



Rolls-Royce

# Market Outlook 2006 - 2025



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Welcome to the 2006 edition of the Rolls-Royce Outlook. Once again, we aim to bring you comprehensive coverage of the long-term forecast for the commercial aircraft and engine markets. The Outlook includes summaries of the mainline passenger aircraft market, as well as the forecast for business jets, regional aircraft, and cargo markets. The parallel internet site provides additional information and presentation material, which we hope you find interesting.

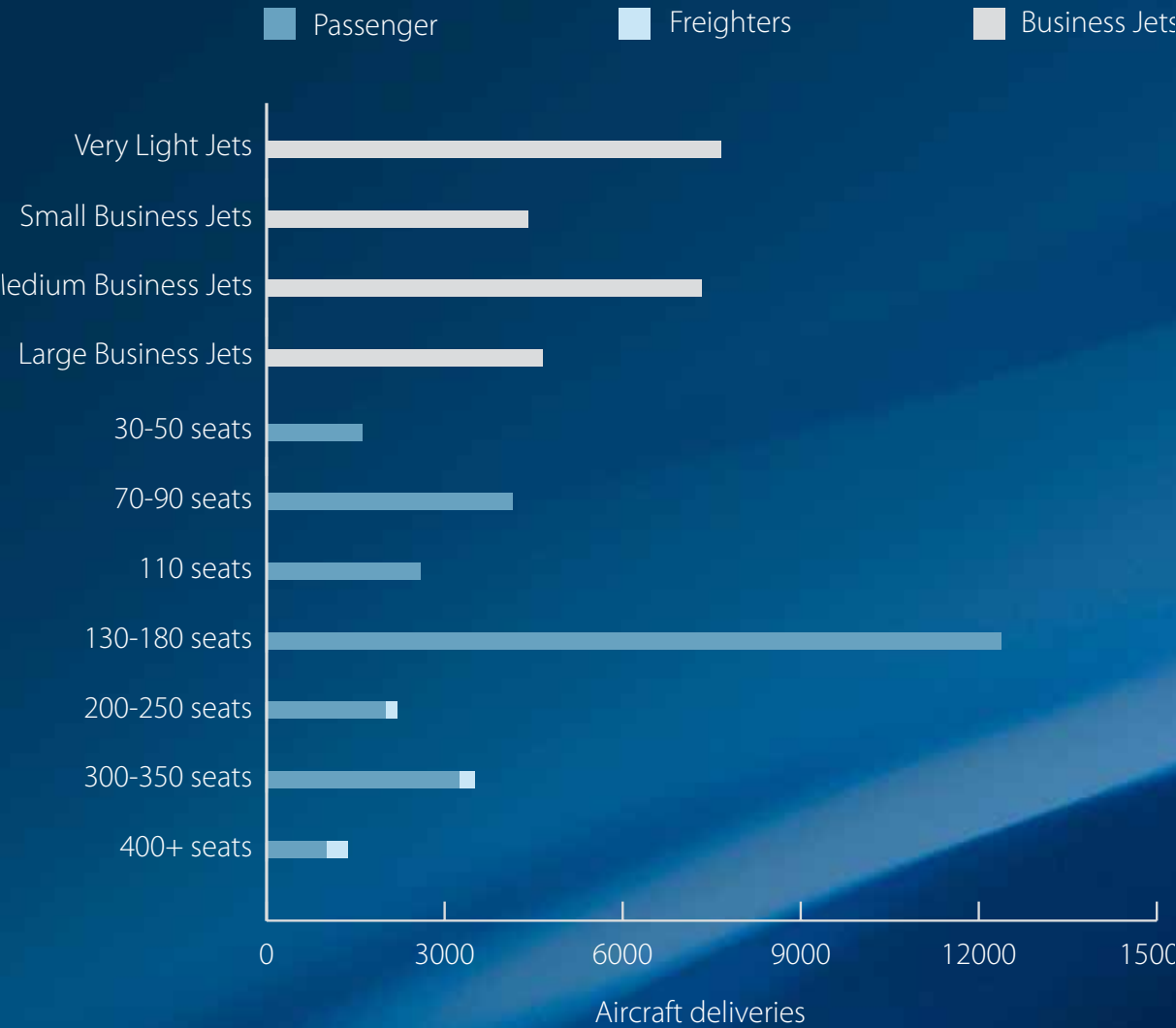
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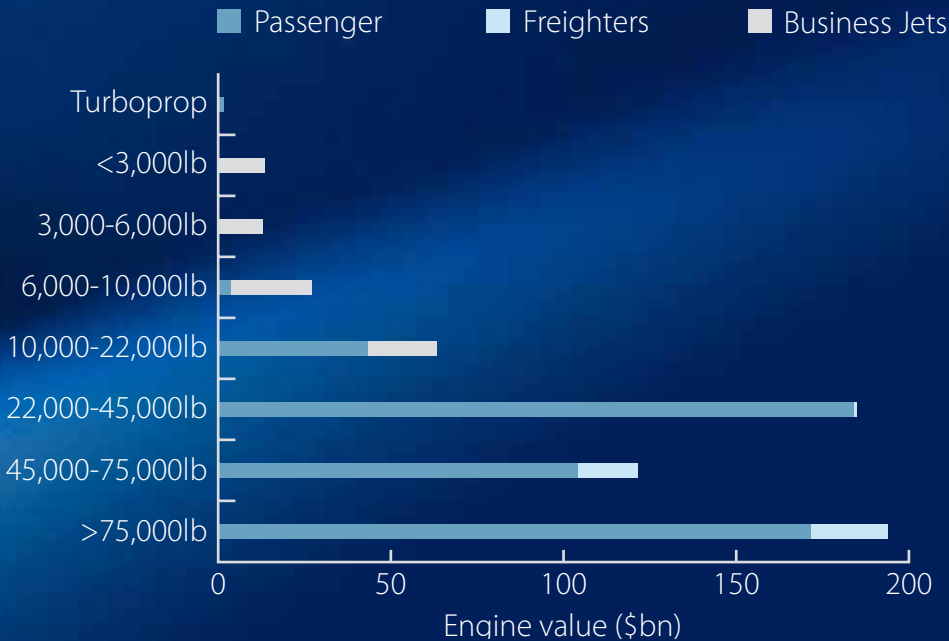
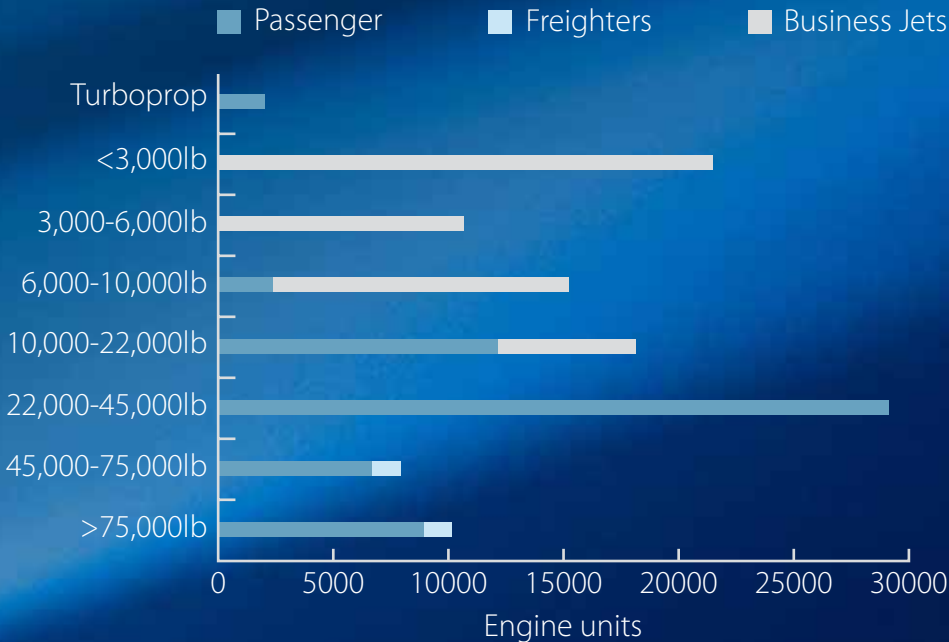
# Aircraft deliveries summary

51,000 aircraft deliveries (2006 - 2025)



# Engine deliveries summary

114,000 engine deliveries, worth over \$600bn (2006 - 2025)



## Forecast overview

Strong long-term demand for products and services, driven by robust passenger and cargo demand.





Rolls-Royce





## Aircraft deliveries

### Strong demand across sectors

The Rolls-Royce Outlook predicts continued growth across all sectors of the commercial aircraft and engine market. In terms of aircraft units, the majority of deliveries will be in the business jet and single-aisle mainline markets. However, in value terms, twin-aisle aircraft designed for use on longer-range routes dominate the market.

The aircraft delivery market is worth \$2.7 trillion over the next 20 years. 50% of this value is for twin-aisle aircraft, with another 32% being for mainline single-aisle types. Although usually considered a fairly small sector, the market for new-build freighters, which consists solely of twin-aisle types, is worth \$170bn.



The total fleet of commercial aircraft grows from 33,000 to 69,000, with the fastest growing segments being the 200-350 seat twin-aisle sector, large regional jets, and very light business jets.

### Aircraft delivery units and value

	Aircraft deliveries	Value
Business Jets	24,027	\$344bn
Regional Aircraft	5,745	\$120bn
Single-aisle aircraft	14,965	\$857bn
Twin-aisle aircraft	6,287	\$1,195bn
Freighters	790	\$171bn
<b>Total</b>	<b>51,814</b>	<b>\$2,687bn</b>

The aircraft and engine figures quoted in the Outlook include deliveries to all countries with the exception of business jet, regional aircraft and freighter deliveries to CIS countries.

The forecast predicts faster growth rates on long-haul markets, and those markets to/from and within Asia/Pacific. These markets continue to see the benefit of more liberal air service agreements boosting demand. In contrast, short-haul markets will grow more slowly.





## Aircraft deliveries by region

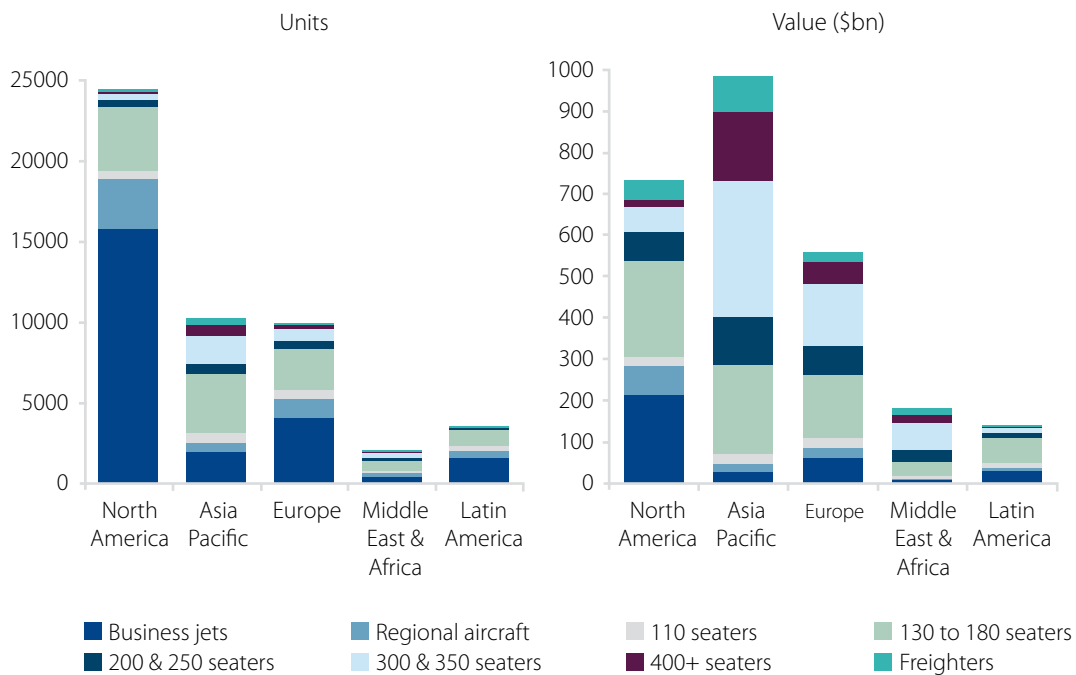
### Asia forecast to be largest market

The forecast for aircraft delivery quantities is dominated by sales to North America. However, over 15,000 of these aircraft are business jets, with a much lower average price than most airliners. The market for regional jets and airliners is around 8,000 units for both North America and Europe, and around 6,000 aircraft for Europe.

