospace businesses in Poland. Traditional aerospace niche products have centred on general aviation aircraft, helicopters, gliders and aircraft components. There are 55 aerospace companies operating in Poland[8] employing 16,000 people. Most are clustered in the Polish 'aviation valley', in the south-western part of Poland, where over 75% of all national aviation products are manufactured. Companies based here include:

- **WSK Rzeszów** (engines)
- **PZL Świdnik** (helicopters)
- **PZL Mielec** (general aviation aircraft, aerostructures and aircraft components for international industrial cooperation programme)
- **Pratt & Whitney Kalisz** (engine parts)
- **Wytwórnia Zespołów Kooperacyjnych** (doors for Boeing aircraft)
- **Stamet Zakład Mechaniczny S. Stachura** (components)

PZL-Swidnik has made fuselages for both the AgustaWestland A109 Power and A 119 Koala, cockpit modules for the Dassault Mirage 2000-5, components for Ratier-Figeac and passenger doors for the Airbus A319/A320/A321 family. In October 2001 EADS CASA took a 51% share in PZL Ockie as part of a contract to supply eight C-295M transports to the Polish air force. The company makes wings, loading doors, seats, and electric harnesses for the CASA C-295 and is developing the PZL-130 TC-II ORLIC advanced trainer. Meanwhile, **PZL-Polskie Zaklady Lotnicze** undertakes subcontract work on the BAE Systems Hawk and for GKN, Saab, and Pratt & Whitney.

In recent years new civil aircraft manufacturing components business has emerged through a series of joint ventures. The following companies have set up joint venture manufacturing businesses:

[7] Source: http://www.haif.org/index.html

[8] Source: http://www.poland.gov.pl/Aerospace,industry,7477.html

- Pratt & Whitney
- General Electric
- EADS
- BAE Systems
- Lockheed Martin
- Boeing
- R&D Precision

Table sixteen: Aircraft systems, structures and equipment contract awards 2005-2009 by Polish companies

Contractor	Supplier	Work package	Value	Comment
Airbus A318/A319/A319CJ/A320/A321				
Airbus	ZKM Forging	Airframe components		
Airbus A380				
Airbus	Goodrich	Landing gear	The programme has the potential to generate total revenues in the range of $2-$3 billion over a 20-year period depending on the number of aircraft ordered.	Goodrich provides both the main body and wing landing gear systems for the A380. achieved a major milestone when the first Airbus A380 body and wing landing gears were shipped from its facility in Oakville, Ontario, Canada to the Airbus test facility in Bristol, UK. The gear will be installed in Airbus' landing system test rig. At 18 1/2-feet tall, a single A380 body landing gear supports approximately 167 tons. In addition to the original equipment, Goodrich will also provide spare parts and gear packages directly to the operators of the A380 aircraft. The components for the landing gear system are produced by Goodrich's Landing Gear division and involve manufacturing facilities at Oakville, Ontario, Canada; Cleveland, Ohio; Tullahoma, Tennessee; and Krosno, Poland. The final gear integration takes place at the Goodrich facility in Toulouse, France before delivery to Airbus' final assembly line. Contract signed March 2001.
Boeing 747-8				
Boeing	Goodrich	Landing gear		Goodrich Corporation signed a long-term agreement with the Boeing Company under which Goodrich will continue as the exclusive supplier of original equipment and aftermarket landing gear for the 737, 747, 767 and 777 Commercial Airplanes programmes. The agreement extends supply arrangements through 2012. The company's US landing gear manufacturing facilities are located in Ohio, Tennessee, Washington, as well as Ontario, Canada and Poland. Contract signed July 2007
Boeing 767-200/-300/-400ER				
Boeing	Goodrich	Landing gear		Goodrich Corporation signed a long-term agreement with the Boeing Company under which Goodrich will continue as the exclusive supplier of original equipment and aftermarket landing gear for the 737, 747, 767 and 777 Commercial Airplanes programmes. The agreement extends supply arrangements through 2012. The company's landing gear manufacturing facilities are located in Ohio, Tennessee, Washington, as well as Ontario, Canada and Poland. Contract signed July 2007

Boeing 777				
Boeing	Goodrich	Landing gear		The semi-levered landing gear allows the 777-300ER to lift its nose early during takeoff by shifting the centre of rotation from the main axle to aft axle of the three-axle landing gear truck. Goodrich is also providing the aircraft with wheels and carbon brakes. The company's landing gear manufacturing facilities are located in Ohio, Tennessee, Washington, as well as Ontario, Canada and Poland.
Boeing	Wytwornia Zespolow Kooperacyjnych	Structures		The five year contract is to manufacture hardware for all new 777 aircraft. WZK is manufacturing the Krueger Flap, a hinged surface on the leading edge of the wing. In 2005 Boeing awarded WZK a contract to manufacture the spare door parts for the fleet of Boeing 757s in operation worldwide. WZK produced all the passenger doors for the 757 from late 1992 to 2005. Contract signed June 2007.
Boeing 787				
Cessna	Goodrich	Fully integrated landing gear system		The system includes main and nose landing gear, wheels and carbon brakes, and electronic control and steering systems. This is the first full landing gear system the company has supplied to Cessna. Goodrich's Landing Gear companies will provide overall system integration, fully dressed main and nose landing gear assemblies, actuation, control and steering systems and final assembly. Hardware deliveries to support rig testing are expected by mid 2009. The company's landing gear manufacturing facilities are located in Ohio, Tennessee, Washington, as well as Ontario, Canada and Poland. Contract signed August 2008.
BAE Systems Hawk 127/128 LIFT				
BAE Systems	PZL-Mielec	Fuselage structures		Poland's state-run company started producing parts for the Hawk aircraft in 1999.
Saab JAS 39 Gripen				
Saab	PZL Mielec	Tailcone sub-assemblies		The company provides machined metal sub-assemblies
AgustaWestland AW 109 Power/LUH/Grand				
AgustaWestland	PZL Swidnik	Fuselage		PZL-Swidnik and AgustaWestland have been co-operating for over 10 years with production of the AgustaWestland Grand, A119 Koala, A109 Power, A109 LUH and AW139 airframes all being carried out in Poland, with over 1000 jobs at its Swidnik plant being supported by AgustaWestland programmes. In 1997 PZL-Swidnik started fuselage production of the A109 Power with a dedicated workforce of around 60 employees. In 2008 PZL-Swidnik is responsible for fuselage production of five AgustaWestland helicopter types in PZL-Swidnik (A109 Power, A109 LUH, A119 Koala, AW139 and Grand). After celebrating the delivery of the 500th fuselage to AgustaWestland in June 2006, PZL-Swidnik has now delivered more than 560 fuselages to date at with production running at a rate of 12 fuselages per month now. The consolidated turnover for PZL-Swidnik from AgustaWestland is today well in excess of US$25 million and the co-operation accounts for almost 25% of the company's annual revenues.
AgustaWestland AW 119 Koala/Ke				
AgustaWestland	PZL Swidnik	Fuselage and tail booms		ZL Swidnik is responsible for the production of fuselages and tail booms for all A119 Koala airframes. These are shipped to the finally assembly line located at AgustaWestland's Philadelphia plant in the USA.
AgustaWestland AW 139				
AgustaWestland	PZL Swidnik	Fuselage		In 2001 PZL started the production of the fuselage for the AW139.

Sikorsky S-70i/UH60M				
Sikorsky	PZL Mielec	Cabins		The first Black Hawk cabin produced at the Mielec facility was rolled out in March 2009. The first cabin was built for the S-70i while the second will be assembled into a US Army UH-60M. Delivery of the first S-70i helicopter from Mielec is expected to occur by the end of 2011. Production is expected to ramp up to as many as 36 S-70i helicopters per year.

3.4 Romania

Romania employs around 7,000 staff in aviation product manufacturing.[9] The main companies are:

Aerostar

Mainly involved in MRO work. AEROSTAR is an EASA, IR Part 145 approved organization for line and base (light and heavy) civil aircraft maintenance and production of aerostructures and components as an approved subcontractor under JAR-21 subpart G and EASA, IR Part 21G. Programmes are currently under way for providing maintenance and/or modification of BAe ATP, SAAB 340, Boeing 737 aircraft types, classic and new generation).

Avione SA Craiova

The company has produced ground attack aircraft, the IAR-93 and the IAR-99 SOIM.

IAR Brasov

Carries out co-operation programmes, including the provision of tooling, subassemblies and parts for different aircraft IAR S.A. Brasov has manufactured and delivered more than 160 Puma helicopters, of which 57 helicopters have been exported to France, Pakistan, UAE; 104 off delivered to the Ministry of National Defence.

Romaero

The company is an integrated facility for aircraft manufacturing, aerostructures, detailed parts, jigs & tools. The company has a strategic partnership with Lockheed Martin and Derco for maintenance and modernization of Romanian Ministry of Defence C-130 Hercules Fleet.

Parts manufacturing includes

- BAE Systems ATP - cargo door, kits
- A109 Agusta Power - tail boom assembly
- Airbus A380 -tooling,skins,doublers and stringers lower center fairing
- BAE Systems MRA4 Nimrod -tooling skins,detailed parts
- Airbus A330/340 - tailcone skins,detail parts
- Boeing B767, B777 - fixed leading edge polished skins
- Airbus A320, inlet ducts
- Gulfstream G-200, aft fuselage-WP-40
- Britten and Norman - BN-2 Islander, aircraft
- Bombardier CL415 floats and cabin
- Hawker parts and components

[9] Source: http://www.opiar.ro/history.html

Turbomecanica

Turbomecanica is a manufacturing and repair company involved in the following areas - aeroengines (repair of Viper 632, Turmo IV, Allison 501, etc), gearboxes and rotorheads for helicopters, accessories and equipment.

Table seventeen: Aircraft systems, structures and equipment contract awards 2005-2009 by Romanian companies

Contractor	Supplier	Work package	Value	Comment
Airbus A318/A319/A319CJ/A320/A321				
Airbus	Romaero	Section 14 passenger floor		
Airbus	Romaero	Inlet ducts		
Airbus A330/A340				
Airbus	Romaero	Tailcone skins, detail parts		
Boeing 767-200/-300/-400ER				
Boeing	Romaero	Fixed leading edge polished skins		

3.5 Russia

Russia is in the last phase of a transformation process which has seen it evolve from a mass producer of airliners and militart aircraft to meet the demand of the Soviet bloc to an integrated member of the global aerospace industry.

The final phase of transformation has been outlined in the 2006 report of the Government Commission for Integration of Aircraft Building Enterprises in the Russian Federation, charged by then president Putin to set out a strategy to revitalise the aerospace sector. One of the main decisions from the report was to develop a “joint stock” company to consolidate many of the state-owned aerospace companies under a single entity, the United Aircraft Corporation (UAC). Russia’s helicopter industry has also been consolidated within the OPK Oboronprom’s Helicopter Group – the government has a 51% share in the enterprise.

UAC has been structured in four divisions: Military Aviation, Transport and Specialized Aviation, Civil Aviation, and Parts and Components.

Since then, Russia’s aerospace sector has developed new civil projects in combination with companies in Europe and the USA and redeveloped military aircraft to aim them at the export market. The *Sukhoi SuperJet 100* is being produced by Sukhoi Civil Aircraft with partners including Boeing, Goodrich, Ilyushin, Powerjet (a 50/50 engine joint venture of NPK Saturn and Snecma), and others. Alenia Aeronautica is providing sales and after sales product support in Western Europe,

North America and South America. Other new civil programmes (the Antonov AN-148 and MC-21 – see section six) also include a wide number of new partnerships.

The following is a list of recent agreements, identified by the US Department of Commerce, [10]

- UAC and Alcoa International have signed a memorandum of understanding (MoU) covering "supply of advanced metallic materials, modern structural components and manufacturing technologies." The MoU covers development of an Alcoa Aerospace Technology Center in Russia.
- European Aeronautic and Defense Space Company (EADS) and UAC have signed four agreements- a five percent partnership in the Airbus A350XWB programme for UAC for airframe component design and construction in Russia; establishment freighter conversion centers for the Airbus A320 family both in Dresden and at Lukhovitsy near Moscow, a joint study of the transport aircraft market and a shareholder exchange in EADS' Engineering Center Airbus Russia (ECAR).
- Vneshtorgbank (VTB), Russia's second-largest state owned bank, purchased a five percent stake in EADS in 2006.
- Honeywell Corporation has an agreement to "westernize" Mi-8/Mi-17 military helicopters for use outside Russia
- Rolls-Royce Corporation (North America) provides an engine for the Kamov KA-226 light multipurpose helicopter.

While sales of fighters to export customers - such as the SU-30s and its derivatives to India, Algeria and elswhere - have been brisk in recent years, the domestic military market is also starting to pick up. According to Russian Prime Minister Putin speaking at the August 2009 MAKS air show, 48 Su-35s, twelve Su-27SMs and four Su-30Ms were sold at the show.

But the industry still needed an injection of funds at the end of 2009 to keep research and development plans in place.

UAC is still transforming – from 100,000 employees now to 50,000 within the next 15 years – from an 80/20 military/civil split to 50/50 in the medium term.

Table eighteen: Aircraft systems, structures and equipment contract awards 2005-2009 by Russian companies

Contractor	Supplier	Work package	Value	Comment
Airbus A318/A319/A319CJ/A320/A321				

[10] www.trade.gov/static/aero_rpt_russian_industry_consolidation.pdf

Airbus	Kaskol	See comment		In 2003, Airbus and the Kaskol Group jointly created an Airbus engineering centre in Russia, ECAR. It mainly performs work in disciplines such as fuselage structure, stress, systems installation and design work.
Airbus	Irkut Scientific Production	Tank panels	$200 million	Following from a 2004 cooperative agreement, IRKUT's contract awarded in December 2005 comprises wall panels for the A320 family auxiliary centre tank, A330/A340 family wing ribs and flap-track roller beams, plus other major components for the A320, A330/A340, and A380 aircraft. In December 2004, IRKUT won Airbus work packages worth $200 million over ten years. A320 family components are made at its facility in Irkutsk. In December 2005 IRKUT sold ten percent of its shares to EADS.
Airbus	Voronezh Aircraft Production	Engine pylon components	$200 million	
Airbus	Rosaviakosmos	See comment	The co-operation programme will generate a turnover of more than $800 million over 10 years for Russia.	A wide co-operation programme has been signed by EADS (Airbus' major shareholder) and Rosaviakosmos, covering numerous research and technology projects, design work, material procurement, product manufacturing and component delivery, as well as extensive co-operation in the certification field. Verkhnaya Salda Metallurgical Production Association continues to supply more than half of all Airbus titanium.
Airbus	VSMPO-Avisma	Titanium		The company supplies around 60% of Airbus' titanium materials. Airbus and its parent company EADS have secured long-term titanium supplies from VSMPO for 2007 to 2012.
Airbus A330/A340				
Airbus	Kaskol	Design and structural sub-assemblies		In 2003, Airbus and the Kaskol Group jointly created an Airbus engineering centre in Russia, ECAR. It mainly performs work in disciplines such as fuselage structure, stress, systems installation and design work.
Airbus	Irkut Scientific Production	Structures and components	$200 million	Following from a 2004 cooperative agreement, IRKUT's contract awarded in December 2005 comprises wall panels for the A320 family auxiliary centre tank, A330/A340 family wing ribs and flap-track roller beams, plus other major components for the A320, A330/A340, and A380 aircraft. In December 2004, IRKUT won Airbus work packages worth $200 million over ten years. A320 family components are made at its facility in Irkutsk. In December 2005 IRKUT sold ten percent of its shares to EADS.
Airbus	Voronezh Aircraft Production	Engine pylon components	$200 million	
Airbus	Rosaviakosmos	Design and procurement	The co-operation programme will generate a turnover of more than $800 million over 10 years for Russia.	A wide co-operation programme has been signed by EADS (Airbus' major shareholder) and Rosaviakosmos, covering numerous research and technology projects, design work, material procurement, product manufacturing and component delivery, as well as extensive co-operation in the certification field. Verkhnaya Salda Metallurgical Production Association continues to supply more than half of all Airbus titanium.
Airbus A380				
Airbus	Irkut Scientific	Structures and	$200	Following from a 2004 cooperative agreement, IRKUT's contract awarded in December 2005 comprises wall panels for the A320

	Production	components	million	family auxiliary centre tank, A330/A340 family wing ribs and flap-track roller beams, plus other major components for the A320, A330/A340, and A380 aircraft. In December 2004, IRKUT won Airbus work packages worth $200 million over ten years. A320 family components are made at its facility in Irkutsk. In December 2005 IRKUT sold ten percent of its shares to EADS.
AgustaWestland AW 139				
AgustaWestland	Oboronprom	Final assembly		The two companies agreed on a joint venture for the assembly of AW 139 helicopters in Russia.
Boeing – all models				
Boeing	VSMPO-Avisma	Raw materials		The company supplies around 30% of Airbus' titanium materials. Boeing's joint venture with VSMPO to build a titanium-forging factory in 2008 will ensure adequate supplies for the 787 aircraft between 2008 and 2013. Boeing also has a larger, 30-year deal with VSMPO for supplies worth a reported $18 billion
Boeing 787				
Boeing	GKN Aerospace	Slat skin wing-to-body fittings/ wing-to-nacelle fittings		The long term agreement is for the supply of 13 complex titanium fittings for the aircraft, comprising structural wing-to-body and wing-to-nacelle fittings. They are being manufactured in 5553 advanced grade titanium. GKN Aerospace rough machines and finishes the titanium forgings supplied by VSMPO-Avisma of Russia at its St Louis, Missouri facility. GKN Aerospace is delivering directly to Boeing's partner companies on the 787 programme, MHI and FHI.

3.6 Turkey

Turkeys' aerospace expertise is centered on **Turkish Aerospace Industries**, Inc (TAI), which has a total of 3,000 staff.

The company's aviation manufacturing experience includes co-production of F-16 fighters, CN-235 light transport/maritime patrol/surveillance aircraft, SF-260 trainers, Cougar AS-532 general purpose helicopters and design and development of unmanned aerial vehicles. TAI is the prime contractor of the indigenous Turkish Unmanned Aerial Vehicle (MALE) and the Turkish Armed Forces Attack Helicopter production programme. It is also engaged in design and development of Primary & Basic Trainer (HÜRKUŞ) Aircraft.

TAI is the prime contractor of the C-130E/B Avionics Modernization (Erciyes) Programme, which covers the modernization of 13 TuAF C-130 aircraft. (7 C-130E and 6 C-130B) and other business areas include modernization, modification and systems integration programmes and after sales support of both fixed and rotary wing military and commercial aircraft.

TAI is also engaged in aerostructures manufacturing business for fixed and rotary wing, military and commercial aircraft for worldwide customers; it is a supplier to AgustaWestland, Airbus, Boeing, CASA-EADS, Eurocopter, Lockheed Martin, Northrop Grumman, MDHI, Sikorsky and many more. TAI participates, as a partner, in the global scale Joint Strike Fighter (JSF) and A400M design and development programmes. TAI has also become a full risk-sharing partner of Airbus in the A350XWB programme for the aileron work package.

Alp Aviation manufactures a large variety of parts and assemblies including;

- Dynamic Motor Components, Tail Rotor Drive Shaft & Flight Control Assemblies for Sikorsky Helicopters.
- Engine Rotating & Structural parts and accesories

- Landing Gear Subassemblies

Customers include: Fixed wing

- F-35 Lightning II Joint Strike Fighter
- F-22 Raptor
- Boeing 737
- Boeing 787 Dreamliner
- Airbus A380
- Airbus A320
- KT-1T

Helicopters

- Black Hawk & Seahawk
- S-92, S-76 & CH-53

Engines

- Pratt & Whitney F135 & F100
- PW150, PW305, PW530, PW535 & PW545

Other major aerospace manufacturing companies in Turkey include **Aselsan** (avionics and weapon systems) and **TEI** – a joint venture between General Electric and a number of Turkish aerospace companies.

Table nineteen: Aircraft systems, structures and equipment contract awards 2005-2009 by Turkish companies

Contractor	Supplier	Work package	Value	Comment
Airbus A318/A319/A319CJ/A320/A321				
Airbus	TAI	Section 18 fuselage panels		
Boeing	TAI	Wing tips and flight deck panels, wire harness assemblies and other sub-assemblies		
Boeing 747-8				
Boeing	TAI	Nose landing gear doors		
Boeing 767-200/-300/-400ER				
Boeing	TAI	Sub-assemblies		
Boeing 787				
Boeing	PFW	Metallic tubing/ducting		This agreement includes the design and manufacture of tubes responsible for the fluid supply of the hydraulic systems. PFW will also design and manufacture tubes responsible for the supply of fuel to the engines and the auxiliary power unit as well as the

				nitrogen generation system, which ensures an inert atmosphere in the fuel tanks. It will also provide tubes for the integrated cooling system and the power electronics cooling system.
Lockheed Martin F-35 Joint Strike Fighter				
Lockheed Martin/Northrop Grumman/JSF programme office	TAI	Centre fuselage	$3 billion plus	Under the Letter of Intent (LOI), signed in February 2007, TAI becomes the second source for the F-35 Lightning II center fuselage. The number of center fuselages to be produced by TAI will be determined depending on the number of F-35s Turkey will procure and the number of F-35s to be produced worldwide. In November 2008 TAI opened a new 74,000sq ft facility to make at least 400 composite subassemblies in the low rate initial production (LRIP) phases of the programme.
Lockheed Martin F-35 Joint Strike Fighter				
Goodrich	Alp Aviation	Landing gear components and assemblies		The agreement covers deliveries through December 31, 2015. Under the agreement, Alp Aviation will supply machined components ranging from aluminium parts to high strength steel components and assemblies. These components will be delivered to Goodrich Landing Gear's final assembly facility in Cleveland, Ohio. Agreement signed July 2009
L-3 Display Systems	Aydin Yazilim ve Elektronik Sanayii	IPDT components		
Pratt & Whitney	Alp Aviation	Fan rear hub		The contract follows on from the signing of the June 2005 industrial partnership between Pratt & Whitney and Alp Aviation. Agreement signed September 2005.
Pratt & Whitney	KaleKalip	F135 high compressor shrouds sets		Agreement signed September 2005.
General Electric/Rolls-Royce	Tusas Engine Industries Inc (TEI)	F136 design engineering services		TEI produces key rotating components for F136 development and test engines at its manufacturing facility in Eskisehir. Agreement signed July 2006.
Agusta A129 Attack and Tactical reconnaissance (ATAK)				
AgustaWestland	TAI	Licence assembly	The deal is reported to be worth $3 billion	Turkey placed an order for 51 A129 ATAKs; Tusas Aerospace Industries (TAI) is responsible for final assembly of the helicopter, to be designated T129. AgustaWestland and Aselsan are the main subcontractors. In May 2009 AgustaWestland opened its new T129 facility in Cascina Costa, Italy. The new facility, staffed by more than 70 Turkish and AgustaWestland integrated team technicians, comprises an assembly area for the T129 prototypes as well as office space for the T129 team members. The licensed assembly deal was signed in September 2007
AgustaWestland AW 139				
AgustaWestland	TAI	Fuselages		
Eurocopter EC 135 T2i/P2i/EC635				
Eurocopter	TAI	Rear doors and engine cowlings		
Eurocopter	TAI	Engine cowlings		
Sikorsky S-76D				

Sikorsky	TAI	Horizontal stabilisers		
Sikorsky S-70A/MH-60				
Sikorsky	TAI	Horizontal stabilizers, tail rotor pylons and tail booms		

4. Far East

4.1 China

The size of China's domestic market has provided a powerful magnet to Western civil aircraft manufacturers for many years. But most of this work has been limited to structural assemblies rather than systems and integration packages. However, until now China has not yet made the leap from supplying structures to supplying major aircraft subsystems such as fuel, pneumatic, electrical and environmental control systems, markets which are still dominated by the US majors Goodrich, General Electric and Parker, *inter alia*. While these companies have recently started to source some components from China there are, as yet, few signs that Chinese companies will in the near future be able to shift through the gears to become major integrators of these systems, where the major value lies, at least in the civil market.

To put the value of this work in context, Chinese companies registered around $700 million worth of component and structural work on North American and European airliner programmes in 2007; in contrast, Parker won business estimated at $3.5 billion in July 2008 for the single contract to supply Bombardier with a fly-by-wire control system on the new CSeries airliner. To put this further into context this $700 million is still far less than the value to US suppliers of contract work on the new AVIC regional jet.

However, Chinese expertise in developing systems capability is increasing rapidly, as evidenced by its aim to develop a fifth generation fighter within eight years and its achievements in creating the J-10 and JF-17 aircraft with performances understood to be at early F-16 generation levels.

There is also a significant lack of Chinese work within the business jet segment, a major area of consistent growth, for the moment at least, within the global aerospace manufacturing sector. But China's prospects for further major inroads into the global aerospace competitive marketplace, beyond the Airbus A350XWB, will no longer depend on winning business with Airbus and Boeing. The COMACC919 which is being developed as a competitor to the Airbus A320/Boeing 737 and successor programmes offers Chinese companies a step-change in developing capabilities from structures suppliers to systems integrators.

The success of this programme will depend on a number of factors including:

- The ability of COMAC to develop an aircraft which is 15-20% cheaper to operate, in terms of direct operating costs, than the current A320/B737 types. This process will be helped by the availability of new engine types, such as the geared turbofan, which could provide at least a 10% improvement over current designs in fuel burn.

- The timing of the A320/B737 replacement launch - the COMAC C919 would ideally be launched some years before the A320/B737 replacements are ready.

The country is not immune to the same fluctuating price impacts of raw materials and oil that have played such havoc with aircraft builders and operators in the West, but a more pressing issue is that the number of major new aircraft programmes is likely to be much smaller in the 2009-2012 timeframe than the past few years, when the Airbus A350XWB, Bombardier CSeries, Boeing 747-8 have all offered Chinese companies new opportunities.

Second, China appears to be slowly losing at least part of its competitive edge in low-wage manufacturing markets. It is likely that the next few years will therefore see a gradual slowdown in the rapid rate of subcontract work within China to major US and European airliner programmes.

Over the past two years aircraft manufacturers in the West have dramatically increased their manufacturing footprint in China. It is not hard to understand why. Over the next 20 years China will need 3,400 airliners according to Boeing. Some regional airliners will be produced by the country's own aircraft manufacturers – but the larger aircraft will need to be imported. According to Airbus' September 2009 *Global Market Forecast* China's aviation market will see an annual increase of 7.9 percent in the next 20 years, becoming the world's second-fastest growing market after India. The Asia Pacific market, including China and India, is forecast to account for 31 percent of demand by 2027, followed by Europe at 25 percent and North America at 10 percent over the next two decades, the report said.

The potential of China's domestic market has provided a powerful magnet to Western civil aircraft manufacturers for many years. In 1985, a licence agreement was signed by McDonnell Douglas Corporation (MDC) to assemble MD-80-series airplanes in Shanghai. The aircraft were assembled from kits and 35 aircraft produced between 1985 and 1994. A follow-on contract which substantially increased Chinese content was signed in 1992 to produce 40 MD-80/MD-90 aircraft. The contract was amended in 1994 to produce 40 MD-90s (20 in Long Beach, 20 in China) and again in 1998, when MDC merged with Boeing, to reduce the number of China produced MD-90's from 20 to just two.

Chinese manufacturers have also been involved in making parts for Bombardier's Q100, Q200, Q300 and Q400 models.

But most of this work has been limited to structural assemblies rather than systems and integration packages. There have also been strict embargoes on North American and European companies exporting technologies which could be used for military purposes, a sometimes limiting factor on the export of computing devices, for example. But the last few years has seen a marked change in the attitude to China by Western companies as Chinese companies re-organised themselves with new skill sets.

The Chinese government has been actively building up the country's civil aircraft manufacturing capabilities, first with the development of ARJ21 regional jet and MA60 regional turboprop and more recently with the COMAC C919. In its Eleventh Five-Year Programme, the government has laid out a medium-term goal of developing its helicopter manufacturing capability so that by 2010 it will have the capacity to manufacture 80-100 helicopters annually.

The country's indigenous skill set has been developed on the back of an increasing presence of US and European aerospace companies in the country.

Boeing has a marginally larger civil aircraft manufacturing footprint in China than Airbus, but Airbus is developing new ranges of other aviation services with new Chinese partners. The Chinese government is committed to increasing the size and scope of its aircraft manufacturing sector; building a new range of regional jets and helicopters while developing new manufacturing facilities such as the Tianjin Aviation Town being developed on a 102 square kilometer plot west of Beijing. In 2006 Chinese aircraft manufacturers realised a turnover of nearly US$400 million, a year-on-year increase of about 45%. Following a major June 2007 package of manufacturing contract work with Boeing (see below),

Strategic agreements between Chinese companies and Western aircraft manufacturers

Airbus has entered into a framework agreement with **Harbin Aircraft Industry Group Co Ltd (HAIG)**, part of AVIC, on a joint venture to produce A320 and A350 XWB composite parts, setting up a manufacturing centre in early 2009 in Harbin, capital of northeastern China's Heilongjiang province. The Airbus (Beijing) Engineering Technology Center began work in July 2008, a joint venture

between **Airbus Hafei Aviation Industry**, **Jiangxi Hongdu Aviation Industry** and the former **China Aviation Industry Corporation I (AVIC1),** to provide design services.

By 2010 Airbus expects to be spending around $120 million of its procurement budget in China. Airbus China opened its Beijing office in 1990; the Airbus Beijing training centre was set up jointly with the **China Aviation Supplies Import & Export Corporation** in 1998 while nearby Airbus has set up a customer support centre, which stocks some 25,000 spare parts.

In June 2007 Boeing contracted a package of work for on its range of Boeing 737NG, Boeing 747-8 and Boeing 787 aircraft valued at about US$500 million. Chinese companies, for the first time, are building flaps, ailerons and spoilers for Boeing aircraft. According to the company "Boeing supplier partners have active supplier contracts with China aviation industry valued at well over US$2.5 billion."

Boeing is one of the main partners, with Hexcel and AVIC , in **BHA Aero Composites Co, Ltd**, in Tianjin, producing secondary composite structures and interior parts. First deliveries started in 2002. BHA customers include Boeing, Hexcel, Fisher and Goodrich. It has over 570 employees.

According to Boeing, its suppliers' Chinese aerospace business includes the following activities:

- General Electric procurement from **Harbin, Shanghai, Xi'an, Sichuan, Suzhou, Guizhou, Shenyang.**
- Goodrich CF34 fan cowl (at BHA, 2003). Contracted in 2008 with **Hongdu Aviation** in Nanchang to build 787 part kits for the 787 nacelle.
- Parker Hannifan, machining with **Jincheng Corp., Shanghai Qi Yi Automotive, Sichuan Golden Dragon Machine.**
- Pratt & Whitney, engine components, from **Xi'an and Chengdu**.
- Primus International in Suzhou, factory ground-breaking 2004, airplane components.
- Rolls-Royce, procurement from several locations including Xi'an, Shenyang.
- Snecma, CFM56 engine blades, joint venture in Guiyang.
- General Electric**,** Suzhou; makes engine parts and flight controls.

Meanwhile Bombardier's new CSeries is being developed in conjunction with **Shenyang Aircraft Company**, which will supply the fuselage, centre wing box and doors. During the 2007 Paris Air Show the former AVIC 1 signed a risk and revenue sharing deal with Bombardier to develop the ARJ21-900, a 105 seat regional jet. Bombardier plans to invest $100 million in the ARJ21-900 project and provide technical assistance towards the development of the aircraft. According to Bombardier "In pursuit of its goal to become a major international tier one structural supplier, AVIC I plans to invest $400 million US for research and development, construction of new facilities and equipment for the CSeries aircraft programme…."

The former AVIC I and Bombardier Aerospace have a long standing strategic agreement which includes **AVIC I's Xian** unit manufacturing components for the Bombardier 415 and **Shenyang Aircraft Corporation** unit supplying components for the Q-Series aircraft..

In October 2004 the French and Chinese presidents were present at the signing of a Cooperation Framework Agreement between AVIC II and Eurocopter for a joint helicopter venture. Eurocopter

and the former AVIC II have been cooperating for more than 25 years, in particular with the Z9, a Dauphin made in China and the EC120 also manufactured in China by **Harbin Aircraft Industries.**

In 2003, EADS, Eurocopter's parent company, took a 5 % share in the newly created **AviChina** enterprise.

And the former AVIC II, through its subsidiaries **Changhe Aircraft Industries Corporation** and **Shanghai Xinshen Aviation Industry Investment and Development Company** recently joined Shanghai Sikorsky as a shareholder. The company was established in 2003 by **Sikorsky** and **Shanghai Little Eagle** to build civil helicopter sales and support in China.

The Harbin aerospace cluster houses the only assembly plant for the Embraer ERJ-145; **Embraer** moved ERJ-145 production to Harbin as part of a joint venture with AVIC II in 2004 and has orders to keep the production line busy for at least another three years.

During the September 2009 Asian Aerospace show **Safran** signed a framework agreement with AVIC for work on the aircraft as did Nexcelle - a joint venture company created by **GE's Middle River Aircraft Systems** and Aircelle, a Safran group company to supply nacelles. According to AVIC: "AVIC Aircraft and Nexcelle will consider a broad range of nacelle and components manufacturing and design opportunities, including current production programmes and for new aircraft. Categories could range from business jets to large airliners."

In late 2008 the Chinese government announced the re-merger of AVIC I and AVIC II, previously separated in 1999, creating a huge organisation with more than 420,000 employees spread across more than 100 companies. AVIC I tended to make larger aircraft and engines – it had 47 manufacturing companies, 31 research institutes and 22 other aviation support companies. In 2008 AVIC 1 employed around 230,000 people and assets exceeded $20 billion US. Products included fighter aircraft, turbofan engines, air-to air missiles and the ARJ 21and the 50-seater turboprop MA60 airliner. AVIC II was the country's only manufacturer of military and commercial helicopters. It also manufactured the 50-seater ERJ 145. AVIC II delivered 132 airplanes in 2007 – 30 aircraft more than in 2006 – while sales revenue reached 10.32 billion yuan, up 30.1% over the previous year.

During 2009 AVIC set up a number of semi-independent subsidiaries - a defence branch was set up in Beijing to develop new capabilities in areas such as unmanned air systems (UAS) and to export J-10, JF-15 and L-15 Falcon military jets. The division owns 10 assembly plants and research institutes across China.

Civil aircraft manufacturing has been devolved to the Commercial Aircraft Corporation of China (COMAC), based in Shanghai, to manage the development of the C919 190-seat airliner and the ARJ-21 regional jet. COMAC businesses include AVIC 1 Commercial Aircraft (ACAC), Shanghai Aircraft (SAC) and First Aircraft Institute (FAI).

An AVIC helicopter company has been set up in Tianjin Binhai New Area. A new aviation engine company has been launched in an aerospace cluster zone near Beijing Capital International Airport. An airborne systems division has been established in the Zhongguancun Aviation Science Park of Haidian district, in northwest Beijing.

In the last two to three year's Chinese companies have succeeded in winning contracts for increasingly complex aero-structures. The new BHA plant operated in conjunction with Hexcel and Boeing has given Chinese industry an entree into the world complex composite panels and parts, for interior and exterior structures. This expertise has allowed Chinese concerns to widen their contract base from aircraft programme OEMs (Airbus, Boeing, Bombardier and Sikorsky) to prime contractors such as Spirit and Fokker-Elmo.

Table twenty: Aircraft systems, structures and equipment contract awards 2005-2009 by Chinese companies

Contractor	Supplier	Work package	Value	Comment
Airbus A318/A319/A319CJ/A320/A321				
Airbus	See comment	Carbon structures		Airbus has signed a contract in January 2009 with Chinese partners to create a joint venture to make carbon composite parts in China for its A350 XWB and A320 aircraft. Airbus's Chinese business will hold a 20% stake in the joint venture, based in Harbin, and China's Harbin Aircraft Industry Group will hold a further 50% stake, while other local players HAI, AviChina and HELI will each own 10%. A new plant should be ready for operations by the end of 2010. Airbus said the value of its partnership with the Chinese aviation industry is expected to be near $200 million per year in 2010 and $450 million in 2015.
Airbus	Chengdu Aircraft Corporation	Rear passenger door and nose section parts		
Airbus	The Hong Yuan Aviation Forging & Casting (HYFC)	Titanium forging parts to mount engines on to wings.		
Airbus	Messier-Bugatti	Wheels and carbon brakes, landing gear extension and retraction system, nose-wheel steering system, braking system, wheels and brakes monitoring system		Messier-Dowty is responsible for the design, manufacture and support of the main and nose landing gears for the A320 family. production at the start of 2008 stood at 30 ship sets per month and has led to new procurement and manufacturing processes, such as the use of articulating assembly rigs, 'superkits' of purchased parts and through the implementation of lean initiatives, reducing assembly and manufacturing lead times. The A320 family landing gear is Messier-Dowty's largest production programme, with manufacturing activities split between the company's Bidos (France), Gloucester (UK), Montreal (Canada) and Suzhou (China) facilities.
Airbus	X'ian Aircraft Corporation	Access doors		
Airbus A330/A340				
Airbus	X'ian Aircraft Company	Electronic bay doors, wing fixed trailing edges		The Xi'an Aircraft Company produces electronic bay doors for the A320 and A330/A340 families, as well the fixed trailing edges on wings for the A320 family and the brake blades and medium air ducts for the A330/A340 family. will soon be manufactured in China. By 2010 Airbus expects to be spending around $120 million of its procurement budget in China.
Airbus	Chengdu Aircraft Corporation	Rear passenger door and nose section parts		
Airbus	The Hong Yuan Aviation Forging & Casting (HYFC)	Titanium forging parts to mount engines on to wings.		

Airbus A350 XWB				
Airbus	See comment	Carbon structures		Airbus has signed a contract in January 2009 with Chinese partners to create a joint venture to make carbon composite parts in China for its A350 XWB and A320 aircraft. Airbus's Chinese business will hold a 20% stake in the joint venture, based in Harbin, and China's Harbin Aircraft Industry Group will hold a further 50% stake, while other local players HAI, AviChina and HELI will each own 10 %. A new plant should be ready for operations by the end of 2010. Airbus will build 5% of the A350 XWB airframe in China. Airbus said the value of its partnership with the Chinese aviation industry is expected to be near $200 million per year in 2010 and $450 million in 2015.
Airbus	Harbin Aircraft Industry Group	Composite material parts and components.		The two companies are establishing a manufacturing centre, which will be set up in early 2009, will be an equity joint venture enterprise, with HAIG holding 80 per cent stake and Airbus China owning 20 per cent stake. According to the contract, the manufacturing centre will manufacture composite materials parts and components for the Airbus A320 family and participate in the industrialisation and serial production of Airbus A350 XWB work-packages.
Airbus	Messier Bugatti/ Messier Dowty	Main landing gear		Airbus has chosen in December 2007 to use a single supplier for all the ATA32 systems of the A350 XWB: landing gear extension / retraction system, braking management, ground steering management and tire pressure, brake temperature and suspension pressure surveillance management. The first landing gear delivery to the Airbus final assembly line in Toulouse is scheduled for early 2011.The main landing gear for the -800 and -900 versions includes a four-wheel bogie and dual side stay which reduces loading on the A350XWB's composite wing. For the -1000 variant, in addition to the dual side stay, the MLG features a six wheel bogie to reduce loading on the tarmac. The main landing gear design also includes the increased use of advanced materials, specifically titanium, which offers weight savings and corrosion resistance. The A350XWB main landing gear will also be chrome and cadmium-free, using surface treatments such as HVOF and MCAC coatings, which are environmentally responsible solutions. Messier-Dowty will manage the A350 main landing gear programme. The contract incorporates features such as the "brake to vacate" system, which enables braking to be calculated according to the programmed turn-off on the landing runway, and the "heading control" function enabling automatic steering of the nose wheel according to a pre-programmed path for the aircraft on the ground. Manufacturing activities are split between the company's Bidos (France), Gloucester (UK), Montreal (Canada) and Suzhou (China) facilities.
ATR 42-500/72-500/600				
ATR	X'ian Aircraft Corporation	Fuselage section 16		
Boeing 737-600,-700,-800,-900				
Boeing	BHA Aero Composites	Composite panels and parts		Flight deck, close out panels, dorsal fin, wing-to-body fairing, cover panels, wing fixed trailing edge, wing fixed leading edge, interior panels).
Vought and Spirit	Chengdu Commercial Aircraft	Forward entry doors		Contracted in 2005. From 2008 the contract is with Spirit.
Vought and Spirit	Chengdu Commercial Aircraft	Over-wing exit doors		Contracted in 2005. From 2008 the contract is with Spirit.
Boeing and Spirit	Shenyang Commercial Aircraft	Aft fuselage sub-assemblies		Originally contracted for 1996/2001, expanded to include "Texas Star" (November 2004), contracted with Spirit, expanded to full aft section 48 (2007)
Boeing	Fokker	Composite interior		Fokker-Elmo, working with Boeing Electrical System Responsibility Center, delivers 99 part numbers to the Boeing 737-600,-700,-800,-

		panels		900 programmes. This work is accomplished in the facility in Langfang, Hebei Province where it has 504 employees working on Boeing, Pratt and Whitney and other company's electrical products.
Boeing	Shanghai Aviation Manufacturing	Horizontal stabilisers		Contract signed in 1995
Korean Aerospace Industries	SAIC, XAC and BHA	Parts for vertical fin, horizontal stabilizer		
Boeing	Xi'an Aircraft Industrial Company (XAIC)	Vertical fin		
Boeing 747-8				
Boeing	Hong Yuan (HYFC) in Sanyuan,	Titanium forgings		There are 12 forgings for each for each Boeing 747. Deliveries began in 1984.
Boeing	BHA Aero Composites	Composite panels, door liners, fixed trailing edge		
Boeing	Chengdu Commercial Aircraft	Aileron and spoilers		Contracted in 2007. First delivery 2009
Vought	Chengdu Commercial Aircraft	Horizontal stabilizer and sub-assemblies		Contracted in 2007
Boeing	Xi'an Aircraft Industrial Company (XAIC)	Fixed trailing edge wing ribs		Contract signed in 2007, first delivery 2008 and inboard flaps contracted in 2007, first delivery in 2009.
Boeing 767				
Boeing	BHA Aero Composites	Wing fixed trailing edges and dry bay barriers, empennage panels		
Boeing 777-all types				
Boeing	BHA Aero Composites	Wing fixed trailing edges and dry bay barriers, empennage panels, flight deck interior panels		
Boeing	Fokker	Composite interior panels		Fokker-Elmo, working with Boeing Electrical System Responsibility Center, delivers 142 part numbers to the 777 airplane programmes. This work is accomplished in the facility in Langfang, Hebei Province where the company has 504 employees working on Boeing, Pratt and Whitney and other company's electrical products.
Boeing 787				

Boeing	Chengdu Aircraft Industrial (Group) Co. Ltd	Composite rudder		Part of a $600 million contract announced in June 2005 by Boeing to a group of Chinese suppliers..
Boeing	Hafei	Wing-to-body fairing panels	Part of the $600 million deal (see "Chengdu entry above).	The company is affiliated to the Chengdu Aircraft Industrial Group based in Sichuan Province, China. Hafei's capabilities include composite and sheet metal manufacturing, numerically controlled machining, tooling design and production, and complex structure assembly and integration. Contract signed 2005
Bombardier C Series				
Bombardier	Fokker Elmo	Electrical wiring interconnetio n system	The associated design and production work is expected to represent a value of approximat ely $300 million, spread over a 15 to 20 multi year period.	Fokker Elmo is also providing all the design and production of all Flight Test and Instrumentation wiring required during the certification of the CSeries aircraft. Papendrecht, the Netherlands. Most design and development effort will take place on-site at Bombardier in Montreal, manufacturing of development and flight test wiring systems will be performed at Fokker Elmo Netherlands, while the serial production is scheduled to be executed at Fokker Elmo China. Contract signed March 2009.
Bombardier	Shenyang Aircraft Corporation	See comment		SAC is a risk sharing partner in the design, manufacturing, assembling and testing of the aircraft's fuselage. The contract follows a June 2007 memorandum of understanding on the CSeries. Just over 10 per cent of the CSeries aircraft will be manufactured in China by Shenyang Aircraft Corporation. Shenyang also supplies the empennage, as well as the aft and forward fuselage sections for Bombardier's Q400 turboprop airliner.
Bombardier Dash 8 Q400				
Bombardier	Shenyang Aircraft Corporation	See comment		Shenyang supplies the empennage, as well as the aft and forward fuselage sections. In July 2006, Bombardier entered an agreement that stipulated SAC would manufacture certain structural aircraft components for the Q400 aircraft that were previously sourced from Mitsubishi Heavy Industry.
Gulfstream G450/G500/G550				
Stork Fokker	Shenyang Aircraft Corporation	Various components	Less than Euro 1 million	Shenyang Aircraft Corporation (part of AVIC-I) and Stork Aerospace have signed a contract in 2005 for the machining of components for the Gulfstream G450, the G500 and the G550. The order relates to components for the aircraft which were formerly produced elsewhere..
Sikorsky S-76C++				
Sikorsky	Changhe Aircraft Industries Corp	Airframes		Changhe Aircraft Industries Corp is supplying S-76 helicopter airframes as part of a Memorandum of Understanding (MOU) signed June 1, 2006, by Sikorsky and China Aviation Industry Corp. II (AVIC II), parent company of Changhe. Changhe is building and delivering S-76C++ helicopter airframes for Sikorsky alongside those of Aero Vodochody.
Sikorsky S-92A				
Sikorsky	Changhe Aircraft Industries Corp/Jingdezhe n Helicopter Group	Tail pylons and tail plane		The company is a 2% risk sharing partner in the aircraft programme.

4.2 India

Most of the country's aerospace manufacturing expertise has been centralised on **Hindustan Aeronautics Limited (HAL).** HAL has 19 manufacturing plants and nine research and design centres in India. Its largest programmes are:

- Dhruv Advanced Light Helicopter (ALH)
- Tejas Light Combat Aircraft (LCA)
- Intermediate Jet Trainer (IJT)
- Various military and civil upgrades.

HAL has formed the following Joint Ventures (JVs) :

- BAeHAL Software Limited
- Indo-Russian Aviation Limited (IRAL)
- Snecma HAL Aerospace Pvt Ltd
- SAMTEL HAL Display System Limited
- HALBIT Avionics Pvt Ltd
- HAL-Edgewood Technologies Pvt Ltd
- INFOTECH HAL Ltd

Some of the work packages for international customers include :-

- Airbus A320 forward passenger doors
- Boeing 757 over wing exit doors
- Boeing 777 uplock box assembly
- Boeing 767 bulk cargo doors
- Boeing 737 freighter conversion kits
- BAE Systems – Tornado pylons
- Fokker Aerostructures – F50 horizontal stablizers
- Boeing -3D-modelling / digitisation of drawings
- Israel Aircraft Industries (IAI) - rear fuselage for the Gulfstream G-150

Another major manufacturer is **Tata Advanced Systems**. In 2009 it set up a joint venture with Sikorsky Aircraft to assemble Sikorsky S-92 helicopter cabins. Tata Advanced Systems is building a facility in Hyderabad, where the helicopter cabins will be assembled from 2010.

