

The market potential for replacing narrowbody freighters is large. It is still unclear, however, how the major operators will develop their fleets. This market sector will now become an increasingly important element of the freight market with several conversion programmes under development.

How large will the market be for narrowbody freighters?

The narrowbodies with passenger-to-freighter conversion programmes in development are the 737-300/-400 and 757-200. There are at least two non-original equipment manufacturer (OEM) conversion programmes in development for each type. Other programmes are likely to follow, raising the issue of how large the market will be for these types and all other new and converted narrowbody freighters.

This will be determined by the number of narrowbody freighters replaced by other narrowbody or widebody freighters, and how many more aircraft the global fleet has to increase by to accommodate traffic growth.

Total demand

The global freighter fleet is often divided into four categories, small and medium narrowbodies; and medium and large widebodies. This analysis concerns the two narrowbody categories. The first includes the DC-9, 737 and 727, with payloads of up to 30 tons. The second category includes the 757, 707 and DC-8, with payloads of 30-60 tons.

It is almost certain that no more 727s, 737-200s and DC-9s will be converted to freighters. This will leave the market to the 737-300/-400 and 757-200 for at least the next five years, since the MD-80's narrow fuselage cross-section makes it unlikely that a conversion programme will be developed. The A320 and A321, however, are likely to have passenger-to-freighter conversion programmes developed when their values fall to a sufficiently low level. This may not happen for at least another five years.

The current fleet of small and medium

narrowbodies totals about 840 aircraft (see table, page 45). The fleet of small narrowbodies is about 580 units, including about 380 727s. Only 25 of these aircraft are the 737-300, which is relatively young. Virtually all the 550 remaining aircraft in this group will retire over the next 20 years.

There are 280 medium narrowbodies, of which about 100 are 757s and the remainder 707s and DC-8s (see table, page 45). All 180 707s and DC-8s now in operation will be retired over the next 20 years. About 50 of the current 757s may also be retired by this time.

Although not directly considered here, the fleet of medium widebodies (the 767/A310/A300) totals about 270 aircraft.

The probable level of retirement of alone indicates the potential market for replacing old narrowbodies for the next 20 years is in the region of 760 units. Some narrowbodies, such as the 707 and DC-8 are likely to be replaced with medium widebodies, such as the A310, A300 and 767.

The second level of demand will come from capacity required to satisfy traffic growth over the same period, but this depends on how airlines will develop. Airlines can acquire the same number of large aircraft, or more aircraft of the same size, or a combination of the two.

Fleet forecasts

Fleet forecasts have been made by Airbus Industrie, Boeing and consultants Mergeglobal. Predictions of the future freighter fleet vary (see table, page 45).

Mergeglobal makes a 10-year forecast and predicts the small narrowbody fleet to be about 685 units, a small net increase over the current fleet. Like

Boeing, Mergeglobal expects the medium narrowbody fleet to maintain its size, and reach 350 aircraft in 2013, and the medium widebody fleet to approximately double in 10 years to about 540 aircraft.

Airbus estimates the number of small narrowbody freighters, which include jets up to the size of the 727-200, to be about 900 in 2020, a net increase of 340 aircraft (see table, page 45). It expects the fleet of medium narrowbody aircraft to have declined to about 50 units, since all 707s and DC-8s will be replaced by medium widebodies. Moreover, it predicts some of the converted 757-200s currently in the fleet will also retire in this period. "We think the narrowbody freighters are not well suited to the feeder role and interlining in small package operations, and this will be taken over by widebodies," explains Didier Lenormand, director of product marketing at Airbus Industrie. "There is only one narrowbody candidate that can replace the 707 and DC-8, and that is the 757. There are currently no 757 conversion backlogs. We expect the medium widebody freighter category to experience the largest growth over the next 20 years."

This contrasts with Boeing's forecast. "In 2021 we expect the small narrowbody fleet to have grown to about 895, and the medium narrowbody fleet to be about 340," explains Tom Hoang, regional director of cargo marketing at Boeing. Like Airbus, Boeing expects the medium widebody category to have the highest rate of expansion over the next 20 years, but does not expect such a large decline in medium narrowbodies. Boeing expects the medium widebody fleet to increase from its current level of 300 to about 1,050 units in 2021. It expects medium narrowbodies to number about 340.