When the forecast is converted into aircraft delivery value, Asia/Pacific becomes comfortably the largest market, with a value of nearly \$1 trillion. This is due to the large quantity of twin-aisle airliners expected to be delivered into the region, compared to the North American and European markets that are dominated by smaller single-aisle types. Indeed, fully 70% of the Asian market value is for twin-aisles. The

forecast for larger aircraft in Asia is underpinned by the large distances between many Asian cities, the strong demand for intercontinental travel, and the relatively high concentration of population and wealth in a small number of mega-cities.

The Rolls-Royce forecast for Asia does assume that there will be significant liberalisation of air travel markets over the coming years, creating huge growth in direct services – many of which will be flown by single-aisle types. However, many of the major airlines continue to place orders for twin aisles for use within Asia. Indeed, the launch customers for the 787 and A350 XWB are much more weighted towards Asian airlines than was the case for their predecessors a generation ago. This trend will continue in the future.





## Engine deliveries

### Large market for high thrust engines

The forecast for the engine market naturally reflects the size distribution and dynamics of the aircraft market. The market has been segmented into take-off thrust categories, which can be roughly matched against aircraft classes. For example, below 6,000lb is the domain of smaller business jets, whilst 6,000-22,000lb engines predominantly power business jets and regional jets. The 22,000-45,000lb category covers the single-aisle market, and engines above 45,000lb thrust are for twin-aisle aircraft.

Whilst there has been little change in the relationship between take-off thrust required and the maximum take-off weight (MTOW) of the aircraft, there have been continued reductions in the MTOW required for a given mission. This is due to more fuel-efficient engines, which require less weight of fuel to be carried, and lighter airframe structures. There is also now more focus on 'hot-and-high' engine performance, with airlines wishing to have the flexibility to operate without payload restrictions from regions such as the Middle East, India and Latin America.

The summary tables below show that, although the largest quantity of engines is for the 22,000-45,000lb thrust band, the market value is dominated by high-thrust engines for long-haul twin-aisle aircraft. This sector has expanded at a rapid rate over the last 15-20 years, and is forecast to continue to grow in the coming decades.

### Engine deliveries – units and value

#### (including spare engines)

Category	Units	Value (\$bn)
Turboprop	2,001	2
<3,000lb	21,466	14
3,000-6,000lb	10,684	13
6,000-10,000lb	15,234	27
10,000-22,000lb	18,142	63
22,000-45,000lb	29,107	185
45,000-75,000lb	7,934	121
>75,000lb	10,151	193
<b>Total</b>	<b>114,718</b>	<b>618</b>

#### Engine deliveries by sector

Sector	Units	Value (\$bn)
Business Jets	51,001	70
Regional Aircraft	12,639	33
Mainline Aircraft	48,570	475
Freighters	2,508	40
<b>Total</b>	<b>114,718</b>	<b>618</b>



## Aircraft productivity

### Continued gains in load factor and utilisation

One of the key assumptions that any aircraft fleet forecast needs to take account of is aircraft productivity trend.

Changes in productivity over time directly affect the number of aircraft needed to satisfy a given amount of passenger or cargo traffic. Airlines can increase the number of Revenue Passenger Kilometers (RPKs) & Available Seat Kilometers (ASKs) produced by one aircraft in the following ways:

- Increased load factor
- Increased average block speed
- Increased annual utilisation
- Increased number of seats per aircraft

Over the last 20 years, passenger load factors have increased dramatically from 63% to 74%, as further liberalisation and competition, and new distribution technologies have driven improvements. This equated to a 17% increase in productivity. The forecast does not assume such a rate of growth in the future, but does envisage an increase to around 76.5%, or an improvement of 3%.

Improvements in ASKs/seat take into account both average speeds and annual utilisation changes. Average speeds have changed little in recent years. The increased average stage

lengths, giving a higher proportion of time spend in cruise, have been largely offset by longer block times to allow for airport and ATC congestion. Improving ATC efficiency in terminal areas and en-route is likely to be a major focus in the future, especially given the consequent environmental benefit. Annual aircraft utilisation is forecast to increase at 0.9% per annum, driven by increased penetration of the low-cost model and the faster growth of long-haul markets compared to short-haul. This results in a 20% increase.

Change in seats/aircraft is not automatically the same as increased aircraft size. As the penetration of the short-haul market by low-cost carriers increases, we may see a consequent increase in seating density. For example, an A319 flown by a European low-cost carrier will seat around 150 people, about the same as most A320s currently flown by major airlines. However, the opposite trend has been true in long-haul markets, with increased use of spacious premium seating layouts. An annual increase of 0.6% is forecast, giving a productivity gain of 13% over 20 years. When each of the productivity gains is taken into account, the overall improvement in RPKs/aircraft over 20 years becomes 39%.

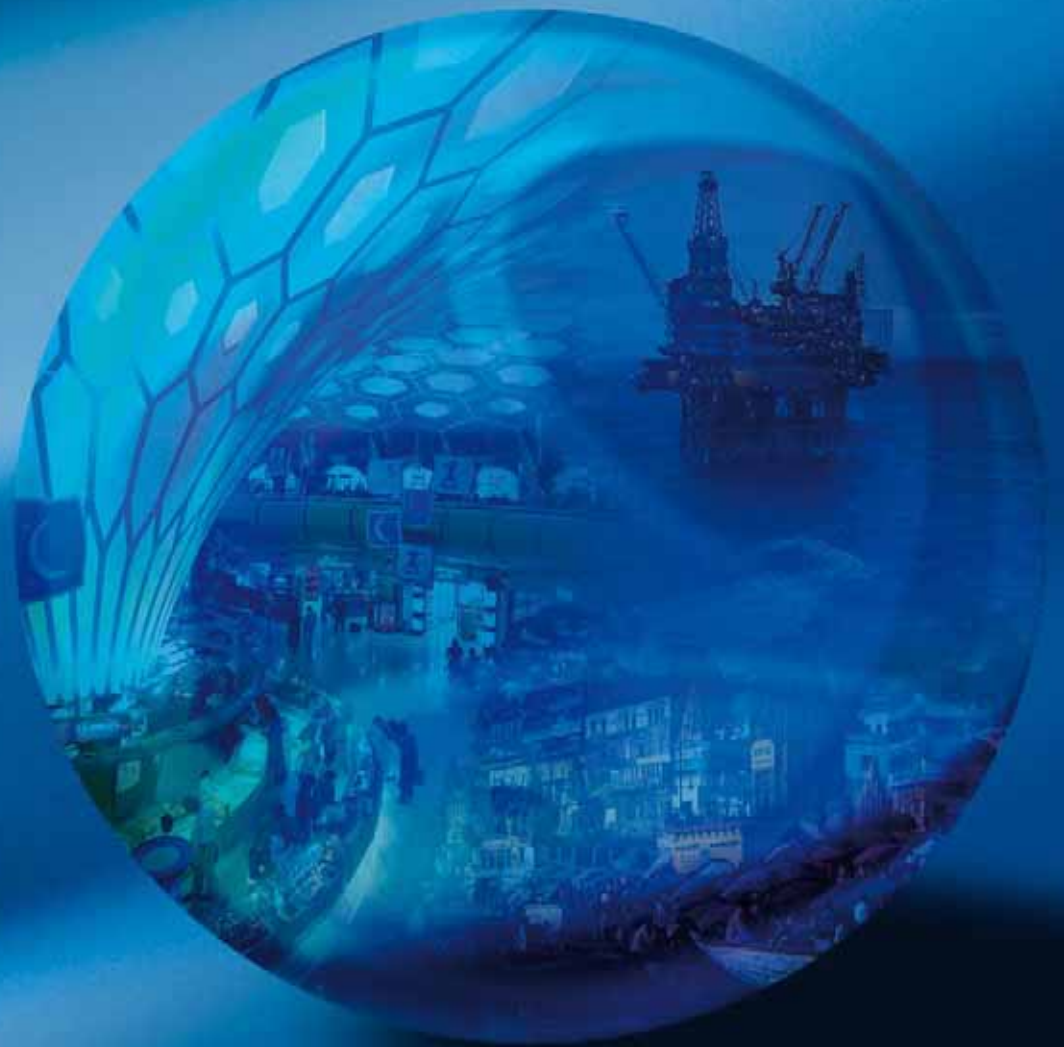
### Productivity forecast for major traffic flows

	Load factor 2005	Load factor 2025	ASKs/seat improvement*	Seats/aircraft improvement*	20-year productivity gain/aircraft
Europe - Asia Pacific	76.0%	80.0%	0.5%	0.3%	23.5%
Europe - Middle East & Africa	72.5%	75.0%	1.1%	0.6%	45.1%
North America - Asia Pacific	80.3%	82.0%	0.7%	0.4%	27.2%
North America - Europe	78.7%	82.0%	0.9%	0.6%	40.5%
With North America	75.6%	76.0%	0.9%	0.2%	25.2%
Within Asia Pacific	69.5%	75.0%	0.9%	0.3%	37.1%
Within China	69.8%	76.0%	0.5%	0.4%	30.3%
Within Europe	68.3%	71.0%	0.7%	0.1%	21.9%
World total	74.2%	76.5%	0.9%	0.6%	39.0%

\* Excludes regional aircraft

## Market trends

Despite concerns about fuel costs, leading airlines prove that profits are possible. Fleet re-equipment takes off, helped by development of new aircraft types.





## Booming orders, but higher costs

### Record orders despite oil woes

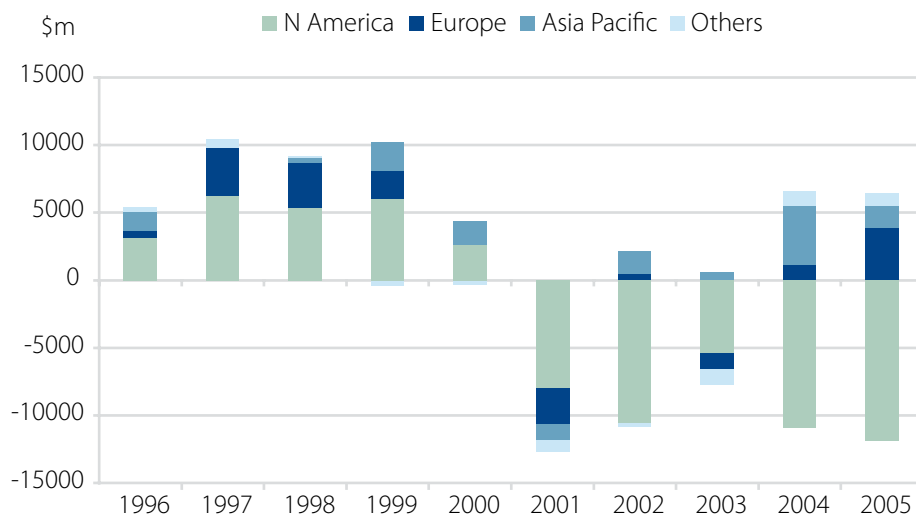
The last 12 months has primarily been dominated by two topics: the cost of fuel and the level of order activity by airlines. The level of orders in 2005 set an all time record, driven by India, China and the Middle East, regions of the world undergoing rapid expansion of their aviation industries. The ordering boom is discussed in more detail on page 19.