Table twenty-one: Aircraft systems, structures and equipment contract awards 2005-2009 by Indian companies

Contractor	Supplier	Work package	Value	Comment
Airbus A318/A319/A319CJ/A320/A321				

Airbus	Hindustan Aeronautics Ltd	Forward passenger doors		
Gulfstream G-150				
Israeli Aircraft Industries	Hindustan Aeronautics Ltd	Aft fuselages		The contract for producing 200 ship-sets of G-150 fuselages was signed in 2007. The
Boeing 767-200/-300/300ER				
Mitsubishi Heavy Industries	Hindustan Aeronautics	Cargo door		
Boeing 777 – all types				
Boeing	Hindustan Aeronautics	Uplock assembly		
Boeing 787				
Magellan Aerospace	Quest Machining and Manufacturing	Landing gear component parts		
Bombardier Global 5000/Express XRS				
Bombardier	Goodrich Hella	Interior and exterior lighting		The interior lights are based on Light Emitting Diode (LED) technology. Locations in Lippstadt, Germany, Bangalore, India and Tampa, Florida, USA
Sikorsky S-92				
Sikorsky	Tata Advanced Systems	Cabins		Tata Advanced Systems and Sikorsky signed an agreement in June 2009 for the Indian enterprise to build cabins for the S-92 helicopter at a greenfield site in Hyderabad, and is due to begin deliveries from late 2010.

4.3 Indonesia

PT Dirgantara Indonesia/Indonesian Aerospace (IAe) has delivered more than 300 fixed wing aircraft and helicopters. It now concentrates on support and manufacturing components to the CN-235 aircraft produced under licence in-house, having cut its workforce from 9,670 a few years ago to 3,720 today.

Table twenty-two: Aircraft systems, structures and equipment contract awards 2005-2009 by Indonesian companies

Contractor	Supplier	Work package	Value	Comment
Bell 412				
Bell Helicopter	IPTN	Licensed		A licence agreement was signed with IPTN in November 1982 for the partial manufacture and complete assembly of 100 plus Bell

Textron		manufacture		412s. The first of these flew in April 1986. Among the customers are Indonesian armed forces and private operators.
Super Puma EC225/2Mark				
Eurocopter	PTDI	Local assembly	$42 million over a 10 year period	The two companies have signed an agreement to set up a local assembly line to manufacture airframes for Super Puma MKII helicopters, with operations of serial production starting in 2011. Contract signed October 2008

4.4 Korea

Around 80% of the country's aerospace manufacturing output is dedicated to military products. Over the past few years revenue has increased at an average annual rate of 7.2%, with 70% of revenues coming from the domestic market and 30% from exports. In 2007 aerospace sales turnover was $1.5 billion.

There are more than 40 companies in Korea involved in aerospace manufacturing and support, with a workforce of 7,000.

Apart from its aircraft manufacturing programme (F-5, SB427 and UH-60 licensed production; KF-16 KT-1, T-50 indigenous development; KHP co-development) Korean aerospace companies supply various fuselage and wing packages to companies such as Boeing, Airbus, Bombardier, Lockheed Martin and Vought.

Korean aerospace manufacturers

Korea Aerospace Industries
Manufacturer of aircraft - KF-16, KT-1, T-50, UAV, KMH, KLH, SB427 – and supplier to the global industry. Employs 2,724.

Samsung Techwin
Engine parts manufacturer.

Korean Air
Parts manufacturer - B717 nose, A330/340 and ERJ-170/190 body structure, KT-1 mid and rear part, B737/747/777 wing parts.

Nex1Future
Electronic controls.

Hanhwa Corporation
Aircraft hydraulic parts, fuel and control systems.

STX Engine Co., Ltd
Radar and electronic systems

Seojin Instech Co., Ltd.
Aircraft generators

Korea Bell Helicopter Co.
Window consolidation, repair, and modification

Samsung Thales
Photoelectron communication equipment, electronic communications.

Wia Corporation
Aircraft parts, landing gear.

Aerospace Technology of Korea Inc.
Aircraft stringer, body structure parts

Soosung Airframe Ltd.
Aircraft body parts.

Kyongju Aerospace Electrical Systems Co., Ltd.
Aircraft parts

Korea Lost-Wax Co., Ltd.
Gas turbine engines, blade, and vanes.

Hankuk Fiber
Helicopter fairings, wing tips, engine covers, body structure, canopies.

Bowon Light Metal Co., Ltd.
Aluminum extrusions.

Chunji Co.
Impellers, housing, gear box, supporting parts

Firstec Co., Ltd
Wiring harnesses, engine hydraulic system and altitude control systems

Aerospace production

	2004	2005	2006	2007
Finished products	518	577	637	679
Airframes (fuselages)	235	261	317	388
Engines	287	64	405	517
Avionics	37	38	51	84
Machinery	53	74	71	83
Materials	3	3	3	2

(US$ millions)

Aerospace exports

	2003	2004	2005	2006
Exports	574	523	643	892

(US$ millions)

Table twenty-three: Aircraft systems, structures and equipment contract awards 2005-2009 by Korean companies

Contractor	Supplier	Work package	Value	Comment
Airbus A380				
Airbus	Korea Aerospace Industries	Bottom wing panel 5		
Rolls-Royce	Samsung Techwin	Components		
Boeing 787				
Boeing	Korean Air Lines Aerospace Division	Wing tips		The raked wing tips are approximately 17 feet in length and provide aerodynamic efficiency for long-haul routes. The company particates as a tier 2 supplier and also makes the fixed trailing edge and centre wing box.
Vought Aircraft Industries	Korean Air Lines (KAL) Aerospace Division	Complete aft body structural assembly, nose wheel assemblies		
Gulfstream G550				
Vought	Korea Aerospace Industries	Wing leading edges		
Bell 427				
Bell Helicopter Textron	Korean Aerospace Industries	Fuselage and tail-boom	The joint development work between Korean Aerospace Industries and Bell Helicopter Textron on the programme is reported to be worth $300 million for 740 units up to 2013	KAI is responsible for marketing the SB427 in Korea, and the Peoples Republic of China and South East Asia, with final assembly facilities at its Sacheon Plant for SB427 sold in these market. SB427 is the designation for KAI assembled and sold BELL427, which was designed by Bell Helicopter through a partnership with KAI. Under a license agreement, KAI is also the sole- source manufacturer for all BELL427/SB427 cabins and tailbooms.
Bell 429				
Bell Helicopter Textron	Korean Aerospace Industries	Fuselage and tail-boom	The agreement was projected to cover all Bell 429 airframes for the next 10 years, which is estimated to be over $150 million.	Bell and KAI are due to complete the 429 helicopter development programme by the end of 2008. KAI is sole source supplier of the fuselage for the world's market and has production and sales right for complete helicopters for the Korean and Chinese markets.

4.5 Malaysia

There are three major suppliers to the global aerospace industry in Malaysia.

Asian Composites Manufacturing Sdn Bhd is a strategic alliance between Sime Darby Berhad and Naluri Berhad of Malaysia and Boeing and Hexcel Corporation of the USA. ACM produces advanced composite structures for the wings of all Boeing jetliners in production. The ACM facility, located in Bukit Kayu Hitam, commenced production in June 2001 and employs more than 310 Malaysians, along with an all-Malaysian management team.

Composites Technology Research Malaysia (CTRM) Incorporated was established in 1990; CTRM's principal shareholder is Malaysia's finance ministry with the company's primary role to develop a high technology-based industry in aerospace and composites. Clients now include

- Goodrich - CTRM has been awarded the Best Certified Supplier by Goodrich Aero Structures (USA) for the V2500 programme. More recently, CTRM sealed a 3.5 billion ringgit (1.03 billion dollar) deal, which will see CTRM provide nacelle components to Goodrich. CTRM said the Goodrich contract will increase the company's book order from 3 billion ringgit to 6.5 billion ringgit.
- Airbus - On the A320 programme the company is the largest composite component supplier for the Airbus A320 wing, covering 20% of the wing surface. On the Airbus A380 the company produces the Inboard Outer Fixed Leading Edge (IOFLE), Fixed Leading Edge Lower Panels (FLELP) and Inner Inboard Fixed Leading Edge (IIFLE). On the A400M the company makes Tail Plane Leading Edge Panels, Wing Trailing Edge Panels, Tail Plan Trailing Edge Panels & Actuator Fittings, Nacelle Extension Fairing & Fuel Pump Fairing, Main Landing Gear Door. On the A350XWB the company makes the aft cascade ring.
- Boeing - On the 787 the company makes the aft bulkhead, inner barrel back skin, 360 degree inner barrel panel. On the 737NG it makes the saddle fairing. On the 777 it manufactures other structures.

Spirit AeroSystems Malaysia Sdn Bhd, a 242,000 sq ft plant based on a 75-acre site adjacent to the runway at Subang Airport near Kuala Lumpur, became operational early in 2009. The facility, employing over 400 staff, provides a variety of manufacturing, engineering and support functions; initial work will include the production of a number of composite subassemblies, principally on the Airbus single aisle range of aircraft.

Table twenty-four: Aircraft systems, structures and equipment contract awards 2005-2009 by Malaysian companies

Contractor	Supplier	Work package	Value	Comment
Airbus A350				
Airbus	Spirit Aero Systems	Fuselage section 15		The section 15 centre fuselage frame section is a composite structure approximately 65ft long, 20 ft wide, it weighs nearly 9000 lb. The company will build a new facility in Lenoir County, North Carolina. It will initially employ 500 people, with plans to

				grow to 1,000 when all phases of development are complete. The new plant should be ready by 2010. Portions of A350 XWB work will also take place in the company' s Wichita plant and the Spirit factory in Malaysia. The company is also building the composite front spar at Kinston; composite sub-assemblies will be made in Malaysia. Contract signed May 2008
Boeing 737-600,-700,-800,-900				
Boeing	Asian Composite Manufacturing Sdn Bhd (ACM)	Aileron panels		Work takes place in Kuala Lumpur, Malaysia
Boeing 747-8				
Boeing	Asian Composite Manufacturing Sdn Bhd (ACM)	Composite details		The supplies composite details for the 747-8 with composite panels and the new composite bullnose.
Boeing 777 – all types				
Boeing	Asian Composite Manufacturing Sdn Bhd (ACM)	Machined honeycomb core		Hawker de Havilland (HdH), a Boeing subsidiary, headquartered in Port Melbourne, Victoria, Australia, is the Boeing integrator for the 777 elevator and rudder. Contract signed November 2008.

4.6 Pakistan

Aerospace manufacturing activies centre on the **Pakistan Aeronautical Complex (PAC).** There, the **Karakoram-8 (K-8)**, basic/advanced jet trainer, is being co-developed by Aircraft Manufacturing Factory (AMF), Kamra, and China National Aero-Technology Import & Export Corporation (CATIC). PAC formally opened its JF-17 production facility at PAC Kamra factory in April 2005. The JF-17 is a combined Chinese-Pakistan third-generation fighter programme.

4.7 Taiwan

The largest aerospace manufacturing concern in the country is **Aerospace Industrial Development Corporation (AIDC),** which has manufactures the IDF C/D Hsiang Sheng fighter. The company is also involved in a wide range of collaborative civil programmes. These include:

- The co-development programme of CL-300 business jet empennage with Bombardier Inc.
- The co-development programme of S-92 helicopter with Sikorsky Aircraft United Technologies Corp.
- The co-production programme of B-737/747 pressurized door with Boeing Company.
- The co-production programme of 601K turbojet engine with Allison Company.
- The co-production programme of ASE120 turbojet engine and AS907 turbofan engine with Honeywell International Inc.
- The co-development programme of CT7 turboshaft engine with General Electric Company.
- The co-production programme of Falcon 900/2000 commercial jet's rudder.
- The co-production programme of Airbus A321/#16A Barrel with Airbus Company.
- The co-production programme of EC-120 helicopter with Singapore Technologies Aerospace.
- The co-production programme of C-27J cargo tail with Alenia.

Other significant aerospace manufacturing companies based in Taiwan comprise:

Hiwin Technologies
Ballscrews, Linear Bearings, Linear Guideway, Aerospace Parts, Linear Motors, Linear Actuators Magnetic Strip.

Chen-Tech Taiwan Industries
Forged Engine and Airframe Components

Chenfeng Machinery and Enterprise
Structural Parts, Engine Parts, Sub-assembly, Hydraulic Components

Aero Win Technology Corp
Turbine Engine Hot Section Sheet Metal Components, Aluminum Sheet Metal Components for Aircraft Structures, Precision Mschining of Compressor Blades, Shrouds and Accessories.

Kolik Enterprise
Aircraft Ratchet Buckles, Buckles Hardware Fittings For Aircraft Cargo Nets.

Jiawoei Precision Machinery Coo
Aerospace Parts.

Ta Yih Industrial Co
Aircraft interior lights

Centre for Aviation and Space Technology
Structures and Aircraft Interior Components

Gongin Precision Industry Co
Engine Sheet Metal, Combustion Liners, Hula Seals, Cap Cowls, Collars, Vane, Seal & Casing, High Precision Hydraulic System Components, Valves, Transition Liner, IC Mold and Progressive Dies

National Aerospace Fasteners
Aerospace Fasteners.

Drewloong Precision Inc
Aerospace Components and Sheet Metal, Aerospace Engine Parts, Semi-conductor Sealing Equipment Parts

Chaheng Precision Co
Aerospace Products

Taiwan Avionics
Avionics

NFT Technology Co
Ferrous / Non-ferrous alloy investment casting

Table twenty-five: Aircraft systems, structures and equipment contract awards 2005-2009 by Taiwanese companies

Contractor	Supplier	Work	Value	Comment

		package		
Airbus A318/A319/A319CJ/A320/A321				
Airbus	Aerospace Industrial Development Corporation (AIDC)	Wing trailing edges		
Airbus UK	AIDC	Structures		AIDC was commissioned in 2003 by Airbus UK to make the 16A barrel of the A321 Business Jet.
Boeing 737-600,-700,-800,-900				
Boeing	AIDC	Structures		AIDC was commissioned in 2005 by Boeing to make pressurised doors on the Boeing 737 and 747 range of aircraft. The company was commissioned in 2003 to make the main landing gear doors of the Boeing 737 range.
Boeing 747-8				
Boeing	AIDC	Structures		AIDC was commissioned in 2005 by Boeing to make pressurised doors on the Boeing 737 and 747 range of aircraft.
Mitsubishi MRJ70/90				
Mitsubishi Aircraft	AIDC	Slats, flaps, belly fairings, rudders as well as horizontal stabiliser rotating blades.		Contract signed January 2009
Bombardier Challenger 300				
Bombardier	AIDC	Rear fuselage and tail unit		
Honeywell	AIDC	AS907 turbofan assembly		
Sikorsky S-92				
Sikorsky	AIDC	Flight deck		

4.8 Thailand

Asian Aerospace - Thailand is the country's largest indignous aerospace business, with its main lines of business in airline MRO and business/general aviation support – especially of Diamond Aircraft.

Thailand has a small but growing aerospace manufacturing footprint, based on the development of European and US manufacturing plants in the country.

In 2002 **GE Elano Asia Ltd**, a division of the General Electric Company (GE) announced that it has committed to invest more than Bht 3,000 million (approximately US$ 69 million) over the next eight years in a three-phase project to set up in Thailand Asia's largest aerospace tubing, ducting and configuration components manufacturing and servicing facility. The facility is located at the Eastern Seaboard Industrial Estate, Rayong province.

Ducommun Incorporated opened its Ducommun Technologies, Inc. (DTI) Thailand subsidiary in 2006. Initial production supports DTI's commercial microwave switches. The facility is located in Saraburi, approximately two hours north of Bangkok.

Weston EU -a supplier of aero-engine parts - has a wholly owned subsidiary company, Weston SEA, which is located in Chonburi province, Thailand. It has a ten-year agreement with Rolls-Royce for the supply of compressor aerofoils; Weston SEA will produce compressor aerofoils for the V2500 engine in Thailand. Production targets for 2009 have been set at 180,000 pieces, increasing to 250,000 pieces in 2010. Weston SEA will assume responsibility for a significant proportion of the V2500 total engine programme, with market values in the range of $15 million per year for phase one alone.

Benchmark Electronics, Inc has set up a manufacturing plant in Ayudhaya, Thailand.

Table twenty-six: Aircraft systems, structures and equipment contract awards 2005-2009 by Thai companies

Contractor	Supplier	Work package	Value	Comment
Boeing 787				
Hamilton Sundstrand	Ducommun Incorporated	Mechanical enclosures and wire harnesses	$15 million	Engineering and first article development will be performed at DTI's Phoenix, Arizona facility with production starting in 2008 at DTI's facility in Thailand. Contract signed June 2006

4.9 Vietnam

Vietnam is starting to see an influx of Japanese aerospace manufacturers.

Mitsubishi Heavy Industries (MHI) has set up MHI Aerospace Vietnam Co., Ltd. (MHIVA) to produce commercial aircraft components in Hanoi, Vietnam. MHI is shifting part of its metal component assembly work to Vietnam. Plans are for MHIVA to begin production of Boeing 737 flap assemblies, with other operations to follow. In 2009 and 2010, MHIVA will assemble flaps for 2-8 aircraft every month, and for 10 aircraft per month starting in 2011. MHIVA, capitalized at US$7 million, will start with 50 employees, to be expanded to about 200 people when the plant reaches maximum production capacity.

Meanwhile **Nikkiso** is establishing a manufacturing facility in the suburb of Hanoi (Nikkiso Vietnam Inc.) The facility is currently under construction and is due to start operations at the end of the year.

Table twenty-seven: Aircraft systems, structures and equipment contract awards 2005-2009 by Vietnamese companies

Contractor	Supplier	Work package	Value	Comment
Boeing 737-600,-700,-800,-900				
Boeing	MHI Aerospace Vietnam Co	Flaps		MHI Aerospace Vietnam Co., Ltd. (MHIVA) of Hanoi is a subsidiary of Mitsubishi Heavy Industries, Ltd. (MHI) completed the manufacture of a component production plant in September 2009. MHIVA, capitalized at US$7 million, was established in December 2007 as a wholly owned subsidiary of MHI to assemble commercial aircraft component structures. The new plant is situated at the Thang Long Industrial Park (TLIP) approximately 16 kilometres northwest of central Hanoi and occupies 4,500 square meters (m2) in floor area within the 19,100 m2 plant. Initially, the flaps for the Boeing 737 will be shipped to MHI's Nagoya Aerospace Systems Works for painting and final inspection, and then delivered to the Renton, US site. Once production gathers momentum, MHIVA will deliver the flaps to the US directly, according to the company. Contract signed September 2009

5. Latin America

5.1 Argentina

The largest aerospace concern in Argentina is Lockheed Martin Aircraft Argentina S.A. (LMAASA), based in Cordoba, with the main business focusing on regional aircraft maintenance and modifications.

5.2 Brazil

Brazil's aerospace sector has a turnover of around $8 billion and employs around 27,000 staff[11]

	2005	2006	2007	2008
Annual turnover*	4.3	4.3	6.2	7.55
Exports*	3.7	3.9	5.6	6.74
Aeronautics	87.3%	90.8%	91.3%	89.13%
Defence	9.29%	5.78%	6.6%	8.79%
Space	0.24%	0.41%	0.4%	0.57%
Exports	90%	90.5%	90.8%	90.5%
Employment	19,800	22,000	25,200	27,100

*(*In US$ billions)*
Source: AIAB

Although the aerospace industry is developed mainly around Embraer there is a growing number of other Brazilian companies working on Embraer and other aircraft programmes. **Embraer** is now one of the largest aircraft manufacturers in the world and was Brazil's largest exporter from 1999 to 2001 and the second largest in 2002, 2003 and 2004. It currently employs more than 16,946 people, 94.7% based in Brazil. Since 1996, **Embraer** has produced and delivered more than 1000 ERJs to more than 37 airlines in 24 countries. The success of the Legacy 600 since its entry into service in 2002 was followed by the Phenom 100, Phenom 300, Legacy 450, Legacy 500, Legacy 600, and Lineage 1000 executive jets. The company is also active in the defence field, with trainers and AWAC aircraft. Defence is likely to take a larger share of the future market with the country's acquisition of new fighters – which will involve considerable Brazilian manufacturing and technology input – and the proposed development of a new military transport aircaft.

Other significant Brazilian aerospace manufacturing companies.

Aeroeletrônica Ltda
Avionic systems

Aeromot Aeronaves e Motores S/A
Aircraft components, structures, equipment – engine systems

Akaer Engenharia S/C Ltda
Akaer, based in São José dos Campos, is heading a consortium of Brazilian companies - comprising Friuli, Winnstal, Minoica and Imbra Aerospace – to provide systems and assemblies to the Gripen NG programme.

[11] Source: http://www.aiab.org.br/english/index.php?option=com_content&task=view&id=17&Itemid=31

Avibrás Indústria Aeroespacial S/A
Aircraft components, structures, equipment

Cenic Engenharia Indústria e Comércio Ltda
Aircraft components, structures, equipment

Imbra Aerospace
Aircraft components, structures, equipment

Helicópteros do Brasil S/A - HELIBRAS
Helicopter components, structures, equipment

Sobraer Ltda
Aircraft components, structures, equipment

To support Embraer activities Western manufacturers have set up a number of joint-ventures and Brazilian-based operations.

- Aernovva do Brasil
- ELEB - Embraer Liebherr Equipamentos do Brasil S/A
- GE Celma Ltda
- GKN Aerospace Transparency Systems
- Latecoere do Brasil Indústria Aeronáutica Ltda
- Parker Hannifin Ind. e Com. Ltda
- Pratt & Whitney Canadá do Brasil Ltda
- Rolls-Royce Brasil Ltda
- Turbomeca do Brasil Ltda

Table twenty-eight: Aircraft systems, structures and equipment contract awards 2005-2009 by Brazilian companies

Contractor	Supplier	Work package	Value	Comment
Airbus A320				
Airbus	Aernnova	Composite parts		MLG doors and elevators. Fuselage and other parts made from sheet metal. Spain's Aernnova has a facility in Sao Jose Dos Campos, Brazil
Airbus	Sonaca	Panels, wing components, fuselage assembly		Sonaca, through the BELAIRBUS consortium has been an Airbus partner for 25 years. It develops, manufactures, assembles and tests the wing leading edge slats and associated de-icing system for the Airbus A320 and A340 families (including the A340-500/600) and the new A380 wide body aircraft. The Sonaca Group also carries out A320 family Frame 1 assembly. This task is performed in Brazil, by SOBRAER.vThe Brazilian companies of the Group, SOPEÇAERO and PESOLA, also manufacture parts for the Airbus A320 and A340-500/600 programmes.
Airbus A330/A340				
Airbus	Sonaca	Panels, wing components, fuselage assembly		Sonaca, through the BELAIRBUS consortium has been an Airbus partner for 25 years . It develops, manufactures, assembles and tests the wing leading edge slats and associated de-icing system for the Airbus A320 and A340 families (including the A340-500/600) and the new A380 wide body aircraft. The Brazilian companies of the Group, SOPEÇAERO and PESOLA, also manufacture parts for the

				Airbus A320 and A340-500/600 programmes.
Airbus	Aernnova	Composite parts		Elevator skins, HS ribs. Spain's Aernnova has a facility in Sao Jose Dos Campos, Brazil
Boeing 777				
Boeing	Embraer	Structures		
Saab JAS39 Gripen				
Saab	Akear	See comment		Akaer, based in São José dos Campos, is heading a consortium of Brazilian companies - comprising Friuli, Winnstal, Minoica and Imbra Aerospace – to provide systems and assemblies to the Gripen NG programme. Further integration will be dependent on Brazil selecting the aircraft for the F-X2 project. Contract awarded September 2009.
Sikorsky S-92				
Sikorsky	Embraer	Sponsons and fuel systems		

5.3 Mexico

Mexico has long been seen as an attractive low-wage economy for aerospace manufacturers. According to the United States' International Trade Commission's Aaron Miller[12], speaking in May 2009, Mexico's advantages cen be summed up as:

- Existing human capital resources
- Proximity to the U.S.
- Economic integration
- 20% cost savings on labour
- Strong IPR protections
- No military aircraft restrictions
- Liberal investment regime

Another key component for Mexico's success has been the BASA (Bilateral Aviation Safety Agreement) federal government project which allows the certification of aerospace designs and components made in Mexico, in accordance with U.S. standards and complying with FAA regulatory issues, to be recognised in the USA - avoiding re-certifications or second reviews by US Government.

In the past five years more than 190 aerospace companies have relocated or set themselves up in Mexico. While most of these are relatively labour-intensive, structural parts and MRO organisations it is possible[13] that by 2011 Cessna will be assembling aircraft in Mexico; Bombardier will start

[12] Source: www.*business.utep.edu/Faculty/PDF/symposium09/miller.ppt*

[13] Source: *"Mexico's Aeronautical Industry" published by MexicoNow, June 2009 – www.mexico-now.com.*

building its Learjet 85 in 2012 and both Bell and MD Helicopters are considering opening assembly lines there.

Figures for turnover and growth differ. According to the Mexican aerospace industry trade association FEMIA [14] the aerospace industry exported $US3,400 million of aeronautical products in 2008, expecting to reach over $4,000 million by the end of 2009 - a 28% increase over 2008. Imports were $2,425 million in 2008 and predicted to be $2,840 million in 2009. Other figures (see table below), suggest a more modest turnover.

Mexico's aerospace turnover

	2007	2008	2009	2012
Employment (000s)	16.5	21 (E)	27 (E)	37.5 (E)
Annual investment (US$ million)	450	900 (E)	1000 (E)	1,900 (E)
Annual exports (US$ million)	600	1,000 (E)	2,000 (E)	6,000 (E)
Total number of plants	150	190 (E)	220 (E)	310

Source: MexicoNow research

[14] Source: *http://www.femia.com.mx/ingles/cifras.html*

Aguascalientes
MDM
Texas Instruments
Baja California
Aerospace Coating International
American Plating Company
Ascotech
BAE Systems
BCM
Bourns
C&D Zodiac
Chromalloy Aerospace
Cobham Defence Electronic Systems
Craig Tools International
Crissair
Cubic
Delphi
Eaton
Electromech
Empresas LM
Esterline
Fluidmaster
GKN
Goodrich
Gulfstream
Hartwell Dzus
Honeywell
HST
Hutchinson
Jonathan Engineered Solutions
Leach
LISI Aerospace
LMI Aerospace
Lockheed Martin
MAHETSA
Mexmil
Next-Tech Aerospace
Northrop Grumman
Orcon Corp
Pacmin
Parker
Pratt & Whitney
Rockwell Collins
Seacon Global
Suntron
TDI
Thayer Aerospace
Tyco Electronics
Volare
Chihuahua
Bell Helicopter
Cambrian Industries
Capsonic Group
Cessna
CN
Electro Switch Corp
FMC Technologies
Hawker Beechcraft
Hitco
Honeywell
Jabil
Labinal
Lockheed Martin
Manoir Industries
Murphy
Nordam
AE Petsche
Stork
Zodiac
Coahuila
Alcoa
General Electric
GSC
Ketema
Parkway Products
Saltillo Jet Center
SEI
Senior Aerospace
Unison
Guerrero
Turbinas de Zihuatanejo
Jalisco
AVNTK
Competitive Global de Mexico
Global Vantage
Hydra
Interplex Industries
Sanmina SCI
Mexico City
Eurocopter
Mexicana
Nueovo Leon
Aerodiesel Engines
Aztek Technologies
Bodycoat

Corporacion EG
Doncasters
EZI Metals
Frisia Wyman Gordon
General Electric
Grupo Protexa
Honeywell
Maquinados Programados
Moneterrey Jet Center
Moneterrey Metal Prodicts
Pratt & Whitney
Technologico de Monterrey
Tecmaq
Schoeller, Bleckmann, Edelstahlrohr
SNECMA
UANL
Puebla
Aritex
Crouzet
LUK
Queretaro
Aernova
Bombardier Aerospace
CIATEQ
CIDESI
ELIMCO
Ellison Surface Technologies
General Electric IQ
Ketema
Messier Services
AE Petsche
ITR
Meggitt
SEI
SNECMA Propulsion Solide
SNECMA Services
San Luis Potosi
Bonanza
General Electric
GKN
Hitchiner
HITCO
TJR
Sonora
Amphenol

Arrow
BAE Systems
ChemResearch
Daher
D.A.M. Industries
Ducommun
ESCO
GS Precision
Goodrich
Harco
Integrated Magnetics
ITT
Molex
Novacap
OVISO
Paradigm Precision
Parker
Precision Aerospace
Sargent
SAVI
SEMCO
Sigmex
Williams International
Vermillion
State of Mexico
Avemex
EADS
Navair
Raytheon
Tampaulipas
Ametek
Cinch
Nova/Link
Porta Systems
RBC Bearings
Zacatecas
Triumph Group
Yucatan
Air Temp
General Electric
Precision Castparts
SMP

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According to Secretary of Economy figures, there are 194 aerospace companies operating in the country, 79% of these are in the manufacturing and assembly, 10% in engineering services and R&D, and 11% are involved in MRO activities.

Raytheon moved its wire harness production to a supplier in Mexico in 2003 but the surge in aerospace business relocation and start-ups really began in 2007. Bombardier relocated its Quebec manufafturing plant to Queretaro in 2007 as part of the manufacturing strategy for the Global Express; in 2006 parts manufacturing for the company had already been transferred to Mexico from Wichita, Japan and Northern Ireland. Cessna and Hawker Beechcraft set up plants in Chihuahua; Cessna's 62,000-square-foot wire assembly and sheet metal facility opened in the first quarter of 2006. Goodrich chose Mexicali for its Boeing 787 work and SAFRAN now employs more than 3,500 Mexican workers in Queretaro and Chihuahua states.

The impact of the setting up of the European and North American companies on the Mexican economy is not yet fully understood – though Eaton Aerospace has estimated it will be sourcing 30% of supplies from local providers.

Mexico has also developed effective "cluster" activities. Most of the relocated companies are located in the Mexicali-Tecate-Tijuana corridor. One particularly successful cluster operation is in Baja California which now employs more than 12,000 people in aerospace activities.

Table twenty-nine: Aircraft systems, structures and equipment contract awards 2005-2009 by Mexican companies

Contractor	Supplier	Work package	Value	Comment
Airbus A350 XWB				
Rolls-Royce	Esterline Corporation	Engine sensors	Approximately $500 million over the lifetime of the programme	The contract covers the supply of approximately 30 separate components in the sensors package. The first Esterline-supplied Trent XWB components are scheduled for delivery to Rolls-Royce in early 2010. Contract signed April 2009. At least 75% of these components will be produced in-house at the company's Advanced Sensors facilities, including the UK-based Weston Aerospace operation, France-based Auxitrol operation, US -based Norwich Aero operation, and a new facility in Mexico.
Boeing 777-300ER				
General Electric	Labinal	Engine wiring within the GE90-115B		The work takes place in Pryor, Oklahoma, Corinth, Texas and Chihuahua, Mexico.
Boeing 787				
Boeing	GKN Aerospace	Titanium metal matrix composite (TMMC) thrust links		The work takes place in Mexicali, Mexico According to GKN this represents the first use of TMMC in a commercial application; TMMC offers major weight savings of 25% to 40% over traditional steel or inconel thrust links and increased temperature tolerance over monolithic titanium. GKN Aerospace is partnered with FMW Composite Systems Inc on the programme. "GKN Aerospace and FMW will partner on this contract and in seeking other teaming opportunities for TMMC in the aerospace sector," said GKN. The Boeing 787 thrust link comprises an FMW manufactured TMMC centre tube, which GKN Aerospace plasma-welds to two machined titanium end lugs. Contract signed October 2007
Gulfstream 550				

Gulfstream	Gulfstream	Wire harnesses		Wire parts and harnesses are assembled at Gulfstream's plant in El Centro, Mexico for assembly and placement into kits which are used in just-in-time (JIT) operations.
MD 500, 520, 600N				
MD Helicopters	MDHI/MDM	Fuselage manufacture		MD Helicopters' new production facility in Monterrey, Mexico, (MDM) delivered its first single-engine fuselage in January 2007. MD Helicopters Inc uses the facility for production of fuselages for its single-engine helicopters and subassemblies. Dedicated in August 2006 the production facility houses a climate-controlled manufacturing operation that includes capabilities such as detail part processing, welding, bonding, and mylar reproduction. Working with fuselages from Monterrey, and other components from various providers, MD 500s and MD 600s are assembled in Mesa and completed at MDHI subsidiary Hertiage Aviation in Texas, or in Mesa, depending on the requirements.
Bombardier Learjet 85				
Bombardier	Bombardier	See comment		All primary structural components of the all-composite aircraft will be built in Mexico at new facilities in Querétaro, about 130 miles north of Mexico City. New facilities have also been developed at Bombardier's main Montreal site and in Wichita, where final assembly of the 85 will take place. The composite structure will be based on a metal skeleton. Wiring harnesses are assembled and installed in Mexico before shipment to Wichita.
Bombardier Challenger 605				
General Electric	Teleflex Aerospace Group	Blades		The blades are made in San Luis Potosi, Mexico
Hawker Beechcraft Premier 1				
Hawker Beechcraft Corporation (formerly Raytheon Aircraft)	Labinal Inc/ Aerotec de Mexico, S.A. de C.V	Wire harness assemblies		Labinal Inc is a North American subsidiary of Labinal, a Snecma Group company. The contract is for a long term agreement for the outsourcing of wire harness assembly for all Raytheon (now Hawker Beechcraft) commercial aircraft. Work takes place in Chihuahua, Mexico. Contract signed June 2003
Hawker Beechcraft 400XP				
Hawker Beechcraft Corporation (formerly Raytheon Aircraft)	Labinal Inc/ Aerotec de Mexico, S.A. de C.V	Wire harness assemblies		Labinal Inc is a North American subsidiary of Labinal, a Snecma Group company. The contract is for a long term agreement for the outsourcing of wire harness assembly for all Raytheon (now Hawker Beechcraft) commercial aircraft. Work takes place in Chihuahua, Mexico. Contract signed June 2003
Hawker Beechcraft 850/900XP				
Hawker Beechcraft Corporation (formerly Raytheon Aircraft)	Labinal Inc/ Aerotec de Mexico, S.A. de C.V	Wire harness assemblies		Labinal Inc is a North American subsidiary of Labinal, a Snecma Group company. The contract is for a long term agreement for the outsourcing of wire harness assembly for all Raytheon (now Hawker Beechcraft) commercial aircraft. Work takes place in Chihuahua, Mexico. Contract signed June 2003
Hawker Beechcraft 4000 Horizon				
Hawker Beechcraft Corporation (formerly Raytheon Aircraft)	Labinal Inc/ Aerotec de Mexico, S.A. de C.V	Wire harness assemblies		Labinal Inc is a North American subsidiary of Labinal, a Snecma Group company. The contract is for a long term agreement for the outsourcing of wire harness assembly for all Raytheon (now Hawker Beechcraft) commercial aircraft. Work takes place in Chihuahua, Mexico. Contract signed June 2003

Part two – Supply chain of aircraft programmes within low-wage aerospace economies

6.1 Argentina

6.1.1 Lockheed Martin AT-63 Pampa

Purchaser	Supplier	Work package	Value	Comment
Lockheed Martin Aircraft	Lockheed Martin Aircraft Argentina	Assembly		The aircraft is assembled at the Lockheed Martin Aircraft Argentina plant. The Pampa programme was re-started in February 2004 with the two five-year contracts awarded by the Argentine Government to Lockheed Martin Aircraft Argentina. The first contract comprises the upgrade of 12 existing aircraft to AT-63 standard, plus a forth contract to build 12 AT-63 Pampa jets, six for the Argentine Air Force with the rest for international sales.
Lockheed Martin Aircraft	Honeywell Aerospace	Engine		The aircraft features a Honeywell TFE-731-2C turbofan engine with 3,500 pounds of thrust. The new engine features FADEC control and improved mean time between failures.
Lockheed Martin Aircraft	Elbit	Avionics		The avionics suite comprises a digital cockpit with a heads-up display in the forward cockpit. Features inclide a 1553B data bus, laser ring INS/GPS navigation system, mission computer and an integrated weapons system. In 2001, Elbit Systems signed a contract with Lockheed Martin Aircraft Argentina S.A. for the avionics upgrade of 24 AT-63 Pampa aircraft for the Argentinean Air Force.
Lockheed Martin Aircraft	Messier-Bugatti	Brakes		Wheels and hydraulic disk brakes
Lockheed Martin Aircraft	Lockheed Martin	Radar		APG-67 multi-mode radar

6.2 Brazil

6.2.1 Embraer 170-175/190-195

Purchaser	Supplier	Work package	Value	Comment
Embraer	Embraer	Structures		At the end of July 2008 Embraer said it would invest EUR148 million in two new plants in Portugal to make wings and tailpieces for export. The two plants will be based in Evora in the south of the country. One, which will cost EUR100 million, will build large metallic parts for aircraft, such as wings, while the other will work with composite materials for tailpieces. The wing production plant should start producing in 2011, and the second plant would become operational in 2012.
Embraer	Aernnova (formerly Gamesa)	Structures		The company is a single source risk-sharing partner with Embraer, responsible for design, prototypes, certification and manufacture of empennages (vertical and horizontal stabilizers), rudder and elevators. The company also makes the rear fuselage (including pressure bulkhead).

Embraer	Aernnova (formerly Gamesa)	Composite parts		Rudder and elevators ,empennage spars and ribs
Embraer	Aernnova (formerly Gamesa)	Composite/sheet metal parts		Wing skins. Frames, stringers.
Embraer	Meggitt Aircraft Braking Systems	Carbon brakes		
Embraer	General Electric	Engines		The Embraer 170-175 is powered by two GE CF34-8E jet engines fitted with FADEC. The Embraer 190-195 is fitted with GE 34-8E-10s.
Embraer	Messier-Bugatti	Landing gear extension and retraction system,nosewheel steering system,braking system.		
Embraer	Latecoere	Structures		Passenger doors, emergency exit door and forward and aft barrel section
Embraer	Messier Dowty	Landing gear		
Embraer	PPG Aerospace	Windhshield transparencies		
Embraer	Sagem Défense Sécurité	Cockpit controls. aircraft condition monitoring system (ACMS).		
Embraer	Sonaca	Structures		The Sonaca Group develops, manufactures, assembles and tests the wing leading edge slats and produces the fuselage panels (CFII) and sub-assemblies - including the keel beam - and the wing skin panels for the Embraer 170-190 and related programmes (Embraer 175/195). These are produced at Gosselies, in Belgium. The EMB 170/190 wing skin panels are manufactured by SONACA NMF CANADA and SONACA NMF AMERICA. SOBRAER, a Brazilian subsidiary of the Group, assembles the EMBRAER 170/190 lower rear and forward panels and associated kits. It is also in charge of finishing the EMB 170/190 upper and side panels and of the CFIII stuffing. The parts required for assembly are partly manufactured by SONACA Gosselies (Belgium) and partly by two other Brazilian subsidiaries, SOPEÇAERO and PESOLA.
Embraer	Sofrance	Air and oil filters, hydraulic filters		
Embraer	Technofan	Fans		
Embraer	Nord Micro	Cabin pressure system		
Embraer	Technical Airborne Components	control, structural and system rods		
Embraer	ASCO	Leading edge high lift mechanisms		
Embraer	Liebherr Aerospace	Nose landing gear, main landing gear		Landing gear supplied via the Eleb consortium,

Embraer	Kawaskai Heavy Industries	Structures and components		Kawasaki Heavy Industries, Ltd. participates in the development of Embraer 170/190 jet transport family as a partner. Kawasaki is responsible for the development of the wing structural components. In addition to the wing stub (center wing) and mobile wings such as flaps, ailerons and spoilers, which Kawasaki has been producing under contract for the Embraer 170/175, Kawasaki has added the wing box to its lineup; the company now develops and manufactures the entire wing of the Embraer 190/195. In late 2003 Kawasaki Aeronáutica do Brasil Indústria, ltda. (KAB), a subsidiary of Kawasaki completed the construction of a new plant to assemble the main wing components of the Embraer 190/195, which has been jointly designed and developed by Embraer and Kawasaki. Embraer constructed an aircraft assembly plant in the city of Gavião Peixoto, 300km northwest of São Paulo, complete with 5km runway and aircraft assembly hangar.
Embraer	Structil	Pastes and structural films		The pastes and films are produced under a Loctite Aerospace licence to ensure metal/metal and metal/composite bondings
Embraer	Goodrich Aircraft Lighting Systems	External and internal lights		
Embraer	Daher	Sub-assemblies		The renewable five year contracts started in May 2008 and are for composite-based sub-assemblies.
Embraer	Microtechnica	Actuation control system		
Embraer	Harco	Thermo-coupling systems		
Embraer	Akaer	Structures (see comment)		The company is responsible for the center fuselage II (CFII) including aft and rear plugs for the Embraer 190/195 and wing to fuselage fairing (WFF) including ventral speed brakes for the170-175. The company also provided full design and engineering services (structure and system installation) to implement the Spin Recovery Parachute System (Tailchute) for the170/190 prototypes' tail cone, for flight- test campaign purposes.
Latecoere	Aero Vodochody	Door structures and hinges	CZK one billion	The contract comprises exclusive deliveries of hinges and inner structure of doors for the aircraft Embraer 170/190. Czech landing gear manufacturer Technometra Radotin, a subsidiary company of Aero, has joined the Latecoere programme. Aero has developed a new production line, with parts supplies to start in February 2009.
General Electric	Aircelle	GE CF34-8^{E} thrust reversers and nacelles		
General Electric	Woodward Governor	GE CF34-8 fuel metering unit		
General Electric	Techspace Aero	Engine compressor		Techspace Aero is responsible for the design, development and the production of the low pressure compressor and forward sump, which represents 9,3actuators of the CF34-10 programme.
General Electric	Aermacchi	GE CF34-8E nacelle		Aermacchi is working with General Electric, through the Joint Venture MHD, for the complete nacelle including the EBU.

General Electric	Woodward Governor	CF34-10 AMV actuator		
General Electric	Middle River Aircraft Systems	CF34-10E thrust reverser		
Middle River Aircraft Systems	General Electric	Thrust reverser actuation system		
Latécoère	Akaer	The Center Fuselage I (CFI) module		The company has also been subcontracted by Latécoère to perform part of the package of Center Fuselage III (CFIII) for both Embraer 170-175/190-195 versions.

