The trans-Atlantic market has been fragmented over the past 10 to 15 years. The 767 has become popular while the 747 still declines. Fragmentation is now slowing down and 4% annual traffic growth means aircraft size will have to increase again. Prospects for the A330 and larger aircraft are good.

Trans-Atlantic ready again for large aircraft

Different sectors of the aircraft market are constantly being watched. The trans-Atlantic is no exception. In the past 10 years the 767 became the most frequently used aircraft across the Atlantic. Yet traffic continues to grow, so what will airlines substitute the 767 with in the years to come?

Thirty years ago the arrival of the first widebodies changed the issue of trans-Atlantic fleet planning from a simple choice of the 707 or the DC-8 to a more complex issue. The development of Etops added to this complexity and to the choice of aircraft types. As a result the 767 has been a winner.

Some of the simplicity of trans-Atlantic fleet planning has been re-introduced by the range performance of widebodies coming on to the market in the past 10 years. Performance issues are critical factors in the trans-Pacific market.

Where aircraft performance is less of a consideration or a problem, fleet planning centres on operating costs, capacity requirements, commonality benefits and the seat and freight capacity of aircraft on offer.

To predict which aircraft might be most in demand across the Atlantic over the next 10 to 15 years it is first important to analyse the capacity offered and to assess what traffic is carried by the most prominent carriers in the market.

Trans-Atlantic capacity

Until the early 1980s the 747 was the most numerous aircraft across the Atlantic. Deregulation and liberalisation of trans-Atlantic bilaterals changed all that.

In the 1970s all the US majors operating trans-Atlantic routes utilised the 747 as their long-haul flagship. This included American, Delta and Continental. These airlines, and many others, found the 747 too big to fill at a reasonable load factor on many routes. The same is still true even 20 years later. Virtually all major airlines flying trans-Atlantic have introduced smaller types on at least some of their routes.

After years of operating the 747, United and Continental now operate all their routes with smaller aircraft. Pan Am, the Atlantic warrior, always found the 747 too large in most cases. Others have operated types such as the DC-10, MD-11, A300 and L-1011 for years because their size was appropriate.

The 747's undesirability is caused by two factors. The first is that it always was simply too big for most airlines. Despite the trans-Atlantic being a tightly regulated market at one time, a large number of non-European and non-US airlines fly across the Atlantic. Airlines from the Asia Pacific, Africa and Middle East have flown fifth freedom rights across the Atlantic for many years. Examples are Kuwait Airways, El Al, Ghana Airways, Air New Zealand, Royal Jordanian, Air India and Pakistan International.

All the operators east of Europe have operated routes via London or Paris mainly to New York, Washington and Canada. This concentration of capacity has meant that the competition and yields on these routes called for smaller types.