The price of jet fuel today is at a level not seen since the early eighties in real terms and is leading to continued cost pressures within the industry. This is particularly apparent in North America, where the weakening dollar has put fuel prices up more than in non-dollar countries. Fuel costs are not the only issue though, since not all airlines globally are losing money. In contrast to the US domestic market, in Europe and Asia demand has been strong enough for airlines to successfully pass on much of their increased fuel costs to

the passengers and freight forwarders. European airlines reported record levels of profit in the second half of 2005, and although Asian carriers now appear less able to increase airfares, in the long run market growth provides cost saving opportunities to these carriers. See page 17 for more information.

Fuel is still primarily seen as a cost issue for airlines, but the environmental impact of burning fossil fuels is coming under increasing scrutiny from the public, the media and the regulatory authorities. In Europe governments are increasingly looking at the practicalities of introducing aviation into carbon trading schemes whilst in North America regulators continue to closely monitor local effects of pollution and noise. Although in most of Asia the environment is less of an issue, Asian carriers are affected by flying into Europe and North American. The environment is discussed on page 18 of The Outlook.

### Airline net results







## Commercial aerospace activity accelerating

### New types boost market

Last year saw the maiden flight of the Airbus A380 powered by the Trent 900. The aircraft has continued its flight-testing phases successfully throughout 2005 and impressed the crowds at the many air shows it has visited. The first delivery is later this year with Singapore Airlines, who will be the first of many to employ the type to link the world's busiest hubs.

Serving hub airports will also be a key use of the Boeing 787 and Airbus A350 XWB. The 'mid-market' has been the keenest fought battleground for new twin-aisle orders recently, with almost all the major airlines fighting for a reducing number of early production slots.

The above aircraft developments mean that airlines now have a wide choice of aircraft with the range capability for Transpacific and Europe to Asia markets. Thus, more than ever before, airlines can match demand and supply better, using flexible scheduling to satisfy the need for daily operations.

Attention is starting to focus on the longer-term need to offer new single-aisle types. However, the 737 and A320 are selling in such huge quantities that it is difficult to see an overwhelming need for new types in this sector. Indeed the current products continue to be upgraded, via the use of improved winglets, take-off weight increases and engine improvements.



In the regional market the biggest debate has been the re-emergence of turboprop aircraft as competitors to smaller regional jets, primarily due to increased fuel prices. Turboprop order backlog is at its highest for several years. Jet products continue to be developed, with the Embraer 190 entering service in 2005 and the Embraer 195 in 2006.

Across the spectrum of aircraft and engines the last 18 months has seen a significant development in the place of services within the industry. The offering of the OEM is more than just the product it produces. Airline customers increasingly expect the support alongside the product to be delivered to them as an ongoing service package. This is normally contracted into and arranged up front and is the beginning of a long-term relationship with the equipment manufacturer.



## Fuel price continues to climb

### No sign of reductions in sight

Over the last year the price of crude oil has continued to grow amid concerns about security in oil producing regions and an increased demand from rapidly developing countries, mainly India & China. In 2005 hurricanes Katrina & Rita disrupted refineries in the USA, further adding to pressure on jet fuel prices.

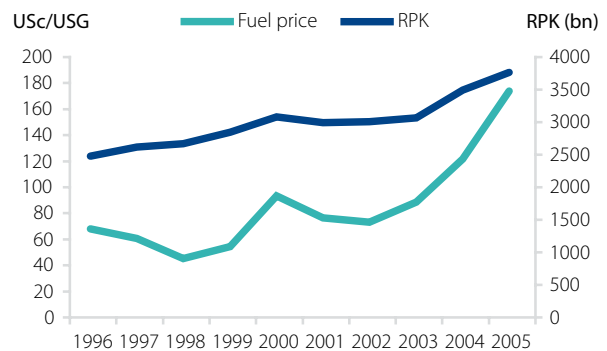
The price of jet fuel is directly linked to crude oil, so jet fuel prices have been rising rapidly causing additional cost pressures on airlines. To cope with rising fuel prices, airlines worldwide have been working to reduce fuel burn, reduce other operating expenses and increase revenues. How airlines have been able to react to the increase in fuel prices has varied depending on the region in which they are based.

In the US airlines have found it hard to increase prices due to the competitive nature of the domestic market, and are consequently struggling to make profits. The one major exception is Southwest, who already had a low cost base and have hedged much of their fuel requirements at very low prices. If it were not for the increase in fuel prices, many believe the US airline industry would be making profits by now. For example, if American Airlines paid the same for their fuel as Southwest Airlines, they would have made a \$300m operating profit in Q4/2005 instead of a \$400m loss.

Elsewhere airlines have found it easier to pass on increased costs to passengers, either with an increase in ticket price or

the introduction of fuel surcharges. Generally, the European airlines are still making profits as the fuel surcharges have made up some of the increased cost. So far there is little sign that the increased airfares have restricted air travel growth.

### Traffic growth not related to fuel price



### Airline passenger yields (Cents/km)

	2000	2001	2002	2003	2004	2005
US (ATA)	13.5	12.4	11.5	11.8	11.7	12.0
Europe (AEA)	9.1	9.0	9.3	10.1	10.3	10.4

With no sign of political stability in major oil producing regions in the short term, there is unlikely to be any reduction in jet fuel prices. Any easing in price is more likely due to reduced demand for oil – either as a result of economic slowdown, or via efficiency improvements triggered by the high prices.



## Environmental issues

### Aviation and the environment

Environmental issues will become a growing influence on the airline industry as awareness grows about climate change and local air quality issues. The debate is currently most intense in Western Europe, and is increasingly focussing on CO<sub>2</sub> emissions, instead of the traditional area of aircraft noise.

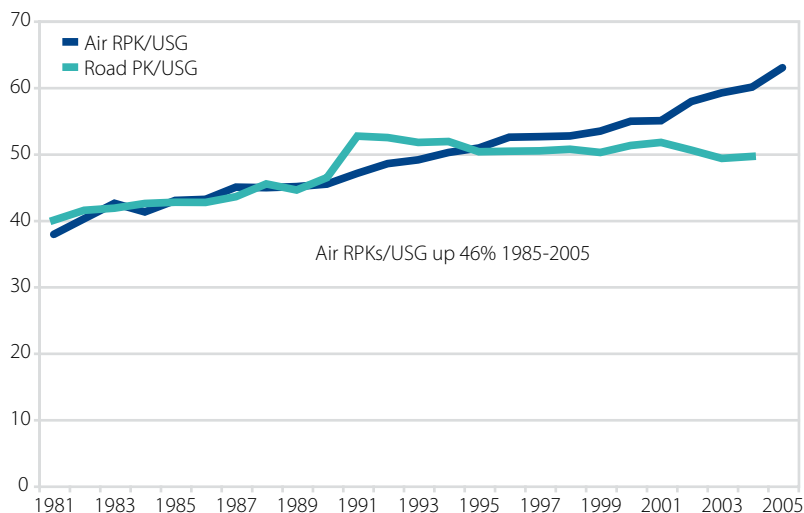
The industry has made great improvements in fuel use, via new engine and airframe technology, as well as better use of capacity by airlines. Indeed, in the US, fuel efficiency has improved almost 50% in the last 20 years, to the point where air transport is more carbon efficient than the automotive sector. However, aircraft engines will continue to utilise fossil fuels in the medium term, meaning that the pressure to improve fuel efficiency will remain.

The Rolls-Royce forecast assumes that environmental issues do not significantly curtail industry growth. However, we

assume that airline cost reduction (and hence average airfare reduction), which has been a major driver of traffic growth, does not reduce at the same rate in the future. For example, the Intra-European market has seen average yield reductions of around 3-4% per annum (in real terms) over the past decade, driven by industry liberalisation and efficiency improvements. The forecast assumes only 1% per annum reduction in the future, with even smaller figures post-2010. This is consistent with a scenario where continued technology and operational improvements may be offset by increases in environmental charges.

Clearly different scenarios may occur, where industry growth rates are faster or slower, and aircraft retirement ages are altered. Ultimately, the environmental impact of aviation and management of associated costs is part of a wider picture, involving personal choices and government policies that reflect the wishes of their people.

### US aviation fuel efficiency outpaces auto



Source: US Air Transport Association & Office of Highway Policy



## Orders placed in record numbers

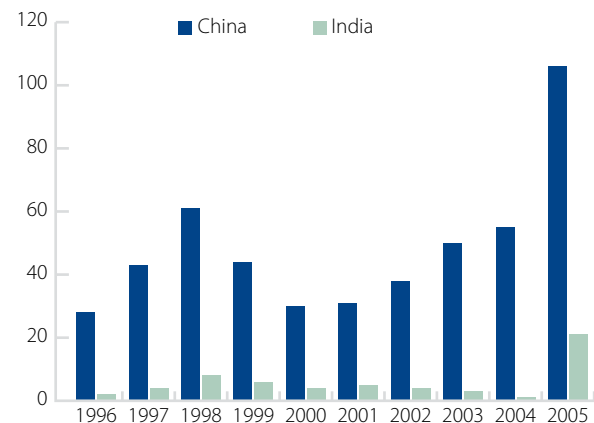
### 2005 orders driven by energising markets

One of the big talking points in recent months has been the record level of orders being received by Airbus and Boeing. Over 2000 orders were taken in 2005, plus another 300+ orders for regional aircraft. In contrast to the previous peak year of 1989, a large number were for the fast-growing markets of China, India and the Middle East. These markets were the source of 34% of the orders for mainline aircraft, compared to only 2% in 1989.

In 1989, US airlines ordered over 700 jet airliners, but in 2005 only 143 orders for mainline passenger jets were placed. The ratio of firm order backlog/fleet is now at an historic low for US carriers, highlighting the potential for more orders to be placed as US carriers recover their financial performance in the next 2-3 years.

Since the last Outlook was published in March 2005, over 150 new aircraft have been delivered to Chinese airlines. Although this represents a large increase over previous years, it is consistent with a market demand currently growing at 10-15% per annum. The Outlook forecasts Chinese airline

### Chinese & Indian orders placed



requirements for over 2500 aircraft over the next 20 years – an average of over 100 deliveries each year.

Indian airlines have ordered an unprecedented number of aircraft in the last 18 months, following liberalisation of the Indian domestic market, and more expansion of bilateral agreements. Although some concern exists about the sustainability of the growth, it can be seen that the Indian market has been constrained for many years, with very few new deliveries, and has a huge pent-up demand for aircraft.

### Orders placed in 2005

	World Total	China	India	Middle East	USA
Mainline passenger jets	2027	332	322	56	143
Freighters	96	8	0	8	24
Regional jets	161	5	5	15	49
Regional turboprops	164	0	50	0	12
<b>Total</b>	<b>2448</b>	<b>345</b>	<b>377</b>	<b>79</b>	<b>228</b>

Excludes orders for non-airline use.