6.2.2 Embraer Phenom 100/300

Contractor	Supplier	Work package	Value	Comment	Awarded
Embraer	Embraer	Final assembly		Embraer announced that it plans to invest an estimated US$ 50 million for the establishment of a 150,000-square-foot facility to house a final assembly line, capable of producing both the Phenom 100 and Phenom 300 executive jet models, as well as a paint shop and a delivery and customer design center, at Melbourne International Airport, in Melbourne, Florida. Embraer expects to create approximately 200 skilled positions by 2011. At the start of September 2009 Embraer started construction of a 161,000-sq-ft facility at Evora in Portugal which will manufacture complex composite airframe structures and components for the company's business aircraft and airliners.	May 2008
Embraer	Meggitt Aircraft Braking Systems	Wheels, brakes and braking systems	Over the life of the programme, the contract value is estimated to be worth around $250 million.	Lightweight aluminium alloy wheels with long life steel brakes.	May 2006
Embraer	Alcoa	Fasteners		The company's UAB™ Blind Bolt has been approved by Embraer for use on the Phenom 300. Each aircraft will use approximately 3,700 UAB Blind Bolts in the manufacture of composite empennage and flaps, says Alcoa.	October 2006
Embraer	Avionics Services	Seats		Avionics/Geven will supply the seats and will provide all the support for the whole lifetime of the fleet.	April 2006

Embraer	BMW Group Designworks, USA	Interior and cockpit design		The interior features a private lavatory and refreshment centre, executive table, entertainment and digital communications, suite. It incorporates Embraer's Oval LiteTM design. The Phenom 100 can be configured to carry four passengers in a typical configuration. The Phenom 300 jet can accommodate nine occupants, plus luggage.	
Embraer	Daher	Sub-assemblies		The renewable five year contracts started in May 2008 and are for composite-based sub-assemblies.	March 2008
Embraer	Meggitt Aircraft Braking Systems	Wheels, brakes and braking systems (-300)	The contract is expected to be worth $100 million over the life of the aircraft.	The award covers main and nose wheels, steel brakes and a brake-by-wire control system, including an emergency park brake and anti-skid system.	April 2006
Embraer	Eaton	Thrust control, landing gear control lever, and landing gear hydraulic components.	The value of the award is estimated at $20 million over the 10-year life of the programme .	See above	October 2005
Embraer	Eaton	Thrust control, landing gear control lever, and landing gear hydraulic components and flap actuators	The revenues from these aerospace contract awards are estimated at $70 million over the life of the programme .	See above	October 2005
Embraer	Garmin	Integrated avionics suite		The flight deck suite called "ProdigyTM" and features three interchangeable 12-inch displays – two primary flight displays (PFD) and one multi-function display (MFD). The system integrates all primary flight, navigation, communication, terrain, traffic, weather, engine instrumentation, and crew-alerting system data and presents the composite information on three high-definition displays	November 2005

Embraer	General Electric	Bleed air and anti-ice subsystems		First delivery August 2007. The subsystems will be manufactured at Smiths' facility – now General Electric - in Rockford, Illinois. General Electric/Smiths Aerospace systems package consists of the bleed air system controller, the pressure regulating and shutoff valves (PRSOVs), fan air valves, cross bleed valve, wing and horizontal stabilizer anti-ice valves, and the engine reverse flow check valves. The controller manages the bleed air valves, anti-ice valves and bleed air leak detection sub-systems. In addition to the above units, GE/Smiths will perform system level performance testing in their test facility on the entire bleed air and anti-ice systems to include Embraer supplied engine anti-ice valves, pre-cooler heat exchanger, system ducting, temperature sensors, and piccolo tubes.	October 2006.
Embraer	Goodrich	Air data system	The award is expected to generate approximat ely $20 million in original equipment and aftermarke t revenues over the life of the programme	Goodrich will provide the SmartProbe(TM) Air Data System for the Phenom 300. The system will provide all primary air data information required by the aircraft.	December 2006
Embraer	Honeywell	Cabin pressure control and monitoring system (CPCMSTM)		This system provides both cabin pressure control and cabin altitude monitoring functions. Controls and sensors are mounted remotely from the flight deck to maximize flight deck panel space, according to Honeywell and the system architecture is designed to interface directly with the aircraft's avionics to provide fully automated cabin pressure control with no flight crew interaction during normal operation. The overall system includes an electronic control and monitoring unit (ECMU), an outflow valve (OFV), and positive and negative pressure relief valves. Via the avionics, the system receives aircraft altitude information from the air data computer (ADC), destination landing altitude from the flight management system (FMS), and engine power setting directly from the throttle.	October 2006

Embraer	Intertechnique	Fuel system including fuel circulation equipment, fuel quantity indication system, fuel management system			
Embraer	Luminescent Systems Inc	Exterior lighting system		In October 2006 Astronics Corporation, the parent company of Luminescent Systems Inc, announced it had been selected to provide exterior lighting for the Phenom 100 and would work with Embraer on the certification process to design a complete exterior lighting system, which uses LED (light emitting diode) and HID (high intensity discharge) lighting technology. Astronics is also supplying flood lighting and lighting controllers for the cockpit.	October 2006
Embraer	Parker Hannifin	Flight control sub-systems		Parker Hannifin will supply four flight control subsystems on the Phenom 300. Parker's Control Systems Division will design and produce the aircraft's fly-by-wire spoiler system and electromechanical pitch trim system, yaw and roll trim actuation, and flap system, as well as a centralised electronic controller.	September 2007
Embraer	Pratt Pratt & Whitney Canada	Engines		PW617F turbofan engines for Phenom 100; PW535E turbofan engines for Phenom 300	May 2005
Embraer	PPG	Transparencies	According to PPG Aerospace expected production life is more than 1,000 aircraft, which could put the value of the contract at more than $35 million	PPG Aerospace-Transparencies has been awarded a sole-source contract to develop and produce cockpit windows for the Phenom 100 and 300. The aircraft will be Embraer's first to be certified with the PPG Surface Seal rain-repellent coating as the primary windshield rain removal system, with no windshield wipers.	June 2007
Embraer	Tactair	Select control systems for brakes, secondary flight and doors		Tactair Fluid Controls Inc is providing select controls for wheel brake, secondary flight control, and door control applications for the Phenom 100/300. On the Phenom 100, Tactair will provide the emergency/park brake control system and passenger door damper. On the Phenom 300, Tactair will provide the landing gear control valves, stick pusher actuator, rudder spring actuator and passenger door damper.	June 2007

Embraer	Thales	Integrated Electronic Standby Instrument (IESI)		Thales announced it will provide the IESI, incorporating the Active Matrix Liquid Crystal Display (AMLCD) in a 3 ATI instrument format.	May 2006
Embraer	Safe Flight Instrument Corporation	AoA sensor		Safe Flight's AoA sensor provides local angle-of-attack information to the dual channel digital SWPS computer. The computer supplies stall warning and low airspeed awareness cues to the integrated avionics suite as well as outputs to drive the stick pusher for stall protection.	May 2008
Embraer	MTI Global	Thermal and acoustic insulation	Production is expected to ramp-up in 1Q 2009 for both programmes, with estimated total revenue expected to exceed $3.8 million over the life of the contracts	MTI-PolyFab has been selected by Embraer to supply thermal and acoustic insulation for a sub system of the new Phenom 100/Phenom 300 aircraft.	May 2008
	Advanced Industries, Inc.	Starter generator and generator control unit		The company is supplying its range of 325 Amp starter generator systems to the Phenom 100/300 family.	
Meggitt Aerospace	Doncasters Precision Forgings	Brake torque tube		According to Doncasters: "The torque tube is an essential part of the brake which encloses the drive shaft used to absorb the resultant torque (twisting, turning force) from the shaft. Doncasters Precision Forgings in Sheffield, UK, will manufacture the torque tubes from stainless steel using the site's four tonne closed die forging hammer."	February 2007
	General Electric (formerly Smiths)	Bleed air & anti-ice subsystems,		The contract includes the supply of controller, pressure regulating and shutoff valves, fan air valves, cross-bleed valve, wing & horizontal stabilizer anti-ice valves, engine reverse flow check valves (all on 300 model)	October 2006
Embraer	Indústria Aeronáutica Neiva	Sub-assemblies		Embraer has contracted associate company Neiva to produce sub-assemblies and components for the Phenom 100/300 family.	
	Lee Products Ltd	Fluid control components		No further information currently available	
	Meggitt Safety Systems Inc	Engine fire detection systems		No further information currently available	

	Meggitt Thermal Systems	Engine inlet anti-ice system		The company won the order in January 2006 to supply the nacelle anti-ice system for the Phenom 100 engine	January 2006
Meggitt Aerospace	Senior Aerospace Metal Bellows	Accumulators		The units are manufactured at Senior Aerospace Metal Bellows facility in Sharon, Massachusetts with deliveries beginning in early 2007.	
	Saint-Gobain Performance Plastics	Radomes			

6.2.3 Embraer MSJ/MLJ

Contractor	Supplier	Work Package	Value	Comment	Awarded
Embraer	Rockwell Collins	Avionics		Both aircraft will feature the Pro Line FusionTM avionics suite. Some of the standard features on the MSJ and MLJ flight deck include: four high-resolution 15-inch diagonal Liquid Crystal Displays (LCD) with synthetic vision depiction of terrain and obstacles; Integrated Flight Information Systems (IFIS) with electronic charts and enhanced maps; Advanced Flight Management Systems (FMS) with Wide Area Augmentation System that supports Localizer Performance with Vertical guidance approaches (WAAS/LPV) and Required Navigation Performance (RNP) capabilities; Advanced human-machine interface including graphical flight planning capability; a Traffic Surveillance System with Automatic Dependent Surveillance Broadcast (ADS-B) capabilities; full-flight regimen auto throttles; and an Information Management System (IMS) to manage databases and facilitate wireless interactivity with the ground infrastructure. Optional features include graphical weather overlays, paperless cockpit provisions, MultiScan™ weather radar with predictive windshear; Controller-Pilot Data Link Communication (CPDLC); surface management system; and enhanced vision display.	April 2008
Embraer	Honeywell	Engines	The contract is valued at more than $23 billion including aftermarket over the life of the agreement.	Honeywell is providing its HTF7000 turbofan propulsion system family for Embraer's MSJ and MLJ business aircraft.	April 2008
Embraer	Honeywell	APU		The 36-150 unit has been specified	April 2008
Embraer	BMW Designworks	Interior design			April 2008

	USA				
Honeywell	GKN	Nacelles	$750 million plus	The contract covers the design adaptation of the nacelle, its manufacture and full integration with the engine, with GKN Aerospace delivering the complete HTF7500E propulsion system podded into the nacelle direct to the customer's assembly line. Work will largely be carried out at the Company's Cowes, Isle of Wight facility in the UK.	July 2008

6.2.4 Embraer Legacy 450/500/600/Shuttle

Contractor	Supplier	Work Package	Value	Comment	Awarded
Embraer	B/E Aerospace	Water water system	The $150 million order encompasses the Bombardier Learjet 85, Dassault Falcon 7X, Embraer Legacy 450 and Legacy 500.	Volume production starts in 2011.	April 2009
Embraer	Embraer	Final assembly		Final assembly of the Legacy, systems integration and testing are carried out at Embraer's aircraft manufacturing facilities in Sao Paulo. The aircraft is based on the ERJ 135/135 but with additional winglets, fuselage strakes, underbelly and cargo compartment tanks. In July 1992 Embraer signed risk-sharing partnerships on the ERJ-135 programme (the basis for the Legacy/Shuttle design) Sonaca, ENEAR, Gamesa, C&D Interiors and Gamesa. At the start of September 2009 Embraer started construction of a 161,000-sq-ft facility at Evora in Portugal which will manufacture complex composite airframe structures and components for the company's business aircraft and airliners.	
Embraer	Ducommun AeroStructures	Ailerons and spoilers	$50 million plus	DAS has been awarded the design and build contract for the ailerons and spoilers. Ducommun will develop the parts from concept through certification, preliminary engineering, and detailed designs, drawings and specifications jointly with Embraer. The Ducommun-led engineering team will work in close collaboration with Embraer's engineering offices located in Brazil.	February 2009
Embraer	Meggitt Fluid Controls	Pneumatic bleed air system		The pneumatic bleed air systems comprise two regulating and seven shut-off valves and a pneumatic system controller. The systems manage the bleed air from the engines' high and low pressure outputs for temperature and pressure control and maintain anti-ice	September 2008

				systems and the aircraft's cargo, cabin and cockpit environments.	
Embraer	Meggitt Aircraft Braking Systems	Wheel, carbon brake, and brake control systems.		The contract is for the 14' main wheel, two-pair carbon brake, six-inch nose wheel and brake-by-wire brake control system. MABS is already a partner on the Embraer Phenom 100 and 300 aircraft and, with Liebherr-Aerospace, on the Embraer 170/175 and 190/195 regional jets and the Lineage 1000 ultra-large business jet.	
Embraer	ENAER	Fin, tail-plane and elevators			
Embraer	Gamesa	Wings, nacelles, wing/fuselage fairings, main landing gear doors and leading edges			
Embraer	SONACA	Rear and centre section of the fuselage, leading edges, main door, rear fuselage, engine pylons and baggage door		SOBRAER, a Brazilian subsidiary of the Sonaca Group, is in charge of assembling the Legacy fuselage sections and engine pylons. The parts required for assembly are partly manufactured by Sonaca Gosselies (Belgium) and partly by two other Brazilian subsidiaries, SOPEÇAERO and PESOLA.	
Embraer	Nordam	Radome		Nordam has opened a new facility, Nordam Brazil, close to the Embraer plant.	
Embraer	Nordam Brazil	Cabinetry		The initial delivery will consist of a Legacy 600 aft baggage bulkhead, vanity, lavatory, and two closets.	
Embraer	Honeywell	Avionics		The aircraft features the Honeywell Primus 1000 digital avionics suite and a dual flight management system (DFMS). The suite is integrated with dual digital air data computers, dual attitude, heading and reference system (AHRS), a TCAS II traffic alert and collision avoidance system and an enhanced ground proximity warning system (EGPWS).	
Embraer	Avos-Eros	Oxygen system			
Embraer	Hamiton Sundstrand	Air conditioning system			
Embraer	Honeywell	Air conditioning and temperature control system		The Legacy's air- conditioning system will use bleed air from either the Honeywell 36-150 auxiliary power unit or the Honeywell HTF7000 engines to cool the cabin.	
Embraer	Honeywell	Engines		Both aircraft are powered by Honeywell HTF7500E engines.	
Embraer	Honeywell	Ovation Select audio/video and cabin management system (AVCMS)		The Ovation Select cabin connection suite provides high-definition audio/video and fully digital cabin management. The individual touch screen control panels provide passengers with controls for such AVCMS components as Blu-ray, LCD	

				monitor, 3-D moving map system, lighting, temperature, cabin speakers, and window shades, among others, including a media dock for iPod use, or any carry-on A/V equipment.	
Embraer	Ducommun AeroStructures	Tailcone and fuselage doors	The DAS contract is valued in excess of $100 million at currently anticipated build rates.		
Embraer	Liebherr Aerospace	Pressurisation system			
Embraer	International Nacelle Systems (Goodrich Aerospace)	Nacelles and the optional clamshell thrust reversers			
Embraer	Goodrich	Air data systems and crew seats	The potential value of the selections is roughly $110 million over the life of the programmes for both original equipment and aftermarket revenue	The ADS features Goodrich's SmartProbe(TM) technology to provide all critical air data parameters to the aircraft's flight control, pilot display and other systems. The crew seats incorporate improvements in reliability and safety.	
Embraer	Goodrich	Windshield heat controllers		Part of a contract won by the company to supply these systems to ERJ-145 aircraft. Windshield heater controllers regulate power used to help keep the windshield free of ice, snow and fog. Goodrich is teamed with PPG Industries, windshield manufacturer for the ERJ 145, to offer windshield and controller replacement packages to current operators beginning in May 2002.	November 2002
Embraer	Goodrich	Wheels and brakes			
Embraer	Parker Hannifin	Fuel management system			
Embraer	Rolls Royce	Engines		The AE 3007 is a single-stage, direct-drive, wide-chord fan design which achieved FAA/JAA certification in 1995.	
Embraer	Hamilton Sundstrand	APU		Tail mounted APIC APS-500 auxiliary power unit	
Embraer	PPG	Windshields			
Embraer	EDE – Embraer	Landing gear		Embraer Liebherr Equipamentos do Brasil S.A. was established in 1999 as a joint-venture between the Brazilian	

	Liebherr			company Embraer – Empresa Brasileira de Aeronáutica S.A. and the Liebherr Group.	
Embraer	Hydro-Aire	Brake-by-wire control system,		Part of the Crane Aerospace group	
Embraer	Goodyear	Tyres		Flight Eagle tyres specified	
Embraer	Eaton	Cockpit components	Part of a cockpit components contract for for the ERJ 145/175 family corporate jet aircraft valued at more than $35 million over ten years	A variety of electrical and actuation components for panels and cockpit controls.	

6.3 China

6.3.1 Eurocopter/CATIC/ST Aerospace EC 120B Colibri

Purchaser	Supplier	Work Package	Value	Comment	Date awarded
Eurocopter/CATIC/ST Aerospace	Eurocopter	Final assembly, instrument panel, landing gear, seats, rotor system, transmission.		Eurocopter has a 61% share of the programme.	1993
Eurocopter/CATIC/ST Aerospace	ST Aerospace	Tailboom, fin, horizontal stabiliser, Fenestron, general doors and instrument pedestal.		In April 1999 Singapore Technologies Aerospace Ltd, established a wholly-owned subsidiary STAIS to provide engineering services, manage and perform services for the post-development and production phase of the EC120 programme. ST Aerospace has 15% of the helicopter programme.	1993
Eurocopter/CATIC/ST Aerospace	Sagem Avionics	Automatic flight control system		The company is providing its AP 85 system, a two-axis autopilot.	
Eurocopter/CATIC/ST Aerospace	Hafei Aviation Industry Company	Cabin structure and doors, engine cowlings, pod central and intermediate structure and fuel system		CATIC (the China National Aero-Technology Import & Export Corporation) negotiated a 24% share in the programme and the work is carried out by the Hafei Aviation Industry Company.	1993
Eurocopter/CATIC/ST Aerospace	Turbomeca	Engines		The Turbomeca Arrius 2F turbine engine generates 504 shp/376 kW and is fitted with FADEC (Full Authority Digital Electronic Control).	
Eurocopter/CATIC/ST Aerospace	Thales North America	Displays and avionics		The company is providing multifunction and vehicle/engine management displays. The suite is part of the “Avionique Nouvelle”	

				family used in modular form on other Eurocopter models.	
Eurocopter	Sagem Défense Sécurité	Cockpit displays			
Eurocopter	Sofrance	Fuel strainer, anti-sand engine filter, oli filter,			
Eurocopter	Hispano Suiza	FADEC for the Turbomeca Arriel 1E2 engine			

6.3.2 Eurocopter EC175/ HAIG Z15

Purchaser	Supplier	Work Package	Value	Comment	Date awarded
Eurocopter/Harbin Aviation Industry	Eurocopter	See comment		The programme is a 50:50 joint production enterprise between Eurocopter and Harbin Aviation Industry Company (HAIG) (see below). Eurocopter has responsibility for the main gearbox, tail rotor, avionics, autopilot, hydraulic and electrical systems, doors and transparencies. Eurocopter is also the technical lead and system integrator.	
Eurocopter/Harbin Aviation Industry	Eurocopter	Avionics		The avionics display suite will comprise four six- by eight-inch displays with an optional fifth display.	
Eurocopter/Harbin Aviation Industry	Harbin Aviation Industry Company (HAIG)	See comment		HAIG is responsible for the airframe, tail and intermediate gearboxes, main rotor, fuel system, flight controls and landing gear. In November 2008 HAIG delivered the first EC175 airframe structure to Eurocopter at its factory in Harbin/China	
Eurocopter/Harbin Aviation Industry	ZhongNan Transmission Machinery Works of Changsha Aviation Industry (ZTMW)	Structures			
Eurocopter/Harbin Aviation Industry	China National Aero Technology (LAMC)	Airframe components			
Eurocopter/Harbin Aviation Industry	Pratt & Whitney Canada	Engines		The EC 175 will be powered by two Pratt & Whitney Canada PT6C-67E engines	
Eurocopter	Hispano-Suiza	Accessory gearbox			June 2006
Eurocopter	APPH	Landing gears	The value of the contract	The contract involves the design and manufacture of landing gears for both	December

			for Original Equipment and spares is anticipated to be in excess of $100 million of revenue	the French EC175 helicopter as well as the Chinese variant - the Z15. The market for this programme is expected to be up to 1000 helicopters, with a production life of 20 years. The initial current production run is anticipated at between 680 and 800 aircraft planned to start in 2011 and the prototype is planned to fly in 2009.	2006
Eurocopter/Harbin Aviation Industry	Aero Sekur	External life raft system		The life-rafts are stowed in aerodynamic canisters, located outside the helicopter cabin.	July 2009

6.3.3 AVIC/Commercial Aircraft Corporation of China (ACACC) ARJ21-700

Contractor	Supplier	Work package	Value	Comment	Awarded
AVIC 1	AVIC I Commercial Aircraft Company (ACAC)	See comment		ACAC is a consortium of six companies and aerospace research institutes – including the Shanghai Aircraft Research Institute and the Xian Aircraft Design and Research Institute - involved in the development and manufacture of the aircraft.	
ACACC	Shanghai Aircraft Company	Final assembly		ACCAC member.	
ACACC	Shenyang Aircraft Corporation	Empennage		ACCAC member.	
ACACC	Xian Aircraft Company	Wings and fuselage		ACCAC member.	
ACACC	Parker Aerospace	Fuel, hydraulic and flight control systems	The contracts are expected to yield as much as $275 million in original-equipment revenues for Parker, with additional revenues from MRO and support	Parker Aerospace is working with ACAC to develop, integrate, build, test, certify and provide service for the three systems throughout the life of the programme, as lead integrator for the fuel and hydraulic systems, and in partnership with Honeywell on the flight control system. The company has established new aerospace facilities in China to support the work.	September 2003
ACACC	Goodrich Hella Aerospace Lighting Systems	Lighting systems		Goodrich is supplying systems for nearly every lighting fixture. From exterior to interior -- including the cockpit – the aircraft features Light Emitting Diode (LED) and High Intensity Discharge (HID) technology	April 2004
ACACC	Honeywell	Fly-by-wire control system	The estimated value of the programme for Honeywell,		

			which includes fly-by-wire controls for each new airplane plus follow-on support and spare parts, exceeds $200 million over the life of the programme		
AVIC	Bombardier Aerospace	See comment		AVIC I and Bombardier Aerospace have signed an agreement for a new, long-term strategic cooperation in the 90- to 149-seat commercial aircraft market. Bombardier intends to participate in the development of AVIC I's five-abreast ARJ21-900 aircraft. Under the terms of the agreement Bombardier intends to invest $100 million US in the ARJ21-900 project, when launched, and provide technical assistance towards the development of the aircraft. Furthermore, in pursuit of its goal to become a major international Tier 1 structural supplier, AVIC I plans to invest $400 million US for research and development, construction of new facilities and equipment for the CSeries aircraft programme, should it be launched.	June 2007
ACACC	Rockwell Collins	Flight displays, avionics, flight management system		Rockwell Collins is supplying five 10in x 8in liquid crystal adaptive flight displays and the avionics suite which is based on the Rockwell Collins Pro Line 21 system. This includes a VHF-4000 voice and data transceiver and an IRU-4000 digital data and audio processor. Rockwell Collins is supplying its FMS 4200 flight management system to the aircraft along with a solid-state weather radar andAHS-3000 attitude heading reference system	
ACACC	Liebherr Aerospace	Landing gear		The aircraft features twin-wheeled tricycle-type landing gear. Liebherr-Aerospace SAS, together with Wuhan Hangda Aero Science & Technology Development Co. Ltd have established a repair centre for aerospace systems and components in Wuhan, People's Republic of China. The new company, Liebherr Hangda Aerospace Technologies (Wuhan) Co. Ltd. is dedicated to the maintenance of all Liebherr Aerospace products as well as heat exchangers installed on Airbus, Boeing, Bombardier and Embraer aircraft operating in the People's Republic of China. It will also provide repair services to ACAC and airlines customers for the Liebherr Aerospace products installed on the regional aircraft ARJ 21.	

ACACC	Goodrich	Wheels and brakes			
ACACC	Microtechnica	Actuation control system			
ACACC	Hamilton Sundstrand	APU		The company is supplying its APS 2300 auxiliary power unit and a back-up ram air turbine generator.	
ACACC	FACC	Passenger cabin		**The** complete cabin contains a multiplicity of different components - from cockpit dividers to the hatracks, ceiling and sidewall panels and the equipment for the galley, wardrobe, toilets, lavatory and floor coverings. The components for the first two test flight units were delivered in the period July until November 2007. In March 2008 FACC was due to deliver the first complete interior for the new ARJ21 to ACAC Shanghai where the final assembly of the Chinese regional jet is taking place.	March 2004
ACACC	General Electric	Engines		The aircraft is powered by two General Electric CF34-10A engines	
ACACC	Sagem Défense Sécurité	Cockpit controls			
ACACC	Meggitt Aircraft Braking Systems	Brake control systems, carbon brakes			
ACACC	Air Cruisers	Evacuation systems		Air Cruisers supplies evacuation systems (escape slides and/or slide rafts) to the following aircraft: Boeing 737, 767, 777,Airbus A319, A320, A321, Sukhoi SuperJet 100 and the ARJ-21	
ACACC	Technofan	Fans, valves			
ACACC	Argosy	Adhesives and coatings			
ACACC	ECE	Landing light lamps			
ACACC	Alcoa	Alloys and materials		Alcoa advanced materials on the ARJ21 include: advanced heat-treated sheet and plate alloys from Alcoa's Davenport (Iowa); extrusions made from proprietary alloys and process technologies for the wing and fuselage stringers, floor beams and seat tracks. The extrusions are sourced from Alcoa's Lafayette, (Indiana), Changwon (S. Korea) and Chandler, (Arizona) plants.	
General Electric	Alcoa	Alloys and materials		Alcoa Fastening Systems' specially engineered aerospace fasteners including engine nuts, inserts and	

				studs are used on the two GE CF34-10A engines used to power the aircraft. The engines are equipped with airfoil castings and structural components from Alcoa's Power and Propulsion businesses in Whitehall, (Michigan), Wichita Falls, (Texas), and Winsted and Branford, (Conn.).	
Liebherr Aerospace	CESA	Hot air non-return valve			
General Electric	Magellan Aerospace	Engine core assembly			
General Electric	General Electric (formerly Smiths Aerospace)	CF34-10A thrust reversal actuators			
General Electric	Aermacchi and Middle River Aircraft System	Engine inlet			
General Electric	JAMCO	CF34 turbine shroud			
Middle River Aircraft System	General Electric (formerly Smiths Aerospace)	Thrust reverser actuation system			
General Electric	Hartwell	CF34-10A hold-open thrust rod		Hartwell Corporation is providing the hold-open rods and rate control device for GE CF34-10A engines.The aft hold-open thrust rod assembly is based on Hartwell's existing design currently in service on an existing military transport aircraft engine nacelle.	June 2007
General Electric	Meggitt Vibrometer	CF34-10A engine control system and engine vibration monitors .			
General Electric	Techspace Aero	Techspace Aero is responsible for the design, development and the production of the low pressure compressor and forward sump, which represents 9,3% of the CF34-10A programme.			

6.3.4 COMAC C919

Contractor	Supplier	Work package	Value	Comment	Awarded
Commercial Aircraft Corporation of China (COMAC)	See comment	See comment	See comment	China's Large Commercial Aircraft Corp has named its 190-seat single-aisle, twin engined-aircraft the C919. First flight planned for 2016. The C919 will be assembled in Shanghai and major partners already announced are: AVIC	

				companies Chengdu Aircraft Corp, Xian Aircraft Corp, Shenyang Aircraft Corp, and Shenxi Aircraft Corp. In June 2009. In June 2009 Messier-Dowty announced that it has signed a letter of intent to cooperate with Landing Gear Advanced Manufacturing Corp. (LAMC) of China to make a joint offer to COMAC) for C919 landing gear. The agreement comprises complete landing gears, including structures, wheels and brakes.	
Commercial Aircraft Corporation of China (COMAC)	Safran/Nexcelle	See comment		During the September 2009 Asian Aerospace show Safran signed a framework agreement with AVIC for work on the aircraft as did Nexcelle - a joint venture company created by GE's Middle River Aircraft Systems and Aircelle, a Safran group company to supply nacelles. According to AVIC: "AVIC Aircraft and Nexcelle will consider a broad range of nacelle and components manufacturing and design opportunities, including current production programmes and for new aircraft. Categories could range from business jets to large airliners."	

6.4 Czech Republic

6.4.1 Aero Vodochody L-159 T1

Purchaser	Supplier	Work Package	Value	Comments	Date awarded
Aero Vodochody	Honeywell	Cockpit pressure control system			
Aero Vodochody	Jihlavan as	Hydraulic components		Hydraulic circuit components for landing gear controls, landing brake controls, landing-gear door controls, aerodynamic brake controls, lift flap controls, canopy controls and in aileron and elevator servo-actuators.	
Aero Vodochody	Vzlu-Speel	Aircraft monitoring system (AMOS)		The AMOS interfaces with Boeing's avionics via MIL-STD-1553B data bus. AMOS complies with MIL-STD-810E/461D and TSO-C124 requirements, according to the company.	
Aero Vodochody	Boeing	Avionics integration		Key elements to the avionics system are outlined below. The aircraft features MIL-STD-1553 integrated avionics with two multi-function colour displays and analogue instruments for backup. It incorporates Hands On Throttle And Stick (HOTAS).	
Aero Vodochody	Honeywell	Navigation system		The navigation system is GPS-based with Ring Laser Gyro INS as backup.	
Aero Vodochody	Rockwell Collins	Communications system			

Aero Vodochody	Mason	Control grip and stick			
Aero Vodochody	Thales (Vinten)	Countermeasures dispensing system			
Aero Vodochody	Honeywell	Displays			
Aero Vodochody	Honeywell	Flight control computer			
Aero Vodochody	Flight Visions	HUD		The HUD is the FV-3000. The company is owned by Esterline CMC Electronics.	
Aero Vodochody	FIAR/Honeywell	Radar		The radar has five air-to-air modes including track-while-scan with four air combat sub-modes. FIAR is now part. FIAR is part of the Finmecanica group.	
Aero Vodochody	BAE Systems	Radar warning receiver			
Aero Vodochody	PBS Velka Bites	Air generator start system and APU			
Aero Vodochody	Hawker	Battery		A 25Ah VARTA battery has been specified.	
Aero Vodochody	Hamilton Sundstrand	Generator		LUN-2134 back up generator	
Aero Vodochody	Honeywell/ ITEC	Engine		The Honeywell/ITEC F124-GA-100 non afterburning turbofan produces 28,2 kN thrust (1x). The engine is equipped with a dual redundant FADEC. The International Turbine Engine Corporation (ITEC), a joint venture between Honeywell and the Aero Vodochody space Industrial Development Corporation (AIDC) of the Republic of China.	
Aero Vodochody	Moravan	Brakes		The brakes are Moravan K52 air cooled hydraulic brakes with anti-skid system.	
Aero Vodochody	Moravan	Wheels		The wheels are Moravan K-36s with 610mm x 215 mm tyres on the main units. The nose unit has a Moravan K37 wheel and 460 x 180 mm tyres	
Aero Vodochody	Intertechnique	Oxygen system			
Aero Vodochody	Dynamic Control Corporation/Hamilton Sundstrand	Stores management system		There are seven hardpoints to carry stores: three under each wing and one under the centre fuselage.	
Aero Vodochody	Goodrich	GH-3100 Electrical Standby Instrument System (ESIS) and the Tactical Airborne Navigation System (TACAN)		Designed to replace conventional electro-mechanical standby attitude, airspeed and altitude instruments, the solid-state GH-3100 ESIS is capable of providing all three functions, plus heading, slip/skid, navigation data and vertical speed, in a single 3" ATI, flat panel display. The GH-3100 has an	June 2001

				internal air data sensor for altitude, airspeed and vertical speed data as well as a self-contained inertial measurement cluster which replaces the need for a traditional electro-mechanical gyro. The system can track up to four ground stations simultaneously in range and two in bearing and can be used for Air-to-Air and Air-to-Ground operations and is Night Vision Goggle (NVG) compatible.	
Aero Vodochody	Letov Letecka Vyroba	Wing, rear fuselage, empennage			

6.5 India

6.5.1 ADA Light Combat Aircraft-Tejas

Purchaser	Supplier	Work Package	Value	Comment	Date awarded
The Indian Aeronautical Development Agency (ADA)	Spectrum Infotech	Environmental control system		The company is a wholly owned subsidiary of Larsen & Toubro Ltd	
The Indian Aeronautical Development Agency (ADA)	HAL	Electrical system		The company is the prime industrial contractor for the programme.	
The Indian Aeronautical Development Agency (ADA)	HAL	Hydraulic system			
The Indian Aeronautical Development Agency (ADA)	HAL	Gas turbine starter unit		Model GTSU-110 has been specified.	
The Indian Aeronautical Development Agency (ADA)	Martin-Baker	Ejection seat		Martin Baker zero-zero ejection seats have been specified.	
The Indian Aeronautical Development Agency (ADA)	Aeronautical Development Establishment/Bharat/CSIO	Avionics		The core avionics system is outlined below with subsequent entries highlighting important sub-systems. The avionics architecture is based on a three bus system (MIL-STD-1553B). A 32-bit mission computer (MC) is responsible for operations computations, flight management, reconfiguration / redundancy management and in-flight system self-tests. Navigation and guidance is via Inertial Navigation System (INS).	
The Indian Aeronautical Development	Aeronautical Development	Cockpit displays			

Agency (ADA)	Establishment/Bharat/CSIO				
The Indian Aeronautical Development Agency (ADA)	HAL	Communications system		The V/UHF equipment provides simplex two way voice and data communication in the VHF and UHF frequency bands.	
The Indian Aeronautical Development Agency (ADA)	HAL	Utility systems management			
The Indian Aeronautical Development Agency (ADA)	HAL	Landing gear		The aircraft features hydraulically retractable tricycle landing gear with a pair of single inward-retracting main wheels and a steerable, twin-wheel forward-retracting nose gear.	
The Indian Aeronautical Development Agency (ADA)	BAE Systems	Digital flight control computer			
The Indian Aeronautical Development Agency (ADA)	Bharat Electronics	Flight displays		The cockpit flight displays feature two 76mm x 76mm colour liquid crystal multi-function displays developed b	
The Indian Aeronautical Development Agency (ADA)	Aeronautical Development Establishment	Flight control system		The FBW system features quadruplex redundant architecture	
The Indian Aeronautical Development Agency (ADA)	CSIO Chandigarh	Head up display			
The Indian Aeronautical Development Agency (ADA)	RCI,	Control and coding unit		The unit connects the flight controls to aircraft equipment points. Software developed by ADA.	
The Indian Aeronautical Development Agency (ADA)	Electronics Research and Development Establishment /HAL	Radar (see also below)		The pulse Doppler radar, mounted within a Kevlar radome, features multiple target search and track-while-scan and ground-mapping modes.	
The Indian Aeronautical Development Agency (ADA)	Advanced Systems Integration and Evaluation Organisation (ASIEO)	Electronic warfare suite		The electronic warfare suite features electromagnetic and electro-optic receivers and jammers and includes a laser warner, missile approach warner, and chaff and flare dispenser. The unit also features jam resistant radio communications.	
The Indian Aeronautical Development	ADE	Display processors			

Agency (ADA)					
The Indian Aeronautical Development Agency (ADA)	Electronics Research and Development Establishment	Mission preparation and data retrieval unit			
The Indian Aeronautical Development Agency (ADA)	General Electric	Engine		The General Electric 85 kN F404-GE-IN20 turbofan engine features full authority digital engine control. HAL has placed an order for 24 F404-GE-IN20 engines.	February 2007
The Indian Aeronautical Development Agency (ADA)	Kumaran Industries	Engine components			
The Indian Aeronautical Development Agency (ADA)	National Aerospace Laboratories	Rudder		The aircraft's structure is made of 40% composites.	
The Indian Aeronautical Development Agency (ADA)	National Aerospace Laboratories	Fin		The fin is a single monolithic honeycomb piece and features graphite composites	
The Indian Aeronautical Development Agency (ADA)	National Aerospace Laboratories	Fuselage		A mixture of aluminium and lithium alloys, titanium alloys and carbon composites have been used in the construction of the aircraft. The wing structure includes composite spares and ribs with a carbon fibre-reinforced plastic skin.	
The Indian Aeronautical Development Agency (ADA)	Elettronica Aster	Brake system metering control valve			
The Indian Aeronautical Development Agency (ADA)	JS Lamps, Delhi	Lights			
The Indian Aeronautical Development Agency (ADA)	MPC Products	Autothrottle			
The Indian Aeronautical Development Agency (ADA)	Goodrich	Power take-off shafts			
The Indian Aeronautical Development Agency (ADA)	Goodrich	Air data/sensor systems, AOA and stall warning systems, engine nozzle hydraulic pumps, lights			
The Indian Aeronautical	Sanghvi	Wires and cables			

Development Agency (ADA)	Aerospace				

6.6 Korea

6.6.1 Korea Aerospace Industries T-50/A-50 Golden Eagle

Purchaser	Supplier	Work package	Value	Comment	Date awarded
Korea Aerospace Industries	Moog	Hydraulic actuators	In its first quarter of 2005 financial report Moog said revenue from The T-50 programme was estimated at $1 million	The company opened a manufacturing/repair site in Incheon City Korea, in August 2006. The facility has a site of 8455m2 (91,000 sq ft) and a floor area of 1962m2 (21,120 sq ft).	
Korea Aerospace Industries	Parker Control Systems Division - Military	Hydraulic actuators			
Korea Aerospace Industries	Messier-Dowty International	Landing gear		Messier-Dowty designs and manufactures the nose landing gear and main landing gear structures and actuators, integrating all the associated landing gear sub systems, including brake controls and steering sub systems and the wheel and brake hardware.the company is partnered with WIA Corp in the work. Each unit features a single wheel and is fitted with an oleo pneumatic shock absorbers. The main wheels are retracted into the engine air intakes structures. The nose wheel retracts forward.	
Korea Aerospace Industries	Electric General Aviation (formerly Smiths Aerospace Electronic Systems)	Voice/data recorders			

Korea Aerospace Industries	Lockheed Martin	Radar			
Korea Aerospace Industries	BAE Systems	HUD, flight control computers, control stick assemblies, accelerometer sensor assemblies, and	BAE Systems has been awarded contracts worth more than $80 million related to the production of the T-50	The contracts provide for in-country production support and training in the Republic of Korea. BAE Systems is a subcontractor to Korean Aerospace Industries and LG Innotek Ltd. It began phase one deliveries in December 2004; phase two deliveries are due to be completed in 2010.	
Korea Aerospace Industries	Martin Baker	Ejection seat			
Korea Aerospace Industries	Claverham	Ejection seat electro-mechanical seat/raise actuator			
Korea Aerospace Industries	Honeywell Defense Avionics Systems Div	Cockpit displays		The cockpit displays include two 127mm full colour Honeywell multifunction and instrumentation displays.	
Korea Aerospace Industries	Goodrich	Power take-off shafts			
Korea Aerospace Industries	Goodrich	Air data systems, engine nozzle hydraulic pumps, fuel measurement, management, ice detection systems, aircrew escape systems spares, exterior lights			
Korea Aerospace Industries	Whittaker Controls, Inc	Valves			
Korea Aerospace Industries	Lockheed Martin Aeronautics Co., Fort Worth	Wing, avionics, flight control systems			
Korea Aerospace Industries	Hamilton Sundstrand	APU			
Korea Aerospace Industries	Hamilton Sundstrand	Emergency power system		The emergency power system is based on high voltage, high energy density thermal batteries which serve as the primary source of power. An electric motor driven hydraulic pump and a DC/AC inverter provide the emergency flight control power. An APU mounted starter/generator provide supplementary power when the thermal battery is discharged.	

Korea Aerospace Industries	Hamilton Sundstrand	Pneumatic output, electric starter system, integral oil system, FADEC unit, flight critical software to DO-178B level A, automatic start, MIL-STD-1553 or ARINC 429 data bus, serial port for data retrieval, over-speed protection, over-temperature protection, low oil pressure and high oil temperature protection, air turbine starter control, main engine start, gearbox motoring speed, torque limiting			
Korea Aerospace Industries	Electric General Aviation (formerly Smiths Aerospace Electronic Systems)	Main generator system (MGS)		The MGS is a 40 kVA variable speed constant frequency-based generator system. General Electric is assisting the T-50 Korea industry participant, Kyungju Aerospace Electrical Systems (KAES) for local production of the T-50 MGS.	
Korea Aerospace Industries	Electric General Aviation (formerly Smiths Aerospace Electronic Systems)	Voice/data recorders			
Korea Aerospace Industries	Sargent Fletcher	External fuel tank		The 150-gallon fuel tanks can be carried on the centerline station and the inner under-wing stations in a one-, two- or three-tank configuration. A single tank extends mission duration/range about 15-20%.	
Korea Aerospace Industries	Grimes Aerospace Co.	Flight instrument displays			
Korea Aerospace Industries	Argo Tech system	Fuel system			
Korea Aerospace Industries	Electric General Aviation (formerly Smiths Aerospace Electronic Systems	Battery charging system			
Korea Aerospace Industries	GE Aircraft Engines (GEAE)	Engine	$80 million	The F404-GE-102 engine, with a three-fan stage and seven axial stage arrangement, is equipped with FADEC and generates 78.7kN with after-burn.	

Korea Aerospace Industries	Korean Air Lines, Aerospace Division	Aft fuselage and tail section			
Korea Aerospace Industries	Korea Aerospace Industries Ltd. (KAI)	Mid-fuselage section		KAI is the prime contractor and is responsible for the design of the fuselage and tail unit.	
Korea Aerospace Industries	Meggit Aircraft Braking Systems	Carbon brakes			
Korea Aerospace Industries	Lockheed Martin	Radar		The APG-67(V)4 multimode fire control radar has been selected.	
General Electric	Goodrich Fuel and Utility Systems	Fuel systems			
General Electric	Goodrich	F-404 engine pump			

6.7 Russia

6.7.1 Sukhoi SU 35/SU 30-MKI

Purchase	Supplier	Work Package	Value	Comment	Date awarded
Sukhoi Design Bureau	Sukhoi Design Bureau	See comment		Sukhoi Design Bureau is responsible for the development, testing and overall serial production management,	
Sukhoi Design Bureau	KnAPPO	See comment		The aircraft is assembled by KNAPPO, part of the Sukhoi Aviation Holding Joint Stock Company.	
Sukhoi Design Bureau	Zvezda	Ejection seat		The aircraft features the K-36D-3.5E zero-zero ejection seat.	
Sukhoi Design Bureau	Avionika Moscow Research and Production Complex JSC (MNPK Avionika).	Fly-by wire control system			
Sukhoi Design Bureau	NPO Saturn and Ufa Engine Production Association	Engines		The aircraft is powered by two Saturn The UFA 117S engines feature thrust-vectoring nozzle control, each supplying 86.3kN thrust or 142.2kN with afterburn, a development of the AL-	

	(UMPO) in Ufa.			41F.	
Sukhoi Design Bureau	Tikhomirov Scientific-Research Institute of Instrument Design (NIIP)	Radar		The aircraft features an X-band multimode phased array Irbis-E radar. It is reported to be bale to track up to 30 aerial targets at 350-400 km range.	
Sukhoi Design Bureau	UOMZ (Ural Optical and Mechanical Plant)	Electro-optical search and track system		The OLS-35 electro-optical search-and-track system combines a scanning infra-red direction finder and thermal imaging module for target detection and identification with a laser rangefinder/designator and TV camera.	
Sukhoi Design Bureau	Instrument Design Bureau of Ramenskoye and affiliated companies of Tekhnokompleks Research and Production Association	Displays		The aircraft features two 230mm×305mm high-resolution MFI-35 liquid crystal displays with a multifunction control panel and a IKSh-1M head-up display.	
Sukhoi Design Bureau	PMZ Voshod	Flaperon control actuator, leading-edge actuator, horizontal tail actuator, flow control module of horizontal tail control, leading-edge flow control module, servo unit for leading-edge fly-by-wire system, electrohydraulic flow control module for rudder and flaperon control, electrohydraulic flow control Module for engine bell deflection control, electrohydraulic actuator of radar system, rudder and flaperon actuator module, multichannel servo unit for horizontal tail fly-by-wire system, multichannel power actuator for tail surface fly-by-wire system			
Sukhoi Design Bureau	Hindustan Aeronautics Limited	Assembly		The Su-30MKI has been jointly designed by the Sukhoi Design Bureau and Hindustan Aeronautics Limited(HAL). In 2000, an agreement was reached for the license production of 140 Su-30MKIs by HAL in India; the first India-built Su-30MKI is to roll out from HAL Nasik in 2010.	
Hindustan Aeronautics Limited	Elbit	Displays		Displays are based on Elbit Su 967 HUD units and seven liquid crystal multifunction displays, six 127 mm x 127 mm and one 152 mm x 152 mm	

				display.	
Hindustan Aeronautics Limited	Defence Research and Development Organisation (DRDO)	Radar warning receiver		Sukhoi Su-30MKI features the "Tarang" radar warning receiver.	
Hindustan Aeronautics Limited	ELTA	Self-protection jammer		The aircraft features an Elta EL/M-8222 self-protection jammer.	