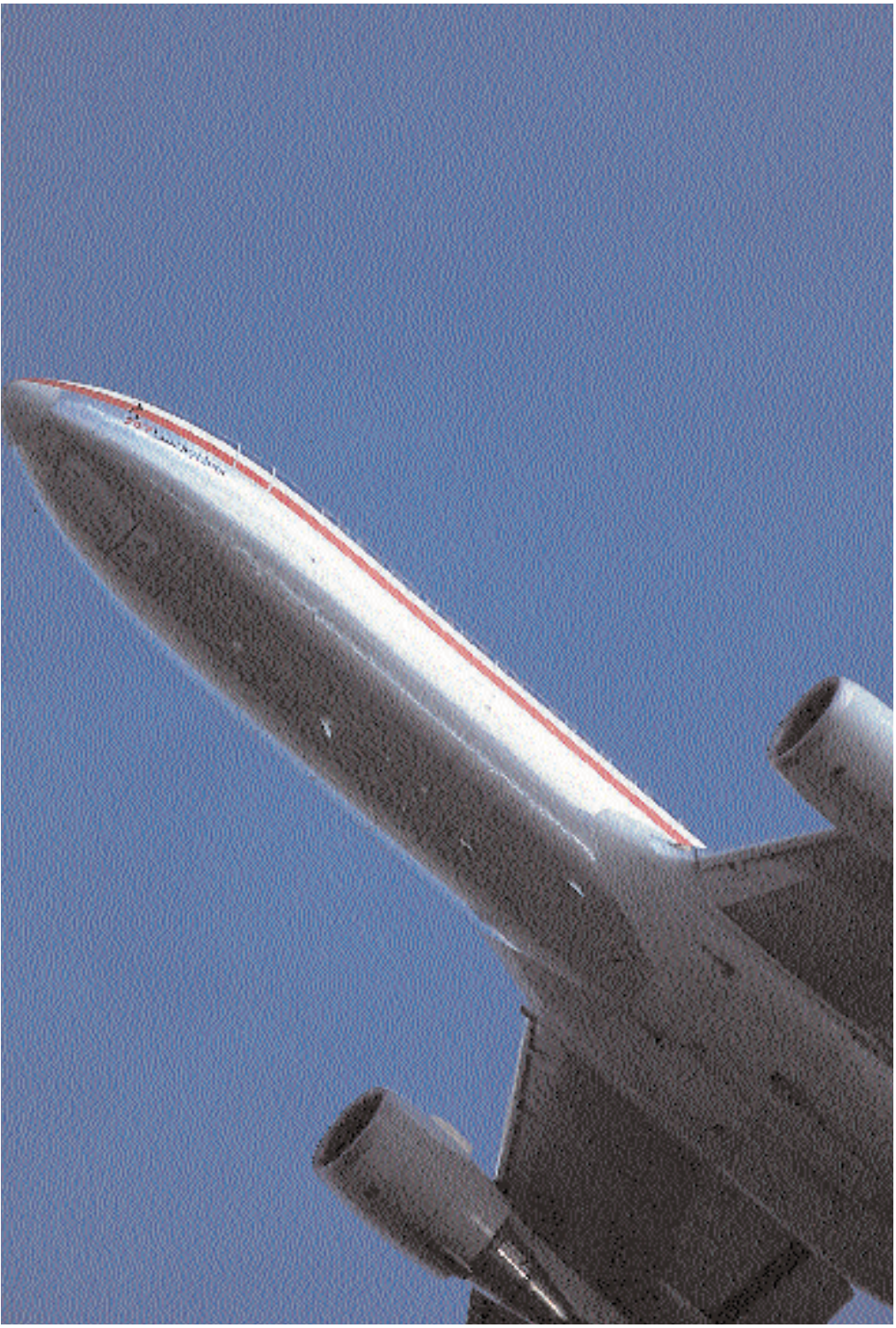
The second factor is an even greater spread of traffic due to the opening of an increasing number of international gateways and US-European city pairs following liberalisation of the market.

Since the US monopoly of trans-Atlantic traffic was given up by the US major gateways long-haul networks have developed from a number of major cities. These include Pittsburgh, Philadelphia, Detroit, Atlanta, Cincinnati, San Diego, Phoenix, Seattle and Denver.

Although liberalisation of long-haul markets has stimulated traffic, the greater number of routes has nevertheless diluted passenger numbers per sector. This has been further magnified by an increasing number of carriers, attracted by high yields and traffic volumes, pushing governments for route rights.

Fragmentation of the trans-Atlantic market has led to a downsizing of aircraft capacity over the past 15 years. This is not surprising, but the virtual halving in size of the most popular aircraft from the 747 to the 767 on many routes may have exceeded the expectations of many.

The 767 is not the only type operating across the Atlantic. Every aircraft with the range capability flies on some routes.



With fragmentation of the trans-Atlantic market nearly complete, traffic growth will require average aircraft size to increase. this will mean 767s being replaced by the A330, A340 and 777.

So although the 767 is the most popular type on this long-haul network it should not be regarded as standard.