Traffic growth

Consistent with forecasts made for the past 10 years, the freight market is expected to grow at a higher rate than passenger traffic. Freight volumes have been depressed in the past three years. Traffic levels reached a peak in 2000. "Global traffic volumes actually contracted in 2001 by about 6%," says Hoang. "This was the largest drop in 30 years. The major traffic lanes that suffered a reduction were domestic North America (9.8%), Europe-North America (10.9%) and Asia-North America (15.9%). These were all due to a slowdown in the global economy, but were precipitated by the events of September 11th 2001. The domestic Chinese market grew by 17.4%, but this was from a low base so made a small contribution to overall global traffic.

"Now there are signs of a traffic recovery, and the major lanes that contracted in 2001 grew by 7.1% in 2002. January 2003 traffic shows growth was 8.9% compared to a year before," says Hoang. "The growth in 2002 did not make up for the contractions in 2001. Traffic volumes are not yet back at 2000 levels, but growth rates are. The long-term expectation is for traffic to average a growth rate of 6.4% per year. The intra-Asia market is forecast to have an annual growth rate of 8.4%, the Asia-North American market to have a growth rate of 7.5% and the Asia-Europe market a rate of 7.0%. These are all higher than the forecast global average."

Airbus studies 123 directional traffic flows, and forecasts a lower aggregate growth rate of 5.5% per year. "The belly freight capacity of passenger aircraft has to be considered against future traffic growth," explains Lenormand. "The deliveries of more passenger aircraft will take the majority of the growth. The growth will be accommodated about 50:50 by passenger and freighter aircraft. This will still require the dedicated freighter fleet to grow by about 6% per annum on average. The leading region is the US, but highest growth rates are in the Asia Pacific and Chinese markets. Seven of the top 10 traffic flows are linked to the Asia Pacific region. Overall, the trend is for aircraft to get larger, and so the portion of larger freighters will grow and the smaller aircraft portion will contract. Densities are also falling, stimulating demand for high volume aircraft."

Future markets are important targets for conversion facilities. One particular market is the Chinese domestic market, where high growth is expected in the express package fleet. This is just beginning to develop, with carriers like Yangtze River Express operating three 737-300s on behalf of United Parcel Service (UPS). "Annual growth rates in

CURRENT & FUTURE FREIGHTER FLEET PREDICTIONS

Aircraft type	Small narrowbody (DC-9, 737, 727)	Medium narrowbody (707, 757, DC-8)
Current fleet	560	280
Future fleet (10 years) (Mergeglobal)	685	350
Future fleet (20 years)		
Airbus Industrie (2020)	900	50
Boeing (2021)	895	340
Probable retirements of current fleet	535	230
Aircraft additions required (20 years)	875	300

China are about 10.3%. China's current fleet is about 17 freighters, and we expect this to grow to about 225 aircraft in 20 years," says Hoang. "The majority of aircraft required will be small narrowbodies. Latin America will also provide a reasonable market, and will need 70 narrowbodies and 30 medium widebodies over the next 20 years."

High growth rates in the Asia Pacific and Chinese regions are expected to have a large influence on aircraft requirements. "The Asia Pacific region requires mainly long-range widebodies," claims Lenormand. "Many industries are becoming localised, with companies relocating from Japan to China, stimulating demand for freight. For example, in 1980 Chinese air freight traffic was equal to a third of US domestic traffic. Chinese freight traffic is expected to be twice US domestic volume by 2020."

Integrator fleet plans

The narrowbody freighter fleets are dominated by a few major carriers, in particular FedEx, UPS, DHL and ABX. These four carriers account for about 70% of narrowbody freighters in operation, including more than 170 727-100s/-200s, 75 757s, 80 DC-8-73s and 75 DC-9s; about 70% of narrowbody freighters in operation. The fleet plans of these carriers will have the largest influence on the market.