6.7.2 Antonov AN-148

Contractor	Supplier	Work package	Value	Comment	Awarded
The Aviant/Kharkov/Voronezh consortium	Aviant	Final assembly		The programme is a risk sharing agreement between the Aviant Kiev plant, Kharkov State Aircraft Manufacturing Company and the Voronezh Joint Stock Aircraft Building Company (Russia). Final assembly takes place at the Kiev Aviant plant. Aviant also manufactures fuselage section F-1; fuselage section F-2; and the outer wing panels.	
The Aviant/Kharkov/Voronezh consortium	Voronezh Joint Stock Building Company	Wing components, engine pylons		The company manufactures: fuselage section F-3, the canopy main frame, doors, door panels; wing leading edge panels; mechanisms, lifting bags and reduction gears for wing high-lift devices; aggregates of wing high-lift devices; tail unit. The wing high-lift devices and engine pylons for attachment of the main engines are delivered to Antonov for integration with the wing.	
The Aviant/Kharkov/Voronezh consortium	Antonov ASTC	Passenger cabin interior, anti-icing system pipes, doors and hatches, assembly work.			
The Aviant/Kharkov/Voronezh consortium	Kharkov State Aircraft Manufacturing Company	Wing			
The Aviant/Kharkov/Voronezh consortium	Motor Sich JSC	Engines		The 436-148 is a variant of the D-436T1 installed on the Tu-334. The engine was designed by Ivchenko-Progress State Enterprise.	
The Aviant/Kharkov/Voronezh consortium	Ukranalit	Fire detection systems			
The Aviant/Kharkov/Voronezh	Electronpry lad JSC	Flight recorders			

consortium					
The Aviant/Kharkov/Voronezh consortium	Ukrainian Scientific Research Institute Radioapparatura (UkrNIIRA)	Communications equipment			
The Aviant/Kharkov/Voronezh consortium	NII Buran	Components			
The Aviant/Kharkov/Voronezh consortium	Aviacontrol JSC	Altimeters			
The Aviant/Kharkov/Voronezh consortium	Aviapribor – Holding JSC (Moscow),	Avionics and aircraft data acquisition systems			
The Aviant/Kharkov/Voronezh consortium	Joint Avia Teploobmennik JSC	Pressurisation components			
The Aviant/Kharkov/Voronezh consortium	Techpribor JSC	Engine monitoring system			
The Aviant/Kharkov/Voronezh consortium	Rubin JS	Hydraulic systems			
The Aviant/Kharkov/Voronezh consortium	Crouzet Automatismes	Arc fault circuit breakers			
The Aviant/Kharkov/Voronezh consortium	Thales	Flight control system			
The Aviant/Kharkov/Voronezh consortium	Liebherr	Integrated air management system			
The Aviant/Kharkov/Voronezh consortium	Litef	Attitude and heading reference systems		The systems use fibre optic rate gyros to provide aircraft motion and attitude data to the primary flight control and pilot instrument systems.	
The Aviant/Kharkov/Voronezh consortium	Goodrich Hella Aerospace	Lighting systems			
The Aviant/Kharkov/Voronezh	Pall Corporation	Filtration systems			

consortium					
The Aviant/Kharkov/Voronezh consortium	Monogram Systems	Interiors			
The Aviant/Kharkov/Voronezh consortium	Dunlop Aircraft Tyres	Aircraft tyres			
The Aviant/Kharkov/Voronezh consortium	Rockwell Collins	Radio communications equipment			

6.7.3 Irkut Corporation MC-21

Contractor	Supplier	Work package	Value	Comment	Awarded
Irkut Corporation	Gidromash	Landing gear			August 2009
Irkut Corporation	Hamilton Sundstrand	Electric power generating system, secondary electrical power distribution, auxiliary power unit, wing anti-ice and bleed air conditioning for the nitrogen generation system.	The value of all MC-21 work is expected to be worth approximately $2.3 billion over the life of the programme	The nitrogen generation system is being developed with Intertechnique	August 2009
Irkut Corporation	Hamilton Sundstrand and NPO Nauka	Integrated air management system		NPO Hamilton Standard – Nauka, a joint venture between Hamilton Sundstrand and OAO NPO Nauka, was established in 1994 in Moscow and specializes in development and production of heat exchangers for commercial aircraft air-conditioning systems. The heat exchangers manufactured by the company are operated by Boeing, Airbus, Embraer, Bombardier and Tupolev.	August 2009
Irkut Corporation	Hamilton Sundstrand and ECE	Power distribution company		ECE is part of the Zodiac Group.	August 2009
Irkut Corporation	Kidde Aerospace & Defense and L'Hotellier and Hamilton Sundstrand	Fire detection and suppression system		Kidde Aerospace and Defense is a Hamilton Sundstrand company.	August 2009
Irkut Corporation	C&D Zodiac	Interiors		C&D Zodiac is part of the Zodiac Group.	August 2009
Irkut Corporation	Intertechnique	Fuel system, oxygen system, nitrogen generating system		Intertechnique is part of the Zodiac Group.	August 2009

Irkut Corporation	Eaton Corporation	Hydraulic system		Eaton Corporation has placed more than 50% of the contract's value with Russian enterprises (see below).	August 2009
Eaton Corporation	PMZ Voshod	Hydraulic system actuators			August 2009
Eaton Corporation	PKO Teploobmennik	Hydraulic system components			August 2009
Eaton Corporation	MIZ Znamya	Hydraulic system components			August 2009
Eaton Corporation	Tehpribor	Hydraulic system components			August 2009

6.7.4 Sukhoi Superjet 100

Contractor	Supplier	Work package	Value	Comment	Awarded
Sukhoi	Novosibirsk Aircraft Production Association (NAPO)	The company manufactures about 40actuators of the aircraft including the nose section, vertical and horizontal tail surfaces and the auxiliary power unit.		The company is a member of the Sukhoi holding company. NAPO is making the forward and after sections of the aircraft along with the empennage, with the rest to be made in Komsomolsk-on-Amur. The first 95-seat aeroplane was completed KnAAPO in 2006. The 75-seat version will be assembled in Novosibirsk, with many components and substructures to be made by KnAAPO.	
Sukhoi	Komsomolsk-on-Amur Aircraft Production Association (KnAAPO)	Wing and fuselage sections, final assembly		The company is a member of the Sukhoi holding company. A new final assembly plant has been constructed at Komsomolsk-on-Amur, based on an SU-27 assembly factory. A second delivery centre is also planned as apart of the agreement with Alenia Aeronautica on aircraft sales and support (see below). The production rate is planned for around sic Superjet 100s a month. In June 2006 the Komsomolsk-on-Amur plant finished the first aircraft's centre wing section assembly. The factory also made fuselage sections and wing panels assembly unit for static tests. Between 2008—2010 KnAAPO plans to build 100 Superjet 100s. The production of Superjet 100s is scheduled to make up 25actuators of all KnAAPO output.	
Sukhoi	VASO	Composite parts			
Sukhoi	Thales	Avionics	$120 million	Thales is the full integrator and avionics supplier of the flight deck aboard the Sukhoi regional jet programme family. Sukhoi and Thales announced in December 2004 the signature of a protocol to provide the development and integration of Thales' full avionics suite on board the aircraft, developing working environment, based on a similar design that equips the Airbus A380. The avionics suite provided by Thales, includes the cockpit display, communication, navigation and	June 2005

				surveillance systems.	
Sukhoi	Goodrich	Wheels and brakes		Goodrich will be integrating and supplying the wheels, carbon brakes, brake control system, tire pressure indicating system and brake temperature monitoring system technologies.	January 2004
Sukhoi	Libherr Aerospace PMZ Voscod Design Centre Russia	Flight control system		Liebherr is supplying both the primary and secondary flight control system, the first time the company has been given the contract to supply both control systems on a single aircraft. Liebherr is supplying the pilot cockpit controls, including the sidestick controller hardware, in partnership with MPC.	September 2003
Sukhoi	Liebherr	Air conditioning system		Liebherr-Aerospace Toulouse is developing the SuperJet 100 air conditioning system alongside that of the ARJ21. The system comprises air conditioning, engine bleed air system, cabin pressure control system, anti-ice system, and high- and low-pressure distribution systems.	September 2003
Sukhoi	B/E Aerospace	Cabin interior, oxygen system, interior lights		The company is supplying a turn-key interior cabin; B/E is the prime vendor in the design, engineering, and manufacture of the complete aircraft cabin interior which includes sidewalls and ceilings, baggage bins, passenger service panels with reading lights and signage, crew and passenger oxygen systems, passenger and crew seats, closets, galleys, ovens, refrigeration and beverage makers, lavatories, water supply and waste systems, cabin management systems and cargo compartment components. According to the company B/E's Flight Structures unit (FSI) will serve as the integrator for the RRJ interior, providing overall programme management, systems integration and certification services for the project. Other B/E Aerospace-provided products include the emergency oxygen systems for passengers and crew, the PSUs and lighting systems.	March 2004
Sukhoi	NPO Saturn Snecma	Engines		The Sukhoi RRJ is powered by two SaM146 turbofan engines. Each SaM146 engine is rated at 62kN to 71kN. The SaM146 engines installed on the aircraft wing passed the first successful engine run in February 2008. The two companies created a jointly owned subsidiary PowerJet to handle all aspects of the programme: design, production, marketing and support. Snecma is responsible or the core engine, control system (FADEC), transmissions (accessory gearbox, transfer gearbox), overall engine integration and flight testing. NPO Saturn is responsible for the components in the low pressure section and engine installation.	April 2003
Sukhoi	Intertechni	Fuel systems		The aircraft has a fuel capacity of 13,135l.	

	que				
Sukhoi	Hamilton Sundstrand	Electrical systems			
Sukhoi	MMPP Salyut Honeywell	APU		The RE220[RJ] for the Superjet 100 is a derivative of Honeywell's RE220 APU family and was one of the first western regional APUs to receive a type certificate by the Interstate Aviation Committee Avian Register, the Russian equivalent of the FAA. The RE220[RJ] APU will start up to 37,000 feet and operate to 41,000 feet. It will deliver up to 110 lbm/min with a simultaneous electrical load of 40 kVA for main engine starting and Environmental Control System operation. It will deliver 40 kVA to support electrical needs up to 41,000 feet, and bleed air for MES or ECS up to 25,000 feet.	July 2006
Sukhoi	Boeing	After-sales support and advice		An agreement was signed in June 2007 between Sukhoi and Boeing to expand Boeing's participation in the Superjet project. According to the agreement, said Sukhoi, "Boeing will explore opportunities to assist Sukhoi in areas including, but not limited to: flight and maintenance crew training, spare parts management and supply, guidance on production of flight and maintenance manuals that meet international standards….Boeing will expand its participation in the organization of after-sales support. It means it will assist Sukhoi in the development of its own infrastructure, will ensure access to infrastructure and modern technologies of Boeing's after-sales service, including the training of personnel as well as access to the infrastructure of the distribution of spare parts. " In 2002 Sukhoi selected Boeing to serve as advisor to the programme.	June 2007
Sukhoi	Curtiss Wright	Fire suppressant system			
Sukhoi	Messier Dowty	Landing gear		The Toronto division is managing the Superjet 100 retractable twin-wheeled tricycle-type landing gear programme, handling design of the main landing gear and the landing- gear systems. The nose gear design is being managed by Vélizy. Production takes place in Toronto. The contract covers: nose and main landing gear, cockpit subsystems, emergency extension, steering control, electrical harnesses, door mechanisms, actuators, uplocks, and the extension/retraction and steering systems.mBidos delivered the Nose Landing Gear unit in August 2007, and Toronto delivered the Main Landing Gear in August 2007. The gears were then transferred to the final assembly line in Komsomolsk.	November 2003

Sukhoi	Parker	Hydraulic system			
Sukhoi	Finmeccanica/Alenia	Marketing		In June 2006 Sukhoi Aviation Holding and Italian Finmeccanica Group, as well as their subsidiaries Sukhoi Civil Aircraft Company (SCAC) and Alenia Aeronautica, signed an Agreement on Strategic Partnership on the Russian Regional Jet (RRJ) Programme – since renamed the Superjet 100. The agreement provided for Alenia Aeronautica to acquire 25actuators + 1 share of SCAC (subject to government approval) and to participate in financing of not less than 25actuators of the programme., Alenia Aeronautica seconded a team of its experts to SCAC to work in certification, procurement, sales, after-sale support and other business units and will provide advanced materials and systems. In September 2007 Alenia Aeronautica, a Finmeccanica company, and Sukhoi Company announced in Venice, Italy the setting up of Superjet International, the new joint-venture focused on worldwide after sales support and marketing and sales on western markets of the Superjet 100 regional aircraft family.	
Sukhoi	Ipeco	Crew seats			
Sukhoi	Technical Airborne Components	Control, structural and system rods			
Sukhoi	ECE	Landing light lamps, integrated cockpit panels		ECE also deliver the complete suite of panels for the cockpit in addition to the computer for the secondary electrical load management.	
Sukhoi	Aircelle	Thrust reversers for the SaM146			
Sukhoi	Sagem Défense Sécurité	Engine overspeed unit			
Sukhoi	Hispano-Suiza	Electrical equipment, hydromechanical equipment,			
Sukhoi	Technofan	Fans			
Sukhoi	Microturbo	Pneumatic starting system			
Sukhoi	Air Cruisers	Evacuation systems		Air Cruisers supplies evacuation systems (escape slides and/or slide rafts) to the following aircraft: Boeing 737, 767, 777,Airbus A319, A320, A321, Sukhoi SuperJet 100 and the ARJ-21	

Thales	CMC Electronics	Flight management system (FMS)		The CMA-9000 will provide the aircraft with multi-sensor based navigation and enhanced operational capability and is derived from the company's CMA-900 FMS/GPS and CMA-3000 helicopter FMS. The single unit CMA-9000 has civil certified multi-sensor (GPS, INS, DME and EGI) navigation capabilities. It conforms to the ARINC-739 multifunction control display unit standard, making it suitable as a display and control unit for other systems such as ACARS, ACMS and Satcom.	July 2006
Goodrich	EmbVUE	Software engineering, verification and validation services for the brake control unit.			March 2007
Liebherr	MPC	Aircraft controls			
PowerJet	Avio	Engine combustion chamber		As well as taking responsibility for combustion chamber Avio is also responsible for development, design and production of transmission control accessories.	
PowerJet	Hispano-Suiza	Engine control system			
PowerJet	Aircelle	Nacelle and thrust reversers			
PowerJet	Sofrance	Nozzle fuel filter			
PowerJet	Techspace Aero	Engine lubrication systems			
PowerJet/Hispano-Suiza	Vibro-Meter	Engine vibration sensors			

6.7.5 Mil Mi-38

Purchaser	Supplier	Work Package	Value	Comment	Date awarded
Mil Moscow Helicopter Plant	Mil Moscow Helicopter Plant	Development, design, component and flight testing			
Mil Moscow Helicopter Plant	Kazan Helicopters	Manufacturing		The company is responsible for the manufacture of the fuselage, rotors and final assembly.	
Mil Moscow Helicopter Plant	Stupino	Titanium main rotor head and elastomeric bearings			
Mil Moscow Helicopter Plant	Pratt & Whitney Canada and Pratt & Whitney Russia	Engines		The two companies have signed a memorandum of understanding to produce the PW127TS engine; JSC "Helicopters of Russia", JSC "Ufa Engine Industrial Association" (UMPO) and the Central Institute of Aviation Motors (CIAM), P&WC will be responsible for developing a turboshaft version of its PW127 engine and having it certified to	May 2008

				Transport Canada and Russian standards. The engines are rated at 2,500hp (1,864kW), fitted with FADEC (full authority digital engine control). The PW127TS engines will be sold to Helicopters of Russia in kits. Modules to convert and adapt the PW127 as a turboshaft, will be built in Russia under the technical supervision of P&WC's Russian affiliate, Pratt & Whitney Russia of St. Petersburg.	
Mil Moscow Helicopter Plant	Thales	Avionics		The flight deck comprises five multifunction colour and has been developed by Thales with ZAO Transas. The integrated avionics suite includes four-channel autopilot, automatic navigation system, weather and navigation radar, vehicle monitoring system and an autostabilisation system. The helicopter is fitted with fly-by-wire controls with manual back-up controls.	

6.7.6 Russian Helicopters Sapsan (Mi-34S2)

Purchaser	Supplier	Work Package	Value	Comment	Date awarded
Russian Helicopters	Turbomeca	Engine		The Arrius 2F provides 504 shp take-off power.	August 2009
Russian Helicopters	Reduktor PM	Main and tail gearboxes, transmission shafts			August 2009
Russian Helicopters	Stupino Machine-Building Industrial Enterprise	Main and tail rotor heads, swash plate			August 2009
Russian Helicopters	Arsenyev Aviation Company Progress	Hull, main and tail rotor blades and helicopter assembly			August 2009

Appendix one – major airframe and engine contract wins, 2005-2009

2005

Airliners							
Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
Airbus	Irkut Scientific Production	Irtkutsk, Russia	Tank panels	Airbus A318/A319 /A319CJ/A320/A321	$200 million	Following from a 2004 cooperative agreement, IRKUT's contract awarded in December 2005 comprises wall panels for the A320 family auxiliary centre tank, A330/A340 family wing ribs and flap-track roller beams, plus other major components for the A320, A330/A340, and A380 aircraft. In December 2004, IRKUT won Airbus work packages worth $200 million over ten years. A320 family components are made at its facility in Irkutsk. In December 2005 IRKUT sold ten percent of its shares to EADS.	Dec 2005
Nord Micro	Curtiss-Wright	Stratford, Ontario, Canada	Cabin pressure control system motor assemblies	Airbus A318, A319,A319 CJ/A320/A321	The contract represents a potential value of more than $10 million through 2011.	These motor assemblies are part of the cabin pressure control systems for existing commercial aircraft programmes, including the Airbus A320, A330 and A340 series and the Boeing 737. Additionally, the contract covers the supply of motors for installation on the new Boeing aircraft.	Oct 2005
Sagem	Barco	Brussels, Belgium	Cockpit systems	Airbus A380	The deal holds a potential business volume of 30 million Euros over the lifetime of the A380 programme.	Barco has won a multi-million euro follow-on contract from Sagem SA, Paris, France, for the delivery of onboard maintenance terminals and terminal processing units.	Apr 2005
ATR	Thales	Paris, France	Cockpit	ATR 42-600/72-600	The contract is expected to generate around $400 million over a 10 - 12 year period.	Thales is supplying the new glass flight deck, which includes 5 LCD displays, the Flight Management System, a communication and navigation systems including GNSS/WAAS capability ready for low RNP operation, as well as a new autopilot with Cat3A approach capability.	Oct 2005
Boeing	Curtiss-Wright	Shelby, North Carolina, USA Stratford, Canada, USA Irwindale, California and Long Beach,	Actuators	Boeing 737-600,-700,-800,-900; Boeing 767-200/-300/-400ER; Boeing 777		The company has signed a long term agreement with Boeing Commercial Airplanes, giving the company exclusive rights to manufacture products for Boeing production airplanes including 747 leading edge slat actuators; 737 and 767 trailing	Nov 2005

		California USA		all types; Boeing 747-8		edge flap actuators; 777 flap position gearboxes; 767 and 777 cargo door actuators; 747, 767 and 777 cargo hold smoke detectors, and various flight control and position sensors.	
Boeing	BAE Systems	Los Angeles, California, USA	Actuator control electronics, digital flight controls	Boeing 777 – all types		The company is providing actuator control electronics (ACE) units for Boeing 777 aircraft through 2012. BAE Systems has supplied this equipment to Boeing since 1990 under a contract that was set to expire at the end of 2005.	Apr 2005
Boeing	Astronautics Corp	Milwaukee, USA	Dual class 3 EFBs	Boeing 787		The 787 is the first Boeing aircraft that will offer dual Class 3 EFBs as a standard system. The company provided EFBs to the Boeing 777	May 2005
Boeing	Chengdu Aircraft Industrial (Group) Co. Ltd	Sichuan Province, China	Composite rudder	Boeing 787/Boeing 737		A $600 million contract announced in by Boeing to a group of Chinese suppliers. Chengdu has also been contracted to supply the Boeing 737 forward entry door and the Boeing 737 automatic over-wing exit door.	Jun 2005
Boeing	CTT Systems	Nykoping, Sweden	Zonal drying system	Boeing 787	The potential total value (including after market) exceeds $250 million over the expected life of the programme	The CTT zonal drying system will be base- line equipment. Humidifiers will be offered as an option for flight deck and crew. The equipment controls build-up of condensation	Aug 2005
Boeing	Diehl Luftfahrt Elektronik (DLE)	Nuremberg, Germany	LED-based lighting systems for the main cabin of the 787	Boeing 787		The work package comprises indirect ceiling wash lights, sidewall wash lights, entry lights, galley lights and accent lights. The use of these LEDs means the interior can change in colour and brightness throughout the flight.	Apr 2005
Boeing	Donaldson Company	Minneapolis, Minnesota, USA	Air purification system	Boeing 787		The technology is based on HEPA filtration, a new gaseous filtration method that removes gaseous irritants and odours from the aircraft cabin, as well as allergens, bacteria and viruses.	May 2005
Boeing	Dräger Aerospace	Lübeck, Germany	Passenger service units	Boeing 787	Up to $200 million	The PSUs will house service systems for passengers, including emergency oxygen, personal lighting, ventilation and signs. The company is part of Cobham's Aerospace Systems Group (ASG)	Aug 2005
Boeing	EADS Composites Atlantic	Lunenberg, Nova Scotia, Canada	Composite diagonal brace (for the pylon-to-wing attachment section)	Boeing 787			Sep 2005
Boeing	Fuji Heavy Industries	Nagoya, Japan	Centre wing box	Boeing 787		Measuring 17.4 feet long by 19 feet wide, the composite structure is the lower skin of the centre wing box. Fuji has built two plants in Nagoya for the 787: one for the composite wing box and the other for assembly work. The Fuji wing box is assembled and	May 2005

						attached to the main landing gear well produced by Kawasaki. Once finished, a barge takes the joined structure to Nagoya's Centrair airport where it is loaded onto a Boeing 747 cargo aircraft and flown to Charleston, South Carolina.	
Boeing	Hafei	Pingfang District, Haerbin, China.	Wing-to-body fairing panels	Boeing 787	Part of the $600 million deal (see "Chengdu entry above).	The company is affiliated to the Chengdu Aircraft Industrial Group based in Sichuan Province, China. Hafei's capabilities include composite and sheet metal manufacturing, numerically controlled machining, tooling design and production, and complex structure assembly and integration.	Jun 2005
Boeing	Ipeco	Southend-on-Sea, Essex, UK	Cockpit Seats	Boeing 787			Apr 2005
Boeing	Jamco	Tokyo, Japan	Lavatories	Boeing 787	The total value of the 787 contracts awarded to Jamco by Boeing is estimated to be over $1 billion through the life of the programme.	Jamco has a sole contract for galleys, lavatories, flight deck door and bulkhead, and flight deck linings, consoles and stowage.	Nov 2005
Boeing	Jamco	Tokyo, Japan	Flight deck door	Boeing 787			May 2005
Boeing	Jamco	Tokyo, Japan	Flight deck bulkhead	Boeing 787			May 2005
Boeing	Jamco	Tokyo, Japan	Flight deck interiors including linings, consoles and stowage	Boeing 787		In March 2007 Jamco announced first delivery the 787 flight deck lining consoles at the end of February, 2007. Flight deck parts are being assembled in Wichita before being transported by air to Seattle for final assembly.	May 2005
Boeing	Kawasaki	Nagoya, Japan	Fixed trailing edge	Boeing 787			May 2005
Boeing	Kawasaki	Nagoya, Japan	Forward fuselage (43)	Boeing 787		The forward fuselage section made by Kawasaki also will be barged to the airport and flown to Charleston on a Large Cargo Freighter. The Kawasaki plant will have about 100 workers, though that will depend on the production rates. Fuji executives said they will require only about 150 workers at the company's two 787 plants	May 2005
Boeing	Kawasaki	Nagoya, Japan	Main landing gear wheel well (45)	Boeing 787			May 2005
Boeing	Korry Electronics	Seattle, Washington, USA	Flight deck control panels	Boeing 787		Korry, an Esterline Technologies company, is providing the flight-deck control panels which include the pilots' overhead panels and switches.	Jan 2005
Boeing	Korean Air Lines Aerospace Division	Seoul, Korea	Wing tips	Boeing 787		The raked wing tips are approximately 17 feet in length and provide aerodynamic efficiency for long-haul routes. The company	Oct 2005

						particates as a tier 2 supplier and also makes the fixed trailing edge and centre wing box.	
Boeing	Michelin	Greenville, South Carolina, USA	Tyres	Boeing 787		Michelin is the second source for aftermarket nose and main tyres for the aircraft. Michelin will offer a combination of traditional radial construction tires and new lightweight Near Zero Growth (NZG) construction tires. NZG construction offers increased resistance to cuts and wear, according to the company. The 787 will have 10 tyres; two for the nose landing gear and eight for the main landing gear.	Jun2005
Boeing	Monogram Systems (Zodiac)	Carson, California, USA	Water and waste system	Boeing 787		The company is part of the Zodiac group of France.	Nov 2005
Boeing	Panasonic Avionics	Lake Forest, California, USA. System production facilities in Osaka, Japan	In-flight entertainment system	Boeing 787		Panasonic is offering a wireless version of its X-Series platform, called X-Series Wireless.	Nov 2005
Boeing	PFW	Speyer, Germany; Izmir, Turkey; Farnborough, UK.	Metallic tubing/ducts	Boeing 787		This agreement includes the design and manufacture of tubes responsible for the fluid supply of the hydraulic systems. PFW will also design and manufacture tubes responsible for the supply of fuel to the engines and the auxiliary power unit as well as the nitrogen generation system, which ensures an inert atmosphere in the fuel tanks. It will also provide tubes for the integrated cooling system and the power electronics cooling system.	Oct 2005
Boeing	PPG Aerospace	Huntsville, Alabama, USA	Electro-chromic window technology	Boeing 787	Approximately $50 million in first five years	PPG Aerospace is providing electrochromic windows which will allow passengers to electronically shade their windows, replacing the plastic screens.	Dec 2005
Boeing	Saab Aerostructures	Linkoping, Sweden	Doors	Boeing 787	Approximately $100 million	The contract covers the design, development and manufacture of large cargo doors, bulk cargo doors and access doors. Saab will provide three door types, totalling seven doors per airplane. The doors will be made of advanced lightweight carbon-fiber composites.	Oct 2005
Boeing	Shenyang Aircraft	Shenyang, China	Vertical fin leading edge assembly	Boeing 787		Shenyang Aircraft Corporation, is an AVIC I-affiliated company,	Jun 2005
Cobham	Turbo Genset	West Drayton, UK	Fuel pump motors	Boeing 787	Up to $20 million		Aug 2005
Vought Aircraft Industries	EADS Military Aircraft	Munich, Germany	Aft pressure bulkhead	Boeing 787		The company is using the vacuum-assisted resin transfer mold (VaRTM) process to make a one-piece dome.	Oct 2005
Honeywell	Diehl Avionik Systeme	Nuremberg, Germany	High lift control hardware/software	Boeing 787			Jun 2005
Boeing/Smiths (now General Electric)	Crane Aerospace & Electronics	Lynwood, Washington, USA	Brake control and monitoring system for the landing gear	Boeing 787		The brake control and monitoring system is being provided to Smiths Aerospace (now General Electric), incorporating “integrated braking services “ (RIBS), a system which integrates antiskid control, brake temperature, wheel speed, and tyre pressure indication functions in an	Aug 2005

						electronic control unit located at each axle.	
Honeywell	Crane Aerospace & Electronics	Lynwood, Washington, USA	Power conditioning modules and batteries for common core flight control system	Boeing 787	$40 million	The flight control electronics system includes four cabinets, each of which includes a power control module and a battery. The developmental stage of the contract covered work from 2005 to 2008 with initial production units being delivered in 2008.	Apr 2005
Hamilton Sundstrand	FR-HiTEMP - now Eaton Aerospace	South Molton, Devon, UK Fareham, Hampshire, UK Wimbourne, Dorset UK	Distribution system within the nitrogen generating system (NGS)	Boeing 787			Jan 2005
Vought Aircraft Industries	Korean Air Lines (KAL) Aerospace Division	Busan, South Korea	Complete aft body structural assembly, nose wheel assemblies	Boeing 787			Oct 2005
Hamilton Sundstrand	Pall Corporation	East Hills, New York, USA	Air filters	Boeing 787		The exclusive contract is to provide cabin air purification filters as part of the overall airmanagement/environmental control system.	Mar2005
Vought Aircraft Industries	ASCO Aerospace Canada	Delta, British Columbia, Canada	Section 48 Upper fin deck bulheads	Boeing 787			Oct 2005
Honeywell Aerospace	Astro-Med	West Warwick, Rhode Island, USA	Cockpit printers	Boeing 787		Astro-Med Inc (US) signed a contract with Honeywell Aerospace to supply a version of its ToughWriter 4 printer for the aircraft cockpit.	Aug 2005
Vought Aircraft Industries	Boeing Canada Technology	Winnepeg, Canada	Shear ties and completed frame assemblies	Boeing 787		Boeing Winnipeg is a Tier I partner to the 787 programme responsible for the wing to body fairing, main landing gear doors and the vertical fin fairing for the life cycle of the programme. Boeing Winnipeg will also supply engine strut forward and aft pylons for the 787 as a tier two partner – and mid-fuselage section components to Global Aeronautica	Oct 2005
Vought Industries	C & D Aerospace	Marysville, Washington, USA	Composite frames	Boeing 787		C&D Aerospace, part of the Zodiac Group, will produce structural composite frames for Vought using a resin film infusion process.	Oct 2005
Hamilton Sundstrand	FR-HiTEMPi	FR Hi Temp, part of the Eaton group of companies is located at South Molton, Devon; Fareham, Hampshire; Wimbourne, Dorset UK	Distribution system within the nitrogen generating system (NGS)	Boeing 787			Jan 2005
Global Aeronautica	Fuji Heavy Industries	Nagoya, Japan	Mid-fuselage section components	Boeing 787			Feb 2005
General Electric	Saab Avitronics	Jonkoping Sweden	Electrical motor/ motor controller units	Boeing 787		The contract with Smiths (now General Electric) comprises development, production and support of an electric motor	Oct 2005

						controller unit and an electric motor unit providing an electrical backup for actuation of the high-lift actuation System for both the leading edge slats and the trailing edge flaps.	
PFW (now Intellifast)	Garner CAD Technic	Munich Germany	Tubing elements	Boeing 787		Garner CAD Technic (GCT) to assist with the design of the tubing elements	Oct 2005
Korry Electronics	IDD Aerospace	Redmond, Washington, USA	Dimmable light plates with LED back-lighting for flight deck control panel	Boeing 787		IDD will design and manufacture dimmable light-plates with LED backlighting for the pilots' main overhead panel and other aircraft control functions, totalling twenty-four panels per aircraft.	Jan 2005
Vought Aircraft Industries	Israel Aircraft Industries (IAI)	Tel Aviv, Israel	Section 48 pivot bulkheads, main deck and section 47 passenger/cargo floor grid assemblies and door surround structural assemblies	Boeing 787	Valued at approximately $500 million	Israel Aircraft Industries (IAI)'s Commercial Aircraft Group has a sole-source contract which runs for the lifetime of the 787 programme.	Oct 2005
PPG Aerospace	Gentex Corporation	Zeeland, Michigan, USA	Automatic window dimming systems	Boeing 787		Gentex is contributing its patented electro-chromic technology, as well as expertise in electronics and microelectronics.	Dec 2005
Hamilton Sundstrand	Eaton	Cleveland, Ohio, USA	Ducting	Boeing 787	An estimate $82 million over the life of the programme	The contract is to design, develop and supply ducting and associated hardware for use on both the nitrogen generating system and the cabin air conditioning and thermal control system.	Oct 2005
Rockwell Collins	Tecom Industries	Thousands Oaks, California, USA	SATCOM Antenna	Boeing 787		A long term purchase agreement for the HGA-2100 High Gain Antenna to meet the Boeing 787 SATCOM High Gain Antenna requirement. The HGA-2100 supports both voice safety services and cabin connectivity including internet access and sending and receiving of e-mails and faxes.	Sept 2005
Sukhoi	Thales	Paris, France	Avionics	Sukhoi Superjet 100	$120 million	Thales is the full integrator and avionics supplier of the flight deck aboard the Sukhoi regional jet programme family. surveillance systems.	Jun2005
Value of all 2005 airliner system, structures and component contracts, in the public domain							$3,602 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							$800 million
PMI Media estimates of total value of 2005 airliner system, structures and component contracts							$6,288 million
PMI Media estimates of low-wage manufacturing system, structures and component contracts							$1,047 million

Military transports							
Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
Airbus	Irkut Scientific Production	Irtkutsk, Russia	Structures and components	Airbus A330 MRTT		Following from a 2004 cooperative agreement, IRKUT's contract awarded in December 2005 comprises A330/A340 family wing ribs and flap-track roller beams, plus other major components for the A320, A330/A340, and A380 aircraft.	Dec 2005
Airbus Military Sociedad Limitada (AMSL)	Saab Aerostructures	Jönköping, Sweden	Crew access doors, high-lift control devices	Airbus A400M		Saab is building the high lift control and monitoring system for the A400M. The first production delivery will take place 2008. In November 2004 Saab was awarded a contract for crew entrance doors for A400M making Saab a risk-sharing partner in the A400M programme.	Mar 2005
Airbus Military Sociedad Limitada (AMSL)	EADS Defence Electronics	Ulm, Germany	Missile warning system, digital map generator system (DMGS), mission management computer	Airbus A400M		The company is supplying a missile warning system MIRAS based on infrared technology. The company has been awarded the contract to deliver 85 missile warning systems from 2010. The new product will be developed jointly by EADS Defence Electronics and Thales. MIRAS relies on infrared super-lattice detector technology successfully developed by AIM Infrarot-Module GmbH, Heilbronn/Germany. Some work packages have been subcontracted to Aselsan (Turkey). The DMGS will be installed on all firm order A400Ms. Previously, EADS Defence Electronics was selected to provide the Mission Management Computer (MMC) and Defensive Aid Computer (DAC).	Sep2005
Airbus Military Sociedad Limitada (AMSL)	B/E Aerospace	Wellington, Florida, USA	Integrated passenger and crew oxygen system	Airbus A400M	Approximately $45 million	The oxygen system includes crew and passenger oxygen storage, distribution and dispensing, as well as portable oxygen for medical and emergency use.	Sep 2005
Boeing Military Aircraft	Curtiss-Wright	Shelby, North Carolina, USA Stratford,	Actuators	Boeing KC-767		The company has signed a long term agreement with Boeing Commercial Airplanes, giving the company exclusive rights to	Nov 2005

		Canada, USA Irwindale, California and Long Beach, California USA				manufacture products for Boeing production airplanes including 747 leading edge slat actuators; 737 and 767 trailing edge flap actuators; 777 flap position gearboxes; 767 and 777 cargo door actuators; 747, 767 and 777 cargo hold smoke detectors, and various flight control and position sensors.	
EADS-CASA	TEAC	Montebello, California, USA	Digital mission data recorders	CN-235		TEAC Aerospace Technologies has supplied digital mission data recorders (MDR) for the CN-235 300M aircraft that have been selected by the US Coast Guard for the Integrated Deepwater System (IDS) programme.	Jul 2005
Lockheed Martin	Parker Aerospace	Irvine, California, USA, plus various Parker divisions located in Michigan, New York, Ohio, and Texas, USA	Flight control, hydraulic, fluid management, and control system components	C-130J		The company has been selected as strategic supplier to Lockheed Martin Aeronautics Co.'s F/A-22 Raptor, F-35 Joint Strike Fighter, F-16 Fighting Falcon, and C-130J Hercules programmes.	Feb 2005
Value of all 2005 military transport system, structures and component contracts, in the public domain							$45 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							-
PMI Media estimates of total value of 2005 military transport system, structures and component contracts							$560 million
PMI Media estimates of low-wage manufacturing system, structures and component contracts							-

Military fast jets							
Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
BAE Systems	BAE Systems Platform Solutions	Brough, UK	Mission computer and autopilot	BAE Systems Hawk 127/128 LIFT		The company is providing the mission computer and autopilot system for 20 Hawk 128 Advanced Jet Trainers ordered by the United Kingdoms Ministry of Defence. The mission computer is an open-architecture system in development at Platform Solutions facility in Edinburgh, UK. This computer provides the graphics for all six cockpit display panels and a head-up display. The autopilot system will enable the MoD to fly the Hawk in controlled civil airspace.The system consists of a computer, rate	Mar 2005

						gyro unit, tailplane actuator, and aileron actuators. The gyros will be provided by BEI Systron Donner, and the actuators by Smiths Aerospace (now part of General Electric). Platform Solutions is also providing the Inertial Navigation Global Positioning System (IN-GPS) system.	
BAE Systems	Goodrich	Charlotte, North Carolina, USA	Air data system	BAE Systems Hawk 127/128 LIFT		The company is providing its SmartProbe(TM) air data system for the Hawk Mk 128. The Goodrich SmartProbe system will provide air data information required by the avionics system to meet Reduced Vertical Separation Minimums (RVSM) flight requirements.	Feb 2005
Eurofighter consortium	Rohde & Schwarz/ Selex/ Indra	Munich, Germany Rome, Italy Madrid, Spain	VHF/UHF transceiver	Eurofighter EF 2000 Typhoon		The latest version of the aircraft's VHF/UHF radio equipment conforms to SATURN (Second Generation of Anti-Jam Tactical UHF Radio for NATO), standardized throughout NATO.	Jun 2005
Lockheed Martin	Parker Aerospace	Various Parker divisions are involved in F-16 work - California, Michigan, New York, Ohio, and Texas.	Flight control, hydraulic, fluid management and control system components, fuel pumps	Lockheed Martin F-16			Feb 2005
Lockheed Martin	Parker Aerospace	Irvine, California, USA, plus various Parker divisions located in Michigan, New York, Ohio, and Texas, USA	Flight control, hydraulic, fluid management, and control system components	Lockheed Martin F-22		The company has been selected as strategic supplier to Lockheed Martin Aeronautics Co.'s F/A-22 Raptor, F-35 Joint Strike Fighter, F-16 Fighting Falcon, and C-130J Hercules programmes.	Feb 2005
Lockheed Martin/Northrop Grumman/JSF programme office	L-3 Display systems	Alpharetta, Georgia, USA	Panoramic cockpit display (PCD) sub-system	Lockheed Martin F-35 Joint Strike Fighter	The potential contract value over the life of the programme is over $200 million.	The contract is for the System Development and Demonstration (SDD) phase. The display system includes the 20in x 8in active matrix liquid crystal displays and display management computer	Nov 2005
Lockheed Martin/Northrop Grumman/JSF	Parker Aerospace	See below	Flight control, hydraulic, fluid management, and control	Lockheed Martin F-35 Joint Strike Fighter		The company has been selected as strategic supplier to Lockheed Martin Aeronautics Co.'s F/A-22 Raptor, F-35 Joint Strike	Feb 2005

programme office			system components			Fighter, F-16 Fighting Falcon, and C-130J Hercules programmes.	
Lockheed Martin	Curtiss-Wright	Gastonia and Shelby, North Carolina, USA	Ordnance hoist system (OHS) and ordnance quick latch system (OQLS)	Lockheed Martin F-35 Joint Strike Fighter	An initial value of $2.2 million for the System Development and Demonstration (SDD) phase and a potential value of $120 million for the total programme requirements .	The equipment to be provided is a new requirement designated as Alternate Mission Equipment (AME) for ordnance loading, carrying, and unloading on all three aircraft variants (CTOL, STOVL, and CV). SDD hardware deliveries are anticipated to occur from 2006 through 2010. .	Nov 2005
Pratt & Whitney	Alp Aviation	Ankara, Turkey	Fan rear hub	Lockheed Martin F-35 Joint Strike Fighter		The contract follows on from the signing of the June 2005 industrial partnership between Pratt & Whitney and Alp Aviation.	Sep 2005
Pratt & Whitney	KaleKalip	Istanbul, Turkey	F135 high compressor shrouds sets	Lockheed Martin F-35 Joint Strike Fighter			Sep 2005
General Electric	GE Transportation Canada	Bromont, Quebec, Canada	Inlet guide vanes (IGV) and stage one high pressure compressor (HPC) variable stator vanes (VSVs) for the F136	Lockheed Martin F-35 Joint Strike Fighter	$450,000		Mar 2005
General Electric/Rolls Royce	BAE Systems, Power Systems Division	Johnson City, New York, USA	Engine full authority digital electronic control (FADEC) systems	Lockheed Martin F-35 Joint Strike Fighter		BAE Systems was selected by the GE Rolls-Royce Fighter Engine Team (FET) to develop a FADEC for the F136 engine, which uses two FADECs per engine. The FET plans to deliver the first production F136 engine in 2012. Orders for the BAE Systems FADEC could total as many as 5,000 units through 2030.	Sep 2005
Rolls-Royce	Dutch Aero	Eindhoven, the Netherlands	F136 blisks	Lockheed Martin F-35 Joint Strike Fighter		DutchAero is an AVIO and Philips joint venture company based in Eindhoven. The1.1m diameter bladed disk or “blisk” is part of the first stage compressor and is machined from a large solid titanium forging.	Jul 2005
Value of all 2005 military fast jet system, structures and component contracts, in the public domain							$321 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							-

PMI Media estimates of total value of 2005 fast jet system, structures and component contracts	$859 million
PMI Media estimates of low-wage manufacturing system, structures and component contracts	-

Rotorcraft							
Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
Lockheed Martin	Palomar Products	Rancho Santa Margarita, California, USA	Intercommunications system	US101/VH-71	$6.8 million		Oct 2005
Bell Helicopter Textron	Goodrich Fuel and Utility Systems	Rome, New York, USA	Cross wing interconnect drive system, engine nacelle flexible couplings	Bell Boeing V22	The contract is expected to generate approximately $40 million in original equipment and aftermarket sales.	Goodrich's Fuel and Utility Systems supplies the cross-wing and engine nacelle flexible couplings which transmit power between the two V-22 engine gearboxes. With the cross wing interconnect drive system contract, the Rome facility will also be providing the composite drive shaft assemblies, seal assemblies, bearing hangars and associated hardware.The drive system provides accessory power to the V-22 in normal operation and allows safe, single engine operation to drive the	Sep 2005
Bell Helicopter Textron	Chelton Flight Systems/S-TEC	Mineral Wells, Texas, USA	Integrated “glass cockpit”	Bell 407	Contract valued at more than $100 million	Chelton Flight Systems has been contracted as the system integrator and supplier of the EFIS. Chelton's Northern Airborne Technology provides dual 8.33 Mhz digital coms, a Mode-S transponder, and audio control. Comant, another Chelton company, supplies the antennas, and a 406 Mhz ELT with GPS interface from Chelton's Artex division will be available as an option. The EFIS consists of large-format portrait or landscape display and features Chelton's forward-looking real-time 3-D terrain and highway-in-the-sky navigation, Class-B helicopter TAWS, dual embedded FMS, integrated GPS-WAAS, digital flight recording, a solid-state air data computer, and a strap-down AHRS.	Sep 2005
Bell Helicopter Textron	Altair Avionics	Anaheim, California, USA	Aircraft and engine monitoring system	Bell 412		The company’s SmartCycle + system has been selected as part of the aircraft’s HUMS package.	Feb 2005
MD Helicopters	Kaman Aerospace	Bloomfield, Connecticut,	Rotor blades, pitch cases and flex	MD900/902		Kaman resumed production of rotorblades for the Explorer in November 2005. According to a	Nov 2005

		ISA	beams			Kaman statement at the time: "Under the terms of the agreement, the company today received a payment in the amount of $4.0 million from MDHI and is scheduled to receive additional payments totaling approximately $1.0 million by the end of the first quarter of 2006. These payments are all related to past due amounts for accounts receivable and inventory previously written off as part of a $20.1 million non-cash charge recorded during the third quarter of 2004 to eliminate the company's investment in its previous MDHI programmes. Those programmes included the blade work now being resumed, and production of fuselages for the MD-500 and MD-600 series of helicopters, which the company does not expect to resume."	
Sikorsky	Thales	Paris, France	Displays	Sikorsky S-76D		The S-76D cockpit features large-format displays that are consolidated in a console for improved visibility and situational awareness.	Dec 2005
Value of all 2005 rotorcraft system, structures and component contracts, in the public domain							$150 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							-
PMI Media estimates of total value of 2005 rotorcraft system, structures and component contracts							$176 million
PMI Media estimates of low-wage manufacturing system, structures and component contracts							-

Business jets							
Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
Cessna	L-3 Avionics	Grand Rapids, Michigan, USA	GH-3000 ESIS	Cessna CJ1 and CJ2		The system provides complete situational picture as a standby to the Pro Line 21 system	Jun 2005

Cessna	Rockwell Collins	Cedar Rapids, Iowa, USA	Integrated flight Information System retrofit programme	Cessna CJ1 and CJ2		The system enables operators to receive XM WX Satellite weather images and services for viewing directly on the cockpit display. The Collins FMS-3000 flight management system is fully integrated with an FAA approved electronic chart system which provides take-off and landing performance data. The V speed limit data are automatically calculated for the numbers of passengers entered and are shown on the primary flight display. The two primary flight displays are 8in x 10in active matrix colour liquid crystal displays.	Nov 2005
Diamond	Garmin	Olathe, Kansas, USA	Avionics	Diamond D-Jet		The Garmin G1000 integrated avionics suite features dual 12 inch primary flight displays (12" PFD) and a centrally mounted 15 inch multifunction display (MFD). The Garmin G1000 integrates all primary flight, navigation, communication, terrain, traffic, weather, engine instrumentation, and crew-alerting system data and presents the composite information on three high-definition displays.	Jun 2005
Embraer	Eaton	Irvine, California, USA	Thrust control, landing gear control lever, and landing gear hydraulic components.	Embraer 100/300	The value of the award is estimated at $20 million over the 10-year life of the programme.	See above	Oct 2005
Embraer	Eaton	Irvine, California, USA	Thrust control, landing gear control lever, and landing gear hydraulic components and flap actuators	Embraer 100/300	The revenues from these aerospace contract awards are estimated at $70 million over the life of the programme.	See above	Oct 2005

Embraer	Garmin	Olathe, Kansas City, USA	Integrated avionics suite	Embraer 100/300		The flight deck suite called "ProdigyTM" and features three interchangeable 12-inch displays – two primary flight displays (PFD) and one multi-function display (MFD). The system integrates all primary flight, navigation, communication, terrain, traffic, weather, engine instrumentation, and crew-alerting system data and presents the composite information on three high-definition displays	Nov 2005
Embraer	Pratt Pratt & Whitney Canada	Longueuil, Quebec, Canada	Engines	Embraer 100/300		PW617F turbofan engines for Phenom 100; PW535E turbofan engines for Phenom 300	May 2005
Gulfstream /IAI	Nordam	Tulsa, Oklahoma, USA	Interior components	Gulfstream G150/200		Under the terms of the contract, Notfsm will provide Gulfstream with the configured interior liner, which will include net trimmed headliners, side walls, ledges and dado panels ready for upholstery. Nordam will also provide computer numerical controlled (CNC)-machined flat and contoured composite panels, which Gulfstream will use to fabricate cabinetry for the G150 at its Dallas completion facility	Nov 2005
Honeywell	Nordam	Tulsa, Oklahoma, USA	Thrust reverser system	Gulfstream G150/200		Honeywell is the Integrated Power Plant System (IPPS) provider to Gulfstream for the aircraft.	Nov 2005
Stork Fokker	Shenyang Aircraft Corporation	Shenyang, China	Various components	Gulfstream G450/G500 /G550	Less than Euro 1 million	Shenyang Aircraft Corporation (part of AVIC-I) and Stork Aerospace have a contract for the machining of components for the Gulfstream G450, the G500 and the G550. The order relates to components for the aircraft which were formerly produced elsewhere. For the implementation of the contract SAC and Stork .	Nov 2005
Hawker Beechcraft Corporation (formerly Raytheon Aircraft)	ShinMaywa	La Palma, California, USA Kobe, Japan	Procurement services	Hawker Beechcraft Premier 1		The company has been contracted to undertake procurement services for the Raytheon Premier 1 rudder, elevator and spoiler.	2005
Hawker Beechcraft Corporation (formerly Raytheon Aircraft)	Kollsman	Merrimack, New Hampshire, USA	Cabin pressurisation control system	Hawker Beechcraft 400XP		The company, an Elbit Systems of America Company, was awarded a contract from the former Raytheon Aircraft Company to provide the cabin pressurization control system for the Hawker and Beechcraft King Air series of aircraft. Kollsman's autoschedule pressurization system, KAPS II, has been incorporated into new production aircraft models, including the Hawker 800XP, Hawker 400XP, Beechcraft King Air Models 350,8200 and C90.	Jun 2005

Hawker Beechcraft Corporation (formerly Raytheon Aircraft)	Kollsman	Merrimack, New Hampshire, USA	Cabin pressurisation control system	Hawker Beechcraft 850/900XP		The company, an Elbit Systems of America Company, was awarded a contract from the former Raytheon Aircraft Company to provide the cabin pressurization control system for the Hawker and Beechcraft King Air series of aircraft. Kollsman's autoschedule pressurization system, KAPS II, has been incorporated into new production aircraft models, including the Hawker 800XP, Hawker 400XP, Beechcraft King Air Models 350,8200 and C90.	Jun 2005
Value of all 2005 business jet system, structures and component contracts, in the public domain							$90.5 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							-
PMI Media estimates of total value of 2005 business jet system, structures and component contracts							$213.5 million
PMI Media estimates of low-wage manufacturing system, structures and component contracts							-

2006

Airliners

Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
Airbus	Patria	Helsinki, Finland	Main landing gear fairings	Airbus A318/A319/A319CJ/A320/A321		The multi-million Euro contact will provide approximately 150 man-years of employment .	Mar 2006
Hispano-Suiza	Vibro-Meter	Basingstoke, UK	Engine rotational speed sensors	Airbus A318, A319,A319 CJ, A320,A321	Around $20 million	This is an exclusive 10-year contract to supply Hispano-Suiza with aircraft engine rotational speed sensors. The sensors will be used on the CFM International CFM56 and General Electric GE90 aircraft engine families as well as a range of other engine applications. Vibro-Meter UK will undertake the manufacturing work related to this contract at its new facility in Basingstoke, Hampshire UK and the Meggitt Xiamen Sensors & Controls Ltd facility in Xiamen, China. Some military products in the package will be manufactured at the Vibro-Meter France facility in Angoulême.	Jun 2006
Airbus UK	Saab	Linkoping, Sweden	Ailerons	Airbus A318, A319,A319 CJ,		The company has delivered more than 1000 units since 2000, as the long-standing single source supplier of these ailerons. Saab Aerostructures	Jun 2006