Despite the positive publicity Boeing has received about the 767, there is a great deal of variation in aircraft types and sizes. Analysis of current capacity and possible traffic growth will give an indication of the aircraft types that will be required in the future.

Airline capacity

An analysis of the aircraft types that the 30 busiest airlines operate across the Atlantic, and how many flights, seats and passengers each type carries, will provide insight into future fleet requirements.

The table *(see page 30)* of US-Europe operations for the year ended August 1998 shows that in terms of available seat-miles (ASMs) British Airways is the busiest airline. BA is followed by Delta, American and then United. The next busiest European airline does not feature until position five in the list; Lufthansa. Virgin, Continental, Air France, Northwest and KLM, also have substantial ASM capacity.

The table shows the 30 most active airlines operating between the US and Europe in terms of ASM capacity, number of seats and passengers and aircraft types used. Between them these airlines operated nearly 210 billion ASMs, carried nearly 38 million passengers with 49 million seats available. Average load factor was therefore a high 76.5%. Average sector length over the whole of these airlines' networks was 4,233nm. The average aircraft size was 269 seats.

Taking typical three-class configurations into consideration, this macro-analysis shows the 'average' aircraft size was equivalent to something as large as a DC-10 but nearer to an A330-300, A340 or MD-11 in most operators' cases.

The data also reveals some interesting facts about trans-Atlantic operations. British Airways had the highest ASM capacity but operated virtually the same number of flights as Delta. This is simply down to the fact that BA operates the 747, whereas the MD-11 is Delta's largest aircraft. Out of the most dominant carriers, all US airlines, with the exception of Northwest, did not operate any 747s in the period. In contrast, all the top European carriers operated the 747. The largest European carrier not to operate the 747 is SAS, which flies the 767. Aer Lingus has since downsized its trans-Atlantic fleet from 747s to A330s.

The average aircraft size tends to be larger for European airlines than it does for US airlines. With the exception of Northwest, all the largest US carriers had an average aircraft size less than 300 seats. All major European airlines had an average aircraft size larger than 300 seats, with the exception of Swissair which has a fleet of 747 Combis.

Despite being the most dominant airlines, major US carriers have average aircraft sizes between about 190 and 265 seats. This is explained by the fact that many of these airlines operate 777s, MD-11s, DC-10s and 767s. Many of these operators are late arrivals to the trans-Atlantic market, one explanation for their small aircraft size.

Aircraft capacity

A further analysis shows how trans-Atlantic traffic is divided between aircraft types. The table *(see page 31)* shows the share of ASM capacity and flight cycles for each major aircraft type for the airlines listed in the first table.

The breakdown by aircraft shows that apart from the A300/310 and 757, which are shorter range aircraft, all aircraft types have average sector lengths