## Retirements

### Little evidence of reducing retirement ages

The Rolls-Royce forecast models aircraft retirements using a 'survivor curve' type approach. There is no single assumption for average retirement ages, but as a guide the figures used are approximately as follows:

Business Jets	=	40 years
Regional jets	=	24 years
Single-aisle	=	28 years
Twin-aisle	=	25 years

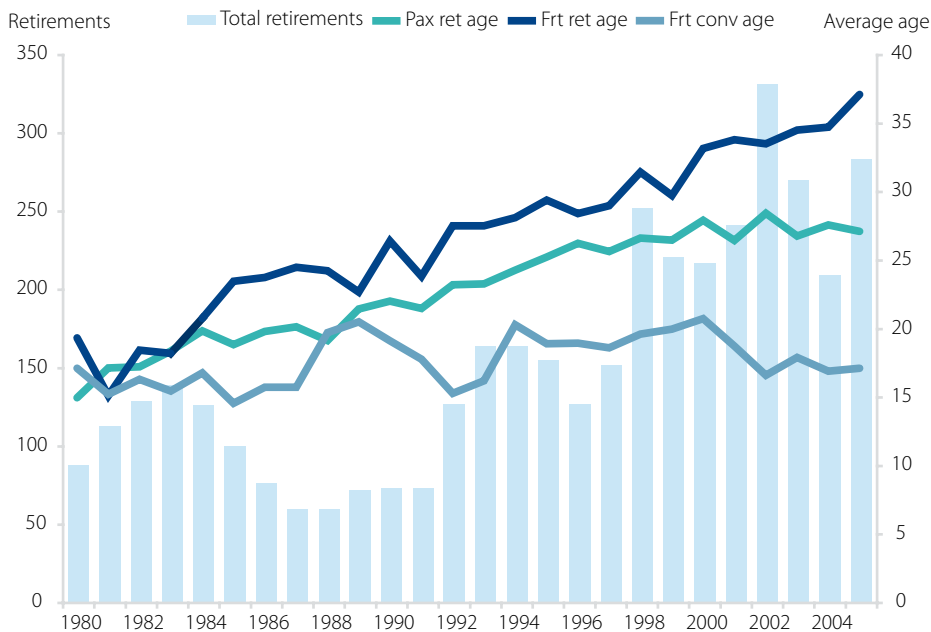
This refers to the removal from active passenger service. The aircraft could continue in service beyond this age, in a non-airline operation, or could be converted to cargo use.

Typically, freighters retire at 35-40 years, depending on the level of utilisation achieved.

There has been some discussion over whether aircraft economic lives are actually reducing, due to the desire for airlines to operate young fleets of aircraft, and to standardise on the minimum number of fleet types. There have been a number of well-publicised examples of aircraft well under 20 years of age being scrapped. However, these isolated examples have not changed the trend towards higher retirement ages, as seen in the accompanying chart. Aircraft retirement age is most influenced by economic cycles, so we should see the average age move up again in the next couple of years, as demand remains strong.

If fuel prices remain at their current levels long-term, there is the possibility that some aircraft will be retired earlier than expected. We have not yet built this scenario into the forecast.

### Aircraft retirements and conversions





## Ability to accommodate growth - infrastructure, pilots

### Infrastructure issues – keeping pace with growth

The rapid expansion in the Middle East, China and more recently India is putting increased pressure on the overall aviation system. Local issues such as airport infrastructure and ATC capability need addressing, but emerging markets also affect worldwide issues such as pilot supply.

The demand for pilots is causing problems, with many airlines experiencing significant attrition as pilots move to fly for better pay. The Indian Pilots' Association estimates that in the next 5 years they will have to nearly double the current number of pilots to 5,000. Whilst it is unlikely to be a major constraint to growth in emerging markets, pilot shortages may moderate growth rates and put pressure on costs.

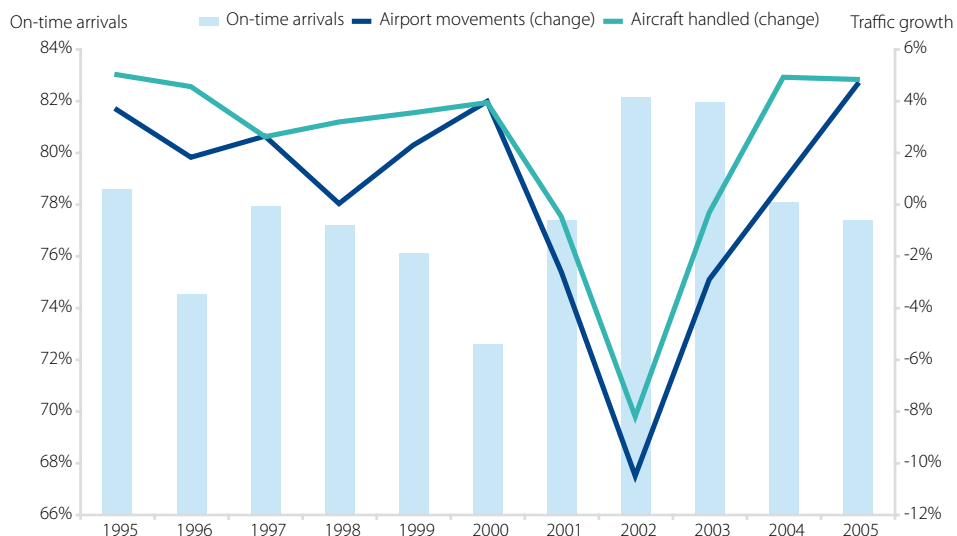
China and the Middle East are investing heavily in airport infrastructure and the Indian government is allowing private investment in airports to allow for massive expansion of

the existing system. Roughly \$30bn is being spent on projects in the Gulf region, including a 2nd airport for Dubai, and upwards of \$10bn in India. China has successfully accommodated growth of >10% per annum over the last 10 years, with Beijing Capital airport growing from 12m passenger to 40m.

The US market exhibits much slower growth, but it is clear from FAA data that delays increase when market growth is high, and vice versa. However, the system has accommodated growth successfully, with delays in 2005 being lower than in 1995.

The market value of infrastructure companies is currently very high, with increasing merger activity. This highlights the ability of airports and ATC providers to attract capital, thus ensuring adequate investment to meet growing demand.

### Relationship between traffic growth and on-time arrivals







## Ultra-long haul markets

### New services offering more choice

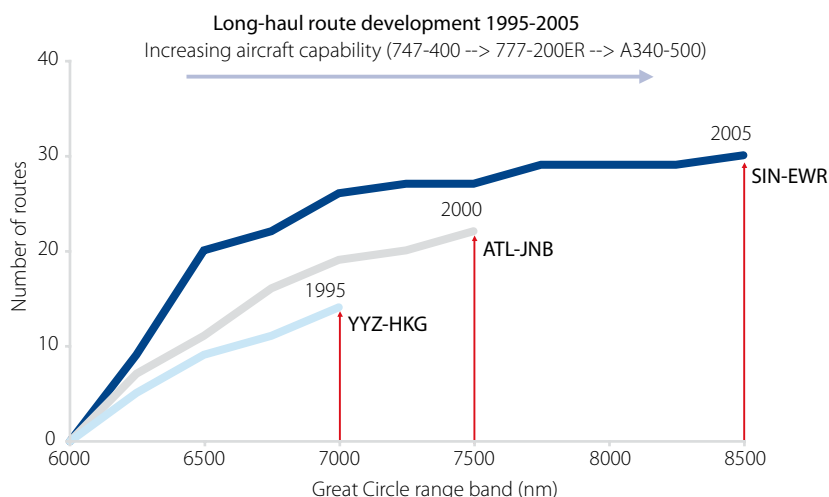
The increased range of the latest twin-aisle airliners offers airlines the ability to fly non-stop up to 9000 nautical miles. This enables launch of direct routes from the US East coast to South East Asia, India to North America, or almost anywhere in the world from the Middle East.

This raises the expectation that indirect services will become a part of history and that there will be a boom in new direct flights. Direct flights are attractive to the passenger, since time is saved, and the hassle of making a connection is avoided. For the airline some cost savings are possible, such as reduced landing fees. However, some costs increase. For example an 8000nm flight will likely require 5 flight crew for 16 duty hours, compared with two 4000nm flights requiring 3 crew each for 8 hours – over 50% more. The fuel burn on an 8000nm mission will be more than for two 4000nm missions, since the aircraft has to carry the extra weight of the fuel itself. In total, the costs per seat of flying ultra long-haul missions can be up to 10% higher than for a one-

stop through service, even before taking into account the possible need for more spacious seating configurations for these services.

The number of routes flown above 6000nm has grown from 14 to 30, but the number of operations has increased even faster, from 7100 flights in 1995 to over 20000 today. This represents a growth rate of nearly 25% per year, far in excess of average long-haul market growth. It is not clear whether this sort of growth rate is sustainable in the medium to long term. Many of the longest routes are in their infancy, and how profitable they are is not yet clear. It is also unclear what the yield premium is for offering non-stop service. There may well be a premium for the business travel market, but many leisure travellers are happy to save money by making a connection en-route. This market sector is also likely to receive a boost when the 787 and A350 XWB enter service, with their longest range variants holding out the promise of significantly lower operating costs.

### Long-haul route development 1995-2005





## Premium long-haul - niche or not?

The long-haul premium market has taken a further step in the last year, with the start of all-business class airlines across the Atlantic. The first airlines (Maxjet & Eos) using large single-aisle (757) or small twin-aisle (767-200) airframes, bought 2nd-hand, and retrofitted with a premium interior and offering a premium level of service. These services add to a market that commenced with a small number of all-business class flights provided by Lufthansa, using Privatair A319s and 737BBJs.

Long-range single-aisle aircraft in an all-business configuration can comfortably reach the East Coast of America and into India from Europe. Therefore, potentially many routes could be offered by major American and European airlines. The big question is: is this a trend, or will this remain a small market niche?

It is probably necessary to separate this market into segments:

1. Use by network carriers of single-aisle types in an all-business layout. The routes flown will usually be where there is insufficient economy-class demand to fill a twin-aisle year-round. The route may be flown as a defensive measure to retain high-yield frequent flyers and deter entry from a competing alliance, or as a new niche service on routes previously beyond the capability of a small aircraft. However, the operating cost per seat of these types in an all-premium layout is up to 40% more than the cost involved in flying the premium cabin of a twin-aisle. Therefore this is likely to be a fairly limited market.

2. Use by new-entrant carriers on a large O&D market. There must be sufficient premium-class demand to allow high frequency (at least daily) operation in a competitive market. The new-entrant is likely to compete on price, but will likely need a high load factor to break-even. Again, this model is likely to be applicable to only a small number of routes, unless the incumbent carriers are unable to respond to the competition.

### Premium long-haul routes flown - Summer 2006

Airline	Type	Route	Frequency	Notes
Lufthansa	A319	Dusseldorf-Newark	Daily	Privatair aircraft. Replaced A340 service.
	A319	Dusseldorf-Chicago	5/week	Privatair aircraft. 48 seats.
	737-700	Munich-Newark	6/week	Privatair aircraft. Replaced A340 service.
Swiss	737-800	Zurich-Newark	6/week	Privatair aircraft. Replaced A330 service.
KLM	737-700	Amsterdam-Houston	6/week	Privatair aircraft. Complements 747 service.
Eurofly	A319	Milan-JFK	4/week	44-seats
Air France	A319	CDG-Pointe Noir	4/week	AF flights have 2-class 82-seat layout
	A319	CDG-Riyadh	5/week	
	A319	CDG-Malabo	4/week	
	A319	CDG-Ndjamena	4/week	
	A319	CDG-Nouakchott	6/week	
Eos	757	New York-Stansted	Daily	48-seat 1st-class layout
Maxjet	767-200	New York-Stansted	6/week	102 seats. All business-class.
	767-200	Washington-Stansted	5/week	



## US Markets - short-haul woes

### Light at the end of the tunnel?

The US airlines have suffered troubled times in recent years with record fuel prices being the latest in a long line of obstacles to profitability. However, there are signs that the market is moving in the right direction.

The health of the domestic sector is crucial for US carriers because it represents 70% of revenues. The historical woes of the domestic market can be seen below – this shows that the year-on-year spread in revenue per available seat mile (RASM) vs cost per available seat mile (CASM) has only been favourable in 2 out of the last 5 years. However, capacity reductions at Delta and Northwest are helping to drive up load factors and consequently yields are recovering and revenues increasing. This trend appears to be accelerating through 2006.