				A320,A321		has developed new CFRP monolithic technologies which will reduce the number of parts on the ailerons by over half, as part of the 2006 deal.	
Boeing	Baoji Group	Shaanxi Province, China	See comment	All models	$147 million plus	The company is supplying about 4,300 tonnes of titanium products to Boeing between 2007 and 2009.	Jun 2006
Airbus	Crane Aerospace and Electronics	Lynnwood, Washington, USA	Door and slide control system	Airbus A330/A340		The DSCS monitors the position of the aircraft's passenger and cargo doors to ensure that they are safely closed, locked and latched	Feb 2006
Goodrich	FACC	FACC will manufacture the components at the new Facility IV to be built in Reichersberg (Upper Austria). Following the placement of the order, the original construction plans were enlarged as to production area and capacity, which will ensure a punctual and unhampered start of production in the year 2009. FACC will invest about € 56 million in the new 21,000 m2 production site.	Nacelle structures	Airbus A350 XWB	This contract provides for the supply of components for the entire lifetime of the aircraft and will generate a turnover of around $300 million for FACC	The contract calls for FACC to develop and manufacture of thrust-reverser components and the moveable blocker doors. These components are already being developed by FACC for the Boeing 787 and will be in series production starting September 2007. The first components will be delivered in the second quarter of 2007. These so-called engine development units will be subjected to numerous tests on engine test benches at GE before the first flight test units will be ready for take-off twelve months later.	Feb 2006
Boeing	Goodrich	Troy, Ohio, USA	Wheels and brakes	Boeing 737-600,-700,-800,-900			Jan 2006
Boeing	Kidde Technologies	Wilson, North Carolina	Smoke detectors	Boeing 737-600,-700,-800,-900		Shipments of the lavatory and crew rest compartment smoke detectors began in 2007.	Jul 2006
Hispano-Suiza	Vibro-Meter	Basingstoke, UK	Engine rotational speed sensors	Boeing 737-600,-700,-800,-900	Around $20 million	This is an exclusive 10-year contract to supply Hispano-Suiza with aircraft engine rotational speed sensors. The sensors will be used on the CFM International CFM56 and General Electric GE90 aircraft engine families as well as a range of other engine applications. Vibro-Meter UK will undertake the manufacturing work related to this contract at its new facility in Basingstoke, Hampshire UK	Jun 2006

						and the Meggitt Xiamen Sensors & Controls Ltd facility in Xiamen, China. Some military products in the package will be manufactured at the Vibro-Meter France facility in Angoulême.	
Boeing	Shimadzu	Tokyo, Japan	Actuators	Boeing 737-600,-700,-800,-900		Shimadzu is designing and manufacturing major control components for trailing edge flap drive system. Through the development experience gained from this programme, Shimadzu hopes that it will lead them to take a big step forward in this field. In 1976, Shimadzu started manufacturing components for Boeing 737s. Thereafter, the business expanded to include gearboxes, pneumatic system regulators, and electro-mechanical actuators for doors, wings, etc. on Boeing 747, 757, 767, and 777 families.	Dec 2006
Boeing	Kidde Technologies	Wilson, North Carolina,USA	Smoke detectors	Boeing 737-600,-700,-800,-900		Shipments of the lavatory and crew rest compartment smoke detectors began in 2007.	Jul 2006
Boeing	General Electric	Peebles, Ohio, USA	Engines	Boeing 747-8		In March 2008 the GEnx-2B engine demonstrated 70,950 lbs. of takeoff thrust during ground testing. Engine certification is anticipated in first half of 2009 with entry into service in late 2009. The engine features both a front fan case and fan blades made of carbon fiber composites.The GEnx-2B engine is optimized for the Boeing 747-8 aircraft, but shares the engine core and 80 percent of the line replaceable units (LRUs) as the GEnx-1B that powers the Boeing 787. IHI of Japan, TechSpace Aero of Belgium, Avio SpA. of Italy, Volvo Aero of Sweden and Samsung Techwin of Korea are revenue-sharing participants in the GEnx programme. The external team includes Middle River Aircraft Systems for the thrust reverser system, and Spirit AeroSystems, Inc., for the nacelle and strut. The internal Boeing supplier team includes Boeing Winnipeg for the aft pylon fairing, Boeing Portland for the engine mounts, and Boeing Propulsion Systems Division for the engine build-up and strut build-up.	Jan 2006
Boeing	Middle River Aircraft Systems	Chesapeake Bay, Maryland, USA	Thrust reverser	Boeing 747-8		Middle River Aircraft Systems (MRAS) will develop, certify and produce the thrust-reverser system for the 747-8. The company will become a new direct supplier to Boeing, supplying the thrust-reverser system directly to Boeing rather than through engine manufacturer GE. MRAS will develop an all-composite thrust reverser for the 747-8.	Jan 2006
Boeing	Spirit AeroSystems	Wichita, Kansas, USA	Nacelle and structures	Boeing 747-8		Spirit AeroSystems, Inc has design and build responsibilities for the engine struts and nacelles for the 747-8. Work includes the upper fairing, fan cowl support beam and strut box for the inboard and	Jan 2006

						outboard struts. Spirit's work package for the nacelles includes the inlet assembly, which will incorporate a seamless, one-piece composite acoustic barrel for a 105-in. diameter fan, composite fan cowl doors, the primary exhaust with sound-dampening chevrons, and plug (or cone).	
Boeing	Shimadzu	Tokyo, Japan	Trailing edge flap drive system components	Boeing 747-8		Shimadzu is designing and manufacturing major control components for trailing edge flap drive system. Through the development experience gained from this programme, Shimadzu hopes that it will lead them to take a big step forward in this field. In 1976, Shimadzu started manufacturing components for Boeing 737s. Thereafter, the business expanded to include gearboxes, pneumatic system regulators, and electro-mechanical actuators for doors, wings, etc. on Boeing 747, 757, 767, and 777 families.	Dec 2006
Boeing	Technofan	Toulouse, France	Fans	Boeing 747-8			
Boeing	Goodrich	Charlotte, North Carolina, USA	Wheels and brakes	Boeing 747-8			Apr 2006
Boeing	Kidde Technologies	Wilson, North Carolina	Smoke detectors	Boeing 747-8		Shipments of the lavatory and crew rest compartment smoke detectors began in 2007.	Jul 2006
Boeing	Kidde Technologies	Wilson, North Carolina	Smoke detectors	Boeing 767-200/-300/-400ER		Shipments of the lavatory and crew rest compartment smoke detectors began in 2007.	Jul 2006
Boeing	Shimadzu	Tokyo, Japan	Actuators	Boeing 767-200/-300/-400ER		Shimadzu is designing and manufacturing major control components for trailing edge flap drive system. Through the development experience gained from this programme, Shimadzu hopes that it will lead them to take a big step forward in this field. In 1976, Shimadzu started manufacturing components for Boeing 737s. Thereafter, the business expanded to include gearboxes, pneumatic system regulators, and electro-mechanical actuators for doors, wings, etc. on Boeing 747, 757, 767, and 777 families.	Dec 2006
Boeing	Shimadzu	Tokyo, Japan	Actuators	Boeing 777 – all types		Shimadzu is designing and manufacturing major control components for trailing edge flap drive system. Through the development experience gained from this programme, Shimadzu hopes that it will lead them to take a big step forward in this field. In 1976, Shimadzu started manufacturing components for Boeing 737s. Thereafter, the business expanded to include gearboxes, pneumatic system regulators, and electro-mechanical	Dec 2006

						actuators for doors, wings, etc. on Boeing 747, 757, 767, and 777 families.	
Boeing	Alcan Rolled Products (Ravenswood)	Ravenswod, West Virginia, USA	Aluminium products	Boeing 787		Alcan Rolled Products signed a multi-year agreement with Boeing to supply advanced lightweight aluminium products	Jan 2006
Boeing	Alcan Rolled Products (Ravenswood)	Ravenswod, West Virginia, USA	Aluminium products	Boeing 787		Alcan Rolled Products signed a multi-year agreement with Boeing to supply advanced lightweight aluminium products	Jan 2006
Boeing	Diethelm Keller Aviation	Singapore	Rotable food service equipment (carts/trolleys)	Boeing 787	$50 million plus over length of programme	The company won the contract for the sole supply of galley inserts, comprising a range of rotable food service equipment, duty-free and sales carts, folding trolleys and waste carts	Mar 2006
Boeing	Eaton Aerospace	Irvine, California, USA	Quick-disconnect coupling products and hose products	Boeing 787	$88 million-plus	The Aeroquip® brand quick-disconnect coupling and hoses support the Integrated Cooling System (ICS) and Power Equipment Cooling System (PECS). These systems provide efficient liquid cooled thermal management across an array of electrical systems and instruments within the platform. The company's UK subsidiary – Eaton Aerospace UK – is designing, developing and supplying the fuel sub-system pumps and valves along with the distribution system within the nitrogen generating system.	Nov 2006
Boeing	Triumph Composite Systems	Spokane, Washington, USA	Floor panel system	Boeing 787	$49 million		Oct 2006
Boeing	GKN Aerospace	St Louis, Missouri USA	Slat skin wing-to-body fittings/ wing-to-nacelle fittings	Boeing 787		The long term agreement is for the supply of 13 complex titanium fittings for the aircraft, comprising structural wing-to-body and wing-to-nacelle fittings. They are being manufactured in 5553 advanced grade titanium. GKN Aerospace rough machines and finishes the titanium forgings supplied by VSMPO-Avisma of Russia at its St Louis, Missouri facility. GKN Aerospace is delivering directly to Boeing's partner companies on the 787 programme, MHI and FHI.	Dec 2006
Boeing	Goodrich Aircraft Interior Products	Colorado Springs, Colorado, USA.	Cabin attendant seating	Boeing 787		The contract calls for 16g-certified, floor-mounted, standard cabin attendant seats as well as cabin attendant seats.	Mar 2006
Boeing	Goodrich Lighting Systems	Lippstadt, Germany and Tampa, Florida, USA	Flight deck lighting system	Boeing 787		The flight deck lighting system consists of all task lighting, general illumination and emergency lighting on the flight deck.	Mar 2006
Boeing	Goodrich Sensor Systems	Burnsville, Minnesota, USA	Flight deck entry video surveillance systems	Boeing 787		The system includes video cameras which allow crews to see in total darkness, a video server designed to interface with the aircraft's Electronic Flight Bag (EFB) system and EFB client server applications software. This was	Apr 2006

						the twelfth contract the company had been awarded by Boeing for the 787 programme.	
Boeing	Triumph Composite Systems	Spokane, Washington, USA	Composite floor panel system	Boeing 787	Estimated $49 million		Oct 2006
Boeing	Tyee	Everett, Washinton, USA	Fuselage interior support tie rods	Boeing 787	Estimated $50 million	First ship-set of fuselage interior support tie rods sent to Boeing's IRC division in mid 2007. Tyee has doubled its machining capacity over the course of the last 10 months and developed two strategic partnerships on the programme, HST aerospace for carbon fibre tubing, and Akro fireguard to provide engineering and test services.	Jun 2006
Hamilton Sundstrand	Ducommun Incorporated	Phoenix, Arizona USA and Thailand	Mechanical enclosures and wire harnesses	Boeing 787	$15 million	Engineering and first article development will be performed at DTI's Phoenix, Arizona facility with production starting in 2008 at DTI's facility in Thailand.	Jun 2006
Shenyang Aircraft Corp	Contour Aerospace	Brea, California USA and Everett, Washington, USA	Vertical leading edge spars	Boeing 787	Potential value of $8 million	The company is a wholly owned subsidiary of Vought Aircraft Industries. The aluminium plate for these parts is over 37 feet long. The completed parts are sent to Shenyang, China, for assembly into the 787's vertical stabilizer.	Feb 2006
Parker Aerospace	AMETEK Aerospace & Defense (US)	Marysville, Ohio, USA	Heat exchangers, hydraulic quantity indicators, temperature sensors and pressure transducers	Boeing 787		The Parker hydraulic subsystem will operate at 5,000 psi. The subsystem incorporates 19 AMETEK pressure transducers (10 high-pressure, three low-pressure and six differential pressure). The pressure transducers are designed for 2-wire 4-20mA output current. The Hughes Treiter unit of AMETEK Aerospace & Defense has designed a high-pressure aluminium tube-fin heat exchanger to satisfy the heat dissipation required for the new hydraulic system.	Jul 2006
Hamilton Sundstrand	TTTech, Austriamicrosystems	Unterpremtatten, Austria	TTP controllers	Boeing 787		Time triggered protocol (TTP) controllers are used to support data communications for Hamilton Sundstrand's electric and environmental control systems.	May 2006
Spirit Aero Systems	MTI Global	Mississauga, Ontario, Canada	Thermal acoustic interior insulation systems	Boeing 787	Approximately $23 million	The systems will be deployed in the nose and forward sections.	Mar 2006
Sukhoi	MMPP Salyut Honeywell	Moscow, Russia Phoenix, Arizona, USA	APU	Sukhoi Superjet 100		The RE220[RJ] for the Superjet 100 is a derivative of Honeywell's RE220 APU family and was one of the first western regional APUs to receive a type certificate by the Interstate Aviation Committee Avian Register, the Russian equivalent of the FAA. The RE220[RJ] APU will start up to 37,000 feet and operate to 41,000 feet. It will deliver up to 110 lbm/min with a simultaneous electrical load of 40 kVA for main engine starting and Environmental Control System operation. It will deliver 40 kVA to	Jul 2006

						support electrical needs up to 41,000 feet, and bleed air for MES or ECS up to 25,000 feet.	
Shenyang Aircraft Corporation	PlasticFab	Wichita, Kansas, USA	Composite/Metal Panels	Boeing 787	$20.5 million	PlasticFab will manufacture metal and composite bonded panels for the vertical fin leading edge, which will be part of the Shenyang Aircraft Corporation supplied vertical fin.	Jan 2006
Hamilton Sundstrand	AdaCore	New York, USA	Software	Boeing 787		AdaCore's GNAT Pro is the Ada development environment for the software running in the Hamilton Sundstrand air conditioning pack airborne software configuration, which regulates cabin air temperature on the Boeing 787.	May 2006
Bombardier	Shenyang Aircraft Corporation	Shenyang, China	See comment	Bombardier Dash 8 Q400		Shenyang supplies the empennage, as well as the aft and forward fuselage sections. In July 2006, Bombardier entered an agreement that stipulated SAC would manufacture certain structural aircraft components for the Q400 aircraft that were previously sourced from Mitsubishi Heavy Industry.	Jul 2006
Goodrich	Stork SP Aerospace	Amsterdam, The Netherlands	Landing gear structures	Bombardier Dash 8 Q400		This contract started activities at Stork SP Aerospace in January 2007, with hardware deliveries scheduled through 2011. In July 2006, Goodrich and Stork SP Aerospace signed an agreement covering the application of load carrying composites in landing gear. Goodrich will continue to be responsible for overall system integration and product engineering as well as the interface with Bombardier and the DASH 8-400 operators through its global customer and product support network.	Dec2006
Thales	CMC Electronics	Saint-Laurent, Quebec, Canada	Flight management system (FMS)	Sukhoi Superjet 100		The CMA-9000 will provide the aircraft with multi-sensor based navigation and enhanced operational capability and is derived from the company's CMA-900 FMS/GPS and CMA-3000 helicopter FMS. The single unit CMA-9000 has civil certified multi-sensor (GPS, INS, DME and EGI) navigation capabilities. It conforms to the ARINC-739 multifunction control display unit standard, making it suitable as a display and control unit for other systems such as ACARS, ACMS and Satcom.	Jul 2006
Value of all 2006 airliner system, structures and component contracts, in the public domain							$819.5 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							$157 million
PMI Media estimates of total value of 2006 airliner system, structures and component contracts							$ 1,735.5 million

PMI Media estimates of low-wage manufacturing system, structures and component contracts	$427 million

Military transports							
Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
Airbus	Crane Aerospace and Electronics	Lynnwood, Washington, USA	Door and slide control system	Airbus A330 MRTT		The DSCS monitors the position of the aircraft's passenger and cargo doors to ensure that they are safely closed, locked and latched	Feb 2006
Lockheed Martin Alenia Tactical Transport Systems	Rolls-Royce	Indianapolis, Indiana, USA	Engines	C-27J	$900 million	In 2006 Alenia Aeronautica and Rolls-Royce signed a $200 million-plus million agreement for Rolls Royce will supply 42 propulsion systems for the C-27J. The agreement includes up to 84 AE 2100-D2 engines, long with six-bladed Dowty R-391 propellers – manufactured by General Electric in Gloucester, UK - and technical support.	Mar2006
Boeing Military Aircraft	Kidde Technologies	Wilson, North Carolina	Smoke detectors	Boeing KC-767		Shipments of the lavatory and crew rest compartment smoke detectors began in 2007.	July 2006
Boeing Military Aircraft	Shimadzu	Tokyo, Japan	Actuators	Boeing KC-767		Shimadzu is designing and manufacturing major control components for trailing edge flap drive system. Through the development experience gained from this programme, Shimadzu hopes that it will lead them to take a big step forward in this field. In 1976, Shimadzu started manufacturing components for Boeing 737s. Thereafter, the business expanded to include gearboxes, pneumatic system regulators, and electro-mechanical actuators for doors, wings, etc. on Boeing 747, 757, 767, and 777 families.	December 2006
Lockheed Martin	Heroux-Devtec	Longueuil, Quebec, Canada	Landing gear components	C-130J		Lockheed Martin and Heroux-Devtec signed a memorandum of understanding for the supply of 60 to 80 additional landing gear ship-sets and an expansion of the licence for C-130 certified parts. In August 1995 Lockheed Martin Aeronautical Systems announced the Canadian company had won the contract for the production of landing gears for up 135 C-130J Hercules aircraft. This programme, including options and provision of replacement parts, could total $30 million.	June 2006
Northrop Grumman	Barco	Kortrijk, Belgium	Displays	Northrop Grumman E-2D Advanced Hawkeye		The company is supplying multi-purpose control display units (MCDUs) and a modular open system development platform. Northrop Grumman will integrate Barco's	February 2006

						MCDUs into the cockpit and rear operator stations. The MCDU contains a high-resolution 4.2" x 4.2" display and interfaces to the E2D avionics system through both a standard ARINC 739 and a dual redundant MIL-STD-1553 interface. The MCDU is scalable and can drive two external displays. MOSART allows Northrop Grumman to develop and integrate its own applications into the MCDU.	
Value of all 2006 military transport system, structures and component contracts, in the public domain							$900 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							-
PMI Media estimates of total value of 2006 military transport system, structures and component contracts							$1,013 million
PMI Media estimates of low-wage manufacturing system, structures and component contracts							-

Military fast jets							
Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
Aermacchi	Hellenic Aerospace Industry	Athens, Greece	Rear fuselage and other structures	Aermacchi M-346		In January 2005, the Greek Ministry of Defence signed a Memorandum of Understanding (MOU) to become a partner in the programme.	Jan 2006
Lockheed Martin/Northrop Grumman/JSF programme office	Terma	Lystrup, Denmark	Horizontal stabliser conventional edges	Lockheed Martin F-35 Joint Strike Fighter	Contract worth around $50 million according to Terma.	Structure made from carbon-fibre parts	Jun 2006
L-3 Display Systems	Barco	Kortrijk, Belgium	IPDT components	Lockheed Martin F-35 Joint Strike Fighter	The Barco PCD contract content holds a potential value of over $15 million over the		Feb 2006

					life of the JSF program me.		
Pratt & Whitney	Production Parts Pty Ltd.	Melbourne, Australia	High turbine supports/bearing housing supports for the F135	Lockheed Martin F-35 Joint Strike Fighter	Value in excess of $60 million.	At the time Australia's largest agreement for the manufacture of military aircraft engine parts	Feb 2006
General Electric/Rolls-Royce	Avio	Turin, Italy	Low pressure turbine components	Lockheed Martin F-35 Joint Strike Fighter		The agreement signed by the three companies provides for Avio's involvement throughout the engine's life span, from the initial development through production and long-term service activities. Avio's responsibilities include the development and production of components for the low-pressure turbine and the compressor. The company has also been contracted for the supply of eleven parts during the System Development and Demonstration Phase (SDD) of the F136 engine programme. As part of the agreements, Avio SpA will be involved in design engineering and manufacturing efforts in the F136 SDD Phase. The agreements also address opportunities for a follow-on supplier relationship for the low rate initial production phase as well as revenue sharing participant agreement for the fixed price production and sustainment phases. In 2002 General Electric, Rolls-Royce and the then FiatAvio signed an MOU of cooperation. A separate agreement with Rolls-Royce calls for FiatAvio to also participate in the design, development, and manufacture of the JSF-F136 accessory gearbox.	Jul 2006
General Electric/Rolls-Royce	Avio	Turin, Italy	Low pressure turbine components	Lockheed Martin F-35 Joint Strike Fighter	The purchase orders (POs) for parts, tooling and non-recurring engineering are valued approximately at $10 million.		Jul 2006
General Electric/Rolls-Royce	Tusas Engine Industries Inc (TEI)	Eskisehir, Turkey	F136 design engineering services	Lockheed Martin F-35 Joint Strike Fighter		TEI produces key rotating components for F136 development and test engines at its manufacturing facility in Eskisehir.	Jul 2006

General Electric/Rolls-Royce	Volvo Aero Norway	Kongsberg, Norway	F136 components	Lockheed Martin F-35 Joint Strike Fighter	Up to $177 million	Volvo will manufacture both the forward and aft cases of the High Pressure Compressor for the F136. The initial $1.7million contract provides cases for the 40,000lb engine, due to run in 2008 as part of the System Development and Demonstration (SDD) programme. The award follows from Volvo's production of aft cases for earlier F136 Phase III test engines.	Nov 2006
General Electric	Production Parts	Melbourne, Australia	F136 components	Lockheed Martin F-35 Joint Strike Fighter		The contract covers delivery of parts as part of the System Development and Demonstration Phase (SDD) of the programme.	Jul 2006
Rolls-Royce	Goodrich	Santa Fe Springs, California, USA Aircraft Wheel & Brake team in Troy, Ohio,USA Materials and Simulation Technical Center in Brecksville, Ohio, USA	F-136 friction research	Lockheed Martin F-35 Joint Strike Fighter		The research and development contract covers the application of the company's friction material expertise to the STOVL variant's LiftFan(TM) clutch by Rolls-Royce. In addition to this new research and development contract, Goodrich is providing the landing system for the Air Force's Conventional Take-off and Landing (CTOL) variant of the aircraft. As the landing systems integrator, Goodrich is responsible for the design, manufacturing and testing of unique landing systems for the STOVL and the Carrier Variant (CV) of the aircraft. Goodrich's Actuation Systems team provides the downlock and retract actuators for the landing gear system, and the wiring harnesses are also provided by Goodrich. Goodrich is also supplying: the Rolls-Royce LiftFan anti-icing system for the STOVL version of the aircraft; the LiftFan drive shaft also for the STOVL variant; the Rolls-Royce three-bearing swivel nozzle cross lock and up lock; the fuel quantity gauging components and the associated wiring harnesses; the weapons bay door drive system and the electronic control unit for the system; utility actuators; and the ice detection system. In addition, Goodrich is developing the air data system.	Feb 2006
BAE Systems	Magellan	Toronto, Canada	Aft-fuselage, horizontal and vertical tails sub-structures	Lockheed Martin F-35 Joint Strike Fighter			Jul 2006
BAE Systems	Avcorp (Canada)	Vancouver,Canada	Aft-fuselage, horizontal and vertical tails sub-structures	Lockheed Martin F-35 Joint Strike Fighter			Jul 2006
BAE Systems	Terma	Lystrup,	Aft-fuselage, horizontal	Lockheed Martin F-35	Terma's contract		Jul 2006

		Denmark	and vertical tails sub-structures	Joint Strike Fighter	was valued in the region of $250 million		
BAE Systems	Hawker de Havilland	Melbourne, Australia	Aft-fuselage, horizontal and vertical tails sub-structures	Lockheed Martin F-35 Joint Strike Fighter	Around $600 million.	A Boeing company	Jun 2006
Value of all 2006 military fast jet system, structures and component contracts, in the public domain							$1162 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							-
PMI Media estimates of total value of 2006 fast jet system, structures and component contracts							$1450 million
PMI Media estimates of low-wage manufacturing system, structures and component contracts							-

Rotorcraft

Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
AgustaWestland	Goodrich	Charlotte, North Caroline, USA	Rotorblade ice protection system (RIPS)	AgustaWestland AW 139		The system assists in keeping the aircraft's main and tail rotorblades ice-free during extreme operating conditions by using Goodrich's DuraTherm(TM) electro-thermal deicing mat technology. The RIPS is used to shed accreted ice and assist in maintaining ice-free conditions for both the helicopter's main and tail rotorblades.	Aug 2006
AgustaWestland	BAE Systems	Edinburgh, UK	Digital flight control computer	AgustaWestland EH101 (Royal Navy version)	$32 million	The Helicopter Electro Actuation Technology (HEAT) programme is replacing hydraulic systems with electromechanical fly-by-wire systems. It comprises two flight control computers providing quadruple-redundant electronic control. In 2006, a "Capability Sustainment Plus (CSP)" upgrade programme was initiated for the Royal Navy's Merlin HM.1s, replacing four rotor system control hydraulic actuators -- three for the main rotor, one for the tail rotor -- with electromechanical actuators.	May 2006
AgustaWestland	LHTEC – a Rolls Royce, Honeywell joint company	Indiana, Indianapolis, USA Phoenix,	Engines	AgustaWestland AW159	$140 million USD (£75 million)	The AW159 is powered by two LHTEC CTS800 engines each rated at 1015 kW (1361 shp). Honeywell produces the high pressure core and undertakes final production. Rolls-Royce produces low pressure spool The CTS800 engines provide 36% greater power than the Gem	Jun 2006

		Arizona, USA				engines used in current MoD Lynx helicopters for very similar fuel consumption. AW159 with its CTS800 engines will have an endurance of approximately 3 hours with standard fuel and 4.5 hours with auxiliary fuel while being able to carry half as much again as current Lynx helicopters. The existing composite main rotor blades will be used and married with an all new 4-blade tail rotor to give improved yaw control at high weights and a new common undercarriage with improved crashworthiness has been designed. The engine achieved European Aviation Safety Agency Type Certification in September 2008.	
AgustaWestland	GKN Aerospace	Yeovil, UK	Airframe	AgustaWestland AW159	Contract is valued at approximately £50 million through to 2016.	GKN Aerospace will supply the complete, assembled airframe for 70 AW159 helicopters for the UK Royal Navy and Army. The Company will be responsible for managing the entire supply chain for this work and will assemble the airframe at its base in Yeovil, prior to delivery to AgustaWestland. The AW159 airframe is a new and less complex design, manufactured in aluminium but incorporating monolithic machined components to reduce the component count by some 30%. The redesigned nose and rear fuselage give greater space and easier access to avionic units while an all new up-rated common undercarriage with strengthened attachments has been designed to meet the aircraft's MAUM of 6,250 kg. AW159 is the launch programme under the new Strategic Partnering Arrangement (SPA) that the UK Ministry of Defence (MoD) and AgustaWestland (AW) have signed. An integral requirement of the SPA has been the back to back signature by AgustaWestland of the AW159 Contract and Partnering Charters with the six major suppliers to the AW159 Programme – one of these being GKN Aerospace.	Jun 2006
AgustaWestland	General Dynamics	London, UK	Advanced tactical processor	AgustaWestland AW159	Contract valued at more than £24 million ($44million)	General Dynamics UK's Development and Manufacture programme for the AW159 programme will continue until 2015. The tactical processor offers a high degree of commonality across both variants of the AW159 - the British Army's Battlefield Reconnaissance Helicopter (BRH) and the Royal Navy's Surface Combatant Maritime Rotorcraft (SCMR). The tactical processor, will host software applications that interface to the hardware using an Allied Standard Avionics Architecture Council (ASAAC)	Jun 2006

						standard based 3-layer software stack. It will also provide a video processing and distribution function, embedded mission recording and playback and a digital map capability that is common to the UK's Merlin Mk3 support helicopter.	
AgustaWestland	General Electric (formerly Smiths Aerospace)	Cheltenham, UK	Cockpit displays	AgustaWestland AW159		The company has been awarded a contract to supply the new SDS-5000 large area cockpit display system for the AW159. Deliveries to AgustaWestland start in 2008. The 10" x 8" (25 cm x 20 cm) liquid crystal displays provide more than 70% additional display area compared to the existing SDS-4000 display system which it replaces. The system allows for variable display formats to present enhanced situational awareness and greater flexibility in the display of flight, system and mission data. Each display unit has multi-functional bezel mounted keys to select information required.	Jul 2006
AgustaWestland	Selex Sensors & Airborne Systems	Edinburgh, UK	Helicopter Integrated Defensive Aids System (HIDAS).	AgustaWestland AW159		The countermeasures suite comprises Selex Sensors and Airborne Systems Helicopter Integrated Defensive Aids System, HIDAS 15, and Electronic Support Measures (ESM). Finmeccanica parent said Selex has signed an initial contract with AgustaWestland worth "tens of millions of pounds" to supply the system, similar to equipment already installed on the British Army's Apache the EH101 Merlin Mk3 and Sea King Mk4 support helicopters.	Jul 2006
AgustaWestland	Thales UK	Chessington, UK	Avionics	AgustaWestland AW159	$63 million	Thales UK is providing the core of the avionics management, communications and navigation systems, as well as taking responsibility for the integration of commercial off the shelf equipment within the navigation and communications sub-systems. The Thales Secure Communications Control System (SCCS), which is at the heart of the communications system, is from the family of TopSIS products. Plain and secure voice communication is provided via V/UHF SATURN and HF radios.	Jul 2006
AgustaWestland	General Electric (formerly Smiths Aerospace)	Southampton, UK	Combined Health & Usage Monitoring System and Cockpit Voice & Flight Data Recorder	AgustaWestland AW159		Development is taking place at the company's facilities Southampton in the UK and Michigan in the USA. HUMS production deliveries are scheduled to commence in 2011. The HUMS application will be integrated into both the Army - 40 Battlefield Reconnaissance Helicopters (BRH) and Navy - 30 Surface Combatant Maritime Rotorcraft (SCMR). The AW159 HUMS will continuously monitor the fleet wide health and performance of safety-critical components, providing advance	Jul 2006

						warning of potential equipment failures and collecting valuable data for routine maintenance of each aircraft. HUMS sensors monitor the health and usage of the engines, transmission, drive-train system, rotor system and airframe by detecting and diagnosing potential failures, recording usage, automating test procedures and providing alerts for potential maintenance actions. The HUMS also provides continuous Rotor Track and Balance capability, negating the requirement for the installation of carry aboard equipment and the overhead for dedicated RTB check flights. This feature will be operational for the aircraft.	
Bell Helicopter Textron	Honeywell	Phoenix, Arizona, USA	Avionics systems	Bell 429		Honeywell avionics products include the dual-channel KSG-7200 air data attitude heading reference system (ADAHRS), which uses Honeywell's solid-state micro-electromechanical sensors (MEMS) and optional automatic direction finder (ADF), radar altimeter, weather radar and enhanced ground proximity warning system (EGPWS).	Feb 2006
American Eurocopter	Aerolite	Everett, Washington, USA	Stretcher installations	America Eurocopter UH-72A		The company's retainer mounts were chosen after a "fit-check" competition with other mounting systems.	Apr 2006
American Eurocopter	BAE Systems Mobility and Protection Systems	Phoenix, Arizona, USA	Seats	America Eurocopter UH-72A		The helicopter's two energy-absorbing cockpit seats have ergonomic cushions, a 4-point restraint system with an inertia reel and are qualified to FAA crashworthiness specifications. The lightweight cockpit seats use advanced composites, including aramid and graphite materials.	Apr 2006
American Eurocopter	Goodrich	Charlotte, North Carolina, USA	Rescue hoist	America Eurocopter UH-72A		The 44301-series hoist is mounted on a boom and support assembly that allows it to be positioned in an arc of up to 63 degrees from the aircraft fuselage centerline.	Apr 2006
Eurocopter	Hispano-Suiza	Colombes, France	Accessory gearbox	Eurocopter EC 175/HAIGZ 15			Jun 2006
Eurocopter	APPH	Bolton, UK	Landing gears	Eurocopter EC 175/HAIGZ 15	The value of the contract for Original Equipment and spares is anticipated to be in excess of $100 million of	The contract involves the design and manufacture of landing gears for both the French EC175 helicopter as well as the Chinese variant - the Z15. The market for this programme is expected to be up to 1000 helicopters, with a production life of 20 years. The initial current production run is anticipated at between 680 and 800 aircraft planned to start in 2011 and the prototype is planned to fly in 2009.	Dec 2006

					revenue		
MD Helicopters	Pratt & Whitney Canada	Longueuil, Quebec, Canada	Engines	MD902		The helicopter is powered by two Pratt and Whitney Canada PW207E engines.	Feb 2006
MD Helicopters	Kamatics	Bloomfield, Conneticut, USA	Main driveshaft and tail rotor self-lubricating bearings	MD900/902		MD Helicopters has signed a strategic agreement with Kamatics Corporation to create a multi-year supplier agreement for 13 components used in the assembly of the MD Explorer, MD 500E, MD 530F, MD 520N and MD 600N helicopters.	Feb 2006
MD Helicopters	Chelton Flight Systems/S-Tech	Mineral Wells, Texas, USA	Electronic flight instrument system (EFIS)	MD 500, 520, 600N		From late 2007 single-engined MD helicopters have been equipped with two Chelton EFIS displays, a solid-state strap-down gyro AHRS (Attitude/Heading Reference Systems), an air data computer and a GPS/WAAS (Wide Area Augmentation System) receiver. The system also features a synthetic vision primary flight display, dual integrated head-up FMS, Class-B or -A helicopter TAWS (Terrain Awareness and Warning System), a master caution voice warning system, HITS (Highway-In-The-Sky navigation), a digital flight recorder, and Chelton's hover vector display.	Sep 2006
MD Helicopters	Kamatics	Bloomfield, Connecticut USA,	Main driveshaft and tail rotor self-lubricating bearings	MD 500, 520, 600N		MD Helicopters has signed a strategic agreement with Kamatics Corporation to create a multi-year supplier agreement for 13 components used in the assembly of the MD Explorer, MD 500E, MD 530F, MD 520N and MD 600N helicopters.	Feb 2006
MD Helicopters	Triumph Gear	Macomb, Michigan, USA	Transmission systems	MD 500, 520, 600N		The two companies have created a long-term agreement for the supply of helicopter transmissions for MDHI's single-engine rotorcraft. The agreement also includes related components from other members of the Triumph Group used in the assembly of both single- and twin-engine helicopters. Additional Triumph Gear Systems' components are included in the MD Explorer transmission manufactured by Kawasaki Heavy Industries.	February 2006
Sikorsky	Rockwell Collins	Cedar Rapids, Iowa, USA	Avionics management system	Sikorsky CH-53K		The CH-53K AMS consists of five fully integrated active matrix liquid crystal multifunction displays (MFD), dual integrated processing cabinets (IPC), dual control display units (CDU), and dual data transfer units (DTU). The integrated cockpit includes fully integrated primary flight instrumentation, crew alerting system, display management, vehicle management, civil and military flight management, and navigation and communication equipment management. In addition, the CH-53K AMS provides improved mission situational awareness	Jun 2006

						through embedded tactical mission aids, such as digital moving map, FLIR video, defensive electronic countermeasures, network ready capability, correlation, and tactical display functions.	
Value of all 2006 rotorcraft system, structures and component contracts, in the public domain							$454 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							-
PMI Media estimates of total value of 2006 rotorcraft system, structures and component contracts							$754 million
PMI Media estimates of low-wage manufacturing system, structures and component contracts							-

Business jets

Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
Bombardier	Nordam	Tulsa, Oklahoma, USA	Interior liner and window shades	Bombardier Learjet 60 XR		The configured interior liner will include headliners; the passenger service unit (PSU), which is used to contain lighting, air gaspers, oxygen boxes and audio speaker components; side walls; and the lower side walls called dado panels.	Nov 2006
Bombardier	Meggitt Aircraft Braking Systems	White Plains, New York, USA	Wheels and brakes	Bombardier Challenger 605		ABSC - now Meggitt - introduced carbon brake technology to business aircraft on the Bombardier Challenger 600. ABSC developed higher capacity wheels and carbon brakes for the Challenger 604 to accommodate the increased braking requirements.	Jan 2006
Cessna Aircraft	Unison Industries, Jacksonvill, Florida., USA	Holtsville, New York, USA	Starter generator and digital generator control unit (DGCU)	Cessna Citation Mustang		The DGCU is used to control the starter generator, which starts the aircraft engine and provides in-flight power for a variety of aircraft functions. This is the first time the Unison technical team has certified an electronic product for turbine engine applications that incorporates embedded software.	Aug 2006
Cessna	L-3 Avionics	Grand Rapids, Michigan, USA	GH-3000 ESIS	Cessna Citation 560 XLS+		Replaces conventional electro-mechanical standby attitude, airspeed and altitude instruments,	Oct 2006
Cessna	L-3 Avionics	Grand Rapids, Michigan, USA	EHSI-400	Cessna Citation 560 XLS+		The system incorporates a fully digital design and provides distance, bearing and course information in a 3-ATI size display.	Oct 2006
Cessna	Nordam	Tulsa, Oklahoma, USA	Wingtip transparencies	Cessna 680 Citation Sovereign		According to the company "Norstar lenses provide an 80% increase in product life relative to polycarbonate lenses and a 50% weight savings over glass lenses."	Jul 2006
Dassault	AirCell	Louisville, Colorado,	Aircell Axxess satcom	Dassault Falcon		AirCell Axxess is a family of latest-generation, multi-channel, satcom	Oct 2006

		USA	system selected as optional factor extra on Falcon jets	50EX,		systems designed for medium-to-large business aircraft.	
Dassault	Labinal	Pryor, Oklahoma,USA	Electrical completion harnesses	Dassault Falcon 900		The electrical completion harnesses will be delivered directly to the Dassault Falcon Jet facility in Little Rock, Arkansas.	Jun 2006
Dassault	CMC Electronics	Montreal, Canada	Pilot view Electronic Flight Bag (EFB)	Dassault Falcon 900		PilotView provides en-route, approach charts, moving map display and graphical real time weather information.	May 2006
Dassault	AirCell	Louisville, Colorado, USA	Aircell Axxess satcom system selected as optional factor extra on Falcon jets	Dassault Falcon 900DX, 900EX		AirCell Axxess is a family of latest-generation, multi-channel, satcom systems designed for medium-to-large business aircraft.	Oct 2006
Diamond	Ballistic Recovery Systems	St Paul, Minnesota, USA	Parachute recovery system	Diamond D-Jet		The D-JET will be fully certified to fly without the parachute, but the parachute will be offered as the standard option.	Jul 2006
Embraer	Meggitt Aircraft Braking Systems	Akron, Ohio, USA	Wheels, brakes and braking systems	Embraer 100	Over the life of the programme, the contract value is estimated to be worth around $250 million.	Lightweight aluminium alloy wheels with long life steel brakes.	May 2006
Embraer	Alcoa	Torrance, California, USA	Fasteners	Embraer 100/300		The company's UAB™ Blind Bolt has been approved by Embraer for use on the Phenom 300. Each aircraft will use approximately 3,700 UAB Blind Bolts in the manufacture of composite empennage and flaps, says Alcoa.	Oct 2006
Embraer	Avionics Services	São Paulo, Brazil	Seats	Embraer 100/300		Avionics/Geven will supply the seats and will provide all the support for the whole lifetime of the fleet.	Apr 2006
Embraer	Daher	Orlytech, Paris, France	Sub-assemblies	Embraer 100/300		The renewable five year contracts started in May 2008 and are for composite-based sub-assemblies.	Mar 2008
Embraer	Meggitt Aircraft Braking Systems	Coventry,UK	Wheels, brakes and braking systems (-300)	Embraer 100/300	The contract is expected to be worth $100 million over the life of the aircraft.	The award covers main and nose wheels, steel brakes and a brake-by-wire control system, including an emergency park brake and anti-skid system.	Apr 2006
Embraer	General Electric	Rockford, Illinois, USA	Bleed air and anti-ice subsystems	Embraer 100/300		First delivery August 2007. The subsystems will be manufactured at Smiths' facility – now General Electric - in Rockford, Illinois.	Oct 2006.

						General Electric/Smiths Aerospace systems package consists of the bleed air system controller, the pressure regulating and shutoff valves (PRSOVs), fan air valves, cross bleed valve, wing and horizontal stabilizer anti-ice valves, and the engine reverse flow check valves. The controller manages the bleed air valves, anti-ice valves and bleed air leak detection sub-systems. In addition to the above units, GE/Smiths will perform system level performance testing in their test facility on the entire bleed air and anti-ice systems to include Embraer supplied engine anti-ice valves, pre-cooler heat exchanger, system ducting, temperature sensors, and piccolo tubes.	
Embraer	Goodrich	Charlotte, North Carolina, USA	Air data system	Embraer 100/300	The award is expected to generate approximately $20 million in original equipment and aftermarket revenues over the life of the programme	Goodrich will provide the SmartProbe(TM) Air Data System for the Phenom 300. The system will provide all primary air data information required by the aircraft.	Dec 2006
Embraer	Honeywell	Orlando, Florida, USA	Cabin pressure control and monitoring system (CPCMSTM)	Embraer 100/300		This system provides both cabin pressure control and cabin altitude monitoring functions. Controls and sensors are mounted remotely from the flight deck to maximize flight deck panel space, according to Honeywell and the system architecture is designed to interface directly with the aircraft's avionics to provide fully automated cabin pressure control with no flight crew interaction during normal operation. The overall system includes an electronic control and monitoring unit (ECMU), an outflow valve (OFV), and positive and negative pressure relief valves. Via the avionics, the system receives aircraft altitude information from the air data computer (ADC), destination landing altitude from the flight management system (FMS), and engine power setting directly from the throttle.	Oct 2006
Embraer	Luminescent Systems Inc	East Aurora, New York, USA	Exterior lighting system	Embraer 100/300		In October 2006 Astronics Corporation, the parent company of Luminescent Systems Inc, announced it had been selected to provide exterior lighting for the Phenom 100 and would work with	Oct 2006

						Embraer on the certification process to design a complete exterior lighting system, which uses LED (light emitting diode) and HID (high intensity discharge) lighting technology. Astronics is also supplying flood lighting and lighting controllers for the cockpit.	
Embraer	Thales	Paris, France	Integrated Electronic Standby Instrument (IESI)	Embraer 100/300		Thales announced it will provide the IESI, incorporating the Active Matrix Liquid Crystal Display (AMLCD) in a 3 ATI instrument format.	May 2006
	General Electric (formerly Smiths)	Rockford, Illinois, USA	Bleed air & anti-ice subsystems,	Embraer 100/300		The contract includes the supply of controller, pressure regulating and shutoff valves, fan air valves, cross-bleed valve, wing & horizontal stabilizer anti-ice valves, engine reverse flow check valves (all on 300 model)	Oct2006
	Meggitt Thermal Systems	Simi Valley, California, USA	Engine inlet anti-ice system	Embraer 100/300		The company won the order in January 2006 to supply the nacelle anti-ice system for the Phenom 100 engine	Jan 2006
Honda Aircraft Company	General Electric/ Honda	Cincinnati, Ohio, USA	H-120 engine	HondaJet		GE Honda's HF120 engine will be rated at 2,050 pounds of thrust. Since 2005, the GE Honda team has run component tests at Honda facilities in Japan; and icing tests at GE's test facilities near Cincinnati, Ohio. The HF120 technologies include: an 18.5-inch wide chord, compound-swept front fan and two-stage booster. The front fan and booster are GE Honda blisk designs; in the compressor, a high temperature, titanium impellor; a compact reverse-flow configured combustor and single-stage air-blast fuel nozzles. During the initial phase of the HF120 programme, engines will be built at GE's Lynn facility under a GE production certificate. Honda Aero will obtain its own FAA production certificate in 2010 and become an FAA-approved repair station. Then in late 2010 and early 2011, the HF120 assembly line capability will be transferred to Honda Aero's new facility	Oct 2006
Hawker Beechcraft Corporation (formerly Raytheon Aircraft)	Honeywell	Phoenix, Arizona, USA	Avionics (retrofit version)	Hawker Beechcraft 850/900XP		The Primus Epic® Control Display System/Retrofit (CDS/RTM) has been certified for Raytheon Hawker 800A aircraft.	Oct 2006
Value of all 2006 business jet system, structures and component contracts, in the public domain							$370 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							$1.9 million

PMI Media estimates of total value of 2006 business jet system, structures and component contracts	$898 million
PMI Media estimates of low-wage manufacturing system, structures and component contracts	$1.9 million

2007

Airliners

Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
Airbus	Liebherr	Lindenberg, Germany	Nose landing gear	Airbus A350 XWB		The nose landing gear of the Airbus A350 is the largest set of landing gear that the company has yet developed. Large parts of it will be manufactured from high-strength steel. Liebherr is investing several million euros in large-scale machine tools for the turning, milling, grinding and deep drilling processes. In addition, a new CNC designing and programmeming system is currently being set up.	Sept 2007
Airbus	Moog	East Aurora, New York, USA	Primary flight control actuators	Airbus A350 XWB		Moog's Aircraft Controls Group is supplying the primary flight controls including aileron, elevator, rudder and spoiler actuators.	Nov 2007
Airbus	Messier Bugatti/ Messier Dowty	Gloucester , UK Bidos, France, Montreal, Canada and Suzhou, China	Main landing gear	Airbus A350 XWB		Airbus has chosen to use a single supplier for all the ATA32 systems of the A350 XWB: landing gear extension / retraction system, braking management, ground steering management and tire pressure, brake temperature and suspension pressure surveillance management. The first landing gear delivery to the Airbus final assembly line in Toulouse is scheduled for early 2011.The main landing gear for the -800 and -900 versions includes a four-wheel bogie and dual side stay which reduces loading on the A350XWB's composite wing. For the -1000 variant, in addition to the dual side stay, the MLG features a six wheel bogie to reduce loading on the tarmac. The main landing gear design also includes the increased use of advanced materials, specifically titanium, which offers weight savings and corrosion resistance. The A350XWB main landing gear will also be chrome and cadmium-free, using surface treatments such as HVOF and MCAC coatings, which are environmentally responsible solutions. Messier-Dowty will manage the A350 main landing gear programme. The contract incorporates features such as the "brake to vacate" system, which enables braking to be calculated	December 2007

						according to the programmed turn-off on the landing runway, and the "heading control" function enabling automatic steering of the nose wheel according to a pre-programmed path for the aircraft on the ground.	
Airbus	GKN	See comment	See comment	Airbus A350 XWB		Airbus selected GKN its preferred partner for the acquisition of the Filton site, including the award of significant composite work packages for the A350 XWB wing, including the fixed trailing edge.	Dec 2007
Airbus	Latécoère	See comment	See comment	Airbus A350 XWB		Airbus selected Latécoère as its preferred partner for the acquisition of the Méaulte and Saint Nazaire Ville sites. This involves work on the nose section (sections 11/12). However, in mid May the sale of the site was put on hold.	Dec 2007
AVIC	Bombardier Aerospace	Montreal, Quebec, Canada	See comment	ARJ21		AVIC I and Bombardier Aerospace have signed an agreement for a new, long-term strategic cooperation in the 90- to 149-seat commercial aircraft market. Bombardier intends to participate in the development of AVIC I's five-abreast ARJ21-900 aircraft. Under the terms of the agreement Bombardier intends to invest $100 million US in the ARJ21-900 project, when launched, and provide technical assistance towards the development of the aircraft. Furthermore, in pursuit of its goal to become a major international Tier 1 structural supplier, AVIC I plans to invest $400 million US for research and development, construction of new facilities and equipment for the CSeries aircraft programme, should it be launched.	Jun 2007
General Electric	Hartwell	Placentia, California, USA	CF34-10A hold-open thrust rod	ARJ21		Hartwell Corporation is providing the hold-open rods and rate control device for GE CF34-10A engines.The aft hold-open thrust rod assembly is based on Hartwell's existing design currently in service on an existing military transport aircraft engine nacelle.	Jun 2007
Boeing	Goodrich	The company's US landing gear manufacturing facilities are located in Ohio, Tennessee, Washington, as well as Ontario, Canada and Poland.	Landing gear	Boeing 737-600,-700,-800,-900; Boeing 767-200/-300/-400ER; Boeing 747-8 and Boeing 777 all models		Goodrich Corporation signed a long-term agreement with the Boeing Company under which Goodrich will continue as the exclusive supplier of original equipment and aftermarket landing gear for the 737, 747, 767 and 777 commercial aircraft programmes. The agreement extends supply arrangements through 2012.	Jul 2007
Airbus	Goodrich	Goodrich has nacelle facilities in both Toulouse, France and Hamburg, Germany	Nacelles	Airbus A350 XWB	The contract is expected to generate approximately $10 billion in	Goodrich Corporation is providing Airbus with nacelle and thrust reverser systems for all variants of the A350 XWB aircraft. The contract includes the integration of the Goodrich technology with each engine manufacturer's offering/option. The company will provide Airbus with complete	Jan 2007

					original equipment and aftermarket revenues for Goodrich over 20 years.	propulsion systems ready to be installed on the A350 XWB final assembly line.	
Boeing	Moog	East Aurora, New York, USA	Lateral Control Electronics (LCE)	Boeing 747-8		The function of the LCE is the control of fly-by-wire aileron and spoiler actuators.	Mar 2007
Boeing	Wytwornia Zespolow Kooperacyjnych	Warsaw, Poland	Structures	Boeing 777 – all types		The five year contract is to manufacture hardware for all new 777 aircraft. WZK is manufacturing the Krueger Flap, a hinged surface on the leading edge of the wing. In 2005 Boeing awarded WZK a contract to manufacture the spare door parts for the fleet of Boeing 757s in operation worldwide. WZK produced all the passenger doors for the 757 from late 1992 to 2005.	Jun 2007
Boeing	Crane Aerospace and Electronics	Lynwood, Washinton,USA	Onboard weight and balance system	Boeing 777 Freighter		The onboard weight and balance system is designed to provide measurements of the 777 Freighter's weight and centre of gravity. In addition, the system can quickly validate manual weight calculations.	Mar2007
Boeing	GKN Aerospace	Mexicali, Mexico	Titanium metal matrix composite (TMMC) thrust links	Boeing 787		According to GKN this represents the first use of TMMC in a commercial application; TMMC offers major weight savings of 25% to 40% over traditional steel or inconel thrust links and increased temperature tolerance over monolithic titanium. GKN Aerospace is partnered with FMW Composite Systems Inc on the programme. “GKN Aerospace and FMW will partner on this contract and in seeking other teaming opportunities for TMMC in the aerospace sector,” said GKN. The Boeing 787 thrust link comprises an FMW manufactured TMMC centre tube, which GKN Aerospace plasma-welds to two machined titanium end lugs.	Oct 2007
Boeing	Honeywell Aerospace	Phoenix , Arizona, USA	Engine nacelle anti-ice regulator	Boeing 787		The engine nacelle anti-ice regulator opens to allow the flow of hot air extracted from the engine compressor section through a steel duct down to the engine cowling.	Apr 2007
Boeing	M.C. Gill	El Monte, California, USA	Floor panels	Boeing 787		The company has a long-term supply agreement with Boeing for Gillcore HK™ Honeycomb core. Under the 5 year contract, M.C. Gill will supply honeycomb core to Boeing Commercial Airplanes - Interior Responsibility Centre (IRC) for interior components on the 787. These components include stowage bins, class dividers, partitions, and crew rests. According to the company: “Gillcore HK™ is a Kevlar® N636 reinforced honeycomb core which is	Sep 2007

						qualified to the Boeing BMS 8-124 material specification. It offers significant weight savings over Nomex® honeycomb core and has contributed to the overall weight reduction effort on the 787 aircraft.The floor panels feature Kevlar® N636 Honeycomb core combined with carbon fiber reinforced epoxy skins."	
Boeing	Toray Industries	Tokyo, Japan	Composite material	Boeing 787	Total contract value up to $6 billion	Toray reported at the end of October 2007 it had won an additional $3billion order to supply Boeing with composite materials for the 787. In 2004 Toray secured a first $3 billion order for material on the aircraft. The total weight of carbon fibre materials that will be used in Boeing's 787 is estimated to be half of its total weight.	Jun 2004 and Oct 2007
Fuji and Kawasaki Heavy Industries	RTI International Metals	Niles, Ohio, USA	Structural Titanium Components	Boeing 787		Extruded and machined parts.	Feb 2007
Latecoere	Aero Vodochody	Prague, Czech Republic	Door structures and hinges	Embraer 170-175/190-195	CZK one billion ($57 million)	The contract comprises exclusive deliveries of hinges and inner structure of doors for the aircraft Embraer 170/190. Czech landing gear manufacturer Technometra Radotin, a subsidiary company of Aero, has joined the Latecoere programme. Aero has developed a new production line, with parts supplies to start in February 2009.	Oct 2007
Sukhoi	Boeing	Seattle, Washington, USA	After-sales support and advice	Sukhoi Superjet 100		An agreement was signed in June 2007 between Sukhoi and Boeing to expand Boeing's participation in the Superjet project. According to the agreement, said Sukhoi, "Boeing will explore opportunities to assist Sukhoi in areas including, but not limited to: flight and maintenance crew training, spare parts management and supply, guidance on production of flight and maintenance manuals that meet international standards." "Boeing will expand its participation in the organization of after-sales support. It means it will assist Sukhoi in the development of its own infrastructure, will ensure access to infrastructure and modern technologies of Boeing's after-sales service, including the training of personnel as well as access to the infrastructure of the distribution of spare parts. " In 2002 Sukhoi selected Boeing to serve as advisor to the programme.	Jun 2007
Goodrich	EmbVUE	Montreal, Canada	Software engineering, verification and validation services for	Sukhoi Superjet 100			Mar 2007

			the brake control unit.				
Value of all 2007 airliner system, structures and component contracts, in the public domain							$13,057 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							$57 million
PMI Media estimates of total value of 2007 airliner system, structures and component contracts							$42,280million
PMI Media estimates of low-wage manufacturing system, structures and component contracts							$1,657 million