TOP 30 AIRLINES OPERATING US-EUROPEAN ROUTES YEAR ENDED AUGUST 1998 LISTED IN ORDER OF DESCENDING ASM CAPACITY

Airline	Flight cycles	Passengers carried	Seats capacity	ASM capacity	Aircraft types operated
British Airways	24,158	5,938,437	8,40,104	33,244,521,346	747, 777, DC-10 767, 757
Delta Airlines	24,194	4,185,762	5,407,856	23,302,419,368	MD-11, L-1011 767
American Airlines	23,241	3,519,004	4,498,044	18,585,015,913	MD-11, A300-600, 767
United Airlines	16,359	3,327,310	4,298,677	18,075,591,540	777, 767
Lufthansa	11,711	2,877,319	3,589,846	16,579,099,605	747, A340 A300-600, A310
Virgin Atlantic	8,410	2,498,551	3,178,805	13,239,013,384	747, A340
Continental	11,968	2,219,308	3,029,762	12,862,730,780	DC-10, 757
Air France	7,239	1,820,322	2,288,442	10,445,665,288	747, A340 767, A310
KLM	7,382	2,068,676	2,412,473	10,169,657,342	747, MD-11 767
Northwest	7,351	1,825,064	2,292,108	9,385,584,624	747, DC-10
Swissair	5,350	1,281,618	1,494,332	6,397,438,560	747, MD-11 A310
US Airways	5,724	916,966	1,197,982	4,860,187,080	767
Alitalia	3,597	750,055	951,952	4,676,310,504	747, MD-11 767
TWA	6,019	910,644	1,162,951	4,435,592,387	747, 767
SAS	4,972	610,442	820,967	3,504,526,974	767
Aer Lingus	3,204	746,012	1,024,246	3,318,712,158	747, MD-11, DC-10, A330, 767
Sabena	2,818	549,573	798,950	3,3126,905,478	747, A340 A330, MD-11
Iberia	1,955	524,455	697,067	2,850,978,856	747, A340 DC-10
Aeroflot	1,874	229,991	433,887	2,182,929,238	777, 767 A310, IL96
Martinair	1,030	245,134	358,787	2,004,311,110	MD-11, 767
LOT	1,782	299,654	426,896	1,967,175,634	767
Air New Zealand	821	267,705	335,787	1,925,044,040	747
LTU	1,034	293,138	362,582	1,729,730,364	MD-11, 767
Air India	1,030	282,024	434,299	1,589,742,861	747
Olympic Airways	718	203,318	297,598	1,487,638,008	747
Finnair	894	226,399	308,990	1,392,506,432	MD-11
Icelandair	2,615	378,403	494,175	1,369,772,775	757
SIA	864	220,968	336,939	1,261,554,102	747
Tower Air	580	199,756	276,494	1,170,252,000	747
Austrian	1,870	284,395	317,485	1,107,968,049	A330, A310
Total	**182,927**	**37,631,812**	**49,156,088**	**208,078,918,543**	

Source: BACK Information Services

in the 4,100nm to 4,300nm range. This closeness of sector lengths shows that airlines do not select aircraft type for routes according to range performance in this market. This implies that airlines are instead selecting aircraft on the basis of seat capacity and other factors related to operating cost performance.

Despite the perception of the 767's dominant position, the 747 still provides the greatest share of ASM capacity. The 747 is, however, second to the 767 in terms of flights operated per year. This fact illustrates the desire by airlines to increase frequency and dilute traffic over a larger number of different routes.

The 767 has the largest number of flights than any other type, which demonstrates the need for airlines to reduce aircraft size. Perhaps not surprisingly the MD-11 and DC-10 provide the third largest slice of capacity and number of flights.

The 777 and A340/330 are close together. Their shares will both increase over the next few years as they replace MD-11s and DC-10s. The A330/340 are strictly European airline equipment whereas the 777 has been ordered by US and European carriers.

The 777 has also been selected by some airlines (for example, United and Continental) to replace 747s, again downsizing aircraft capacity. The 777 has also been selected by stalwarts of the MD-11 and DC-10, such as BA, American and Delta.

Considering the 777's order position it should become a more important type on trans-Atlantic operations. The MD-11 and DC-10 will decline in importance.

Airline fleets

While the 777 has won orders from a majority of airlines and the larger share of MD-11/DC-10 replacement orders, the 250-seat A330-200 is positioned to replace A310s, A300s, 767s, DC-10s and L-1011s. The A330-200 has proved successful with some European airlines in this objective.

Facing the A330-200 is the 767-400 which offers similar capacity and range. So far the 767-400 has only been ordered by Delta and Continental, but it may also be selected by American. American, however, holds a large number of options for 777s and is reportedly waiting for a clearer picture of the economy and its market position before deciding between the Boeings, or a mix of both.

Looking ahead, the mix of aircraft types and capacity offered by them will change. There will be a reduction of MD-11, DC-10, A300, A310 and L-1011 activity. This has already occurred since August 1998, the time to which data in the tables refers.