Fuel hedges have been a crucial financial tool for a number of US airlines and have afforded those airlines the pricing power within the market. However, these hedges are starting to run out and those individual airlines will feel negative effect but for the US airline industry as whole it will be

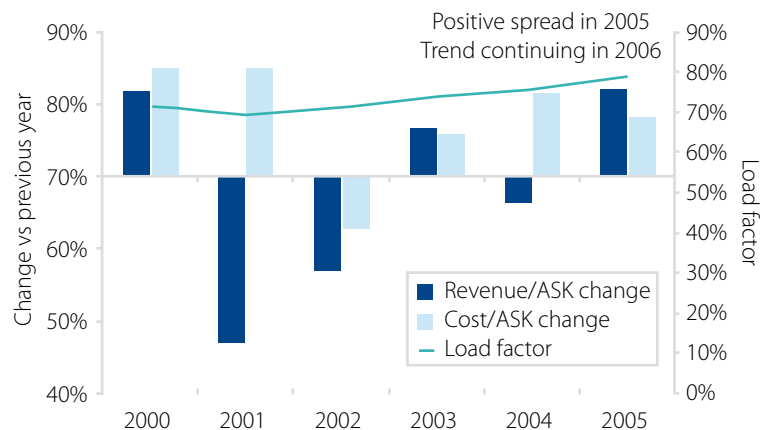


Photograph: Tim Berry

beneficial as it will remove competitive advantage from a small number of airlines and will allow free market pricing.

Whilst the US airlines have been removing domestic capacity they have been adding capacity on international routes. International routes grew 11.5% and 8.7% in 2004 and 2005 respectively and the trend is continuing in the first quarter of 2006. This growth combined with strong load factors has helped achieve year-on-year RASM growth of 15% over the last 2 years, and passenger revenue growth reached 21.5% in 2004 and 15.1% in 2005. Much of the growth in international capacity has been achieved through the switching of domestic aircraft to international routes. Analysis shows that there has been nearly a 3-fold increase in Transatlantic ASKs flown by single aisle types in 2006 compared to 2004.

### US airline revenue & cost trends





## Intra Europe

### Single-market expands South-eastwards

Since the European Union (EU) expanded in 2004, airlines have been increasing services to Central & Eastern Europe. All 8 new member countries saw traffic increases of at least 10% in 2005. Most of this growth is between the old & new EU states. Generally it has been the 'low fares' carriers, such as SkyEurope rather than the network carriers that have been most aggressive in launching new services. The EU is now expanding the single aviation market beyond its borders, signing agreements with Morocco, Turkey and the Ukraine for example. These deals are driving rapid traffic growth in these markets.

The continued strong demand in intra-Europe air travel has meant that the expected consolidation & bankruptcies among the smaller start-up airlines has failed to materialise with many airlines finding profitable niches. For the network



Transaero

carriers the position is mixed. Some, generally the larger carriers with strong hubs, have been able to restructure and deal effectively with the changing market. Others however continue to lose money, with the EU investigating claims of illegal subsidies.

Outside the EU, Russian ticket price increases, brought on by rising fuel costs, have slowed growth after several years of impressive growth rates. With fuel prices now accounting for over 50% of operating costs for some types of fuel-hungry Soviet-era aircraft types, demand for imported Western aircraft has continued to grow. Indeed, the fleet has doubled in the last 2 years.

### Western aircraft in Russian operation





## Developing markets - India & Middle East

### Rapid growth continues

Passenger traffic continues to grow at double-digit rates in China, as it has done for the past 20 years. The Rolls-Royce forecast is for domestic traffic to continue to grow at 8.0% per annum for the next 20 years, with international traffic growing at the same rate. This produces a market for over 2,500 new aircraft - an average of 140 deliveries per annum, a figure that is already being approached in 2006.

### Deliveries to China 2006-2025

Regional aircraft (30-90 seats)	273
Single-aisle aircraft (110-180 seats)	1727
Twin-aisle aircraft (200-600 seats)	713
Freighters	83
<b>Total</b>	<b>2796</b>

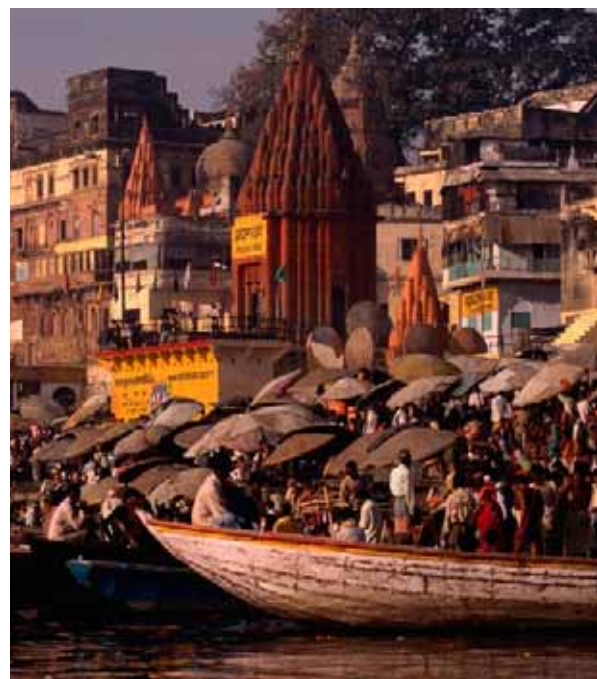
We do not currently have a forecast for the Indian market alone, it being part of the larger Asian market forecast. However, Indian passenger traffic (RPKs) for 2004, the first year of dramatic growth following liberalisation, was very close to the figure for China in 1992. Therefore we can produce some delivery forecast scenarios by drawing parallels with Chinese deliveries since that point.

For example, if we believe that the Indian market will go through a similar period of growth to that seen in China since 1992, we may see a similar level of deliveries as China for the 1992-2011 period. This totals 715 delivered to date, plus another 600 forecast for 2006-2011. A more conservative scenario might be that Indian deliveries for 2006-2025 only equal the number delivered to China between 1992-2005. This would equate to 'only' 715 aircraft.

There is a perception that the growth of long-haul capacity out of the Indian sub-continent will damage the prospects for Middle East hub carries such as Emirates, Qatar and Etihad. However, transfer traffic to/from this region only represents a small proportion of their overall traffic. Indeed much of the traffic between the Gulf and India is actually O&D traffic, so whilst the development of efficient long-haul/short-haul hubs in India will inevitably effect Gulf hubs, the impact is likely to be small.

### Exposure to Indian market

Airline	Total ASKs (Aug 2006)	ASKs to/from India/Pakistan	%
Emirates	7916m	480m	6%
Qatar	2618m	175m	7%
Etihad	1532m	100m	7%



## Regional and Business Jet markets

Business jet flexibility gives corporations and individuals competitive edge, whilst regional airlines move to larger types as growth continues.







## Regional aircraft market

### Market of 5,745 aircraft

The forecast anticipates a market demand for 5,745 new regional aircraft for delivery over the next 20 years, worth \$120 billion. North America and Europe will continue to dominate new aircraft demand, accounting for 75% of world requirements. Growth rates for regional airlines will continue to be somewhat faster than those for the network carriers but the difference will not be as marked as in recent years. The fastest growing regions, albeit from a low base will be Africa and South and Central America where a significant portion of demand will be met by used aircraft. Approximately 9% of demand will come for the Asia/Pacific region.

Regional aircraft demand has significantly shifted towards the larger 70 to 90 seat aircraft from the 30 to 50 seat RJs, where the demand for new aircraft has all but ended. This shift has been driven by a combination of scope clause relaxation in the USA and the continued erosion of operating economics for the smaller aircraft, caused predominantly by the continued run up in fuel prices and, until recently, an erosion of yields. The larger aircraft will account for 83% of demand over the next ten years. A replacement market for 30 to 50 seat aircraft is expected to emerge post-2016, which will reduce the larger aircraft market share to 63% of total demand in the last ten years of the forecast.

### Market issues

The dramatic rise in fuel prices has led to a resurgence in demand for turbo-props in the sub-70 seat market; production is set to triple over the next few years with orders for over 150 aircraft placed in 2005 alone. However, the attractions of turbofan propulsion – especially in the USA – still appear to dominate, and particularly for the larger aircraft; the forecast projects they will take an 84% share of the regional aircraft powerplant deliveries over the next 20 years.

The hub-and-spoke route structure continues to dominate in North America and is expected to stay intact over the long term. Longer range regional aircraft have extended the catchment areas for hubs and in some cases, have led to an increase in “hub raiding.”





## Business jet deliveries

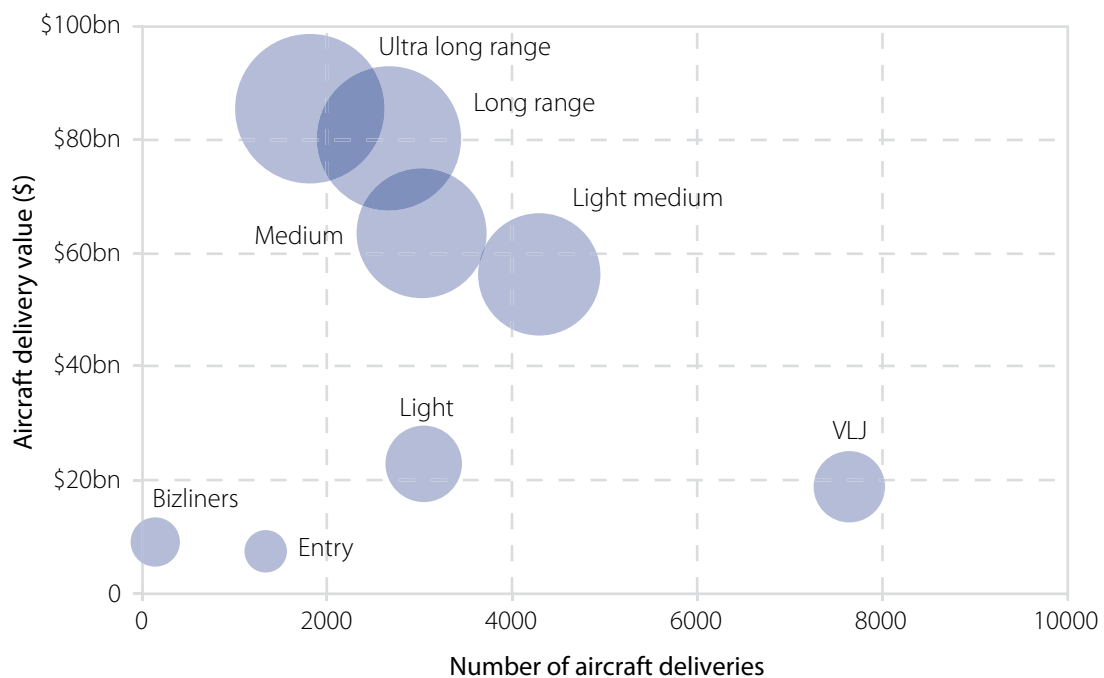
### Market of 24,026 aircraft

A total of 24,026 business jets are forecast to be delivered over the next 20 years, worth an estimated \$343 billion. Included in that total is the emerging Very Light Jet (VLJ) sector, accounting for 7649 deliveries. The forecast demand for the “traditional” market is 16,377 aircraft and approximately 40% of this demand will be for replacement of aircraft retired over the forecast period. Overall, the in-service traditional fleet grows by an average 3.2 percent per year. The aircraft delivery forecast results in a demand for turbofan engines worth approximately \$70 billion over the period.

Deliveries are expected to be higher in the second decade of the forecast, driven by the compounding effect of continued growth. This growth is driven by macro economic growth, the accelerating pace of retirements, and an increasing acceptance outside the USA of the utility of business jets. However, the USA will continue to be the dominant market, accounting for 65% of total demand over the next 20 years.