Military transports							
Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
Airbus Military Sociedad Limitada (AMSL)	Saab Avitronics	Jönköping, Sweden	Terrain masking low level flight computer	Airbus A400M	Contract worth more than EUR 10 million	The system enables safe tactical flights at very low altitudes. The computer will be supplied to EADS Military Air Systems, Germany, developers of the system application software.	Feb 2007
Airbus Military Sociedad Limitada (AMSL)	Parker Aerospace	Cleveland, Ohio, USA	Fuel tank inerting system	Airbus A400M	The value of the contracts could exceed $500 million over the life of the program mes.	The fuel tank inerting system contract for the Airbus A400M also includes the airliner fleet. The Parker fuel tank inerting system uses air separation modules (ASMs) that generate nitrogen-enriched air by removing the oxygen from its air source and distributing it to the aircraft's center fuel tank, thereby reducing the flammability of fuel vapors in the tank. As the tier-one integrator, Parker will provide the core inerting technology subsystem consisting of the ASMs that produce the nitrogen and integrate it with a temperature-control subsystem developed by Liebherr Aerospace, Airbus's primary environmental control system supplier. The ASM fiber technology for the Airbus programmes is patented and owned by Parker. The Parker inerting system is expected to enter into service on Airbus aircraft in the course of 2009.	Dec 2007
Global Military Aircraft Systems	APPH	Runcorn, UK	Landing gears	C-27J/LCA	The C-27J will provide total sales revenue in excess of $60 million for original equipme nt and logistical support over ten years	The company has been given an initial contract to supply the landing gear for 78 aircraft with the anticipated total requirement for over 200 aircraft. APPH has designed, manufactured and certified the main landing gear for the JCA version. APPH has worked in collaboration with Magnaghi SpA Italy, to develop and integrate the total landing gear system on the C-27J.	Jun 2007
Global Military Aircraft Systems	Rolls-Royce	Indianapolis, Indiana, USA	Engines	C-27J/LCA	The C-27J business is worth more than $500 million to Rolls-Royce	The twin-engine C-27J Spartan aircraft version for the JCA is powered by Rolls-Royce AE 2100D2 turboprop engines. The initial contract award includes up to 78 C-27J aircraft and up to 180 engines. The total contract value for the aircraft is more than $2 billion. The Army and Air Force have announced previously they may purchase up to 145 aircraft in the JCA programme. The AE 2100 turboprop is a two shaft	Jun 2007

						gas turbine with a 14-stage high pressure (HP) compressor driven by a two-stage HP turbine. The LP shaft, driven by a two-stage power turbine, drives the compound planetary reduction gearbox connected to the propeller. The engine is the first to use dual FADECs (Full Authority Digital Engine Control) to control both engine and propeller.	
Boeing Military Aircraft	Honeywell	Phoenix, Arizona, USA	IFF transponder/ TCAS system, air data computer	Boeing C-17 Globemaster III	$20 million	Honeywell is producing 180 Military Airborne Collision Avoidance System – Formation Rendezvous (MILACAS-FR) systems for Boeing's entire C-17 fleet.	2007
Boeing Military Aircraft	Telephonics Corporation	Farmingdale, New York, USA Huntingdon, New York, USA Gardena, California, USA	Communications	Boeing C-17 Globemaster III	$32 million plus	The company makes the Communications Open Systems Architecture (COSA) Integrated Radio Management System (IRMS) The work is in support of both new production C-17 aircraft as well as the upgrade of existing C-17's to the new open architecture system. The production programme quantity of 22 aircraft supports USAF and international C-17 customers. The upgrade programme provides 15 kits in support of the planned upgrade of 124 aircraft over five years. This communications management system provides C-17 aircrews with secure fully digital audio, integrated displays and controls for management of all communication and navigation assets.	Apr 2007
Boeing Military Aircraft	Goodrich	The company's US landing gear manufacturing facilities are located in Ohio, Tennessee, Washington, as well as Ontario, Canada and Poland.	Landing gear	Boeing KC-767		Goodrich Corporation signed a long-term agreement with the Boeing Company under which Goodrich will continue as the exclusive supplier of original equipment and aftermarket landing gear for the 737, 747, 767 and 777 commercial airplanes programmes. The agreement extends supply arrangements through 2012.	Jul 2007
Value of all 2007 military transport system, structures and component contracts, in the public domain							$1,123 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							-
PMI Media estimates of total value of 2007 military transport system, structures and component contracts							$1,143 million
PMI Media estimates of low-wage manufacturing system, structures and component contracts							-

Military fast jets							
Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
The Indian Aeronautical Development Agency (ADA)	General Electric	Fairfield, Connecticut, USA	Engine	ADA Light Combat Aircraft - Tejas		The General Electric 85 kN F404-GE-IN20 turbofan engine features full authority digital engine control. HAL has placed an order for 24 F404-GE-IN20 engines.	Feb 2007
Boeing	Martin Baker	Uxbridge, UK	Ejection seat	Boeing F/A-18 E/F	$39.7 million	The order is part of a 172 Navy Aircrew Common Ejection Seats (NACES) contract, including 70 for the US Navy's F/A-18E/F Super Hornets.	Jun 2007
Boeing	Lockheed Martin's Missiles and Fire Control division		Up to 150 Infrared Search and Track (IRST) systems for Super Hornet Block II aircraft	Boeing F/A-18 E/F	The total contract value is expected to exceed $500 million through the development and production phases of the programme.	Sensor-fused data from IRST, AESA, ALR-67(v)3 digitally cued receiver and off board information will provide multi-spectral air-to-air targeting. IRST is a passive, long-range sensor system that searches for and detects long-wave IR emissions within its field of view. It can track several targets simultaneously and provide an effective air-to-air targeting capability, even when facing advanced threats with radar jamming equipment. First production deliveries of IRST systems are expected in 2012, with initial operational capability anticipated in 2013.	Jul 2007
Boeing/US Navy	Cyclone/Elbit	Carmiel, Israel	330 gallon fuel tanks	Boeing F/A-18 E/F	$2 million out of potential $60 million	Deliveries will take place between 2009 and 2013. The tanks are made from a filament welding process. Previous F-18 components supplied by the company have included leading edge extensions and nose landing gear door	Dec 2007
Lockheed Martin	Circle Seals Controls	Corona, California, USA	Check valves and pressure regulators for t hydraulic and fuel systems	Lockheed Martin F-22		The contract is for the design, development and manufacture of specialty fluidic control components and systems.	Apr 2007
Lockheed Martin/Northrop Grumman/JSF programme office	Pratt & Whitney	East Hartford, Connecticut, USA	F135 engine production	Lockheed Martin F-35 Joint Strike Fighter	$69.3 million	The F135 engine low rate initial production contract will support two conventional take-off and landing (CTOL) F-35 production aircraft. Engine deliveries are scheduled to begin in June 2009. The F135 propulsion system team consists of Pratt & Whitney, the prime contractor with responsibility for the main engine and system integration; Rolls-Royce, providing lift components for the STOVL F-35B; and Hamilton Sundstrand, provider of the F135's control system, external accessories and gearbox.	Sep 2007
Lockheed Martin/Northrop Grumman/JSF programme	Kongsberg Defence and Aerospace	Kongsberg, Norway	Composite products	Lockheed Martin F-35 Joint Strike Fighter	Initial scope of MNOK 1300 and MNOK 650	The framework agreements with Lockheed Martin and Northrop Grumman were conditional on Norway procuring – a decision is expected in 2008.The agreements will extend for	Jan 2007

office					($345 million) Full-scale production will mean the scope can potentially increase to a total of NOK 6-8 billion.	more than eight years and require the construction of a new composite factory. In June 2005 Kongsberg Defence and Aerospace signed a nearly $40 million, long-term agreement with Northrop Grumman Corporation to produce composite parts and subassemblies for the F-35, centre fuselage.	
Lockheed Martin/Northrop Grumman/JSF programme office	Turkish Aerospace Industries	Ankara, Turkey	Centre fuselage	Lockheed Martin F-35 Joint Strike Fighter	$3 billion plus	Under the Letter of Intent (LOI) TAI becomes the second source for the F-35 Lightning II center fuselage. The number of center fuselages to be produced by TAI will be determined depending on the number of F-35s Turkey will procure and the number of F-35s to be produced worldwide. In November 2008 TAI opened a new 74,000sq ft facility to make at least 400 composite subassemblies in the low rate initial production (LRIP) phases of the programme.	Feb 2007
Lockheed Martin	Alcoa	Cleveland, Ohio, USA	Aluminum die forgings	Lockheed Martin F-35 Joint Strike Fighter	$360 million	Alcoa Power and Propulsion business has been awarded a 10-year contract to supply 7085 alloy aluminium die forgings for the JSF programme. Contract work will be performed by Alcoa Forged and Cast Products Cleveland operations and involves the design and manufacture of all the large aluminium structural die forgings for more than 1,200 aircraft. The forgings include 15 large bulkheads — the primary structural support for the wing and engine that can weigh from 1,800 to 6,000 pounds and range from 10 to 23 feet in length — and six wing box parts which serve as an important component of the skeletal structure to the wing. Alcoa's partnership with Lockheed Martin began in 2004. In addition to the aluminium forgings described above, other Alcoa aerospace units will provide critical F-35 components and solutions to the programme. Among those are highly-engineered joining devices from Alcoa Fastening Systems, specialty alloy plate from Alcoa North American Mill Products, and high-pressure turbine blades for F-35 JSF engines and structural aluminum castings from Alcoa Power and Propulsion. As part of the JSF contract, Alcoa plans to invest $24 million in Cleveland Works primarily for new machinery, equipment and infrastructure improvements. Alcoa Forged and Cast Products is being supported by the State of Ohio with a $400,000 Rapid Outreach Grant and	Nov 2007

						up to $450,000 for employee training.	
Pratt & Whitney	GKN Aerospace	Luton, UK	Ice protection system	Lockheed Martin F-35 Joint Strike Fighter	$6 million	The contract is for electro-thermal heater mats for the F135 engine ice protection system (EIPS). The contract should lead to full scale production. The new electro-thermal EIPS will remove the need to bleed hot air from the engine. It will represent the first production application of a Resin Transfer Moulded (RTM) composite structure with an electro-thermal heating system, according to the company. GKN Aerospace is responsible for the integration of the mats into the forward fan case for the F135.	Mar 2007
Value of all 2007 military fast jet system, structures and component contracts, in the public domain							$4,322 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							$3,000 million
PMI Media estimates of total value of 2007 fast jet system, structures and component contracts							$4,450 million
PMI Media estimates of low-wage manufacturing system, structures and component contracts							$3,000 million

Rotorcraft							
Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
AgustaWestland	Tusas Aerospace Industries	Ankara, Turkey and Cascina Costa, Italy	Licence assembly	Agusta A129 Attack and Tactical reconnaissance (ATAK)	The deal is reported to be worth $3 billion	Turkey placed an order for 51 A129 ATAKs; Tusas Aerospace Industries (TAI) is responsible for final assembly of the helicopter, to be designated T129. AgustaWestland and Aselsan are the main subcontractors. In May 2009 AgustaWestland opened its new T129 facility in Cascina Costa, Italy. The new facility, staffed by more than 70 Turkish and AgustaWestland integrated team technicians, comprises an assembly area for the T129 prototypes as well as office space for the T129 team members.	Sep 2007
AgustaWestland	BAE Systems	Phoenix, Arizona, USA	Crashworthy seats	AgustaWestland AW159		Deliveries of 140 seats are slated for 2011 through 2016 under the contract.	Nov 2007
AgustaWestland	Selex Sensors & Airborne Systems	Edinburgh, UK	Radar	AgustaWestland AW159		Selex Sensors & Airborne Systems is supplying its Seaspray 7000E Active Electronically Scanned Array (AESA) radar system, a multi-mode I-band radar which provides 360° coverage. Modes include SAR (Synthetic	Feb 2007

						Aperture Radar), ISAR (Inverted SAR) and GMTI (Ground Moving Target Indicator).	
AgustaWestland	Wescam/L-3 Communications	Ontario Canada	Electro-Optical Laser Designator system. System	AgustaWestland AW159		L-3 Communications/Wescam has been selected to provide 56 MX®-15Di turrets as the Electro-Optical Laser Designator system. System deliveries are slated to begin late in 2009 and will continue through 2014.	Mar 2007
US Naval Air Systems Command	Rolls-Royce	Indiana, Indianopolis, USA	Engines	Bell Boeing V22	$700 million	The contract is for the production of 370 AE 1107C-Liberty engines for the US Marine Corps' MV-22 and the US Air Force's CV-22 Osprey. The production agreement includes engines for 148 aircraft plus 74 spares, for deliveries going forward to 2013. The AE 1107C engine is part of the "common core" AE engine line produced by Rolls-Royce, and provides more than 6,000 shaft horsepower. The engines are fitted with Full-Authority Digital Electronic Control (FADEC) supplied by Goodrich (formerly TRW/Lucas).	Sep 2007
US Naval Air Systems Command	Boeing	St Louis, Missouri, USA	Hydraulic automatic test system	Bell Boeing V-22	$15 million plus	VHATS provides advanced dynamic testing for servo-cylinder linear and rotational actuators as well as other aircraft hydraulic components.	Jan 2007
Bell Helicopter Textron	Sagem Avionics	Dallas, Texas, USA	Display system	Bell 206/407		Sagem Avionics developed a partnership with ACROHELIPRO Global Services to install the SAGEM ICDS - "Integrated Cockpit Display System" for the Bell 206.	Mar 2007
Bell Helicopter Textron	EFW	Fort Worth, Texas, USA	Helmet display and tracking system; data transfer system (DTS)	Bell ARH-70A		The Helmet Display and Tracking System (HDTS) provides pilots with helmet mounted night vision, flight data, and weapons targeting information. The DTS interfaces with the ARH communications, navigation, aircraft survivability equipment and mission equipment subsystems to automate the mission data input process and record a variety of mission and aircraft information during flight.	Jul 2007
Enstrom	Chelton Flight Systems	Mineral Wells, Texas, USA	Electronic flight instrument systems	Enstrom 480B		The installation includes two Chelton EFIS displays, 6.0B software, a digital air data and attitude/heading reference system, (ADAHRS), along with Chelton's Beta 3 GPS/WAAS (Wide Area Augmentation System) receiver. The system also features a synthetic vision primary flight display, dual integrated FMS, Class-B (or –A capable) helicopter TAWS (Terrain Awareness and Warning System), a master caution voice warning system, HITS (Highway-In-The-Sky navigation), a digital flight recorder, and Chelton's unique hover vector display.	Feb 2007
US Department of Defense – US Army	Boeing	Mesa, Arizona, USA	Final assembly, structures	Boeing AH-64D Apache	$1.149 billion	Boeing's contract is for the remanufacture of 96 AH-64D Apache Longbow helicopters for the US Army and 30 AH-64Ds for the United Arab Emirates. Work began in March 2006 following the award of a long-lead agreement. The contract brings the total number of remanufactured US Army AH-64D Apache Longbow helicopters to 597. The U.S. Army has	Jan 2007

						ordered an additional 27 new-build Apaches as war-replacement aircraft. The US Army Apache Longbow aircraft, to be built in the Block II configuration, are in addition to the 501 remanufactured AH-64D Apache Longbows built between 1997 and 2006 under two five-year, multi-year contracts. Under a foreign military sales agreement, the United Arab Emirates is upgrading its fleet of AH-64A Apache helicopters to the next-generation configuration. Meanwhile in July 2005, the US Army awarded Boeing a development contract for Block III improvements, to enter service from 2011. The Block III version incorporates increased digitisation, a joint tactical radio system, enhanced engines and drive systems, capability to control UAVs and new composite rotor blade. The development and demonstration (SDD) contract was awarded to Boeing in July 2006 and the first flight of the Block III Apache was in July 2008.	
Sikorsky	General Electric	Lynn, Massachusetts, USA	Engines	Sikorsky CH-53K		The GE38-1B engine uses a similar architecture to the T700. Three engines will be installed in the CH-53K. Capable of producing more than 7,500-shaft horsepower at sea level, the GE38-1B is based on the GE27 technology demonstrator engine completed for the U.S. military and T407 turboprop engine developed for the US Navy. The GE38-1B has a five-stage axial compressor coupled with a single-stage centrifugal compressor. It has a low-emission, annular combustor, two-stage gas generator turbine, and three-stage power turbine. It features a dual-channel Full Authority Digital Electronic Control system with advanced health monitoring functions. Approximately 6,000 hours of engine ground testing will begin in 2009 on the engine. Engine ground testing is a critical element in the process to obtain flight clearance and approval for production	Jan 2007
Sikorsky	Aurora Flight Sciences	Clarksburg, West Virginia, USA	Main rotor pylon	Sikorsky CH-53K		The Main Rotor Pylon (MRP) is one of six major fuselage sections and houses the CH-53K's main rotor head, the No. 2 engine and other aircraft subsystems. Made primarily of composite material, the MRP will be fabricated in Clarksburg and shipped to Sikorsky for integration. Main rotor pylon assemblies will initially be built for seven test and certification aircraft (four Engineering Development Models, one Ground Test Vehicle, one Static Test Article and one Fatigue Test Article.)	Apr 2007
Sikorsky	Sanmina-SCI Corporation	San Jose, California, USA	Intercommunications system	Sikorsky CH-53K			Jun 2007

Sikorsky	Spirit AeroSystems	Wichita, Kansas, USA	Cockpit cabin	Sikorsky CH-53K	$150 million plus	The seven-year contract is for the supply of major structural components under the Systems Development and Demonstration (SDD) phase of the contract. Spirit will design, produce and join the helicopter's composite cockpit and cabin. Spirit began work on the SDD phase of the programme in 2007. Under the contract, Spirit will design and produce seven test articles, four of which will undergo flight testing.	May 2007
Sikorsky	Eaton Corporation	Irvine, California, USA	Fuel system	Sikorsky CH-53K	$96 million for the Marine Corps element and $160 million when foreign sales are included	Eaton Corporation is designing, developing and supplying the CH-54K's integrated fuel system. During the development phase of the programme, which runs through 2014, Eaton will provide the integrated fuel system support hardware for five helicopter shipsets in addition to a number of system development test sets.	Nov 2007
Sikorsky	Eaton Corporation	Irvine, California, USA	Primary hydraulic power generation system and the fluid conveyance package	Sikorsky CH-53K	More than $200 million	During the development phase of the programme, which runs through 2014, Eaton will provide support hardware for 10 aircraft shipsets.	Jul 2007
Sikorsky	Hamilton Sundstrand	Windsor Locks, Connecticut USA	Integrated secondary power systems , fly-by-wire control computers and tail-rotor actuators	Sikorsky CH-53K	This agreement has a potential value of more than $400 million.	The integrated secondary power systems package consists of the environmental control system, auxiliary power unit and main engine start system. The contract includes design, development and production work. Design and development will begin immediately with first hardware deliveries scheduled for 2009. The environmental control system and main engine start system will be built at Hamilton Sundstrand's Windsor Locks, Connecticut. facility while the Auxiliary Power Unit will be built at the company's San Diego, California facility. The environmental control system consists of flight deck and avionics air conditioning, cabin ventilation and heating, engine bleed system, and supply air for the onboard inert gas generation system. Sikorsky previously awarded Hamilton Sundstrand a contract to supply the CH-53K's fly-by-wire flight control computers and primary main and tail rotor actuators.	Sep 2007
Sikorsky	Goodrich Corporation	Pitstone Green, UK and Twinsburg, Ohio, USA	Electrical power system	Sikorsky CH-53K		The contract involves the development and delivery of a complete electrical power system for the aircraft, consisting of generators and controls; primary power distribution; AC/DC converters; battery; and external power controls.	Jun 2007
Sikorsky	Héroux-Devtek	Longueuil, Quebec,	Landing gear and tail	Sikorsky CH-53K	Around $95	Under the terms of the agreement, Héroux-Devtek will design, develop, fabricate, assemble, test and deliver	Jun 2007

		Canada	bumper		million	the helicopter's landing gears and tail bumper during the Systems Design and Development (SDD) phase. This development phase of the programme includes the production of landing gears and tail bumper assemblies for eight systems. The production phase of the programme, with the delivery of two systems for the Low Rate Initial Production phase in 2013 and four systems in 2014, is expected to lead to 156 deliveries to the U.S. Marine Corps under current programme expectations.	
Sikorsky	Changhe Aircraft Industries Corp	Beijing, China	Airframes	Sikorsky S-76C++		Changhe Aircraft Industries Corp is supplying S-76 helicopter airframes as part of a Memorandum of Understanding (MOU) signed June 1, 2006, by Sikorsky and China Aviation Industry Corp. II (AVIC II), parent company of Changhe. Changhe is building and delivering S-76C++ helicopter airframes for Sikorsky alongside those of Aero Vodochody.	Jul 2007
Sikorsky	Curtiss-Wright	Roseland, New Jersey, USA	Supply recovery assist secure and traverse (RAST) system probes for the H-92 Canadian Maritime Helicopter Programme	Sikorsky S-92	$13 million	Curtiss-Wright Corporation through its Motion Control segment received a contract from for the supply of RAST probes to be fitted on 28 of the H-92 helicopters destined for the Canadian Maritime Helicopter Programme. The contract includes all design, development, testing and delivery of production probes for the contracted helicopters.The helicopter probe is required to interface with the shipboard RAST system provided by Curtiss-Wright under a separate contract awarded in 2004 to the Canadian Department of National Defence.	Mar 2007
GKN Aerospace	Ducommun AeroStructures	Los Angeles, California, USA	Titanium erosion shields	Sikorsky UH 60M	The contract is valued at approximately $60 million at anticipated build rates and will carry on through 2012.	The long-term agreement is to furnish titanium erosion shields, which provide leading edge protection for both new and aftermarket main rotor blades to support the Sikorsky UH-60	Nov2007
Value of all 2007 rotorcraft system, structures and component contracts, in the public domain							$5875 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							$ 3,000 million
PMI Media estimates of total value of 2007 rotorcraft system, structures and component contracts							$6,784 million
PMI Media estimates of low-wage manufacturing system, structures and component contracts							$ 3,600 million

Business jets							
Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
Bombardier	Goodrich	Troy, Ohio, USA	Wheels and brakes	Bombardier Learjet 40 XR/45 XR		The company is supplying wheels and carbon brakes as part of the contract. In addition to the Bombardier Learjet 40 and 45, Goodrich wheels and brakes also continue to be the standard equipment for the majority of Bombardier business jets.	Sep 2007
Cessna	Keith Products	Addison Texas, USA	Vapour cycle cooling system	Cessna, CJ4		The company is part of the Meggitt group. The system features the company's new brushless DC motor technology for the compressor drive and the evaporative blowers.	Apr 2007
Cessna	Meggitt Aircraft Braking Systems	Akron, Ohio, USA	Wheels and brakes	Cessna CJ4		Cessna selected ABSC's 8-inch nose wheels, 10-inch main wheels and long-life steel brakes. A brake landing guarantee will be offered by Cessna through both the ProAdvantage operating cost programmes as well as Citation Parts Distribution's comprehensive brake overhaul and exchange programmes.	Jun 2007
Cirrus	L-3 Communications	New York, New York, USA	Avionics	Cirrus Vision SJ50		The company has customized its SmartDeck(R) flight controls and display system for the development phase of the aircraft.	Sep 2007
Dassault	Honeywell	Phoenix, Arizona, USA	APU	Dassault Falcon 7X		The 36-150[FN] APU has been specified .	May 2007
Dassault	Rockwell Collins	Cedar Rapids, Iowa, USA	iPod Quad Station	Dassault Falcon 900		The new iPod Solo Station and the iPod Quad Station both offer flexible designs that allow passengers to charge their iPod and access their music and video libraries through the cabin audio visual system	Sep 2007
Dassault	Ducommun AeroStructures Inc	Monrovia, California, USA	Winglets	Dassault Falcon 2000	$25 million	The programme was won in cooperation with Aviation Partners Inc. (API) and with Dassault-Aviation.	Oct 2007
Bombardier	Rolls-Royce	Virginia, USA	Engine	Dassault SMS/5X		The Rolls-Royce RB282-3 is the first member of a new two-shaft family engine, under development by the UK manufacturer at its Dahlewitz, Germany plant, and will be manufactured and tested in a facility under construction in Virginia.	Jun 2007
Embraer	Parker Hannifin	Irvine, California, USA	Flight control sub-systems	Embraer 100/300		Parker Hannifin will supply four flight control subsystems on the Phenom 300. Parker's Control Systems Division will design and produce the aircraft's fly-by-wire spoiler system and electromechanical pitch trim	Sep 2007

						system, yaw and roll trim actuation, and flap system, as well as a centralised electronic controller.	
Embraer	PPG	Huntsville, Alabama, USA	Transparencies	Embraer 100/300	According to PPG Aerospace expected production life is more than 1,000 aircraft, which could put the value of the contract at more than $35 million	PPG Aerospace-Transparencies has been awarded a sole-source contract to develop and produce cockpit windows for the Phenom 100 and 300. The aircraft will be Embraer's first to be certified with the PPG Surface Seal rain-repellent coating as the primary windshield rain removal system, with no windshield wipers.	June 2007
Embraer	Tactair	Liverpool, New York, USA	Select control systems for brakes, secondary flight and doors	Embraer 100/300		Tactair Fluid Controls Inc is providing select controls for wheel brake, secondary flight control, and door control applications for the Phenom 100/300. On the Phenom 100, Tactair will provide the emergency/park brake control system and passenger door damper. On the Phenom 300, Tactair will provide the landing gear control valves, stick pusher actuator, rudder spring actuator and passenger door damper.	Jun 2007
Israeli Aircraft Industries	Hindustan Aeronautics Ltd	Bangalore	Aft fuselages	Gulfstream G-150		The contract covers production of 200 ship-sets of G-150 fuselages	2007
Meggitt Aerospace	Doncasters Precision Forgings	Sheffield, United Kingdom	Brake torque tube	Embraer 100/300		According to Doncasters: “The torque tube is an essential part of the brake which encloses the drive shaft used to absorb the resultant torque (twisting, turning force) from the shaft. Doncasters Precision Forgings in Sheffield, UK, will manufacture the torque tubes from stainless steel using the site's four tonne closed die forging hammer.”	Feb 2007
Gulfstream	Rockwell Collins	Cedar Rapids, Iowa, USA	Head up guidance system	Gulfstream 450/550		Beginning in 2009, Rockwell Collins' new HGS-6000 Head-Up Guidance System (HGS®) series will be featured on new aircraft delivered by Gulfstream Aerospace. The HGS-6000 will be standard equipment on Gulfstream G450 and G550 aircraft, and optional equipment on the G150, G200, G350 and G500 aircraft. The HGS-6000 features advanced active-matrix liquid crystal display technology and presents critical flight information in the pilot's forward field of view. The new digital display will allow the pilot to see an integrated display of flight information and an infrared image from Gulfstream's Enhanced Vision System (EVS) in almost all weather conditions. The HGS-6000 is designed to support emerging technologies such as synthetic vision and surface guidance which will further	May 2007

						improve safety of operations.	
Hawker Beechcraft Corporation (formerly Raytheon Aircraft)	PPG	Kennesaw, Georgia, USA	Sealant tape	Hawker Beechcraft Premier 1		A polysulfide formed-in-place sealant tape developed by PPG Aerospace – PRC-DeSoto has been approved for use by Hawker Beechcraft for the wing fairings of the aircraft. According to PPG: "Uncured sealant is premixed and frozen in one-foot preformed strips that are thawed prior to application. The strips thaw in five minutes to puttylike consistency and cure in four hours to a highly fuel-resistant elastomer."	Jun 2007
Honda Aircraft Company	Honda Aircraft Company	Greensboro, North Carolina, USA	Final assembly	HondaJet		The 215,000 square foot headquarters will be the center of all activity related to HondaJet, including type certification, all sales, marketing and service support activity, and continued research and development activities. The HACI production facility will handle production of HondaJet, including final assembly of all structural components and parts, aircraft system assembly and installation, completion of the interior, and painting.	Feb 2007
Honda Aircraft Company	Hampson Industries	Grand Prairie, Texas, USA	Complete empennage structural sub-assembly	HondaJet			Oct 2007
Honda Aircraft Company	GKN	Tallassee, Alabama, USA	Fuselage sub-assembly	HondaJet			Mar 2007
Honda Aircraft Company	Garmin International		Avionics	HondaJet			Mar 2007
Honda Aircraft Company	Avcorp	Delta, British Columbia, Canada	Wing structural component	HondaJet			Mar 2007
Value of all 2007 business jet system, structures and component contracts, in the public domain							$370 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							-
PMI Media estimates of total value of 2007 business jet system, structures and component contracts							$1,598 million
PMI Media estimates of low-wage manufacturing system, structures and component contracts							$700 million

2008

Airliners							
Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
Airbus	Goodrich Interiors'	Colorado Springs, Colorado, USA	Cabin attendant seats	Airbus A318/A319/A319CJ/A320/A321	The award is expected to generate $100 million in revenue to support new production aircraft, retrofit sales and spares over the life of the programme	With this new contract, Goodrich cabin attendant seats are featured on the entire family of Airbus aircraft including the A300, A330, A340 and A380.	Feb 2008
Airbus	ZKM Forging	Stalowa, Poland	Airframe components	Airbus A318/A319/A319CJ/A320/A321			Feb 2008
Airbus	Honeywell	Phoenix, Arizona, USA	Weather radar	Airbus A330/A340	Contract, including deliveries to the A320 programme estimated at $300 million	Honeywell's IntuVue 3-D Advanced Weather Radar is being supplied to A320s, A330s and A340s, giving flight crews the ability to detect and avoid previously unforeseen turbulence, wind shears and dangerous storm activity so they can make more informed route decisions. Honeywell's IntuVue weather radar is already standard equipment on Airbus A380 and A350 as part of the Aircraft Environment Surveillance System. Deliveries are planned to start with the single aisle A320 family (A318, 319, A320, and A321) in the first quarter of 2010 with the long range A330s and A340s, including freighters, shortly thereafter.	Sep 2008
Airbus	Spirit Aero Systems	Kinston, North Carolina, USA Prestwick, UK	Wing leading edge	Airbus A319, A320, A321	$1.7 billion	Trailing edges and other wing structures	Jul 2008
Airbus	Spirit Aero Systems	Kinston, North Carolina, USA Wichita, Kansas, USA Kuala Lumpur, Malaysia	Fuselage section 15	Airbus A350 XWB		The section 15 centre fuselage frame section is a composite structure approximately 65ft long, 20 ft wide, it weighs nearly 9000 lb. The company will build a new facility in Lenoir County, North Carolina. It will initially employ 500 people, with plans to grow to 1,000 when all phases of development are complete. The new plant should be ready by 2010. Portions of A350 XWB work will also take place in the company' s Wichita plant and the Spirit factory in Malaysia. The company is also building the composite front spar at Kinston; composite sub-assemblies will be made in Malaysia.	May 2008
Airbus	Spirit Aero Systems	Prestwick, UK	Wing leading edge	Airbus A350 XWB		The leading edge will be 32m long and about 50% carbon-fibre reinforced material.	Jul 2008
Airbus	Hamilton Sundstrand	Rockford, Illinois, USA Phoenix,	Electrical power generation	Airbus A350 XWB	Hamilton Sundstrand estimates total	Hamilton Sundstrand's A350 XWB electric power generation system (EPGS) comprises four 100 kVA, 230-volt variable frequency generators and four generator	Feb 2008

		Arizona, USA Puerto Rico and the Republic of Singapore.			programme revenue of approximatel y $1 billion.	control units. The EPGS will be designed in Rockford, Illinois, and manufactured at various Hamilton Sundstrand plants, including those in Rockford, Phoenix, Arizona, Puerto Rico and the Republic of Singapore.	
Airbus	Harbin Aircraft Industry Group	Harbin, China	Composit e material parts and compone nts.	Airbus A350 XWB		The two companies are establishing a manufacturing centre, which will be set up in early 2009, will be an equity joint venture enterprise, with HAIG holding 80 per cent stake and Airbus China owning 20 per cent stake. According to the contract, the manufacturing centre will manufacture composite materials parts and components for the Airbus A320 family and participate in the industrialisation and serial production of Airbus A350 XWB work-packages.	Jul 2008
Airbus	Hexcel Corporation	Stamford, Connecticut , USA	Carbon fibre composit e materials	Airbus A350 XWB	Hexcel expects the award to generate revenues of $4-5 billion over the life of the contract.	The award covers the entire family of A350 XWB aircraft through 2025. Hexcel is supplying a “HexPly” toughened epoxy prepreg made with Hexcel’s HexTow intermediate modulus carbon fiber. The materials and their components will be manufactured at Hexcel facilities in the US, France, Spain, Germany and the UK.	Jul 2008
Airbus	Sagem Defense Securite	Paris, France	Flight data acquisitio n and security system	Airbus A350 XWB		Sagem Defense Securite will develop, produce, integrate and provide support for the system, which will consist of two components: the Centralized Data Acquisition Unit (CDAU), which acquires, processes, monitors, displays and records data available on the aircraft to monitor systems and provide maintenance and flight safety; the Secure Communication Interface (SCI), which will provide the secure link between the aircraft's avionics core and the open information.	Jul 2008
Airbus	Meggitt Safety Systems	Simi Valley, California, USA	Fire protectio n systems	Airbus A350 XWB			Jul 2008
Airbus	Goodrich	Troy, Ohio, USA	Wheels and brakes	Airbus A350 XWB	The selection is expected to generate more than $3 billion in revenue over the life of the programme.	The brakes will incorporate Goodrich's DURACARB(R) carbon heat sink material.	Dec 2008
Airbus	Goodrich Sensors and Integrated Systems	Burnsville, Minnesota, USA	Air data and ice detection systems	Airbus A350 XWB	The awards are expected to generate more than $600 million in original equipment and aftermarket revenue over 20 years	The ADS provides all critical air data parameters to the vehicle management computers for the aircraft's flight control and pilot display systems. Goodrich’s SmartProbe(TM) and SmartPort(R) air data sensing technology allows integration of multi-function sensing ports, pressure sensors and processing capability through the elimination of pneumatic lines. The ice detection system provides advisory indication of ice buildup and enables the flight crew to activate the aircraft's ice protection system at the optimal time. The system helps reduce fuel consumption by activating the energy-consuming de-ice function only	Sep 2008

						when required.	
Airbus	Hamilton Sundstrand	Connecticut, USA	Ram air turbine	Airbus A350 XWB	Hamilton Sundstrand estimates total A350 XWB Ram Air Turbine (RAT) system revenues in excess of $500 million over the life of the multi-year programme.		Sep 2008
Airbus	Sirio Panel	Levanella, Italy	ICP and cockpit lighting	Airbus A350 XWB	$100 million	SELEX Communications subsidiary Sirio Panel, has signed two contracts with Airbus, to develop and supply avionics interface control units and manufacture the cockpit lighting system for the Airbus A350 XWB. Sirio Panel will develop the pilot/system interface of the Integrated Control Panel and the cockpit illumination system (Cockpit General Illumination). The order covers 12 control panels, 15 up front control panels using LED technology, and dimming units. The cockpit illumination system, comprising 22 lights with an option for a further 18, allows the pilot to illuminate specific areas, such as maps or other units. The light intensity can be varied using the dimmers.	Feb 2008
Airbus	Saft	Paris, France	Batteries	Airbus A350 XWB	Around Euro 200 million over the next 25 years	Lithium-ion battery systems have been specified	Mar 2008
Airbus	Thales	Paris, France	Electrical power conversion system, integrated modular avionics suite	Airbus A350 XWB	These two selections are expected to generate up to 2 billion euros in revenues over the first 20 years of in-service life for the aircraft.	The system converts electricity from different sources into the appropriate standard voltage required by various applications. Its electrical network will include several electrical standards ranging from direct current (DC) to variable frequency alternating current (AC). The company was selected at the beginning of 2008 for the Integrated Modular Avionics suite, the Interactive Control and Display Systems and the Air Data and Inertial reference unit for the Thales has made a significant investment to support its A350 bids, with the creation in Toulouse and Bordeaux of simulation and prototyping demonstrators and tools, such as the Airlab technico-operational laboratory and the iDeck simulator.	Mar 2008
Airbus	Thales and Diehl	Paris, France	Common remote data concentrators (cRDC)	Airbus A350 XWB		The common remote data concentrators (cRDC) and core processing input/output modules (CPIOM), serve as the two main building blocks within the Integrated Modular Avionics (IMA) suite. The development and production of the cRDCs will be carried out by Diehl Aerospace, the Joint Venture Company formed by Thales and Diehl in 2000.The cRDC is an avionics unit generally installed outside of the avionics bays.	Mar 2008

Airbus	Rockwell Collins	Cedar Rapids, Iowa, USA	Data management and navigation system	Airbus A350 XWB	Rockwell Collins expects the potential value of the entire programme to be $2.5 billion.		Jul 2008
Airbus	Rockwell Collins	Cedar Rapids, Iowa, USA	Communications equipment	Airbus A350 XWB		Awards include the fully integrated Communication Global Work package, the Avionics Data Network, and landing systems. These awards come in addition to Airbus' previous selection of Rockwell Collins' trimmable horizontal stabilizer actuator (THSA).	Apr 2008
Airbus	Parker Aerospace	Irvine, California, USA Smithtown, New York, USA Amsterdam, The Netherlands Elyria, Ohio, USA	Fuel system	Airbus A350 XWB	The contract will generate more than US$1 billion over the life of the programme for Parker	The fuel system contract is the result of a collaborative effort by Parker's Air & Fuel, Electronic Systems, and Nichols Airborne Divisions and Parker's Fuel Systems team. The companies will provide the entire fuel system equipment package, including the inerting system, fuel measurement and management system, fluid mechanical equipment, and engine feed and transfer fuel pumps. Parker's Air & Fuel Division in Irvine, California, will provide the fuel tank inerting system. Parker's Electronic Systems Division in Smithtown, New York, will provide the fuel measurement system.The fluid mechanical equipment provided by the Air & Fuel Division and the engine feed and transfer fuel pumps provided by the Nichols Airborne Division in Elyria, Ohio, are new product wins for Parker on Airbus aircraft.	Jan 2008
Airbus	Parker Aerospace	Kalamazoo, Michigan, USA	Hydraulic system	Airbus A350 XWB	The contract will generate over US$1 billion for Parker over the life of the programme	This work comprises seven individual work packages including pumps, reservoirs, manifolds, accumulators, thermal control, isolation, and software. Together these products provide the hydraulic system functions necessary to power and control the aircraft.	Jan 2008
Airbus	B/E Aerospace	Wellington, Florida, USA	Passenger and crew oxygen systems	Airbus A350 XWB	The award is initially valued at more than $125 million.	The systems will include B/E Aerospace's Pulse™ system as well as chemical oxygen generation .	Jan 2008
Airbus	B/E Aerospace	Wellington, Florida, USA	Galley systems	Airbus A350 XWB	B/E Aerospace values the award at more than $1.0 billion.	Programme deliveries for the A350 XWB will commence in 2013. The A350 XWB will be equipped with a galley system designed to accommodate the aircraft's "flex zones", which allows the airlines to select from a wide range of pre-engineered galley configurations.	Oct 2008
Rockwell Collins	Cobham	Wimbourne, UK	Radio and audio integrated manage	Airbus A350 XWB	Over the life of the contract the business is anticipated to be worth	The RAIMS enables aircrew to control many of the aircraft's communications, navigation and data-link systems through a single integrated interface.	Aug 2008

			ment system (RAIMS)		US$200million including aftermarket support.		
Rolls-Royce	Hispano-Suiza	Colombes, France	Accessory gearbox for the Trent XWB	Airbus A350 XWB		Hispano-Suiza will supply a complete accessory gearbox package, including the accessory gearbox and its transfer gearbox, angle drive shaft, step aside gearbox, radial drive shaft, complete oil tank assembly and high pressure and radial drive shaft bevel gears.	July 2008
Nord Micro	CTT Environmental Systems	Nyköping, Sweden	Environmental system components	Airbus A350 XWB		CTT is developing and delivering for Nord-Micro its zonal drying system and humidifiers for the Airbus A350 XWB programme. Nord-Micro will in turn supply the systems to Honeywell, a "tier-one" supplier and turnkey systems integrator to Airbus. The CTT-developed Cair system will be offered by Airbus as an option for cabin-section, flight-deck and crew-rest humidification.The system will also be available for executive versions of the aircraft.	Dec 2008
Boeing	Vibro-Meter	Fribourg, Switzerland	Vibration monitor	Boeing 737-600,-700,-800,-900		The company is providing its Advanced Airborne Vibration Monitor (AAVM) on all new Boeing 737 NG aircraft. The AAVM is a Boeing, CFM International and Vibro-Meter venture. AAVM data can be downloaded via ACARS or by interrogation of the AAVM front panel.	Aug 2008
ST Aerospace Systems	Honeywell	Phoenix, Arizona, USA	Mechanical part pieces	Boeing 737-600, -700,-800,-900, Boeing 747-8	The agreement is potentially worth $30 million for parts purchased and covers deliveries to Boeing 737, 747 and 767 types	The agreement is for five years.	Oct 2008
Boeing	Kaman	Jacksonville, Florida, USA	Structures	Boeing 767-200/-300/-400ER		At the start of 2008 the company's Aerostructures Division signed a seven-year follow-on contract with The Boeing Company for the production of wing fixed trailing edge assemblies on the Boeing 777 and 767 aircraft. The agreement calls for Kaman to supply components for all configurations of the 777 and 767 at the Boeing annual production rates.	Jan 2008
ST Aerospace Systems	Honeywell	Phoenix, Arizona, USA	Mechanical part pieces	Boeing 767	The agreement is potentially worth $30 million for parts purchased and covers deliveries to Boeing 737, 747 and 767 types	The agreement is for five years.	Oct 2008