Some of the replacements for these have already been described. Delta is the major L-1011 carrier and has ordered the 767-400 as its replacement. Sabena, Swissair and Austrian will replace their A310s with A330-200s. Aer Lingus has since replaced its 747s with A330s, as well as off-loading MD-11s and 767s once used.

Air France has 777s on order, as does Delta and American. Continental has already taken delivery of 777s and will retire DC-10s over the next five years. US Airways will start adding A330-300s and

may replace its 767s with A330-200s.

Apart from A330-200s, Swissair has also ordered the A340-500 and -600 to replace the 747 and MD-11.

Many of these aircraft have yet to be delivered.

There are also replacement order decisions still to be made. One in particular is Iberia, which will decide between the A340 and 777 to replace 747s and DC-10s. SAS has reportedly already decided on the A330 and A340 to replace its 767-300s.

The orders placed by airlines so far indicate that many still want to downsize from the 747. Other carriers which were either the first to downsize in the 1980s to aircraft such as the DC-10 and 767 or never operated the 747 in the first place have orders for aircraft to provide them with increased aircraft size following traffic growth.

Overall, these first indications are that after a few years average aircraft size will meet somewhere in the middle of a downsizing from the 747 and an increase from the A310/767 and DC-10.

AIRCRAFT TYPES OPERATING US-EUROPEAN ROUTES YEAR ENDED AUGUST 1998 LISTED IN ORDER OF DESCENDING ASM CAPACITY

Aircraft type	Flight cycles	ASM capacity	Share of ASM capacity %	Average sector length nm
747-all types	47,811	77,038,496,471	35.5	4,282
767-all types	65,232	56,976,911,532	26.2	4,134
MD-11/DC-10	31,603	37,567,540,735	17.3	4,210
777	14,441	17,599,453,954	8.1	4,151
A330/340	14,019	16,337,121,280	7.5	4,018
A300/310	7,413	4,893,183,773	2.2	3,677
757	5,953	3,449,736,195	1.6	3,110
L-1011-all types	3,345	3,467,174,950	1.6	4,220

Source: BACK Information services

Traffic growth

The premise of fleet planning is that traffic growth fuels a need for more and/or larger aircraft. Applying predicted rates of growth to traffic levels can lead to some broad assumptions about traffic carried and capacity required.

Applying other influences, such as load factor, an impression of the average aircraft size can be given. Traffic and capacity, however, also depends on airline corporate factors.

The use of lower fares to stimulate traffic, e-commerce to auction empty seats and increase load factor, the traffic concentrating powers of code-sharing and airline alliances, the opening of further routes and the emergence of increased competition are all difficult to predict and to model their effects.

The effect of new routes alone is difficult to assess, since new city pairs will dilute traffic flowing through other gateways, requiring smaller aircraft, but will also stimulate new traffic, moderating the dilution effect.

Ignoring the influence of airline corporate activity, the effect of traffic growth on current passenger numbers, ASMs and aircraft size, produces some revealing results.

Airbus expects trans-Atlantic traffic growth to average 4.6% per year over the next 20 years. Applying this to existing traffic and capacity the following increases in traffic and capacity will result. This first assumes that load factor and flight frequencies will remain constant.

After five years passenger numbers will have increased by 10 million to 47.1 million. Seats and ASMs will have had to increase to 61.5 million and 260 billion, respectively.

If flight frequencies remain constant then average aircraft size will have to increase from about 270 seats to about 340. Flight frequencies will not be able to increase much further, considering the problems with airspace and airport congestion, especially in Europe.

If load factor increases from 76.5% to 80% then this will ease some of the pressure for larger aircraft. Nevertheless, the average aircraft size across the network would still have to increase to 320 seats.

After 10 years the requirement for large aircraft will be even more compelling. The number of passengers would have grown to about 59 million. At load factors of 76.% and 80% the average aircraft sizes would need to be 420 and 400 seats.

This simple analysis shows how in five to 10 years the average aircraft size will have had to increase to something beyond the standard three-class layout of a 777-200 or A340-500 – and up to a 777-300, A340-600 or 747-400.