### Market weighted towards larger jets

Delivered aircraft value and units (2006-2025)





## Sector issues

### Sector issues

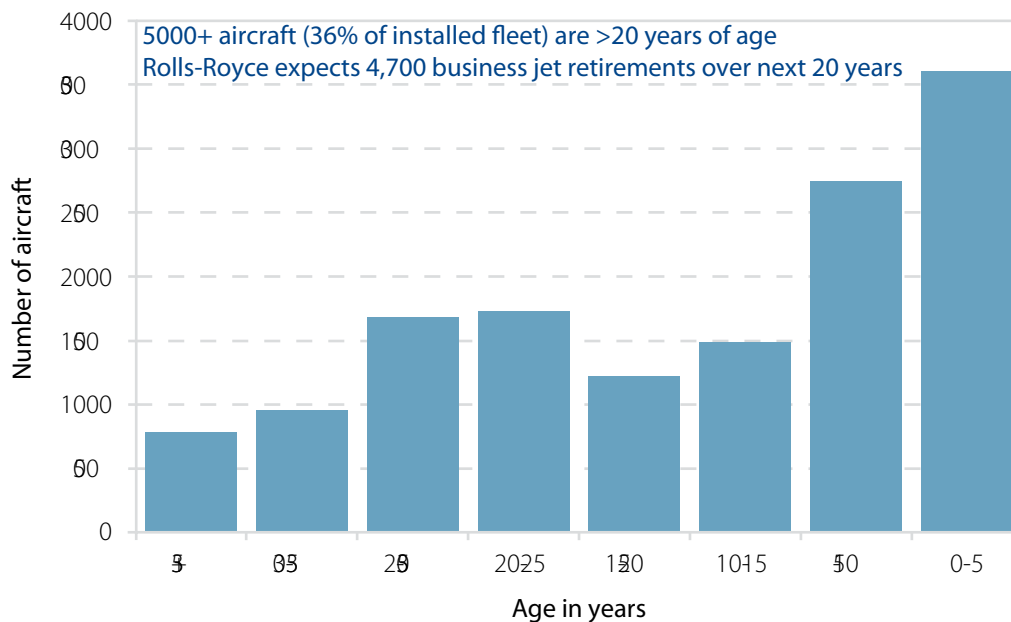
With the imminent certification of several Very Light Jets (VLJs), this new sector has been recognized in the forecast. There are still some concerns about its overall size and the key assumption concerns the viability of a large air taxi transportation sector. The forecast of approximately of 400 aircraft deliveries per year is based predominantly on a demand shift from typical general aviation turboprops, and does not assume a substantive air taxi network.

The established business jet manufacturers, and some new entrants, are in the early stages of defining new aircraft that will have a significant impact on the shape of the business jet market over the next twenty years. These new aircraft will lead to a demand for both new and derivative engines offering greater efficiency.

All business jet sectors will grow over the 20 years but significant growth is expected in both the Medium and Large sectors as customers take advantage of the longer range capability and improved comfort levels provided by the new, larger, aircraft.



### Retirements on the way





## Geographic mix

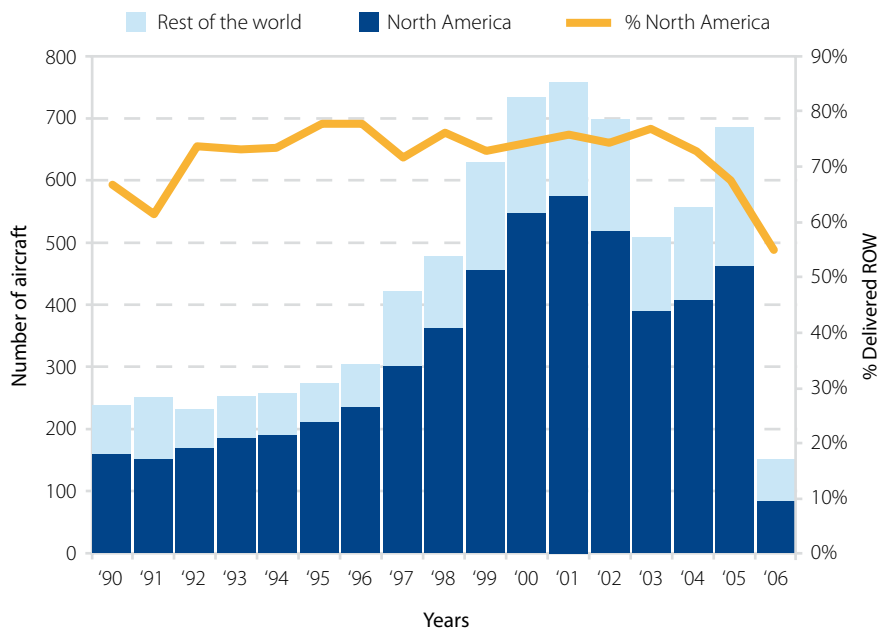
The North American market has dominated the business jet landscape over the last 40 years - taking delivery of over 75% of all the world's aircraft. This is considerably higher than the mainline and regional airline industry, where the figure has been closer to 50%. The primary reasons for the difference lie in the economies of individual countries as well as air transportation infrastructure. It is believed that as other economies grow the drivers that encourage business jet usage will lead to many emerging markets for future business jet deployment.

We may be seeing the start of those changes today, as the 75% delivery share taken by North America could be changing. In 2005, the North American share declined to 67% and during the first half of 2006, the proportion declined to only 58%. As economies around the world thrive, air travel and business jet markets are following. A leading indicator of

this is the growth of fractional operations around the world. For example, fractional operators in Europe will take at least 40 new aircraft in 2006 compared with only 20 for 1999-2002 combined. Over the medium term, fractional operations are likely to expand to Asia and elsewhere.

The market for business jet aircraft has become more apparent in several emerging markets. Areas such as China, Russia, India and the Middle East are predicted to see important growth in the future. There are several common factors amongst these regions, which have led to growth expectations. They are experiencing rapid growth of high net worth individuals, who are major customers of personal aircraft, plus huge inward investment from major corporations, who are sometimes reluctant to allow their executives to fly on local airlines. As growth in infrastructure follows economic growth, business jet deliveries will result.

### Non-US share of deliveries growing



## Cargo market

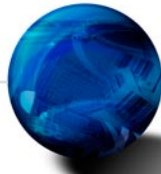
Slow traffic growth in 2005 masks market strength. Orders for new aircraft and conversions surge ahead.



Rolls-Royce







## Market commentary

### Slower growth in 2006, but confidence high

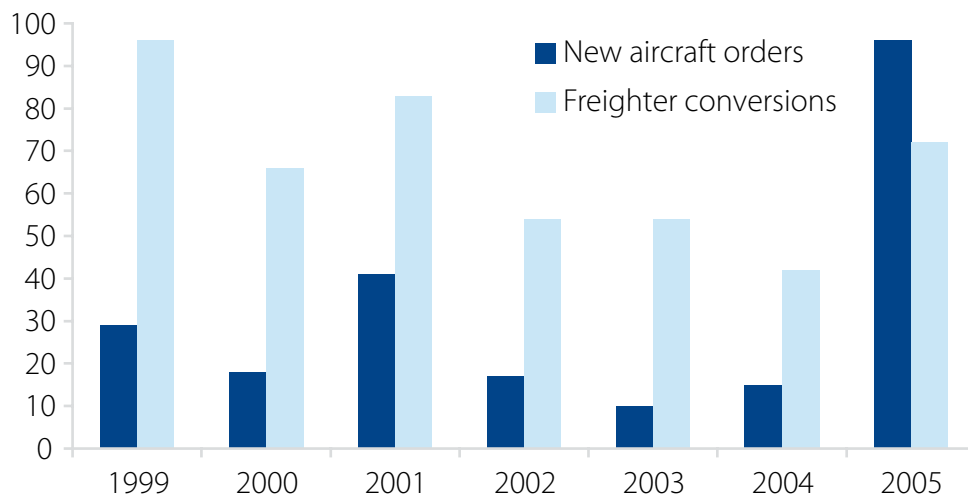
The air cargo market saw a slower traffic growth rate in 2005 of 3-4%, compared to a long-term trend of 6-7% per annum. This was partly due to fuel price increases being passed on to customers, but also the fact that air cargo capacity was tight, at the same time that shipping tonnage available was increasing at double-digit rates.

At present the global economy remains strong, with international trade growing at roughly twice the pace of world GDP. Confidence in the air cargo market is being demonstrated by the record number of orders for new-build aircraft placed in 2005, together with the recovery in passenger-to-freight conversions.

Rolls-Royce forecasts the air cargo market to grow considerably faster than the passenger market, with world growth averaging 6.8% per annum over the next 20 years (see table on page 34).

There were nearly 100 orders for new-build aircraft in 2005. These were all for twin-aisle types, with 80% being for the largest category of >70t aircraft. Conversions picked up to 72 aircraft, after averaging 50 per annum in 2002-2004, with a further 80 due over the next 12 months.

### Freighter orders & conversions





## Intermodal competition

### Competition from surface modes

The intercontinental air cargo market is a sub-set of the overall cargo/logistics sector, with the type of goods carried by air and sea in constant change. Air cargo costs have decreased as airlines have shifted to using larger aircraft, with very high annual utilisations of over 5000hrs/year – often higher than passenger aircraft. This has meant that for lower value time-definite goods, air cargo has become an option.

However, intense competition for lower value goods exists, driven by huge expansion of the world's container fleet. Around 30% of the fleet has been built in the last 5 years, 73% originating in Asia. These large, modern ships are very attractive, especially when aviation fuel is priced around \$2/USG. The infrastructure and logistics supporting shipping operations to and from Asia has undergone major change in recent time. China has seen terminal growth of 25% year-on-year for nearly 20 years, and now accounts for 25% of the world Twenty-foot Equivalent Units (TEU) handled, and 60% of TEU handled on Pacific, Asian and European markets. Orders for container ships remain healthy with a backlog to fleet ratio of around 50%, driven by traffic growth of 12% in 2005.

In the light of the rapid expansion in low-cost container capacity, the air cargo industry must continue to focus on costs and efficiency, whilst maximising the benefit of rapid transfer and time-definite products.



Photograph: Tim Goodwin

The US domestic market also has increasing surface competition. Increases in fuel costs, and in some cases aging aircraft, has meant that package carriers have made more use of trucking. The US interstate network and the availability of capacity makes this a cost-effective alternative to air transport. Trucking can be competitive on routes up to 1,000 miles, for 2-day delivery, or alternatively used to feed hubs where short-haul aircraft use is too expensive. It is therefore forecast that there will be very little, if any, growth in the single-aisle US domestic air cargo fleet, with growth concentrated in the twin-aisle segment, for longer domestic routes and international service.



## Cargo traffic summary

### Cargo traffic growth forecast

Air cargo growth has several drivers, but the primary force is increase in international trade. The global economy is becoming more interwoven than ever before, with air cargo forming a crucial link between continents, enabling companies to source components and finished goods in an efficient manner.

Asian exports to Europe and North America have been the main source of air cargo growth in recent years, with airlines such as Singapore Cargo, Cathay Pacific & Korean Air growing their all-cargo fleets tremendously. The Asian-operated jet freighter fleet has increased from 100 to 200 aircraft in the last 6 years alone. Up to now, most Chinese exports have been shipped via Hong Kong and Korea to the rest of the World. Now Chinese airlines are gearing up to take this trade for themselves, and most experts predict that China will be moving up the 'food chain', with more value-added finished



goods for export, as well as the economy importing more high value commodities.

The fastest growing market is expected to be Intra-Asia at 8.6% per annum, with traffic to/from and within China forecast to grow at around 10% each year.

### Air Cargo traffic growth 2006-2025

Market	2005 traffic (FTKs bn)	Traffic growth rate:			2025 traffic (FTKs bn)
		2006-2015	2016-2025	2006-2025	
North America - Europe	28	4.5%	3.9%	4.2%	64
North America - Asia Pacific	28	8.0%	7.2%	7.6%	121
Europe - Asia Pacific	37	8.5%	7.6%	8.1%	176
Within North America	22	3.8%	3.4%	3.6%	45
Within Asia Pacific	27	9.3%	7.9%	8.6%	141
Europe - Africa & Middle East	15	5.5%	5.0%	5.3%	42
Rest of World	25	7.1%	6.5%	6.8%	93
<b>World Total</b>	<b>182</b>	<b>7.1%</b>	<b>6.5%</b>	<b>6.8%</b>	<b>681</b>

Data includes traffic in both directions



## Average conversion and retirement ages for freighters

### Cargo fleet development

The air cargo fleet is forecast to grow from 1,634 jet aircraft at the end of 2005, to 3,403 in 20 years time. 1,177 of the current fleet will be retired, hence creating demand for 2,946 deliveries. 73% of these are forecast to be conversions from the existing passenger fleet, with new-build aircraft totalling 790. The actual total for deliveries may well be slightly higher than this, since some aircraft converted in the early years of the forecast, will likely be retired before 2025, creating additional demand. See the table on page 47 for fleet information.