Boeing	Asian Composite Manufacturing Sdn Bhd (ACM)	Kuala Lumpur, Malaysia	Machined honeycomb core	Boeing 777 – all types			Nov 2008
Boeing	Kaman	Jacksonville, Florida, USA	Structures	Boeing 777 – all types		Kaman won its first contract to build wing structures for the Boeing 777 in 1991. At the start of 2008 the company's Aerostructures Division signed a seven-year follow-on contract with The Boeing Company for the production of wing fixed trailing edge assemblies on the Boeing 777 and 767 aircraft. The agreement calls for Kaman to supply components for all configurations of the 777 and 767 at the Boeing annual production rates.	Jan 2008
Boeing	Honeywell Aerospace	Phoenix, Arizona, USA	Cargo bay lighting	Boeing 787		Lower lobe cargo lights	Jun 2008
Saab	Curtiss-Wright	Shelby, North Carolina, USA	Cargo door actuation system	Boeing 787	Over $16 million	The company is providing the large cargo door mechanical actuation system for the new Boeing 787. The mechanical system is comprised of five major flight-critical sub-assemblies, including the lift, pull-in, latching, locking and vent systems for the B787 large cargo doors. Curtiss-Wright will manufacture these components at its Motion Control facility located in Shelby, North Carolina.	Feb 2008
Saab	Curtiss-Wright	Shelby ,North Carolina, USA	Cargo door mechanical system	Boeing 787	Over $80 million	The company is providing the mechanical system and structural fittings for the Boeing 787 large cargo door. Sales from this and other contracts have the potential to exceed $200 million during the production life of the aircraft to Curtiss-Wright. The mechanical system comprises the mechanical parts for five major flight-critical sub-systems - the lift, pull-in, latching, locking and vent systems.	Sep 2008
Bombardier	Parker Aerospace	Irvine, California, USA	Fuel system	Bombardier C Series	Hydraulics and fuel system contracts expected to generate approximately $1.2 billion in revenues	Product design and manufacture will be completed by Parker's Air & Fuel Division, Electronic Systems, and Nichols Airborne Divisions. According to Parker the fluid mechanical equipment includes the control valves for fuel and emergency shutoff, isolation, and venting of air in and out of the aircraft fuel tanks.	Sep 2008
Bombardier	Parker Aerospace	The hydraulic system will be designed and manufactured by Parker's Hydraulic Systems Division in Kalamazoo, Michiga	Hydraulic system	Bombardier C Series		This is the Parker Hydraulic Systems Division's fifth major hydraulic system platform to be jointly developed with Bombardier Aerospace. Major system hardware elements include engine-driven pumps, VFAC-motor- driven pumps, a power transfer unit, reservoirs, accumulators, and filtration. Additionally, Parker will provide ancillary equipment, including heat exchangers, various sensors, valves, and quick-disconnect couplings.	Sep 2008

		n					
Bombardier	Parker Aerospace	Cleveland, Ohio, USA	Fly-by-wire control systems	Bombardier CSeries	Parker estimates that this has the potential to generate revenues of US $3.5 billion over the life of the programmes.	The company has been named as the exclusive supplier for a period of ten years of fly-by-wire flight control systems for all new Bombardier widebody aircraft programmes. Parker Aerospace will develop a fly-by-wire system from stick to surface, that will then be customized and manufactured for each aircraft programme, starting with the CSeries. The company will also supply fuel tank inerting and fully integrated fuel and hydraulic systems.	Jul 2008
Bombardier	Bombardier	See comment	Assembly	Bombardier CSeries		Montreal Mirabel is the final assembly location; the manufacture of the aircraft's aft fuselage and cockpit will take place at the Saint-Laurent facility. Bombardier's Belfast facility will be home to the design and manufacture of the aircraft wings.	Jul 2008
Bombardier	Rockwell Collins	Cedar Rapids, Iowa, USA	Avionics	Bombardier CSeries		The company is supplying its Pro Line Fusion™ integrated avionics to the aircraft programme. The Pro Line Fusion integrated flight deck features high-resolution, 15-inch diagonal LCD displays capable of enhanced and synthetic vision. Rockwell Collins will also provide communication, navigation, surveillance, engine indication and crew alerting system (EICAS), and aircraft maintenance systems. The flight management system is integrated with aircraft performance characteristics and features graphical flight planning, as well as WAAS/LPV and RNP SAAAR capabilities.	Jul 2008
Bombardier	Shenyang Aircraft Corporation	Shenyang, China	See comment	Bombardier CSeries		SAC is a risk sharing partner in the design, manufacturing, assembling and testing of the aircraft's fuselage. The contract follows a June 2007 memorandum of understanding on the CSeries. Just over 10 per cent of the CSeries aircraft will be manufactured in China by Shenyang Aircraft Corporation. Shenyang also supplies the empennage, as well as the aft and forward fuselage sections for Bombardier's Q400 turboprop airliner.	Jul 2008
Bombardier	C&D Zodiac	Huntington Beach, California, USA	Interiors	Bombardier CSeries		The interior contract includes the seats, interiors (including the linings, monuments, bins, galleys and lavatories), oxygen system, lighting system, insulation system, waste system and the water system.	Jul 2008
Bombardier	Liebherr Aerospace	Toulouse, France	Air management system	Bombardier CSeries		The contract includes the environmental control and cabin pressure control system.	Jul 2008
Embraer	Daher	Orlytech, Paris, France	Sub-assemblies	Embraer 170-175/190-195		The renewable five year contracts started in May 2008 and are for composite-based sub-assemblies.	Mar 2008
Mitsubishi Aircraft	Mitsubishi Aircraft Corp	Nagoya, Japan	See comment	Mitsubishi MRJ70/90		Mitsubishi Heavy Industries launched the Mitsubishi Regional Jet (MRJ) on March 28 2008. Mitsubishi Aircraft counts as minority partners Toyota, Mitsubishi Corp., Mitsui & Company,	Mar2008

						Sumitomo Corp., Tokyo Marine Nichido, JGC Corp, Mitsubishi Electric, Mitsubishi Rayon and the Development Bank of Japan. Majority shareholder Mitsubishi Heavy Industries controls 64 percent of the company. MHI's Nagoya Aerospace Systems Works will manufacture both the prototype aircraft and production models; it will also be in charge of the MRJ's flight testing. MHI plans to furnish roughly two-thirds of the funding capital for the programme. Mitsubishi makes composite parts for the tail unit without an autoclave but using the advanced vacuum-assisted resin transfer molding (A-VARTM) process.	
Mitsubishi Aircraft	Spirit AeroSystems	Wichita, Kansas, USA	Engine pylon	Mitsubishi MRJ70/90		The contract is Spirit's first regional jet market order.	Oct 2008
Mitsubishi Aircraft	Hamilton Sundstrand	Illinois, USA	Electrical power system, air management system, auxiliary power unit, inert gas system, high lift actuation system, and fire and overheat protection system	Mitsubishi MRJ70/90			Mar 2008
Mitsubishi Aircraft	Rockwell Collins	Cedar Rapids, Iowa, USA	Flight control system, avionics	Mitsubishi MRJ70/90		Rockwell Collins will provide the primary flight control computer (PFCC) while Nabtesco (see below) will provide the flight control actuators.	Mar 2008
Mitsubishi Aircraft	Nabtesco Corporation	Tokyo, Japan	Flight control system	Mitsubishi MRJ70/90			Mar 2008
Mitsubishi Aircraft	Sumitomo Precision Products	Hyogo, Japan	Landing gear	Mitsubishi MRJ70/90		A revenue sharing partner	Mar 2008
Pratt & Whitney	Goodrich	Chula Vista, California, USA	Nacelles	Mitsubishi MRJ70/90	The award is expected to generate more than $5 billion in original equipment and aftermarket revenue for Goodrich during the 25-year period following entry into service.	Goodrich is the exclusive provider of the complete nacelle systems for the Geared Turbofan engine for both the Mitsubishi Regional Jet (MRJ) and the Bombardier CSeries aircraft families. Under the agreement, the Goodrich Aerostructures business unit, will produce the entire nacelle systems, including the inlet, fan cowl, thrust reverser, exhaust system, and engine mounts.	Apr 2008

Value of all 2008 airliner system, structures and component contracts, in the public domain							$29,631 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							-
PMI Media estimates of total value of 2006 airliner system, structures and component contracts							$ 39,223 million
PMI Media estimates of low-wage manufacturing system, structures and component contracts							$3,720 million

Military transports							
Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
ST Aerospace Systems	Honeywell	Phoenix, Arizona, USA	Mechanical part pieces	Boeing 767 tanker	The agreement is potentially worth $30 million for parts purchased and covers deliveries to Boeing 737, 747 and 767 types	The agreement is for five years.	Oct 2008
Lockheed Martin	GKN Aerospace	Cowes, UK	Nacelle and other systems	C-130J	$800 million	GKN Aerospace has gained a follow on contract from Lockheed Martin to supply the integrated nacelle for the C-130J aircraft. This is a five year, $400 million contract. GKN Aerospace has been the sole source provider of the integrated nacelle for the C-130J since it's inception in 1993. The new contract runs from Jan 2009 until December 2013. First deliveries will take place in January 2009 and GKN Aerospace anticipates delivering nacelles at a rate of around 10 per month until the end of 2013. The C-130J integrated nacelle includes the engine mounting structure, lower pan, scoop, doors and air inlet and also contains all the associated fluid systems including bleed air ducting, fuel, hydraulic and anti-ice systems. GKN Aerospace delivers the nacelle fully assembled with a majority of these systems installed. Lockheed Martin then installs the engine and finishes the systems integration. Collectively, the UK industrial team is known as the UK C-130J Industrial Support Group and includes companies such as Rolls-Royce (engines), GKN (engine nacelles),	Apr 2008

						Goodrich (digital engine controls) and General Electric (formerly Smiths Aerospace), including Dowty Propellers (power generation and distribution propellers). Over £740M in C-130J-related business has been placed directly with Lockheed Martin's British industrial partners and suppliers to date.	
Lockheed Martin	Elbit	Haifa, Israel	Global digital map	C-130J			Jul 2008
Lockheed Martin	CMC Canada	Montreal, Quebec, Canada	Portable mission display, GPS landing system	C-130J			Jul 2008
Lockheed Martin	L-3	New York, New York, USA	Special mission display processor	C-130J			Jul 2008
Lockheed Martin	General Electric	Michigan, USA	Communications, navigation and identification system	C-130J	$30 million	The contract is for more than 230 CNI open architecture systems.	Jul 2008
Value of all 2008 military transport system, structures and component contracts, in the public domain							$860 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							-
PMI Media estimates of total value of 2007 military transport system, structures and component contracts							$890 million
PMI Media estimates of low-wage manufacturing system, structures and component contracts							-

Military fast jets

Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
Raytheon	Ducommun Technologies (DTI)	The manufacture and sub-system integration work will be performed at DTI's Phoenix, Arizona Integrated Electrical Sub-Assembly center of excellence.	The contract is for the manufacture and sub-system integration of radar racks and electromechanical enclosures for the active electronically scanned array radar system	Boeing F/A-18 E/F	The multi-year agreement is worth more than $102 million	The racks and enclosures are for the APG-79 radar used on the F/A-18 E/F and the Radar Modernization Programme (RMP) for the F- 15E aircraft. This agreement is for the period of performance through 2020.	Dec 2008

Northrop Grumman	Ellanef Manufacturing	Corona, New York, USA	Structural components featuring titanium assemblies	Boeing F/A-18 E/F	$13 million	A Magellan company.	Feb 2008
Lockheed Martin/Northrop Grumman/ JSF programme office	Alenia	Cameri, Italy	Final assembly and check-out facility	Lockheed Martin F-35 Joint Strike Fighter		Cameri has been chosen by the government to set up a final assembly line producing two F-35s a month and managed by Alenia Aeronautica. The site will employ 500 people and production is due to run from 2011 to 2022.	Dec 2008
Lockheed Martin/Northrop Grumman/ JSF programme office	Pratt & Whitney	East Hartford, Connecticut USA	F135 engine production	Lockheed Martin F-35 Joint Strike Fighter	$78 million	The low rate initial production (LRIP) contract covers F135 long lead material for seven conventional take-off and landing (CTOL) and seven short-takeoff/vertical-landing (STOVL) F-35 aircraft. This award is one in a series of milestones for the F135 engine programme, including exceeding 10,000 ground test hours as part of the system development and demonstration programme; logging 59 successful flight tests and more than 75 flight test hours of the F135-powered CTOL F-35 aircraft; and completing 14 flights of the F-35B powered by Pratt & Whitney's F135 STOVL propulsion system.	Oct 2008
Lockheed Martin	Stork/Fokker Elmo	Wonsdrecht, The Netherlands	Wiring harnesses	Lockheed Martin F-35 Joint Strike Fighter	Potential value $2 billion	Under the terms of the agreement, Fokker Elmo will provide production capabilities, support and sustaining engineering during the aircraft's Low Rate Initial Production Phase. Both companies will also investigate ways to jointly support the Full Rate Production phase of the F-35 programme. This agreement represents the largest Dutch industrial cooperation agreement to date on the programme. Lockheed Martin and Fokker Elmo are working on a Total Integrated Wiring System (TIWS) solution which includes wiring management, configuration management, procurement and logistics, product support, set-up and management of all wiring production, and manufacturing of complex wiring harnesses both in the Netherlands and in the global supply chain, including Fokker Elmo's facility in Turkey.	April 2008
Pratt & Whitney	Rolls-Royce	Indianapolis, Indiana, USA	Lift-systems	Lockheed Martin F-35 Joint Strike Fighter	$131 million	The contract covers the supply of lift systems for the first six Short Take-Off and Vertical Landing (STOVL) variant F-35B. The Rolls-Royce LiftSystem(r) comprises a lift fan, roll posts and three bearing swivel module. Rolls-Royce will provide these through the propulsion system prime contractor Pratt & Whitney.The scope of the contract also includes spare hardware, production investment and sustainment planning. Orders for the LiftSystem are expected to total over 600, with leading customers including the US	Dec 2008

						Marine Corps, The UK Armed Forces and the Italian Navy. The F-35B variant is expected to remain in service well after 2050.	
Value of all 2008 military fast jet system, structures and component contracts, in the public domain							$2,324 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							-
PMI Media estimates of total value of 2008 fast jet system, structures and component contracts							$3,224 million
PMI Media estimates of low-wage manufacturing system, structures and component contracts							-

Rotorcraft							
Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
AgustaWestland	Oboronprom	Moscow, Russia	Final assembly	AgustaWestland AW 139		The two companies agreed on a joint venture for the assembly of AW 139 helicopters in Russia.	Jul 2008
AgustaWestland	Meggitt Aircraft Braking Systems	Coventry, UK	Differential brake control system	AgustaWestland AW159		This latest contract follows on from the award of the original contract in March 2007 for the wheels and brakes for the AW159 platform.	Dec 2008
Bell Boeing	General Electric	Cheltenham, Wolverhampton UK, Maryland, Michigan, Florida, California, Ohio, Illinois and New York USA	Primary flight controls and actuation systems, voice and data recorders, standby altitude indicator and the standby flight display	Bell Boeing V-22	$190 million	The contract is for an integrated systems and equipment package for 167 V-22s, 141 MV-22s and 26 CV-22s. Deliveries starting in 2009.	Jul 2008
Boeing Integrated Defense Systems	Hamilton Sundstrand	Windsor Locks, USA	Constant frequency electrical systems	Bell Boeing V-22	$90 million	The contract a follow-on procurement contract to supply additional constant frequency electric systems, under Lots 12-16 of the programme. The five-year procurement agreement is for 40-kilovolt-ampere (kVA) constant frequency generators.	Apr 2008
US Army	Boeing	St Louis, Missouri, USA	Production contract	Boeing CH-47F	$4.7 billion	At the start of 2008 11 new CH-47F Chinook helicopters were ordered, increasing the number of new Chinooks on contract to 59. Aircraft deliveries under this award will begin in 2011. At the end of August 2008 Boeing announced it had won a five-year contract to produce as many as 215 modernized F-model Chinook helicopters with a potential price tag of $4.3 billion.	Aug 2008

Boeing	AgustaWestland	Rome, Italy	See comment	Boeing CH-47F		The companies have signed an agreement for the joint manufacture of CH-47F helicopters for the Italian Army. As prime contractor for the Italian CH-47F, AgustaWestland will be responsible for design and systems integration, and aircraft delivery to the Italian Army. Boeing Rotorcraft Systems will build the fuselage in Ridley Park, Pa. The agreement also includes a licensing arrangement that enables AgustaWestland to market, sell and produce the Boeing CH-47F Chinook to the UK, other European countries and several countries in the Mediterranean region.	Jul 2008
Boeing	Ducommun	Gardena, California, USA	Titanium blade erosion caps	Boeing CH-47F	$23 million	Ducommun AeroStructures was awarded a long-term agreement to furnish titanium blade erosion caps, which provide leading edge protection for both new and spare blades to support the CH-47 Chinook Helicopter programme. The contractwill carry on through 2010. The programme was awarded to DAS by Boeing Philadelphia, which manufactures new and refurbished CH-47 Chinook Helicopters for all branches of the US Defense Department.	Mar 2008
Eurocopter	PTDI	Jakarta, Indonesia	Local assembly	Super Puma EC225/2Mark	$42 million over a 10 year period	The two companies have signed an agreement to set up a local assembly line to manufacture airframes for Super Puma MKII helicopters, with operations of serial production starting in 2011.	Oct 2008
Sikorsky	Aurora Flight Sciences	Bridgeport, West Virgnina, USA	Nacelles	Sikorsky CH-53K		The contract covers nacelles for the CH-53K's number one and three engines. Made primarily of composite and titanium materials, the nacelle will be fabricated by Aurora Flight Sciences of West Virginia and shipped to Sikorsky for integration into the U.S. Marine Corps helicopter.	Jan2008
Sikorsky	Onboard Systems International	Vancouver, Washington, USA	External cargo hook system	Sikorsky CH-53K			Mar 2008
US Naval Aviation Systems Command	Northrop Grumman	Rolling Meadows, Illinois, USA	Radar warning receiver	Sikorsky CH-53K	$17 million	**The** APR-39BvX radar warning receiver (RWR) integration programme upgrade is scheduled for completion and flight testing in late 2009 or early 2010. Under the terms of the phase two contract, Northrop Grumman will incorporate all electronic warfare (EW) integration capabilities of the APR-39Av2 and APR-39Bv2 versions, creating one interoperable version for the CH-53K fleet.	Feb 2008
Sikorsky	Eaton Corporation	Irvine, California, USA	Lighted control panels and dimming controllers	Sikorsky CH-53K	$26 million	During the development phase of the programme, which runs through 2014, Eaton will provide the lighted control panel support hardware for five helicopter shipsets in addition to a number of system development test sets.	Jan 2008

Sikorsky	Hamilton Sundstrand	Hartford, Connecticut, USA	Utility management system	Sikorsky CH-53K		The UMS includes two different digital electronic computers which manage air vehicle inputs for key CH-53K helicopter subsystems.Hamilton Sundstrand was previously selected to supply the CH-53K helicopter's secondary power systems – consisting of the environmental control system, auxiliary power unit and main engine start system. The company also was chosen to develop the helicopter's fly-by-wire flight control system, which includes triple redundant computers, and main and tail rotor actuators.	Jul 2008
Sikorsky	Goodrich Corporation	Work will be performed by Goodrich's Sensors and Integrated Systems team in Vergennes, Vt.	Integrated Vehicle Health Management System (IVHMS)	Sikorsky CH-53K		The Goodrich IVHMS will give the US Marines complete health assessment of the aircraft.	Sep 2008
US Department of Defense	Northrop Grumman Corporation	Rolling Meadows, Illinois, USA	DIRCM system	Sikorsky CH-53D	$13.3 million (see comment)	Northrop Grumman is also supplying US Marine Corps CH-46E helicopters as part of the contract.	Jan 2008
Sikorsky	Goodrich	Charlotte, Vergennes, Vermont, USA	Health usage and monitoring system	Sikorsky S-76D		The company is supplying its Vigor(TM) Health Usage and Management System (VHUMS(TM)) for the S-76D(TM). The system will monitor the entire helicopter mechanical drive train from the engines to the rotor system, flight manual exceedances, and hundreds of aircraft system signals.	Jul 2008
Sikorsky	CPI Aerostructures	Edgewood, New York, USA	Sponson trailing edge	Sikorsky S-92	$2 million	CPI Aero is providing the trailing edge of the sponson, a piece of structure that projects from the side of the helicopter. Deliveries of these parts will begin in December 2008.	Jul 2008
US Army	Goodrich	Vergennes, Vermont, USA	Vehicle Health Management Systems (VHMS)	UH-60A/L Black Hawk	Contract award is potentially valued at $300 million over life of the programme	The five-year Indefinite Delivery, Indefinite Quantity (IDIQ) contract is to provide up to 1,000 VHMS units, which monitor the entire helicopter mechanical drive train from the engines to the rotor system, flight manual irregulatories, and hundreds of aircraft system signals. The system also includes a cockpit voice flight data recorder and crash survivable memory unit. See also below.	Oct 2008
US Navy	Harris Corporation	Melbourne, Florida, USA	Ku-band Common Data Link (CDL) “Hawklink” system	Sikorsky MH-60R	$53 million	Hawklink is a high-speed digital data link that transmits tactical video, radar, acoustic and other sensor data from MH-60R helicopters to their host surface ships. The CDL Hawklink programme could exceed $350 million by 2015 if the Navy exercises all options to equip as many as 350 aircraft and ships, including Arleigh Burke-class destroyers and Ticonderoga-class cruisers.	Sep 2008

Sikorsky	CPI Aerostructures	Edgewood, New York, USA	Penguin missile launcher assemblies	S-70B(R) Seahawk(R)	$2.8 million	Delivery of these parts will begin in May 2009. The weapons management system has an open architecture design capable of integrating indigenous weapons and mission equipment.	Dec 2008
Value of all 2008 rotorcraft system, structures and component contracts, in the public domain							$5,459.1 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							$42 million
PMI Media estimates of total value of 2008 rotorcraft system, structures and component contracts							$ 6,157 million
PMI Media estimates of low-wage manufacturing system, structures and component contracts							$160 million

Business jets							
Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
Bombardier	Grob Aerospace	Tussenhausen-Mattsies, Germany	All-composite structure of the aircraft and build the first three prototype aircraft for the programme	Bombardier Learjet 85		In September 2008 the company announced it had taken over responsibility for the design and manufacturing of the structure of its Learjet 85 business aircraft after its partner Grob Aerospace AG encountered financial difficulties. Bombardier has effectively terminated its agreement with the Swiss company.	Jan 2008
Bombardier	Pratt & Whitney Canada	Longueuil, Quebec, Canada	Engine	Bombardier Learjet 85		Pratt & Whitney Canada's PW307B engine has been selected by Bombardier Aerospace to power the all-new composite Learjet 85 midsize business jet. The PW307B turbofan engine is rated in the 6,000-pound-thrust class.	May 2008
Bombardier	Rockwell Collins	Cedar Rapids, Iowa, USA	Avionics	Bombardier Learjet 85		The all-composite Learjet 85 aircraft will feature Rockwell Collins' Pro Line Fusion TM avionics suite. This is the second application of Pro Line Fusion in a Bombardier aircraft platform; the avionics suite was launched as a component of Bombardier's Global Vision flight deck in September 2007. Rockwell Collins is partnered with design consultancy firm Design Q on the programme.	May 2008

Bombardier	Aircelle	Plaisir, France	Nacelles and thrust reversers	Bombardier Learjet 85		The package includes a two-door thrust reverser system, air inlet, fan cowl doors, associated equipment and full nacelle integration.	Jul 2008
Bombardier	Innovative Power Solutions	Eatontown, New Jersey, USA	Starter generator system	Bombardier Learjet 85		The company is supplying a 18KW DC brushless starter generator system.	May 2008
Bombardier	Honeywell	Phoenix, Arizona,USA	Cockpit display upgrade	Bombardier Global 5000/Express XRS		Bombardier Aerospace has selected Honeywell to provide a cockpit display upgrade for the Global Express jet- the Honeywell DU-875 avionics system that includes liquid crystal displays, capabilities to accommodate charts and maps and XM graphical weather. This cockpit display upgrade is available only for Global Express aircraft equipped with the Primus 2000XP flight deck.	May 2008
Cessna	LORD Corporation	LORD is providing the engine and APU isolation system for the Columbus business jet from its plants in Erie, Pennsylvania, USA and Dayton, Ohio, USA	Noise, vibration and isolation technologies	Cessna Citation Columbus[15]		LORD provides a wide variety of NVH solutions to Cessna including Fluidlastic isolators, Auxiliary Power Unit (APU) mounts, interior systems and tuned vibration absorbers.	Oct 2008
Cessna	Goodrich	Work will be performed by Goodrich's Sensors and Integrated Systems team in Burnsville, Minnesota, USA	Air data systems and windshield heat controllers	Cessna Citation Columbus		The selection marks the first application of Goodrich's SmartProbe air data and windshield heat controller technology for a Cessna aircraft. The SmartProbe system provides critical air data parameters to the aircraft's flight control, pilot display and other systems and integrates multi-function sensing probes, pressure sensors and full air data measurement processing, allowing the elimination of pneumatic lines.	Oct 2008
Cessna	Goodrich	The equipment will be supplied from plants in Oakville, Ontario Canada and Krosno, Poland. Goodrich's Aircraft Wheels and Brakes team	Fully integrated landing gear system	Cessna Citation Columbus		The system includes main and nose landing gear, wheels and carbon brakes, and electronic control and steering systems. This is the first full landing gear system the company has supplied to Cessna. Goodrich's Landing Gear companies will provide overall system integration, fully dressed main and nose landing gear assemblies, actuation, control and steering systems and final assembly. Hardware deliveries to support rig testing are expected by mid 2009.	Aug 2008

[15] Cessna Columbus since put on hold

		in Troy, Ohio will supply the wheels, tires, carbon brakes, brake control and other related braking components.					
Cessna	Pratt & Whitney Canada	Longueuil, Quebec, Canada	PW810 engine	Cessna Citation Columbus			Feb 2008
Cessna	Rockwell Collins	Cedar Rapids, Iowa, USA	Avionics	Cessna Citation Columbus		Pro Line Fusion™ advanced avionics system specified. The fully integrated flight deck has four landscape high-resolution 15-inch liquid crystal displays with graphical flight planning, synthetic-enhanced vision, auto throttle, MultiScan™ Hazard Detection system and an optional head-up display	Feb 2008
Cessna	Rockwell Collins	Cedar Rapids, Iowa, USA	Head-up guidance system	Cessna Citation Columbus		Rockwell Collins is providing its HGS® -6000 Head Up Guidance System; the unit will be the first head up display ever installed on a Cessna Aircraft, according to the company. The Rockwell Collins HGS-6000 series, featuring advanced active-matrix liquid crystal display technology, presents critical flight information in the pilot's forward field of view. Aircraft flight path and attitude symbols appear overlaying the outside scene enhancing situational awareness, improving energy management and increasing touchdown precision.	May 2008
Cessna	Spirit Aerosystems	Wichita, Kansas, USA	Fuselage and empennage	Cessna Citation Columbus		Agreements have been signed with Spirit AeroSystems Inc. for the fuselage and Spirit AeroSystems Europe Ltd. for the empennage. In October 2008 AeroSystems announced plans to build a 375,000-sq-ft factory to accommodate the manufacturing and testing of the Cessna Citation Columbus. The new factory will provide enough capacity for the Citation model, as well as for additional programmes.	Feb 2008
Cessna	Vought	Nashville, Tennessee, USA	Wing	Cessna Citation Columbus	More than $1 billion	Cessna's Citation X currently uses upper and lower wing panel assemblies manufactured at Vought's Nashville facility, where the Columbus wing manufacturing also will take place. Vought Aircraft Industries is providing wings and slats and the contract covers engineering design, tooling and production work. Vought's engineering and tool design will be done primarily in Dallas. Production work and other manufacturing engineering will be performed in Nashville. Production test articles are scheduled for delivery beginning in 2010, with production article deliveries scheduled to start in 2011.	May 2008

Cessna	Goodrich	Oakville, Ontario, Canada	Landing gear	Cessna Citation Columbus			May 2008
Cessna	Parker Aerospace Control Systems	Irvine, California, USA	Flight control system	Cessna Citation Columbus	$400 million	The Columbus is the first aircraft in the Citation family to be equipped with a hybrid fly-by-wire flight control system developed by Cessna, working with conventional hydraulic actuation. The powered flight control system contract consists of design and manufacturing responsibility for the primary and secondary flight controls, including roll, pitch, and yaw axes, high lift, stabilizer trim, and speed brake controls.	Mar 2008
Cessna	Eaton	Cleveland, Ohio, USA	Fuel system	Cessna Citation Columbus	The value of the program me to Eaton is estimate d at approxim ately $100 million over 20 years	As the system integrator, Eaton will design, develop and manufacture the complete aircraft fuel system including the electric fuel boost pumps, ejector pumps, flow control valves for fuel transfer, the refuel/defuel sub-system and the fuel quantity measurement system.	Jul 2008
Cessna	Innovative Power Solutions	Eatontown, New Jersey, USA	Transformer rectifier units	Cessna CJ4		The TRUs provide 125 Amp, 28Vdc power from a 115 V AC input with frequency range down to 200Hz.	Jun 2008
Dassault	Nordam	Wichita, Kansas, USA	Cabinetry	Dassault Falcon 7X	$70 million	Nordam will produce up to 22 deliverables for each selected aircraft, including galleys, closets, vanities and pocket doors. The programme should last until 2010.	Jul 2008
Diamond	Mecaer America	Montreal, Quebec, Canada	Nose and main landing gear	Diamond D-Jet		Mecaer America's scope of work includes design, certification testing, manufacturing and after-sale support of the nose and main landing gear.	May 2008
Diamond	MTI Global	Mississauga, Ontario, Canada	Thermal and acoustic insulation	Diamond D-Jet		MTI-PolyFab is supplying a thermal and acoustic insulation system. The company supported the development of the D-JET aircraft with prototype thermal and acoustic systems, as well as Environmental Control Systems (ECS) design solutions.	May 2008

Embraer	Embraer	Melbourne, Florida, USA	Final assembly	Embraer 100/300		Embraer announced that it plans to invest an estimated US$ 50 million for the establishment of a 150,000-square-foot facility to house a final assembly line, capable of producing both the Phenom 100 and Phenom 300 executive jet models, as well as a paint shop and a delivery and customer design center, at Melbourne International Airport, in Melbourne, Florida. Embraer expects to create approximately 200 skilled positions by 2011. At the start of September 2009 Embraer started construction of a 161,000-sq-ft facility at Evora in Portugal which will manufacture complex composite airframe structures and components for the company's business aircraft and airliners.	May 2008
Embraer	Safe Flight Instrument Corporation	White Plains, New York, USA	AoA sensor	Embraer 100		Safe Flight's AoA sensor provides local angle-of-attack information to the dual channel digital SWPS computer. The computer supplies stall warning and low airspeed awareness cues to the integrated avionics suite as well as outputs to drive the stick pusher for stall protection.	May 2008
Embraer	MTI Global	Mississauga, Ontario, Canada	Thermal and acoustic insulation	Embraer 100/300	Production is expected to ramp-up in 1Q 2009 for both programmes, with estimated total revenue expected to exceed $3.8 million over the life of the contracts	MTI-PolyFab has been selected by Embraer to supply thermal and acoustic insulation for a sub system of the new Phenom 100/Phenom 300 aircraft.	May 2008
Embraer	Rockwell Collins	Cedar Rapids, Iowa, USA	Avionics	Embraer MSJ/MLJ		Both aircraft will feature the Pro Line FusionTM avionics suite. Some of the standard features on the MSJ and MLJ flight deck include: four high-resolution 15-inch diagonal Liquid Crystal Displays (LCD) with synthetic vision depiction of terrain and obstacles; Integrated Flight Information Systems (IFIS) with electronic charts and enhanced maps; Advanced Flight Management Systems (FMS) with Wide Area Augmentation System that supports Localizer Performance with Vertical guidance approaches (WAAS/LPV) and Required Navigation Performance (RNP) capabilities.	Apr 2008
Embraer	Honeywell	Phoenix, Arizona, USA	Engines	Embraer MSJ/MLJ		Honeywell is providing its HTF7000 turbofan propulsion system family for Embraer's MSJ and MLJ business aircraft.	Apr 2008

Embraer	Honeywell	Phoenix, Arizona, USA	APU	Embraer MSJ/MLJ		The 36-150 unit has been specified	Apr 2008
Embraer	BMW Designworks USA	California, USA	Interior design	Embraer MSJ/MLJ			Apr 2008
Honeywell	GKN	Cowes, UK	Nacelles	Embraer MSJ/MLJ	$750 million plus	The contract covers the design adaptation of the nacelle, its manufacture and full integration with the engine, with GKN Aerospace delivering the complete HTF7500E propulsion system podded into the nacelle direct to the customer's assembly line. Work will largely be carried out at the Company's Cowes, Isle of Wight facility in the UK.	Jul 2008
Embraer	Meggitt Fluid Controls	North Hollywood and Corona, California, USA	Pneumatic bleed air system	Embraer Legacy 450/500		The pneumatic bleed air systems comprise two regulating and seven shut-off valves and a pneumatic system controller. The systems manage the bleed air from the engines' high and low pressure outputs for temperature and pressure control and maintain anti-ice systems and the aircraft's cargo, cabin and cockpit environments.	Sep 2008
Gulfstream	Safe Flight Instrument	White Plains, New York, USA	Automatic throttle system	Gulfstream G150		The AutoPower automatic throttle system is an option on the Gulfstream G150.	Oct 2008
Gulfstream	Israel Aircraft Industries	Tel Aviv, Israel	Fuselage, empennage and landing gear	Gulfstream G250		Initial phase manufacturing for the G250 will be at the IAI facility near the Ben Gurion International Airport in Israel. IAI currently builds two other Gulfstream aircraft: the G150 and the G200.	Oct 2008
Gulfstream	Spirit AeroSystems	Tulsa, Oklahoma, USA	Wing	Gulfstream G250		Spirit will design and produce the wing at its Tulsa facility and ship it to Israel Aerospace Industries for incorporation with the rest of the airframe.	Oct 2008
Gulfstream	Meggitt Aircraft Braking Systems	Akron, Ohio, USA	Main wheels, nose wheels, carbon brakes and advanced brake-by-wire brake control system	Gulfstream G250		The G250 features MABS' advanced brake control technology, which includes individual wheel brake-by-wire and anti-skid control, automatic braking and brake temperature monitoring. The brake temperature monitoring system displays brake temperatures through the avionics system. The win follows Gulfstream's selection of MABS' braking system for the G650. MABS has equipped every Gulfstream aircraft and remains the exclusive braking system supplier for all seven of Gulfstream's current aircraft.	Oct 2008
Gulfstream ad Israel Aerospace Industries	Kidde Aerospace	Wilson, North Carolina, USA	Integrated fire and overheat protection system	Gulfstream G250		The integrated fire and overheat protection system comprises engine/Auxiliary Power Unit fire detection and extinguishing, cargo bay smoke detection, overheat detection system, and integrated control unit. According to the	Oct 2008

						company the G250 system will be the first fully integrated fire and overheat protection system used on a business aircraft. The integrated controller will monitor and control the fire protection and overheat (bleed air leak detection) subsystems, as well as provide auxiliary aircraft functions. The integrated control unit communicates with the G250's avionic system computers to provide fire/overheat warning and caution information.	
Gulfstream	Hamilton Sundstrand	Rockford, Illinois, USA	See comment	Gulfstream G650	The G650 has the potential to generate approximately $100 million	Hamilton Sundstrand's suite of systems for the G650 includes the primary electrical power generating system, the emergency power Ram Air Turbine and power distribution boxes.	Jun 2008
Gulfstream	Honeywell	Phoenix, Arizona, USA	Avionics	Gulfstream G650	Estimated at $3 billion including aftermarket sales over the life of the platform.	The G650 incorporates PlaneView(r) II cockpit with a number of enhancements including: four 14-inch, adaptive, liquid-crystal displays; three standard PlaneBook(r) computer tablets; a smaller pedestal; a standby multifunction controller that combines current display controller functionality with standby flight instruments; and a fully automatic, three-dimensional scanning weather radar with an integral terrain database for efficient ground-clutter elimination.	Mar 2008
Gulfstream	Honeywell	Phoenix, Arizona, USA	Synthetic Vision-Primary Flight Display (SV-PFD) system	Gulfstream G650		See above	Mar 2008
Gulfstream	MPC Products	Chicago, Illinois, USA	Auto-throttle	Gulfstream G650			Jul 2008
Gulfstream	Honeywell	Phoenix, Arizona, USA	Environmental control and cabin pressure control system components	Gulfstream G650			Mar 2008
Gulfstream	Honeywell	Phoenix, Arizona, USA	Air turbine starter	Gulfstream G650			Mar 2008
Gulfstream	Spirit AeroSystems	Tulsa, Oklahoma, USA	Wing, engine nacelles and thrust reversers	Gulfstream G650		The company is responsible for the design, production and integration of the wing.	Mar 2008
Gulfstream	Parker Aerospace	Irvine, California, USA	Flight control actuation system, hydraulic pumps, auxiliary electric motor pumps,	Gulfstream G650	The contract will generate an estimated US$390	The Parker Control Systems Division will design and manufacture the G650's fly-by-wire flight control actuation system, including the primary aileron, rudder, elevator, and spoiler flight control actuation and control electronics. This system incorporates electro-hydrostatic	Mar 2008

			electro-hydrostatic motor pump units, landing gear retraction and door actuators, fluid quantity indicator		million over the life of the programme for Parker.	and electro-hydraulic technologies. In addition to the flight control system, Parker's Hydraulic Systems Division will provide engine-driven hydraulic pumps, auxiliary electric motor pumps, and electro-hydrostatic motor pump units for flight controls. The Parker Electronic Systems Division will supply the fluid quantity indicator (FQI) which measures and controls maintenance of the engine oil and hydraulic fluids. The G650's ecology bottle and hydraulic selector valve are new wins for the Parker Air & Fuel Division on Gulfstream aircraft. The division will also provide oil and hydraulic replenishment reservoirs and oil selector valves on the aircraft.	
Gulfstream	Meggitt Aircraft Braking Systems	Akron, Ohio, USA	Wheels, brakes, brake-by-wire control system, tyre monitoring system	Gulfstream G650		The advanced wheel and braking system for the G650 jet is Meggitt's biggest ever wheels and brakes contract in the business aviation marketplace and has the potential to provide a strong revenue stream over the life of the programme. Meggitt Aircraft Braking Systems is developing new aluminium wheels and compact carbon brakes, featuring carbon composite heatsink material and anti-oxidant coating. Meggitt Aircraft Braking Systems' involvement with the G650 also includes the development of an 'intelligent' brake-by-wire control system. This features patented deceleration feedback. The system also provides brake temperature information to the avionics system for cockpit display. Gulfstream has also selected the company to integrate the aircraft's tyre pressure monitoring system.	May 2008
Gulfstream	Stork Aerospace	Papendrecht and Hoogevee,The Netherlands	Composite tail and bonded fuselage panels	Gulfstream G650	Stork's revenues from the programme could total approximately $600 million.	Stork is incorporating a new generation of composite materials in the design of the tail section. The 650's empennage will feature advanced lightweight composites and thermoplastics. Stork is making nonrecurring investments of around $56 million for its role in the programme and it expects to see first revenues within five years of starting its design work. Stork has been a key supplier for the Gulfstream GV programme, since 1993, providing materials for the original GV, as well as the G500 and G550. It is responsible for the tail section for all types, having delivered the first GV tail in 1995.	May 2008
Gulfstream	Kollsman	Merrimack, New Hampshire, USA	Enhanced Vision System (EVS II),	Gulfstream G650		The EVS II and SV-PFD provide pilots with a synthetic view of the terrain, obstacles and approaches, regardless of the weather conditions outside the cockpit. EVS uses a forward-looking infrared (FLIR) camera to capture them on the pilot's all-digital HUD II,	Mar 2008

						while the SV-PFD uses three-dimensional, colour terrain images that are derived from data stored in the Honeywell Enhanced Ground Proximity Warning System (EGPWS).	
Gulfstream	Rockwell Collins	Cedar Rapids, Iowa, USA	Head up display	Gulfstream G650		The HUD II on the G650 features Rockwell Collins' HGS-6250 advanced active-matrix liquid crystal display technology. Aircraft flight path and attitude symbols appear overlaying the outside scene.	Mar 2008
Gulfstream	Rockwell Collins	Cedar Rapids, Iowa, USA	Horizontal Stabilizer Trim System (HSTS)	Gulfstream G650		Rockwell Collins is developing the flap and speed brake control modules in the centre pedestal, and the pitch, roll, yaw pilot controls, as well as their interfaces to the aircraft's fly-by-wire systems. The HSTS incorporates two independent means of drive and failure detection.	Mar 2008
Gulfstream	Rolls-Royce	Dahlewitz, Germany	Engine	Gulfstream G650		The BR725 engine produces 16,100 pounds of thrust at take-off and features a 50-inch swept fan with 24 blades, reduced noise and lower emissions.	Mar 2008
Gulfstream	Goodrich	Charlotte, North Carolina, USA	Landing gear	Gulfstream G650		Nose and main landing gear to be supplied	Mar 2008
Gulfstream	Goodrich Interiors	Charlotte, North Carolina, USA	flight deck observer seats	Gulfstream G650			Mar 2008
Rolls-Royce	Goodrich Engine Control Systems	Charlotte, North Carolina, USA	FADEC	Gulfstream G650		The Full Authority Digital Engine Control (FADEC) system comprises an electronic engine control, fuel metering unit, fuel pump and engine actuation.	Mar 2008
Rolls-Royce	Mecachrome	Montreal, Quebec, Canada	Rear bearing support structure	Gulfstream G650	Mecachrome's contract on the BR725 is estimated at US$45 million over the life of the programme	Mecachrome International is supplying Rolls-Royce, on an exclusive basis, with the rear bearing support structure ("RBSS") and the intermediary casing ("IMC") of the BR725 engine.	Mar 2008
Rolls-Royce	Spirit AeroSystems	Wichita, Kansas, USA	Engine nacelle, thrust-reverser and engine build-up components	Gulfstream G650	Contract estimated at more than $600 million	The technology incorporates integrated composite assemblies. Spirit will also support the contract in the Rolls-Royce Corporate Programme.	Mar 2008
Spirit AeroSystems	Ruag Aerospace	Emmen, Switzerland	Winglets, ailerons and spoilers	Gulfstream G650		RUAG Aerospace will supply the winglets, ailerons and spoilers made of carbon fibre composites and aluminium. The first batch deliveries take place from 2010.	Jun 2008

Stork Fokker	Daher	Orlytech, Paris, France	Upper tail, including aerial protectors	Gulfstream G650		The upper tail has a surface area of 9sq m – the upper part of the vertical tail, including the tail protectors, are designed with a metal structure and composite panels.	Apr 2008
Stork Fokker	Airborne Composites	Catalunya, Spain	Composites overhang panels for the empennage	Gulfstream G650		Within the contract, ship-sets containing 38 different panels will be delivered as part of the Stork G650 empennage programme. Airborne Composites will design the product as well as the tooling. The first ship sets will be manufactured in The Hague facility in the Netherlands. From 2010, the series manufacturing of the panels will be transferred to Catalunya, Spain.	Oct 2008
Honda Aircraft Company	Korry	Seattle, Washington, USA	Cockpit panels	HondaJet		Each panel integrates Korry's 5/8" LED switches with lightplates and other components. Korry is supplying 12 control panels per aircraft beginning in 2008.	Sep 2008
Spectrum	Honeywell	Morristown, New Jersey, USA	Avionics	Freedom S-40		Honeywell is supplying its Primus Apex with four screens: 15" primary flight displays (PFDs) and two 10.4" multifunction displays (MFDs). All use ultra-high resolution graphics, and the installation incorporates multiple redundancies for enhanced reliability. Additional features include advanced auto-flight control, graphical flight planning, paperless charts and maps, keypad data entry, and cursor control device technology.	Jul 2008
Value of all 2008 business jet system, structures and component contracts, in the public domain							$7058.8 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							-
PMI Media estimates of total value of 2008 business jet system, structures and component contracts							$13,850 million
PMI Media estimates of low-wage manufacturing system, structures and component contracts							$40 million

2009

Airliners

Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
Airbus	See comment	Harbin, China	Carbon structures	Airbus A318/A319/A319 CJ/A320/ A321,	$450 million	Airbus has signed a contract with Chinese partners to create a joint venture to make carbon composite parts in China for its A350 XWB and A320 aircraft.	Jan2009

				Airbus A350 XWB		Airbus's Chinese business will hold a 20% stake in the joint venture, based in Harbin, and China's Harbin Aircraft Industry Group will hold a further 50% stake, while other local players HAI, AviChina and HELI will each own 10%. A new plant should be ready for operations by the end of 2010. Airbus said the value of its partnership with the Chinese aviation industry is expected to be near $200 million per year in 2010 and $450 million in 2015.	
Airbus	Cobham	Wimbourne, UK	High-gain antennas	Airbus A318/A319/A319 CJ/A320/ A321		The company has secured a contract to supply high-gain antennas for use on single-aisle and long-range Airbus airliners. Cobham's HGA-7001 antenna will be used for long-range communication between pilots and ATC. The antenna supports Inmarsat SwiftBroadband services.	Jun 2009
Goodrich	Composites Technology Research Malaysia (CTRM)	Kuala Lumpur, Malaysia	Nacelle components	Airbus , Mitsubishi aircraft	The 3.5 billion ringgit, $1.03 billion, deal is for 20 years.		Oct 2009
Airbus	TenCate	Almelo, The Netherlands	Composites	All models		Airbus has signed an extension of its existing Memorandum of Understanding with TenCate, Stork Fokker AESP and The Netherlands Aerospace Group, making up the Affordable Primary Aircraft Structure (TAPAS) consortium. TAPAS material technology is being developed for future Airbus applications, including primary structure parts such as fuselage and wings.	Apr 2009
EADS	Strata Manufacturing/ Mubadala	Abu Dhabi, United Arab Emirates	See comment	Airbus A330/A340	Initial contract with EADS and Finmecanica worth around $2 billion	Strata has formed industrial partnerships with EADS. The factory will make advanced composite aerostructures, including flap track fairings, ailerons, spoilers and assemblies for Airbus aircraft and the empennage for the ATR Regional Aircraft. The plant will start operations in 2010, initially the providing spoilers and flap track fairings for the Airbus A330, A340, A350 and A380. The planned next phase will see the manufacturing of primary structures and components.	
Airbus	Premium Aerotec	Nordenham, Germany Varel, Germany Augsburg, Germany	Structures	Airbus A350 XWB	$500 million	The company is providing the fuselage structure for the A350XWB. The structures are for the floor and aft pressure bulkhead, adding to existing work it has to build forward section elements and aft side shells (see below). The aft press bulkhead will be made from carbon fiber composites	Jun 2009