Boeing forecasts trans-Atlantic traffic growth to average 3.6% per year. This same increase in aircraft sizes would be required after 13 years rather than 10.

A 4.65% growth rate over 10 years will result in a 56% increase in traffic over the period, hence some sort of adjustment to cope with this. The past 10 years have seen compound growth of a similar scale, although the market has been fragmented in that time, leading to smaller aircraft sizes. What will happen in the next 10 years can not be predicted with great accuracy. What is certain, however, is that fragmentation across the Atlantic is probably approaching its limit and that aircraft size will now have to keep more in line with traffic growth.

For airlines with average aircraft size larger than 300 seats, an annual traffic increase of 4.6% will raise average size to more than 400. This is the case with the majority of dominant European airlines operating across the Atlantic.

Future aircraft size

The effect of growth on each portion of traffic currently catered for by each aircraft type can be examined. Thus, a 4.6% annual growth will mean that without any other influences, the block of traffic carried by 747s will require an average aircraft size of close to 500 seats after 10 years.

This assumes pure traffic growth without change in load factor or flight frequency. Taking into account congestion and that 747 load factors are already approaching 80%, the A3XX or its equivalent could be in real demand. Out of the top 30 airlines, the 747 operates nearly 50,000 flights per year, or an average of nearly 70 return flights per day. This gives an indication of the possible demand for very large aircraft across the Atlantic.

In turn, the portion of traffic carried by the 767 would have to be carried by aircraft larger than 300 seats.

While A330s, A340-300/-500s and 777-200s are now replacing MD-11s and DC-10s, traffic growth would result in the need for aircraft of about 400 seats

The A340 has good prospects of winning large sales in the trans-Atlantic market because larger aircraft will be needed. It is also aided by the A330-200, which provides airlines with a good stepping stone between it and the 767.

after another 10 to 13 years to replace them. This would stimulate a need for the A340-600, 777-300 and 747-400.

Although these blocks of traffic currently carried by the 747, 767, 777, MD-11, DC-10, A330 and A340 would not be replaced one for one as this simple analysis suggests, there would nevertheless be the need for an increase in average aircraft size.

Fleet choices

Although it is impossible to predict how the trans-Atlantic market will develop, it is certain that larger aircraft will be required by airlines.

The actual selection of types by airlines will have already been influenced by current orders and recent deliveries. The commonality factor is now so strong that, for example, it is hard to see why a 777-200 customer would later select the A340-600 instead of the 777-300.

There are some important considerations to be made, however. These will be based on operating performance, revenue earning capacity, operating costs and, as already mentioned, commonality considerations.

Operating costs for this market will be most influenced by fuel, maintenance and financing. These cost categories are similar in magnitude for similar sized aircraft. Fuel and maintenance can offer less scope for two competing aircraft to have large differences in operating in cost performance than was the case 20 years ago. The only exception to this is the higher total maintenance and inventory cost of powerplants for four-engined and twin-engined aircraft.

Besides purchase discounts and attractive financing techniques, such as Exim-backed or European Export Credit aid for Boeings and Airbuses, the critical issues in aircraft selection will be their payload-range performance and revenue-generating capability. Once airlines are satisfied with these aspects of an aircraft's performance the decision could then rest largely on commonality issues. This is especially since more airlines are appearing to become sole Airbus or sole Boeing operators.

Operating routes from London to New York will not be a problem for any of the new widebodies on the market, even in mid-summer when ambient temperatures are high and could limit take-off performance.

The performance on longer routes will reveal a difference between aircraft types. The important routes are those that depart from London Heathrow, Frankfurt, Munich, Rome Fiumicino and Madrid. Many of these airports experience high ambient temperatures in midsummer and may pose performance and payload limitations for aircraft operating to cities in the central and western US.