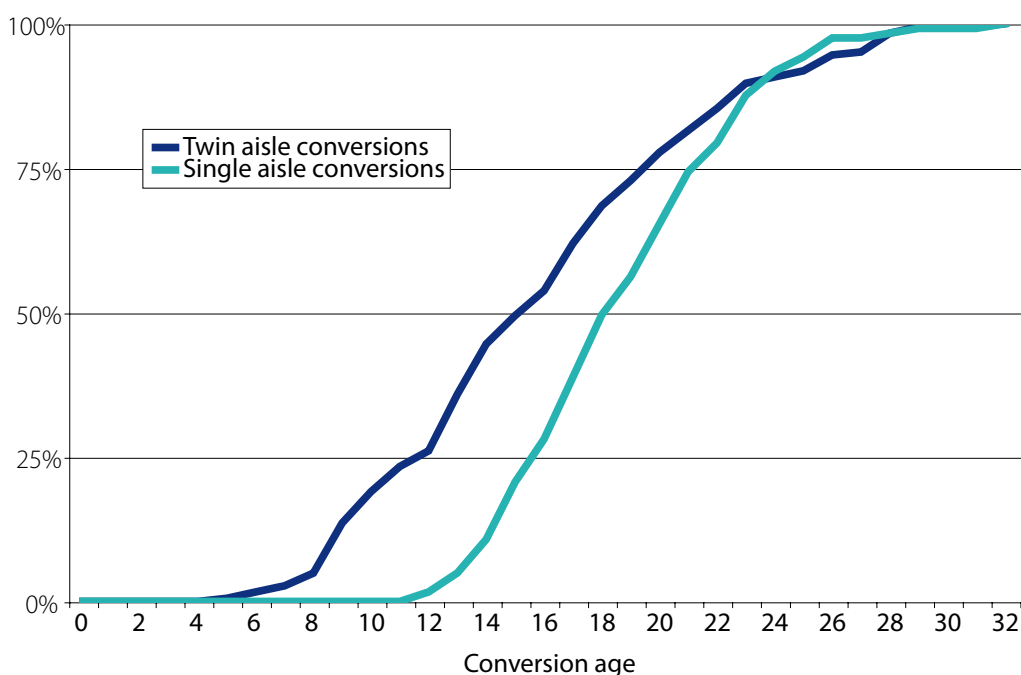
The need for aircraft conversions obviously means there is interaction with the passenger aircraft fleet requirements. A number of factors determine when aircraft are converted,

and which types are converted in the greatest number.

Availability of used aircraft and acquisition price are key, combined with payload-range and cargo density characteristics of the converted aircraft. Environmental performance, especially noise, is becoming increasingly important for the overnight express package operators, in order to allow for expansion of their operations in noise-sensitive countries.

Most conversions take place at around 15-20 years of age, when there is the best combination of declining residual values and useful economic life remaining. This age has been fairly consistent over the last two business cycles, although the ultimate retirement age of freighter aircraft has continued to increase.

### Retirement & conversion ages



## Assumptions and data

The figures behind the forecast. Traffic, deliveries, retirements and more.



Rolls-Royce





## Traffic growth

Market	RPK (m)				2006-2025	RPK (m)
	2005	2006	2007	2008	average	2025
Within North America	955	3.4%	3.5%	3.4%	3.0%	1727
Within Europe	342	4.2%	4.1%	3.8%	3.2%	640
Europe Leisure Airlines	273	4.0%	3.8%	3.8%	3.5%	547
Within Asia Pacific	512	7.9%	7.8%	7.9%	6.5%	1804
Within China	123	10.2%	10.7%	11.7%	8.0%	572
Within Africa & Middle East	75	6.8%	5.9%	5.5%	5.0%	200
Within Latin America	95	6.8%	4.7%	5.1%	5.0%	253
North America - Europe	406	4.4%	4.4%	4.5%	3.8%	860
North America - Asia Pacific	217	7.9%	8.0%	8.2%	6.3%	729
North America - Latin America	161	5.9%	5.7%	5.8%	4.9%	423
Europe - Asia Pacific	267	7.5%	7.0%	7.3%	6.0%	859
Europe - Africa & Middle East	188	6.6%	6.0%	5.9%	4.9%	490
Europe - Latin America	147	5.9%	5.5%	5.7%	4.8%	372
Asia Pacific - Africa & Middle East	82	8.5%	7.9%	7.4%	6.1%	271
CIS markets	121	8.0%	6.2%	5.9%	5.1%	282
Others	18	10.0%	10.0%	10.0%	6.5%	65
World Total	3965	5.7%	5.5%	5.6%	4.8%	10093

Domicile	RPK (m)				2006-2025	RPK (m)
	2005	2006	2007	2008	average	2025
Europe (excl CIS)	1166	4.9%	4.7%	4.7%	4.1%	2601
North America	1308	4.0%	4.1%	4.1%	3.6%	2643
Asia Pacific	945	8.1%	8.0%	8.3%	6.6%	3361
Africa & Middle East	246	7.1%	6.5%	6.3%	5.3%	686
Latin America	197	6.4%	5.3%	5.5%	5.0%	521

*CIS markets refers to traffic carried by airlines domiciled in Russia and other CIS countries.*

*Traffic carried to/from CIS countries by airlines domiciled outside the CIS is reflected in market flow totals.*














## Fleet development

Aircraft deliveries by domicile							Aircraft value (\$bn)	
	North America	Asia Pacific	Europe	M East & Africa	Latin America	CIS	Total	
Very Light Jets	5,660	574	1,147	76	191	n/a	7,649	19
Small Business Jets	2,730	386	795	99	392	n/a	4,403	30
Medium Business Jets	4,545	643	1,324	165	652	n/a	7,330	120
Large Business Jets	2,880	407	839	105	413	n/a	4,645	175
<b>Business Jet total</b>	<b>15,816</b>	<b>2,010</b>	<b>4,106</b>	<b>445</b>	<b>1,649</b>		<b>24,027</b>	<b>344</b>
30-50 seats	656	215	305	104	330	n/a	1,610	26
70-90 seats	2,472	589	851	117	106	n/a	4,135	94
<b>Regional Aircraft total</b>	<b>3,128</b>	<b>804</b>	<b>1,156</b>	<b>221</b>	<b>436</b>		<b>5,745</b>	<b>120</b>
110 seats	570	651	655	157	274	285	2,592	104
130 to 180 seats	3,867	3,562	2,474	576	1,036	858	12,373	753
200 & 250 seats	465	736	454	193	77	92	2,017	303
300 & 350 seats	320	1,711	787	334	50	44	3,246	628
400+ seats	51	660	212	77	10	14	1,024	264
Freighters	236	351	105	75	23	n/a	790	171
<b>Mainline Aircraft total</b>	<b>5,508</b>	<b>7,671</b>	<b>4,687</b>	<b>1,411</b>	<b>1,471</b>	<b>1,293</b>	<b>22,042</b>	<b>2,223</b>
<b>Grand total</b>	<b>24,453</b>	<b>10,486</b>	<b>9,949</b>	<b>2,077</b>	<b>3,556</b>	<b>1,293</b>	<b>51,814</b>	<b>2,687</b>

Fleet development	Fleet 2005	Deliveries 2006-2025	Retirements	Conversions	Fleet 2025
Very Light Jets	0	7,649	150		7,499
Small Business Jets	6,329	4,403	2,565		8,167
Medium Business Jets	5,397	7,330	1,625		11,102
Large Business Jets	1,494	4,645	571		5,569
<b>Business Jet total</b>	<b>13,220</b>	<b>24,027</b>	<b>4,911</b>		<b>32,337</b>
30-50 seats	3,489	1,610	2,924		2,175
70-90 seats	1,164	4,135	441		4,858
<b>Regional Aircraft total</b>	<b>4,653</b>	<b>5,745</b>	<b>3,365</b>		<b>7,033</b>
110 seats	1,897	2,592	1,536		2,953
130 to 180 seats	8,353	12,373	4,615		16,111
200 & 250 seats	1,382	2,017	1,057		2,342
300 & 350 seats	1,082	3,246	577		3,751
400+ seats	641	1,024	476		1,189
Small freighters	511	0	484	683	710
Medium freighters	653	241	411	817	1,300
Large freighters	470	549	282	656	1,393
<b>Mainline Aircraft Total</b>	<b>14,989</b>	<b>22,042</b>	<b>9,438</b>	<b>2,156</b>	<b>29,749</b>



## Aircraft and engine categorisations

		<b>Current types</b>	<b>Future types</b>
<b>30-50 seats</b>		ERJ-135 ERJ-140 ERJ-145 CRJ-200 DHC-8-200/300 ATR-42 An-140	RRJ-60
<b>70-90 seats</b>		Embraer 170/175 Embraer 190 CRJ-700 CRJ-900/705 ATR-72 DHC-8-400 An-148	MHI M-JET AVIC ARJ-21 DHC-8-400X CRJ-900X RRJ-75/95
<b>110 seats</b>		A318 737-600 Embraer 195 Tu-334	BBD Cseries
<b>130-180 seats</b>		A319/320/321 737-700/800/900 Tu-204/214	A320X 737X
<b>200-250 seats</b>		A330-200 767 Il96-300	787-3/8/9 A350-800
<b>300-350 seats</b>		A340 777 A330-300	787-10 A350-900/1000
<b>400+ seats</b>		A380-800 747-400 737F	A380-900 747-8 A320F
<b>Small freighters</b> <b>15t-30t payload</b>			
<b>Medium freighters</b> <b>30t-70t payload</b>		A300F 767F Tu-204C	A330F 787F
<b>Large freighters</b> <b>&gt;70t payload</b>		747-400F An-124	A380F 747-8F 777F



## Business Jet aircraft and engine categorisations

Aircraft class	Forecast category	Indicative MTOW	Types in production or launched
<b>Microjet</b>	Very Light Jets	5,000-10,000lb	Citation Mustang Eclipse 500 Adam 700 Phenom 100/300
<b>Entry</b>	Light	10,000-13,000lb	Citation CJ1+ Citation CJ2+ Raytheon Premier Sino Swearingen SJ30-2
<b>Light</b>	Light	13,000-20,000lb	Cessna CJ3 Citation Encore Hawker 400XP Learjet 40
<b>Light medium</b>	Medium	20,000-33,000lb	Gulfstream 100 Gulfstream 150 Citation XLS Citation Sovereign Hawker 850XP Learjet 45 Learjet 60
<b>Medium</b>	Medium	33,000-50,000lb	Embraer Legacy Embraer Legacy Shuttle Citation X Challenger 300 Falcon 50EX Falco 2000 Gulfstream 200 Hawker 4000
<b>Long range</b>	Large	50,000-80,000lb	Gulfstream 350/450 Bombardier Global 5000 Challenger 605 Challenger 850ELR Falcon 2000DX/EX Falcon 900EX/DX
<b>Very long range</b>	Large	80,000-100,000lb	Gulfstream 500/550 Global Express XRS Falcon 7X
<b>Bizliner</b>	Large	Over 100,000lb	A319CJ A318CJ Boeing BBJ1/BBJ2



## Engine categories

### Over 75,000lb

Rolls-Royce Trent 800  
Rolls-Royce Trent 900\*  
Rolls-Royce Trent XWB  
GE90  
PW4090  
GP7000