						(CFRP) and will be the third aircraft structural component developed and manufactured by the company using the vacuum assisted process (VAP)–an infusion process it has developed in-house and patented. In August 2009 Premium Aerotec in Nordenham took delivery of the 27 meter long autoclave, eight meters high in diameter, for production of the forward fuselage sections for the Airbus A350 XWB. The company is the largest aerostrucures supplier for the new Airbus A350 XWB. The company between 2009 and 2011 is investing some 360 million Euros for the production infrastructures of this aircraft.	
Airbus	Goodrich	Work will be performed by Goodrich's Sensors and Integrated Systems teams in Burnsville, Minn. and Toulouse, France.	External video system	Airbus A350 XWB	Goodrich expects the award to generate more than $1 billion in original equipment and aftermarket revenue over the life of the programme	The external video system integrates all video information inside and outside the aircraft, processes it for display and sends it to the flight deck. The system includes three externallymounted digital video cameras and two Concentrator-Multiplexer for Video (CMV) avionics modules. The CMVs receive information from the ruggedized external video cameras, multiple internal cabin video sources and from the On-board Information System. The information is processed into high quality video images viewable by the flight crew over the flight deck displays.	May 2009
Airbus	KID-Systeme	Buxtehude, Germany	Cabin surveillance equipment	Airbus A350 XWB		The integrated solution will include a cockpit door surveillance system (CDSS) and a cabin video monitoring system (CVMS). The A350 cabin surveillance is based on network technology that consists of cameras and microphones, network switches and a video processing unit. It will be fully integrated into the Cabin Intercommunications Data System (CIDS), developed by Airbus in Buxtehude, providing data recording and video system configuration tools.	Mar2009
Airbus	Cobham	Wimbourne, UK	High-gain antennas	Airbus A350 XWB		The company has secured a contract to supply high-gain antennas for use on single-aisle and long-range Airbus airliners. Cobham's HGA-7001 antenna will be used for long-range communication between pilots and ATC. The antenna supports Inmarsat SwiftBroadband	Jun 2009

						services.	
Messier-Bugatti	CIRCOR Aerospace Products Group	Corona, California,USA	Main and nose landing gear door actuators	Airbus A350 XWB		The actuators incorporate a fluid recirculation feature to help reduce weight and improve system efficiency and reliability.	Aug2009
Honeywell	Kidde Aerospace and Defense	Wilson, North Carolina, USA	Overheat detection system	Airbus A350 XWB		The A350XWB overheat detection system monitors the aircraft environmental control system's bleed air ducts for overheat conditions caused by failures. The system features linear thermal sensors, interconnecting cable assemblies and electronic controls residing within the Honeywell Bleed Overheat Monitoring Unit.	Jan2009
Rolls-Royce	Mitsubishi Heavy Industries	Tokyo, Japan	Combustion system and turbine blades	Airbus A350 XWB		As a risk- and revenue-sharing partner (RRSP), MHI will be responsible for the development and manufacture of the components for the engine's combustion system and manufacture of low-pressure turbine blades and others. MHI has been in a cooperative relationship with Rolls-Royce through joint involvement in the V2500 engine programme, and as an RRSP it has participated in Rolls-Royce's programme to develop the Trent 1000.	Jan2009
Rolls-Royce	Esterline Corporation	At least 75% of these components will be produced in-house at the company's Advanced Sensors facilities, including the UK-based Weston Aerospace operation, France-based Auxitrol operation, US -based Norwich Aero operation, and a new facility in Mexico.	Engine sensors	Airbus A350 XWB	Approximately $500 million over the lifetime of the programme	The contract covers the supply of approximately 30 separate components in the sensors package. The first Esterline-supplied Trent XWB components are scheduled for delivery to Rolls-Royce in early 2010.	Apr 2009
Rolls-Royce	Parker	Product design, manufacture, and support will be completed by multiple Parker Aerospace divisions,	Engine fuel and other systems	Airbus A350 XWB	Parker estimates that the agreement will generate approximately $2.5 billion in revenues over the life of the programme	The contract covers several product lines in support of Rolls-Royce requirements: the pneumatics valve suite that enables anti-icing, turbine case cooling and engine bleed functions; the oil pump that feeds oil to bearings and gearboxes and scavenges that return oil; and the hydraulic	Jan2009

		including the Air & Fuel Division and Customer Support Operations in Irvine, California; Nichols Airborne Division in Devens, Massachusetts; and Stratoflex Products Division in Fort Worth, Texas				engine build-up (EBU) system that includes tubes, hoses and attaching hardware required to convey the aircraft hydraulic power between the engine-mounted pumps and the aircraft.	
Rolls-Royce	Fokker Elmo	The development phase of the A350XWB programme will take place at Fokker Elmo the Netherlands followed by series production scheduled to be undertaken at Fokker Elmo China.	Electrical wiring for the Trent XWB	Airbus A350 XWB	The associated design-support and production work is expected to be worth approximately $70 million, with activities to start in 2009.		Oct2009
Rolls-Royce	Goodrich	West Des Moines, Iowa, USA	Combustion system fuel nozzles	Airbus A350 XWB			Oct2009
Airbus	Cobham	Wimbourne, UK	High-gain antennas	Airbus A380		The company has secured a contract to supply high-gain antennas for use on single-aisle and long-range Airbus airliners. Cobham's HGA-7001 antenna will be used for long-range communication between pilots and ATC. The antenna supports Inmarsat SwiftBroadband services.	Jun 2009
ATR	Daher	Nantes, France	Composite wing tip panels	ATR 72-500		The company has won a contract to produce composite wing tip panels and longitudinal members for the ATR 72 range of aircraft, uding automatic drape-forming processes. The contract covers the full suration of the ATR 72 production programme. Start-up of manufacturer is scheduled for the end of 2010.	Jun 2009
EADS/Finmecanica	Strata Manufacturing/ Mubadala	Abu Dhabi, United Arab Emirates	See comment	ATR 42-500/72-500/600		Strata has formed industrial partnerships with EADS. The factory will make advanced composite aerostructures, including flap track fairings, ailerons, spoilers and assemblies for Airbus aircraft and the empennage for the	

						ATR Regional Aircraft.	
Boeing	MHI Aerospace Vietnam Co	Hanoi, Vietnam	Flaps	Boeing 737-600,-700,-800,-900		MHI Aerospace Vietnam Co., Ltd. (MHIVA) of Hanoi is a subsidiary of Mitsubishi Heavy Industries, Ltd. (MHI) completed the manufacture of a component production plant in September 2009. MHIVA, capitalized at US$7 million, was established in December 2007 as a wholly owned subsidiary of MHI to assemble commercial aircraft component structures. The new plant is situated at the Thang Long Industrial Park (TLIP) approximately 16 kilometers northwest of central Hanoi and occupies 4,500 square meters (m2) in floor area within the 19,100 m2 plant. Initially, the flaps for the Boeing 737 will be shipped to MHI's Nagoya Aerospace Systems Works for painting and final inspection, and then delivered to the Renton, US site. Once production gathers momentum, MHIVA will deliver the flaps to the US directly, according to the company.	Sep 2009
Spirit AeroSystems	PPG Aerospace	Huntsville, Alabama, USA	Laminated glass windshields	Boeing 737-600,-700,-800,-900		The windshields are being redesigned at Boeing's request to accommodate airframe improvements. The redesigned windshields will be slightly smaller than the current version and include an inboard plastic antispall liner to prevent broken glass from entering the flight deck during a bird-strike event. PPG will be the sole source of the redesigned windshields for production and aftermarket applications.	Aug2009
Boeing	Boeing	Boeing North Charleston, Southern Carolina, USA	See comment	Boeing 787		Boeing has chosen its North Charleston, S.C., facility as the location for a second final assembly site for the 787 programme. In addition to serving as a location for final assembly of the aircraft, the facility also will have the capability to support the testing and delivery of the Boeing 787. Boeing Charleston performs fabrication, assembly and systems installation for the 787 aft fuselage sections. Nearby Global Aeronautica, which is 50 percent owned by Boeing, is responsible for joining and integrating 787 fuselage sections from other structural partners. Until the second 787 assembly line is brought on line in North	Oct2009

						Charleston, Boeing will establish transitional surge capability at its Everett, Wash., location.	
Saab	Noranco	Pickering, Ontario, Canada	Structural, landing gear and avionics components	Boeing 787		Under the terms of the agreement, Noranco's Pickering Division will produce structural components for Saab Aerospace in Linkoping, Sweden, with deliveries commencing in 2009 and running through 2012.	Sep 2009
Bombardier	Alenia Aeronautica	Turin, Italy	Horizontal and vertical stabilizers, fully equipped with hydraulic, electrical and flight control systems, lights and antennas	Bombardier C Series			Mar 2009
Bombardier	Goodrich Actuation Systems	Wolverhampton, UK	Flap and slat actuation system	Bombardier C Series	The selection is expected to generate more than $750 million in original equipment and aftermarket revenue over 20 years	Goodrich will provide a fully integrated high lift flap and slat system for the aircraft including actuators, power drive units, wing tip brakes, electronic control units, cockpit levers, transmission shafts and sensors.	Mar 2009
Bombardier	Fokker Elmo	Papendrecht, the Netherlands. Most design and development effort will take place on-site at Bombardier in Montreal, manufacturing of development and flight test wiring systems will be performed at Fokker Elmo Netherlands, while the serial production is scheduled to be executed at Fokker Elmo China.	Electrical wiring interconnection system	Bombardier C Series	The associated design and production work is expected to represent a value of approximately $300 million, spread over a 15 to 20 multi year period.	Fokker Elmo is also providing all the design and production of all Flight Test and Instrumentation wiring required during the certification of the CSeries aircraft.	Mar2009
Bombardier	Hamilton Sundstrand	Windsor Locks, Connecticut, USA	Electrical power system	Bombardier CSeries	Hamilton Sundstrand projects the programme value to be in	The Hamilton Sundstrand Electric Power Generation and Distribution System (EPGDS) performs power generation, power distribution and load	Jun 2009

					excess of $2 billion over the life of the programme	management. It generates electrical power via two variable frequency generators and provides necessary interfaces with avionics and member systems to convey data and serve embedded utility loads throughout the aircraft. The EPGDS provides secondary load management through its five secondary power distribution assemblies, which receive alternating or direct current (AC/DC) power inputs from power centers, then manage and distribute the power to load equipment. Hamilton Sundstrand also provides emergency power, via an electric air-driven generator.	
Bombardier	Kidde Aerospace and Defense	Wilson, North Carolina, USA	Fire protection system	Bombardier CSeries		The integrated Fire Protection System comprises smoke detectors, fire detectors, fire extinguishers and integrated control electronics.	Jun 2009
Bombardier	Esterline Control Systems-Korry	Bellevue, Washington, USA	Integrated cockpit control panels	Bombardier C Series		The 14 Korry panels which will use Esterline Control Systems' Opticon TM solid-state switching technology are used to control the operation of various aircraft functions, including the hydraulic, fuel, electrical and lighting systems.	Jun 2009
Bombardier	Goodrich	Goodrich's Sensors and Integrated Systems facility in Burnsville, Minn, USA	Air data system	Bombardier C Series		The company is providing several systems including its next-generation SmartProbe™ air data system and ice detection system. Work will be performed primarily at. The SmartProbe system provides all critical air data parameters for the aircraft's flight control, pilot display and other systems. SmartProbe air data sensing technology integrates multi-function sensing probes, pressure sensors and air data computer processing. The primary ice detection system advises flight crews of ice buildup for activation of the ice protection system at the optimal time. Goodrich has also been selected to provide the external, cockpit and maintenance lighting system for the CSeries aircraft.	Jun 2009
Bombardier	Honeywell	Phoenix, Arizona, USA	Inertial reference system and APU	Bombardier C Series		The IRS system provides positioning and attitude data for the aircraft's navigation system as well as other systems. The company's LASEREF VI Inertial Reference System is an all-digital high performance Ring Laser Gyro	Jun 2009

						system. The system is compliant with new ADS-B requirements and can meet RNP .1 performance standards when used with Honeywell's GPS Hybrid (HIGH) software.	
Bombardier	L-3 Communications	Sarasota, Florida, USA	Voice and data recorders	Bombardier C Series			Jun 2009
Bombardier	Liebherr Aerospace	Lindenberg, Germany	Landing gears	Bombardier C Series		The company is responsible for the design and manufacture of the complete landing gears system which includes the main and nose landing gears, the landing gear control and indication system, the alternate release system, the proximity sensing system and the steering control system.	Jun 2009
Bombardier	Magnaghi & Salver	Naples, Italy	Structures	Bombardier C Series		Magnaghi & Salver is providing the composite inboard/outboard flaps, spoilers and main landing gear doors.	Jun 2009
Bombardier	Panasonic Avionics Corporation	Lake Forest, CA, USA	Cabin management and passenger address system	Bombardier C Series		The CMS, with its integrated digital architecture, allows control, monitoring and diagnostics of numerous aircraft cabin functions, including temperature and lighting. The CMS also provides an embedded digital audio solution offering passenger address, interphone and PRAM (Pre-Recorded Announcements and Music) capabilities to the CSeries aircraft passengers, cabin and flight crew.	Jun 2009
Bombardier	Senior Aerospace BWT	Manchester, UK	Low pressure air distribution system	Bombardier C Series		The company is responsible for the low pressure air distribution systems for the aircraft cabin and cockpit environmental control systems (ECS). The low pressure ducting system brings fresh air into the aircraft for various purposes such as conditioned air supply, cabin air re-circulation, flight deck instrumentation cooling, avionics ventilation and windshield demisting.	Jun 2009
Bombardier	Senior Aerospace SSP	Burbank, California, USA	High pressure (HP) bleed air and ram air ducting systems	Bombardier C Series		The bleed air HP ducting is conveyed from the engines and the auxiliary power unit (APU) to the environment control system (ECS), the aircraft wing anti-ice system and the fuel tank inerting system. The ram air HP ducting conveys ram air (fresh air from the outside) to the ECS and fuel tank inerting systems.	Jun 2009

Bombardier	Sonaca	Gosseilies, Belgium	Structures	Bombardier C Series		The company will supply the fixed leading edges, slats and tracks.	Jun 2009
Bombardier	Spirit AeroSystems	Wichita, Kansas, USA	Engine pylons	Bombardier C Series			Jun 2009
Bombardier	Woodward MPC	Skokie, Illinois, USA	Throttle quadrant assembly	Bombardier C Series		The throttle quadrant assembly (TQA) which acts as the direct link for the control of the engine thrust and is located in the cockpit suite.	Jun 2009
Ruag Aerospace	Ducommun	Los Angeles, California, USA - All work will be performed at DAS's Gardena, California and Orange, California facilities.	Aft fuselage pane l assemblies	CRJ700/900/1000	$75 million	The initial contract will run through 2012 and is valued at approximately $75 million at anticipated build rates. The first set of panel assemblies is to be delivered in the third quarter of 2009 with ramp-up to production starting by first quarter of 2010.	May 2009
COMAC	See comment	See comment	See comment	COMAC C919	See comment	China's Large Commercial Aircraft Corp has named its 190-seat single-aisle, twin engined-aircraft the C919. First flight planned for 2016. The C919 will be assembled in Shanghai and major partners already announced are: AVIC companies Chengdu Aircraft Corp, Xian Aircraft Corp, Shenyang Aircraft Corp, and Shenxi Aircraft Corp. In June 2009. COMAC will build the horizontal stabiliser. In June 2009 Messier-Dowty announced that it has signed a letter of intent to cooperate with Landing Gear Advanced Manufacturing Corp. (LAMC) of China to make a joint offer to COMAC) for C919 landing gear. The agreement comprises complete landing gears, including structures, wheels and brakes.	
COMAC	Jiangxi Hongdu Aviation (also known as Nanchang Aircraft)	Hongdu, China	Aft fuselage	COMAC C919			Oct 2009
COMAC	Harbin Aircraft	Harbin, China	Composite fairings and moving surfaces and	COMAC C919			Oct2009
COMAC	Shenyang Aircraft	Shenyang, China	Empennage, including vertical stabiliser.	COMAC C919			Oct2009

COMAC	Chengdu Aircraft	Chengdu, China	Nose	COMAC C919			Oct 2009
COMAC	Xian Aircraft	Xian, China	Cockpit, wings and main fuselage				Oct 2009
COMAC	Alcoa	New York, New York, USA	Advanced aluminum structural concepts	COMAC C919		Through a technology cooperation agreement, the two companies are examining advanced aluminum structural concepts, designs and alloys to create the 190-seat aircraft.	Oct2009
COMAC	Safran/Nexcelle	See comment	See comment	COMAC C919		During the September 2009 Asian Aerospace show Safran signed a framework agreement with AVIC for work on the aircraft as did Nexcelle - a joint venture company created by GE's Middle River Aircraft Systems and Aircelle, a Safran group company to supply nacelles. According to AVIC: "AVIC Aircraft and Nexcelle will consider a broad range of nacelle and components manufacturing and design opportunities, including current production programmes and for new aircraft. Categories could range from business jets to large airliners."	
Irkut Corporation	Gidromash	Moscow, Russia	Landing gear	Irkut Corp MC-21			Aug 2009
Irkut Corporation	Hamilton Sundstrand	Rockford, Illinois, USA	Electric power generating system, secondary electrical power distribution, auxiliary power unit, wing anti-ice and bleed air conditioning for the nitrogen generation system.	Irkut Corp MC-21	The value of all MC-21 work is expected to be worth approximately $2.3 billion over the life of the programme	The nitrogen generation system is being developed with Intertechnique	Aug2009
Irkut Corporation	Hamilton Sundstrand and NPO Nauka	Moscow, Russia	Integrated air management system	Irkut Corp MC-21		NPO Hamilton Standard – Nauka, a joint venture between Hamilton Sundstrand and OAO NPO Nauka, was established in 1994 in Moscow and specializes in development and production of heat exchangers for commercial aircraft air-conditioning systems. The heat exchangers manufactured by the company are operated by Boeing, Airbus, Embraer, Bombardier	Aug 2009

						and Tupolev.	
Irkut Corporation	Hamilton Sundstrand and ECE	Rockford, Illinois, USA and Paris, France	Power distribution company	Irkut Corp MC-21		ECE is part of the Zodiac Group.	Aug 2009
Irkut Corporation	Kidde Aerospace & Defense and L'Hotellier and Hamilton Sundstrand	Wilson, North Carolina, USA and Antony, France	Fire detection and suppression system	Irkut Corp MC-21		Kidde Aerospace and Defense is a Hamilton Sundstrand company.	Aug2009
Irkut Corporation	C&D Zodiac	Huntingdon Beach, California, USA	Interiors	Irkut Corp MC-21		C&D Zodiac is part of the Zodiac Group.	Aug2009
Irkut Corporation	Intertechniqu e	Plaisir, France	Fuel system, oxygen system, nitrogen generating system	Irkut Corp MC-21		Intertechnique is part of the Zodiac Group.	Aug2009
Irkut Corporation	Eaton Corporation	Cleveland, Ohio, USA	Hydraulic system	Irkut Corp MC-21		Eaton Corporation has placed more than 50% of the contract's value with Russian enterprises (see below).	Aug2009
Eaton Corporation	PMZ Voshod	Nizhegorodsk aya oblast, Russia	Hydraulic system actuators	Irkut Corp MC-21			Aug2009
Eaton Corporation	PKO Teploobmenn ik	Nizhniy Novgorod, Russia	Hydraulic system components	Irkut Corp MC-21			Aug 2009
Eaton Corporation	MIZ Znamya	Moscow, Russia	Hydraulic system components	Irkut Corp MC-21			Aug2009
Eaton Corporation	Tehpribor	Omsk, Russia	Hydraulic system components	Irkut Corp MC-21			Aug2009
Mitsubishi Aircraft	Aerospace Industrial Development Corporation (AIDC)	Taipei, Taiwan	Slats, flaps, belly fairings, rudders as well as horizontal stabiliser rotating blades.	Mitsubis hi MRJ70/9 0			Jan2009
Value of all (estimated) 2009 airliner system, structures and component contracts, in the public domain							$13,025 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							$ 1,650 million
PMI Media estimates of total value of 2009 airliner system, structures and component contracts							$ 22,982 million
PMI Media estimates of low-wage manufacturing system, structures and component contracts							$ 8,060

	million

Military transports							
Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
Boeing Military Aircraft	BAE Systems	Phoenix, Arizona, USA	Troop seats	Boeing C-17 Globemaster III	$4.6 million	The seats are scheduled to be delivered through June 2010. The contract also includes an option of $4.6 million for an additional 15 shipsets that would extend seat deliveries until the middle of 2011.	Jan 2009
Boeing Military Aircraft	Ducommun	Gardena, California, USA	Fuselage skin panels	Boeing C-17 Globemaster III		The company signed a follow-on contract with Boeing to provide fuselage skins for the C-17 through the fourth quarter of 2010.	Nov 2009
Boeing Military Aircraft	Boeing Military Aircraft	Wichita, Kansas,USA	Fuselage	Boeing P-8A/8I		The integrated Navy/Boeing team were due to begin formal flight testing of the P-8A in late 2009. The Navy plans to purchase 117 P-8As, and initial operational capability is planned for 2013. The Boeing Company and the US Navy formally unveiled the aircraft in July 2009 at the Boeing facility in Renton, Washington, USA.	Jan 2009
Defense Logistics Agency - Ogden	Goodrich	Charlotte, North Carolina, USA	Braking systems	C-130J	$400 million	The company has been awarded a contract to provide new carbon brakes and boltless wheels for the Air Force's fleet of C-130 transport aircraft. The contract covers qualification activities as well as flight test and retrofit equipment. The equipment will be provided by Goodrich's Aircraft Wheels and Brakes business. Goodrich will supply DURACARB(TM) carbon braking systems featuring lighter weight, longer life, higher performance and lower cost of ownership compared to steel braking systems, according to the company.	Aug 2009
L-3 Communications Integrated Systems	Fairchild Controls	Frederick, Maryland, USA	Vapour cycling cooling system	C-130H		The company is providing the US Air Force's EC-130H Compass Call aircraft with a vapour cycle cooling system, which will provide environmental control for the onboard mission systems. This system will consist of a mission-critical, twin-redundant vapour cycle pack with lightweight helical screw compressors and an integrated motor/system controller.	Jan 2009
US Navy	Northrop Grumman	St Augustine, Florida, USA	See comment	Northrop Grumman E-2D Advanced Hawkeye		A $432 million contract, which includes two Low-Rate Initial Production (LRIP) Lot 1 aircraft and an Advanced Acquisition Contract for two LRIP Lot 2 aircraft, was awarded to Northrop Grumman in June 2009 as part of the initial, $1.9 billion E-2D Advanced Hawkeye System Development & Design contract, awarded in August 2003.Northrop Grumman will also provide associated engineering and testing. The first pilot production aircraft is scheduled for 2010; with entry into service in 2013. Main features of the aircraft are an enhanced radar system, new digital	Jun 2009

						avionics and more powerful engines.	
Value of all (estimated) 2009 military transport system, structures and component contracts, in the public domain							$836.6 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							-
PMI Media estimates of total value of 2009 military system, structures and component contracts							$ 1166.6
PMI Media estimates of low-wage manufacturing system, structures and component contracts							-

Military fast jets							
Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
Alenia SIA	Northrop Grumman Italia	Pomezia, Italy	Navigation system	Aermacchi M-346		Northrop Grumman Italia is supplying the aircraft transducer unit which will be integrated into the fly-by-wire control system. The transducer unit uses a quadruple redundant installation of the company's LISA-200 fibre-optic gyro attitude and heading reference unit (AHRS). The LISA-200 AHRS is a lightweight fibre-optic gyro attitude and heading reference system based on the Northrop Grumman LN-200 inertial measurement unit. Northrop Grumman Italia will supply 10 aircraft transducer prototype units to Alenia SIA under this development contract. The first unit is scheduled for delivery in September 2009.	Apr 2009
AMX International	Elbit/Elisra	Bene Brak, Israel	Avionics/EW suite upgrade	AMX International AMX	$187 million	The avionics suite on Brazilian AMX aircraft is being upgraded by Elbit Systems, Elisra's parent company, with Elisra responsible for the electronic warfare components.	Early 2009
AMX International	FLIR Systems	Portland, Oregon, USA	Airborne thermal imaging systems	AMX International AMX	$7 million	The company is supplying multiple units of its new NavFLIR airborne thermal imaging systems. The units delivered under this contact will be installed on Brazilian Air Force AMX swept-wing fighter jets. The NavFLIR is a fixed-mount, forward-looking infrared system, installed on the nose of the aircraft. The NavFLIR aids pilots by enhancing their ability to see terrain and other aircraft at long ranges, even in total darkness, light fog, dust and smoke.	Jun 2009

-	Herley Industries	Woburn, Massachusetts, USA	Complex integrated microwave assembly (IMA)	Eurofighter EF 2000 Typhoon	$2.8 million	The IMA will be integrated into the CAPTOR radar.	Jul 2009
Defense Logistics Agency	Circor Aerospace	Corona, California, USA	Nose wheel steering actuator	Lockheed Martin F-16	The value of this initial contract exceeds $3.7 million	The company is supplying its nose wheel steering actuator (NWSA) for all models of the F-16. The company's unit is a drop-in replacement, which, it says, requires no change to current installation or operational procedures. The design is approved for domestic and foreign sales for the Lockheed Martin F-16 Fighting Falcon fleet of over 4400 aircraft.	Sep 2009
US Department of Defense	Pratt & Whitney	East Hartford, Connecticut, USA	F135 engine production	Lockheed Martin F-35 Joint Strike Fighter	$571 million	This low rate initial production (LRIP) contract covers production, sustainment, spare parts and engineering support for the third lot of F135 engines, including 10 conventional take-off and landing (CTOL) and 11 short-takeoff/vertical-landing (STOVL) engines for F-35 aircraft. Additionally, Pratt & Whitney has been awarded a $113 million contract for long lead material procurement to produce 32 F135 engines for the fourth lot of F135 engines.	Jul 2009
Lockheed Martin, BAE Systems and Northrop Grumman Corporation	Terma	Grenaa, Denmark	See comment	Lockheed Martin F-35 Joint Strike Fighter	The present estimated value of the MOU is more than 7 billion DKK ($1.4 billion)	Lockheed Martin, BAE Systems and Northrop Grumman Corporation along with Moog Incorporated, General Dynamics Armament and Technical Products, Parker Hannifin Corporation and Marvin Engineering Company have signed a Memorandum of Understanding (MoU) with Terma A/S for the Danish company to become a major strategic partner in the programme. The agreement covers the following systems (see also below): composite conventional edges for the aircraft horizontal tails; advanced lightweight composite components for the center fuselage; STOVL horizontal tails; missionized gun pods for STOVL and CV variants; data acquisition pods for flight test instrumentation; radar electronics flight control components. This work involves a major expansion of the Grenaa facilities, primarily in the area of advanced lightweight composites technology which will give Terma the opportunity to compete for	Aug 2009

						additional programme work.	
Lockheed Martin	Vision Systems International	San Jose, California, USA	Helmet-mounted display (HMD)	Lockheed Martin F-35 Joint Strike Fighter	$54.1 million	The Lockheed Martin Corporation awarded VSI a contract for the delivery of 52 F-35 Gen II Helmet Mounted Displays and 30 aircraft shipsets in support of the F-35 Lightning II Helmet Mounted Display System (HMDS) programme. Under the low rate initial production (LRIP) contract, VSI will provide HMDS hardware and production tooling for the LRIP 1, 2 and 3 acquisitions. This procurement fills initial U.S. government domestic requirements for the U.S. Air Force F-35A, U.S. Marine Corps F-35B and U.S. Navy F 35C platforms, as well as some foreign military sales production commitments. LRIP deliveries will continue through 2012.	Jun 2009
Lockheed Martin	Stork Fokker	Papendrecht, the Netherlands	Flaperons	Lockheed Martin F-35 Joint Strike Fighter	Spread over the period from 2009 to the end of 2014 this selection represents a turnover value of $ 200 million. The order could exceed US $1.0 billion over the life of the programme.	The F-35's flaperons are 3 metre long flaps on the wing trailing edges which are vital for the controllability of the aircraft. The units design are based on a combination of composite and titanium with a better resistance to fatigue and corrosion. Stork Fokker has already manufactured more than 2000 sets of flaperons for the Lockheed Martin F-16 aircraft type for many years. This initial order will provide employment for around 100 people, a figure that will be doubled if the total production order is received. Production will be in the Netherlands, initially in the existing Stork Fokker factory in Hoogeveen, and will later be transferred to a new F-35 factory. Other contributions by Stork Aerospace to the JSF project include the design and production of the doors and hatches, the electrical wiring harnesses, the wiring and structural components for the Pratt & Whitney engines and the arresting gear. Stork has up to now involved forty suppliers in the Netherlands in these JSF orders, and this number is expected to increase further when the serial production phase starts (see also below).	Oct2009
Goodrich	US Air Force's Ogden Air	Hill Air Force Base,	Landing gear coatings	Lockheed Martin F-35		Under the agreement, the OO-ALC will apply high	Jan2009

	Logistics Center (OO-ALC)	Utah, USA		Joint Strike Fighter		velocity oxygenated fuel (HVOF) thermal spray coating on Goodrich landing gear components produced for the F-35. The initial agreement runs through May 2009, and covers requirements for five landing gear ship-sets of the carrier variant F-35.	
Goodrich	Alp Aviation	Ankara, Turkey	Landing gear components and assemblies	Lockheed Martin F-35 Joint Strike Fighter		The agreement covers deliveries through December 31, 2015. Under the agreement, Alp Aviation will supply machined components ranging from aluminium parts to high strength steel components and assemblies. These components will be delivered to Goodrich Landing Gear's final assembly facility in Cleveland, Ohio.	Jul 2009
BAE Systems	RLC Group	Altham, UK	Components	Lockheed Martin F-35 Joint Strike Fighter	See comment	Contract awarded as part of a £4.2 million Northwest Regional Development Agency (NWDA) Aerospace Supply Chain Excellence Programme (ASCE) to link primes with SMEs in the local area.The company will work closely with BAE Systems in a Supplier Association which will be the first supplier association run through the ASCE programme.	July2009
BAE Systems	John Huddleston Engineering	Blackpool, UK	Components	Lockheed Martin F-35 Joint Strike Fighter	See comment	Contract awarded as part of a £4.2 million Northwest Regional Development Agency (NWDA) Aerospace Supply Chain Excellence Programme (ASCE) to link primes with SMEs in the local area.The company will work closely with BAE Systems in a Supplier Association which will be the first supplier association run through the ASCE programme.	Jul 2009
BAE Systems	Hyde Aero Products	Dukenfield, Manchester , UK	Components	Lockheed Martin F-35 Joint Strike Fighter	See comment	Contract awarded as part of a £4.2 million Northwest Regional Development Agency (NWDA) Aerospace Supply Chain Excellence Programme (ASCE) to link primes with SMEs in the local area.The company will work closely with BAE Systems in a Supplier Association which will be the first supplier association run through the ASCE programme.	Jul 2009
BAE Systems	Thyssenkrupp	Bamber Bridge, Preston, UK	Components	Lockheed Martin F-35 Joint Strike Fighter	See comment	Contract awarded as part of a £4.2 million Northwest Regional Development Agency (NWDA) Aerospace Supply Chain Excellence Programme (ASCE) to link primes with SMEs in the local area.The company will work	Jul 2009

						closely with BAE Systems in a Supplier Association which will be the first supplier association run through the ASCE programme.	
Northrop Grumman	Kongsberg	Kongsberg, Norway	Composite components	Lockheed Martin F-35 Joint Strike Fighter	The current agreement is valued at approx. 460 Million NOK, ($82 million) and it has a potential value of 2.5 Billion NOK for the duration of the F-35 Programme.	The company's initial deliveries will support lot three low rate initial production aircraft, which will begin the programme's transition to full rate production. The parts will be produced at the new 30 000 m2 plant built in Kongsberg. Production is currently in start-up and will last until 2015.	Jul 2009
Lockheed Martin	BAE Systems Avionics	Edinburgh, UK	EOTS FLIR	Lockheed Martin F-35 Joint Strike Fighter			
Northrop Grumman	Turkish Aerospace Industries	Ankara, Turkey	See comment	Lockheed Martin F-35 Joint Strike Fighter	$28.4 million	Northrop Grumman Corporation has awarded a second source supplier contract to TAI to produce composite air inlet ducts. The contract is for four years. The first deliveries of ducts from the TAI contract are scheduled for June 2010. Northrop Grumman will use the ducts to support production of centre fuselages during the fourth through eighth phases of low rate initial production.	Oct 2009
FMV (the Swedish Defence Materiel Administration)	Saab	Linkoping, Jarfalla and Kista, Sweden	Gripen upgrade programme	Saab JAS 39 Gripen NG	The order is valued at approx. MSEK 350 ($50 million)	The order covers Gripen aircraft operating in Sweden, Hungary, the Czech Republic and Thailand.	Jul 2009
Value of all 2009 military fast jet system, structures and component contracts, in the public domain							$2,655 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							$28.4 million
PMI Media estimates of total value of 2009 fast jet system, structures and component contracts							$ 2691 million
PMI Media estimates of low-wage manufacturing system, structures and component contracts							$42 million

Rotorcraft							
Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
AgustaWes	Aero Sekur	Farnborough,	External life	AgustaW		The life-rafts are stowed in	July 2009

tland		UK	raft system	estland AW 139		aerodynamic canisters, located outside the helicopter cabin.	
Bell/Agusta	Kaman Corporation	Bloomfield, Connecticut, USA	Assemblies and structures (see comment)	Bell/Agusta BA609	The contract has a potential value of $53 million – covering all Bell helicopter types	Kaman Aerospace Corporation has been awarded a five-year contract to build composite helicopter blade skins and skin core assemblies for Bell Helicopters. Under the terms of the contract, Kaman will provide 18 different assemblies for H1, 406, 407, 412, 427, 429, 430 and BA609 aircraft. All work will be performed at the Kaman HeliworX(TM) full-service aerospace innovation and manufacturing support center in Bloomfield, Connecticut.	September 2009
US Department of Defense	Bell Boeing	The Bell Boeing Tiltrotor Team comprises Bell Helicopter Textron in Fort Worth, Texas, USA and the Boeing Company in Philadelphia, USA.	Logistics support - Joint Performance Based Logistics (PBL)	Bell Boeing V-22	Phase I of the contract, valued at $581 million over five years	Phase I of the contract provides integrated logistics support for the Osprey fleet, including programme management, site activation, maintenance planning and supportability analysis, technical data, in-service engineering and logistics, training and trainer support, support equipment, and dedicated and deployable support for all V-22 squadrons across the globe. Phase II of the PBL contract will include supply chain management, which encompasses the purchase, repair, stocking and delivery of approximately 15,000 spare and repair aircraft parts. In June 2009 the Bell Boeing Programme Office announced it had been awarded Phase 1.5 of the contract.	January 2009
Bell Boeing	Ducommun	Coxsackie, New York, USA	Exhaust ducts	Bell Boeing V-22		Ducommun AeroStructures Inc has been awarded a V-22 Multi-Year Procurement Programme (MYP) contract through 2012 for titanium EAPS exhaust ducts.	April 2009
Bell Boeing	LaBarge	St Louis, Missouri, USA	De-icing system electronic sub-assemblies	Bell Boeing V-22	$5.1 million	This is a follow-on contract to continue to produce electronic subassemblies. LaBarge began producing the V-22 electronics in 2005.	April 2009
Bell Helicopter Textron	Rolls-Royce	Indiana, Indianapolis, USA	Engines	Bell 206 L4/407	$400 million	Rolls Royce 250-C30P. During 2007 Bell and Rolls-Royce reached an agreement for an upgrade kit for the 206L1 to replace the Model 250 engine with Model 250-C30P powerplant, which provides 650 shaft-horsepower at takeoff. In February 2009 Rolls-Royce and Bell Helicopter signed a ten-year agreement for the supply of Model 250 engines for Bell 206 and 407 helicopters. As part of this agreement, Model 250 engines will be delivered to Bell Helicopter through 2017. Rolls-Royce Helicopter Engines have delivered more than 18,000 Model 250 engines for use on single and twin-engine helicopters to Bell over the last decades.	February 2009
Boeing	Ducommun Aerostructures	Monrovia, California, USA	Main and tail rotor blades.	Boeing AH-64D Apache		These are follow-on contracts for both original equipment and replacement blades, in addition to current production, and extend	January 2009

						deliveries into 2010. The Monrovia, facility has built every Apache rotor blade since the inception of the programme.	
US Department of Defense	Goodrich's Engine Control Systems	West Hartford, Connecticut, USA	Enhanced digital electronic control units (EDECU)	Boeing AH-64D Apache		The company is equipping GE T700 engines powering the AH-64 Apache helicopters for the US Army, with EDECUs In September 2009, Goodrich received a contract from the US Army for 55 EDECUs, with options for 230 additional units. Prior to this, Goodrich received contracts from the US Navy, U.S. Coast Guard, and GE Aircraft Engines for more than 600 additional units. In all, nearly 1,000 firm and option EDECUs are on order for delivery through 2011.	September 2009
US Army	Lockheed Martin	Orlando, Florida, USA	Target Acquisition Designation Sight/Pilot Night Vision Sensor (TADS/PNVS) and Modernized TADS/PNVS (M-TADS/PNVS) systems	Boeing AH-64D Apache – Block III	The contract has a potential value of $89 million for 2009.	This is a follow-on Performance Based Logistics (PBL) contract.The original PBL contract, awarded in early 2007, established a system of continuous improvements supporting the AH-64 Apache TADS/PNVS and M-TADS/PNVS programmes. The PBL contract provides post-production supply chain management, including spares planning, procurement, repairs, maintenance, modifications and inventory management of fielded systems. The value of the first year of the contract was $117.8 million and the 2008 contract was worth $76.6 million.	July 2009
Boeing	Stork Fokker	Papendrecht and Hoogeveen, the Netherlands	Aft section major subassemblies.	Boeing CH-47F		The contract will involve 15 other Dutch companies as part of the company's extended supply chain. First delivery is scheduled for the second quarter of 2010.	February 2009
Eurocopter	Daher	Tarbes, France	Airframes	Eurocopter EC 130 Ecureuil/ Fennec/AS350/AS355/AS550/AS555		The company has signed a contract to develop a new generation of airframes for Eurocopter's range of light helicopters. Daher expects to start production in early 2012 at its plant in Tarbes, France.	June 2009
American Eurocopter	See comment	See comment	Security and support mission equipment package sub-assemblies and components	America Eurocopter UH-72A		EADS North America and its subsidiary American Eurocopter have selected the industry team that will provide components and sub-systems for the UH-72A Lakota Light Utility Helicopter Security and Support (S&S) mission equipment package (MEP). The mission equipment package consists of an electro-optical infrared sensor, data communications suite, moving map display, cabin and cockpit screens, a digital video recorder and a searchlight. Companies selected to provide key components and sub-systems for the S&S mission equipment package are: • LCX Systems; Sarasota, Fla. • Sierra Nevada Corporation; Sparks, Nev. • Ranger Rotorcraft Group; Fort Worth, Texas • MARK IV Luminator;	June 2009

						Plano, Texas • L-3 Communications; New York, N.Y.	
Korea Aerospace Industries	Elbit	Haifa, Israel	Helmet mounted systems	Korean Utility Helicopter		Under the contract, Elbit Systems will supply the prime contractor KAI with the advanced helmet mounted display systems.	March 2009
Russian Helicopters	Turbomeca	Bordes, France	Engine	Russian Helicopters Sapsan (Mi-34S2)		The Arrius 2F provides 504 shp take-off power.	August 2009
Russian Helicopters	Reduktor PM	Perm, Russia	Main and tail gearboxes, transmission shafts	Russian Helicopters Sapsan (Mi-34S2)			August 2009
Russian Helicopters	Stupino Machine-Building Industrial Enterprise	Stupino, Russia	Main and tail rotor heads, swash plate	Russian Helicopters Sapsan (Mi-34S2)			August 2009
Russian Helicopters	Arsenyev Aviation Company Progress	Moscow, Russia	Hull, main and tail rotor blades and helicopter assembly	Russian Helicopters Sapsan (Mi-34S2)			August 2009
Sikorsky	BAE Systems	Phoenix, Arizona, USA	Cockpit seats and cabin armour systems	Sikorsky CH-53K	The total value of the programmes is estimated at approximately $90 million through 2022.	The first deliveries of seats and cabin armour are scheduled for 2010. BAE Systems' work will include design, development, testing, qualification, and delivery of initial systems to support the flight and ground test aircraft. Follow-on contracts would be placed for production orders and spares. The cockpit seat will be part of BAE Systems "S7000" family and will include integration of the CH-53K's fly-by-wire flight controls.	February 2009
Claverham	Curtiss-Wright Corporation	Christchurch, UK	Transducers	Sikorsky UH 60M Upgrade	The contract has a potential value in excess of $20 million over a 15-year period.	The transducers are for use in the fly-by-wire systems that control the main rotor and tail rotor on the Sikorsky UH-60M Upgrade and CH-53K helicopters.	April 2009
Sikorsky	Tata Advanced Systems	Hyderabad, India	Cabins	Sikorsky S-92		Tata Advanced Systems and Sikorsky have signed an agreement for the Indian enterprise to build cabins for the S-92 helicopter at a greenfield site in Hyderabad, and is due to begin deliveries from late 2010.	June 2009
Sikorsky	General Electric	Lynn, Massachusetts, USA	Engines	Sikorsky UH 60M		The General Electric T700-GE-701D engine is fitted with full authority digital electronic control. In April 2009 GE Aviation was awarded a multi-year contract extension from the U.S. Army that provides for the continued production of T700 turbo-shaft engines in support of both Army	April 2009

						and Navy Black Hawk series helicopters through 2014. If exercised fully the contract allows for the potential for up to an additional 3,700 T700 engines (-701D/-701E/-401C variants). A portion of these engines will go on the new UH-60M upgrade Black Hawk helicopter, as well as serve as spares for aircraft currently operating in Iraq and Afghanistan.	
US Department of Defense	Goodrich's Engine Control Systems	West Hartford, Connecticut, USA	Enhanced digital electronic control units (EDECU)	Sikorsky H-60 Black Hawk, Jayhawk and Seahawk		The company is equipping GE T700 engines powering Sikorsky H-60 Black Hawk, Jayhawk and Seahawk model helicopters for the US Army, Coast Guard and Navy, as well as Boeing AH-64 Apache helicopters for the U.S. Army, with EDECUs In September 2009, Goodrich received a contract from the US Army for 55 EDECUs, with options for 230 additional units. Prior to this, Goodrich received contracts from the US Navy, U.S. Coast Guard, and GE Aircraft Engines for more than 600 additional units. In all, nearly 1,000 firm and option EDECUs are on order for delivery through 2011. The EDECU, part of the US Army's "common control" for the T700 engine, includes enhanced built-in test and fault recording algorithms to aid in engine health and performance assessments. According to the company, the EDECU evolved from the Universal Control technology programmes sponsored by the US Army to develop a single part number common control with the processing power to contain multiple application software packages, address electronics obsolescence issues, provide a work station-like platform for improved engine health condition monitoring, and reduce engine control system recurring and logistics costs.	September 2009
Sikorsky	Northrop Grumman	Pomezia, Italy	Air navigation system	Sikorsky UH-60L		The NAVEX air navigation system has been chosen for use on UH-60L Black Hawk utility helicopters for export. Under the contract Northrop Grumman's Italy-based subsidiary will supply Sikorsky Aircraft with NAVEX systems and installation kits for an initial 15 helicopters with a follow-on contract for an additional 17 helicopters. Two NAVEX systems will be supplied for each helicopter.	January 2009
Sikorsky	LaBarge	Huntsville, Arkansas, USA	Components (see comment)	Sikorsky UH-60	$1.8 million	The contract is for the continuing supply of various electronic assemblies for various models of UH-60 helicopters. The LaBarge-built electronic assemblies will support the inlet barrier filtration system, which extends the life of the engine. Production is expected to continue through July 2010.	October 2009
Kaman Aerospace	LaBarge	St Louis, Missouri, USA	Cockpit wiring	Sikorsky UH	Around $12	The LaBarge-built wiring harnesses will be installed in cockpits of the UH-	July 2009

Corporation			harnesses	60M/L	million	60M and UH-60L Black Hawk helicopters, and the HH-60M and HH-60L Medevac models. LaBarge also provides electronic assemblies directly to Sikorsky Aircraft Corp. for the Black Hawk helicopter.	
Value of all estimated 2009 rotorcraft system, structures and component contracts, in the public domain							$1,251.9 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							-
PMI Media estimates of total value of 2009 rotorcraft system, structures and component contracts							$ 4,066
PMI Media estimates of low-wage manufacturing system, structures and component contracts							$1,110

Business jets

Contractor	Supplier	Supplier location	Work package	Aircraft type	Contract value	Contract details	Contract date
Bombardier	Meggitt	White Plains, New York, USA	Fire protection system	Bombardier Learjet 85		The company is supplying its FIDEX fire detection and extinguishing system. The system, which includes advanced fire and smoke detection equipment and Pacific Scientific fire extinguishing components, protects the engines, auxiliary power unit and cargo compartments of the aircraft. It is an FAA/EASA-approved Air Transportation Association (ATA) Chapter 26 fire protection system.	August 2009
Bombardier	Goodrich	Bursnville, Minnesota, USA	Air data system	Bombardier Learjet 85	The contract is expected to generate more than $75 million	The company is providing its next generation SmartProbe™ air data system, providing all critical air data parameters – including stall protection – to the aircraft's flight control, pilot display and other systems.	July 2009
Bombardier	B/E Aerospace	Wellington, Florida, USA	Waste water system	Bombardier Learjet 85	The $150 million order encompasses the Bombardier Learjet 85, Dassault Falcon 7X, Embraer Legacy 450 and Legacy 500.	Volume production starts in 2011.	April 2009
Bombardier	Astronics Corporation	East Aurora, New York, USA	Electronic power distribution system	Bombardier Learjet 85		Astronics is supplying its Corepower (r) EPDS which uses arc-fault electronic circuit breaker technology. The EPDS is integrated with the aircraft's avionics and features automation of functions such as engine start-up and electrical load	February 2009

						management.	
Cessna	Winglet Technology LLC	Wichita, Kansas, USA	Winglets	Cessna 750 Citation X		Available as a retrofit option the Elliptical Winglets kit includes the replacement of the existing anti-collision and position light system with LED versions. The delivery of the first Cessna Citation X to be fitted with Elliptical Winglets took place in late August 2009.	August 2009
Dassault	B/E Aerospace	Wellington, Florida, USA	Water water system	Dassault Falcon 7X	The $150 million order encompasses the Bombardier Learjet 85, Dassault Falcon 7X, Embraer Legacy 450 and Legacy 500.	Volume production starts in 2011.	April 2009
Embraer	B/E Aerospace	Wellington, Florida, USA	Water water system	Embraer 450/500	The $150 million order encompasses the Bombardier Learjet 85, Dassault Falcon 7X, Embraer Legacy 450 and Legacy 500.	Volume production starts in 2011.	April 2009
Embraer	Ducommun AeroStructures	Los Angeles, California, USA	Ailerons and spoilers	Embraer Legacy 450/500	$50 million plus	DAS has been awarded the design and build contract for the ailerons and spoilers. Ducommun will develop the parts from concept through certification, preliminary engineering, and detailed designs, drawings and specifications jointly with Embraer. The Ducommun-led engineering team will work in close collaboration with Embraer's engineering offices located in Brazil.	February 2009
Gulfstream	Kidde Aerospace and Defence	Colnbrook, UK	Engine fire detection system	Gulfstream G650		The contract incorporates the supply of engine and nacelle-mounted fire detectors and control units. Graviner currently supplies Gulfstream the engine fire detection system for its G350, G450, G500 and G550 aircraft.	October 2009
Value of all estimated 2009 business jet system, structures and component contracts, in the public domain							$575 million
Value of low-wage manufacturing system, structures and component contracts, in the public domain							-

PMI Media estimates of total value of 2009 business jet system, structures and component contracts	$ 650 million
PMI Media estimates of low-wage manufacturing system, structures and component contracts	-