Considering typical flight schedules, flights will be leaving Europe between late morning and early afternoon for the US, the hottest time of day. Return flights to Europe usually depart early to late evening from the US. Westbound flights leaving Europe therefore present the real performance test for aircraft types.

The permitted take-off weight and payload performance of the 767-300ER, 767-400ER, 777-200, 777-300 and 747-400 have been examined on routes between the five major European cities and Atlanta, Dallas-Fort Worth, Chicago O'Hare, Denver and Los Angeles.

The Airbus types studied on the same routes are the A330-200, A330-300, A340-300, A340-500 and A340-600.

These aircraft have been examined on the 25 possible city pairs to reveal any possible payload limitations that arise from operating from the European airports on a westbound departure during mid-afternoon in mid August. Aircraft that have no payload limitations on these routes will therefore be able to operate most other trans-Atlantic sectors with no payload restrictions at all times of the year. This feature will make them flexible and suitable to all potential operators' requirements.

The aircraft were analysed using the assumed conditions of 85% August winds, international operating rules, 210lbs per passenger, 100% passenger load factor and utilisation of all available freight payload. The analysis has been conducted to reveal passenger payload and freight payload restrictions.

Not surprisingly routes out of Rome and Madrid are more limiting than other European airports. This is because they have the longest sector lengths and the highest ambient temperatures at departure. Routes to Los Angeles also pose the most restrictions because of that city's distance from Europe.

The 25 routes analysed have tracked distances between 3,526nm and 5,671nm. Taking into consideration 85% winds during mid-August this translates to between 3,974nm and 6,169nm equivalent still air distances. This compares with the range capabilities of aircraft with full passenger and freight payloads *(see table, 33)*.

The smallest aircraft analysed, the 218-seat 767-300ER, only faces direct competition in seat capacity terms from the A300-600. The 767-300ER is a strong performer, with no passenger seat limits. It does, however, experience freight restrictions on most routes. This is less than half the available payload on the majority of routes.

The larger 245-seat 767-400ER has a range of 5,625nm at sea level, about 600nm less than the -300ER. This will naturally reduce payload performance on the longest routes. The 767-400ER is still a good performer, with no passenger number limitations on westbound trips except for Rome-Los Angeles and Madrid-Los Angeles. Like the -300ER, the -400ER experiences some loss of freight payload, which on about half the routes is more than 50%.

SUMMARY OF AIRCRAFT CONFIGURATION FOR TRANS-ATLANTIC OPERATING PERFORMANCE

Aircraft type	Engine type	MTOW lbs	MZFW lbs	OEW lbs	Seat capacity	Range with full passenger payload nm	Maximum cargo payload (lbs)	Range with full payload nm
A330-200	Trent 772	507,000	370,400	265,800	253	6,500	51,535	4,200
A330-300	Trent 772	507,000	381,400	274,300	295	5,600	45,150	3,700
A340-300	CFM56-5C4	606,300	392,400	286,300	295	7,200	44,371	5,700
A340-500	Trent 553	804,700	489,400	375,500	313	8,500	48,350	7,000
A340-600	Trent 556	804,700	529,100	390,000	380	7,500	59,526	5,600
767-300ER	CF6-80C2B7F	412,000	295,000	199,700	218	6,200	49,520	4,000
767-400ER	CF6-80C2B8F	450,000	330,000	227,300	245	6,000	51,250	3,700
777-200ER	GE90-94B	656,000	430,000	316,800	305	7,400	49,150	5,400
777-300	PW4098	660,000	524,000	349,600	368	6,000	68,120	3,700
747-400	CF6-80C2B5F	875,000	555,000	398,780	416	7,200	68,860	6,100

The 253-seat A330-200 has no passenger limits on any of the routes. Freight payload does get limited, but to a smaller degree on fewer routes than the 767-400ER.

Out of all Airbus types examined, the A330-300, the shortest-range aircraft, has the most payload limitations. This only applies to available freight payload, since the aircraft only experiences a passenger limitation of four from Munich to Los Angeles and a severe seat limit of 157 from Rome to Los Angeles.