### 45,000-75,000lb

Rolls-Royce Trent 500  
Rolls-Royce Trent 700  
Rolls-Royce Trent 1000\*  
Rolls-Royce RB211-524  
CF6-80C2/E1  
PW4056/4168



### 22,000-45,000lb

Rolls-Royce RB211-535  
IAE V2500\*  
CFM56  
PW6000  
PW2000  
PS90



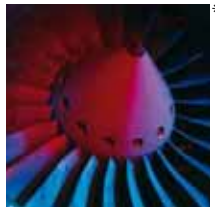
### 10,000-22,000lb

Rolls-Royce BR710\*  
Rolls-Royce BR715  
Rolls-Royce Tay  
CF34-8  
CF34-10



### 6,000-10,000lb

Rolls-Royce AE3007\*  
CF34-3  
HTF7000  
PW308  
CFE738



### 3,000-6,000lb

TFE731  
PW305  
PW500



### Under 3,000lb

Williams-Rolls FJ44\*  
JT15D  
PW600





## Top 50 world airlines by RPKs

### Top 50 world airlines in 2005, by passenger traffic (RPKs)

Rank	Airline	RPK (m)	Alliance membership	Rolls-Royce engines
1	American Airlines	222412	oneworld	Trent 800, RB211, AE3007
2	Delta Air Lines	193006	Skyteam	Trent 800, V2500
3	Air France-KLM Group	189253	Skyteam	Tay, AE3007
4	United Airlines	183262	Star Alliance	V2500
5	Northwest Airlines	121994	Skyteam	Trent 1000
6	Continental Airlines	114659	Skyteam	RB211, AE3007
7	British Airways	111859	oneworld	Trent 800, RB211, V2500, AE3007
8	Lufthansa	108185	Star Alliance	Trent 500, Trent 700, Trent 900, V2500
9	US Airways (inc.America West)	101612	Star Alliance	RB211, V2500, AE3007
10	Japan Airlines Corporation	100345	oneworld	V2500
11	Southwest Airlines	96899		
12	Qantas Airways	86986	oneworld	Trent 900, RB211, V2500
13	Singapore Airlines	82742	Star Alliance	Trent 500, Trent 800, Trent 900
14	Air Canada	71081	Star Alliance	Trent 500, Trent 700
15	Cathay Pacific	65110	oneworld	Trent 500, Trent 700, Trent 800, RB211
16	China Southern Airlines	61923		Trent 700, Trent 900, RB211, V2500, AE3007
17	TUI Group	61000	est.	Trent 700, RB211, Tay
18	Emirates	59299		Trent 500, Trent 700, Trent 800
19	All Nippon	56853	Star Alliance	Trent 1000, V2500
20	Korean Air	52534	Skyteam	
21	Air China	52453	Star Alliance (2007)	Trent 700, RB211, V2500
22	Thai	50041	Star Alliance	Trent 500, Trent 800
23	Iberia Airlines	49060	oneworld	Trent 500, RB211
24	Malaysia Airlines	47304		Trent 800, Trent 900, RB211
25	Thomas Cook Airlines Group	45000	est.	Trent 700, RB211
26	Alitalia	37969	Skyteam	AE3007
27	China Eastern Airlines	36381		Trent 500, Trent 700, RB211
28	JetBlue Airways	32502		V2500
29	Virgin Atlantic Airways	32118		Trent 500, Trent 900
30	China Airlines	32047		
31	Ryanair	31205		
32	Varig	28571	Star Alliance	RB211
33	easyJet	27448		
34	Alaska Airlines	27216		
35	Scandinavian Airlines	26487	Star Alliance	Trent 700, V2500
36	Saudi Arabian Airlines	26000	est.	RB211
37	Air New Zealand	25568	Star Alliance	Trent 1000, RB211, V2500
38	South African Airways	24246	Star Alliance	Trent 500, RB211, V2500
39	EVA Air	23099		V2500
40	Austrian	22894	Star Alliance	Tay
41	Mytravel Airways	21307		Trent 700, RB211, V2500
42	Aeroflot Russian Airlines	20750	Skyteam	
43	Swiss	20469	Star Alliance	AE3007, AE2100
44	THY Turkish Airlines	20452		V2500
45	Asiana	20425	Star Alliance	V2500
46	Air Berlin	19500	est.	V2500, Tay
47	TAM	19377		V2500, Tay
48	LTU International Airways	18206		
49	AirTran Airways	18184		BR715
50	Qatar Airways	18072		Trent 500
	Other airlines	950000		
	<b>World total</b>	<b>3965000</b>		

TUI Group: Thomsonfly, Hapagfly, Hapag Lloyd Express, Corsair, TUIfly Nordic, Jetair, Arkefly.  
 Thomas Cook Group: Condor, Thomas Cook Airlines (UK & Belgium), Sun Express.  
 MyTravel Airways includes MyTravel AS (Denmark).



## Historic deliveries by type

### Aircraft deliveries 1986-2005

Passenger jets	86/90	91/95	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Airbus A300	79	96	7	1	7		1		3				194
Airbus A310	109	69	2	2	1								183
Airbus A320 family	132	421	72	127	168	222	241	257	236	233	233	289	2631
Airbus A330		40	10	14	23	44	43	35	42	31	47	56	385
Airbus A340		66	28	33	24	20	19	22	16	33	28	24	313
BAC One-Eleven	6												6
BAe 146/Avro RJ	106	101	26	21	21	23	14	10		4			326
Boeing 717						12	32	49	20	12	12	13	150
Boeing 737-200	52												52
Boeing 737-300/400/500	735	795	76	132	116	42	2						1898
Boeing 737NG				3	165	278	279	299	222	173	201	211	1831
Boeing 747	178	233	23	35	45	37	10	19	9	9	3	2	603
Boeing 757	227	326	37	36	51	64	45	45	29	14	11	2	887
Boeing 767	214	247	31	34	41	40	43	35	34	23	9	5	756
Boeing 777		13	32	59	74	83	55	61	47	39	36	40	539
Bombardier CRJ Regional Jet		91	53	60	75	82	99	125	139	156	108	47	1035
Bombardier CRJ700								22	46	57	52	69	246
Bombardier CRJ900										10	15	14	39
Embraer 170/175											46	60	106
Embraer 190												12	12
Embraer ERJ-145 family			2	33	60	97	160	161	131	101	102	69	916
Fairchild/Dornier 328JET						15	33	29	8	7	8	3	103
Fokker 100	60	213	4										277
Fokker 70		27	13	6	1								47
Fokker F28	13												13
McDonnell-Douglas DC-10	7												7
McDonnell-Douglas MD-11	3	124	10	7	3								147
McDonnell-Douglas MD-80	555	308	12	16	8	26							925
McDonnell-Douglas MD-90		13	25	26	34	13	5						116
<b>Total</b>	<b>2476</b>	<b>3183</b>	<b>463</b>	<b>645</b>	<b>917</b>	<b>1098</b>	<b>1081</b>	<b>1169</b>	<b>982</b>	<b>902</b>	<b>911</b>	<b>916</b>	<b>14743</b>
<b>Passenger turboprops</b>													
ATR ATR 42	181	99	27	18	8	12	7	4	5	2	5	5	373
ATR ATR 72	18	147	11	19	21	23	15	15	14	6	8	10	307
BAe ATP	29	28		2	3								62
BAe H5748	2												2
BAe Jetstream 41		71	19	5	1								96
Bombardier DHC-7	6												6
Bombardier DHC-8	213	166	32	35	30	25	34	51	33	15	24	23	681
CASA/IPTN CN-235	29	6	1			2	1		2			2	43
Embraer EMB-120	204	91	16	12	14	7		2					346
Fairchild/Dornier 328		50	23	11	12	6	1	2			1		106
Fokker 50	101	88	5	3									197
Fokker F27	13												13
Saab 2000		26	12	8	8	4							58
Saab 340	174	159	26	22	24	2							407
Shorts 330/360	79	2											81
<b>Total</b>	<b>1049</b>	<b>933</b>	<b>172</b>	<b>135</b>	<b>121</b>	<b>81</b>	<b>58</b>	<b>74</b>	<b>54</b>	<b>23</b>	<b>38</b>	<b>40</b>	<b>2778</b>
<b>Freighter aircraft</b>													
Airbus A300	2	13	6	5	6	8	7	11	6	8	12	9	93
BAe 146	19	4											23
McDonnell-Douglas DC-10	10												10
McDonnell-Douglas MD-11		20	5	5	9	8	4	2					53
Boeing 747	19	13	3	4	8	10	14	12	18	10	12	11	134
Boeing 757	24	36	5	10	3	2							80
Boeing 767		5	11	7	6	4	1	5	1			3	43
<b>Total</b>	<b>74</b>	<b>91</b>	<b>30</b>	<b>31</b>	<b>32</b>	<b>32</b>	<b>26</b>	<b>30</b>	<b>25</b>	<b>18</b>	<b>24</b>	<b>23</b>	<b>436</b>
<b>Business Jets</b>													
BAe 125/Hawker 800	135	129	23	32	30	57	52	52	44	46	50	55	705
Bombardier Challenger	105	103	29	38	28	40	39	32	36	22	24	22	518
Bombardier Challenger 300										1	23	44	68
Bombardier Global 5000											1	12	13
Bombardier Global Express					3	27	38	25	16	10	5	18	142
Bombardier Learjet 31	26	78	12	20	21	21	27	18	12	2			237
Bombardier Learjet 35/36	75	12	1										88
Bombardier Learjet 40										2	15	21	38
Bombardier Learjet 45				1	7	34	60	57	46	18	26	25	274
Bombardier Learjet 55	23	2											25
Bombardier Learjet 60		56	20	22	31	28	28	36	21	16	8	16	282
Cessna Citation Bravo				25	37	34	55	48	41	33	23	21	317
Cessna Citation Excel/XLS					14	39	80	83	83	48	53	69	469
Cessna Citation C550	176	69											245
Cessna Citation III (C650)	94	12											106
Cessna Citation Sovereign											12	42	54
Cessna Citation V/Ultra/Encore (C560)	89	245	48	52	44	32	7	36	36	21	27	7	644
Cessna Citation VI/VII (C650)		88	18	7	12	15	11						151
Cessna Citation X (C750)			7	25	31	37	36	33	31	18	14	15	247
Cessna CitationJet/CJ1 (C525)		124	44	64	60	57	62	61	31	21	21	17	562
Cessna CJ2/CJ3							8	39	88	59	33	69	296
Dassault Falcon 10/100	20												20
Dassault Falcon 20/200	14	2											16
Dassault Falcon 2000		15	20	15	14	31	28	36	35	27	40	28	289
Dassault Falcon 50	51	39	2	9	13	11	18	13	10	8	5	5	184
Dassault Falcon 900	86	61	13	21	20	24	29	27	22	11	18	17	349
Gulfstream III	20												20
Gulfstream IV/G300/G350/G400/G450	137	123	23	19	26	31	45	37	31	27	19	26	544
Gulfstream V/G500/G550				17	23	33	32	32	35	27	29	34	262
IAI Astra/G100	40	25	10	6	13	8	11	8	8	6	5	4	144
IAI Galaxy/Gulfstream G200						2	9	28	15	22	21	21	118
IAI Westwind	12												12
Raytheon Premier I								18	30	28	36	26	138
Raytheon Beechjet 400/Mu-300	66	90	30	40	45	43	45	25	18	22	29	51	504
<b>Total</b>	<b>1169</b>	<b>1273</b>	<b>300</b>	<b>413</b>	<b>472</b>	<b>604</b>	<b>720</b>	<b>744</b>	<b>689</b>	<b>495</b>	<b>537</b>	<b>665</b>	<b>8081</b>

Data excludes deliveries to military operators, and those for special usage, such as experimental platforms. Passenger jets include Business Jet versions



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Data sources:

Fleet data: Airclaims CASE database

Schedules data: BACK Aviation Link/OAG

Traffic data: IATA, ICAO, AEA, ATA, AAPA, CAA, ALTA

Rolls-Royce analysis



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