The 295-seat A330-300's standard range at sea level take-off is 5,600nm. Not surprisingly it suffers limited freight payload between almost zero and 30,000lbs on 20 of the 25 routes.

Not surprisingly the ultra-long range A340-300 makes up for the A330-300's loss of freight payload. The A340-300 only suffers a freight payload on Rome-Los Angeles and this is less than a 10,000lbs reduction.

The 777-200 is a strong performer. Not only does it have no passenger number limitations on all westbound routes, it is also able to carry a full load of freight on every sector, except for Rome-Los Angeles where it loses about 1,000lbs of performance. The 777-200ER is therefore a stronger performer than the A340-300, because the 777-200ER has larger passenger and freight payloads.

The A340-500 makes up for the -300's shortfall with full passenger and freight payload capability on all routes. With Airbus' standard three-class layout, the A340-500 also has a slightly higher seat capacity than the 777-200, giving the A340 a revenue capacity advantage.

The 777-300 only suffers passenger reductions of 41 and 44 seats on Rome- and Madrid-Los Angeles. The aircraft does, however, suffer freight payload restrictions of more than 50% on half the routes. This highlights the 777-300's need for more payload-range performance.

The A340-600 operates virtually restriction-free, except for Rome-Los Angeles where it has to accommodate about a 11,000lbs freight payload reduction.

Finally, the 416-seat 747-400 demonstrates its capability as a high-capacity, long-range performer with no limits on passenger numbers or freight payloads on any of the westbound routes.

While westbound routes have been examined, eastbound routes have been ignored. The tailwinds and evening departures should make these routes free of performance restrictions. Exceptions to this are departures from Denver, which has an elevation of 5,431 feet. Midday departures therefore should be avoided and take-off weight limitations will be minimised.

Summary

The trans-Atlantic market is in the final stages of fragmentation. Congestion will mean that increases in flight frequency on existing networks will be minimised. New routes could still open, but this will stimulate traffic, limiting dilution of traffic across city pairs.

The trend of downsizing will therefore not continue for much longer and aircraft size will have to increase thereafter with traffic growth. Although airline corporate activity makes it more difficult to predict fleet changes at a micro level, a macro-analysis shows that traffic growth over the next 10 to 15 years must indicate an increase in aircraft size.

This means that aircraft at least the size of the A330-300 will be required to provide a majority of capacity. Whether the 747-400 or A3XX will be the largest needed in 10 years depends on whether Airbus or Boeing is correct in its traffic growth prediction.

Naturally each manufacturer wants to argue the case for its product, and its predicted traffic growth rate supports this. This debate will doubtless continue. If traffic growth is slower than Airbus predicts then Boeing will have more time for traffic levels to reach a stage where it needs to launch a competitor to the A3XX. This later requirement is something Boeing has been advocating for the past two years.

Besides the very large aircraft issue, all modern widebodies have good opportunities for orders over the next 10 years. The A330-300 is probably in the weakest position because of its marginal performance on the most challenging routes. Most airlines which potentially are A330-300 customers will have already ordered the A330-200 and A340. Airbus is therefore unlikely to lose any orders because the A330-300's performance shortfalls, since the longer-range A340 is also available.

Traffic growth bodes well for the 777-200. With the increase expected, the 767-300 will have to be replaced with the 777-200 or equivalent-sized aircraft. The 767 is operated by most US majors and some European carriers. Most of these airlines have already ordered the 777 and have options outstanding for more. The replacement of the dominant 767 with the 777 already appears to be a foregone conclusion.

Airbus, on the other hand, may hold a trump card with the A340-500. Not only is it capable of trans-Atlantic operations but its trans-Pacific range performance may make it the more desired aircraft. This can only be challenged by a credible 777-200X, the specifications of which have still not been revealed.

Airbus' position is further enhanced here with the A330-200, which could persuade airlines to retire their 767s and become Airbus customers. AC