These airlines all have extensive air route networks, and operate enough daily frequencies to meet their delivery schedules. The problem integrators face is the erosion of their yields by the reduction of small packages and express documents and the addition of lower yield general freight to make up the

volumes in the aircraft. "The integrators have two ways in which they adjust to this in terms of fleet planning," explains David Hoppin, principal at Mergeglobal. "The first option is to exclude general freight and reduce aircraft size commensurate with maintaining better load factors and increase average yields. This would be in hand with continuing to serve the same number of airports and air routes with jet equipment. The alternative is to consolidate their air networks by pulling jets out of some air routes and upsize aircraft to larger narrowbodies or widebodies. Turboprops would replace jets on routes with the lowest volumes."

A strategy of downsizing would suit the 737-300/-400 in terms of replacing the 727-200s. It may also suit the 757 in terms of replacing some widebodies. It would also contradict future fleet forecasts. Consolidation would better suit the 757, while making the predicted future small freighter fleet unlikely and lower than expected sales of 737s.

The other issue facing the integrators is consolidation, which is a consequence of reduced yields. Emery left the small package market several years ago, and DHL is now making attempts to acquire ABX. Although there are objections, the merger is likely to be completed. This would leave three viable operators; FedEx, UPS and DHL. Consolidation would be likely to lead to larger aircraft being used by remaining operators, again favouring the 757.

UPS uses Louisville as its main hub in the US, as well as five other mini hubs. All of these have daily flights operating into and out of them. UPS has a range of aircraft which provide increasingly larger capacities to be used as growth on each route continues. The 727-100 is its smallest aircraft, followed by the 757, the

DC-8-73, the 767-300 and then A300-600. Further larger types are the MD-11 and 747. "We try to avoid operating extra frequencies and incurring additional operational costs by substituting larger aircraft as traffic volumes on a route increase. Larger types have the advantage of lower unit cost per lb of freight," explains Bill Simpson, long-range planning manager at UPS. "We use the 727-100 on routes with the lightest traffic volumes, and the 757 and DC-8-73 on routes with progressively larger volumes. We also use the 727-100s where the traffic volumes require more than one daily DC-8-73 flight, but not two. The 727-100 is also used as a spare aircraft.

"We plan to have an optimal system of matching capacity with demand," adds Simpson. "If we get steady traffic growth it may lead to a swapping of the 727-100 for a larger type. This could mean either acquiring more 757s, or adding larger aircraft at the top of the fleet, and moving the smaller ones onto the routes with the lowest traffic volumes."

This indicates UPS is unlikely to acquire significant numbers of 737s or 757s. "We prefer to go for widebodies and use existing aircraft as traffic grows, rather than acquire narrowbodies. The number of routes that require narrowbodies is gradually decreasing, and the 727 and DC-8 fleets will get smaller," says

Simpson.

The fleet decisions of FedEx will have a major impact on the narrowbody freighter market over the next 10-20 years. FedEx has always taken opportunities to acquire aircraft at low capital costs, and is examining the 757. The current surplus of 757s, and the possibility of an even larger surplus, could drive up availability and reduce market value to the point where FedEx would find it economic to acquire a large number of 757-200s to replace its 727-200s.

One factor in the 757's favour is the low maintenance cost of its two RB211s compared to the 727's three JT8Ds. FedEx wants to maintain the flexibility of its container types, and so is examining both the Boeing and non-OEM conversions.

DHL Airways in the US is another carrier taking advantage of the surplus and low market value of used aircraft. It is undergoing a fleet planning study to determine if it should replace some of its fleet, including the 727-200 and DC-8-73.

There are also several major European express package carriers which have fleets that require modernising. TNT, for example, has partially replaced its 727-200s with A300B4s, but has Super 27s, Tu-204s and Lockheed

Electras which will have to be replaced. This could be accomplished by a mixture of 10-15 737s and 757s.

Some smaller airlines are experiencing high rates of growth, and provide a few opportunities for the 737-300/400 and 757. Estafeta Carga Aerea, for example, is the airline branch of the Estafeta group, which is the largest overnight delivery company in Mexico. The company shifts 90,000 packages a day, and operates a large ground network with vehicles, similar to UPS in the US. The airline was formed in 2000 to operate its own air services that until then were being wet leased to other carriers. "We chose the 737-200, and started with three aircraft and have expanded to a fleet of four," says Juan Rodriguez Anza, director general of Estafeta. The airline operates overnight on its domestic network, and uses its aircraft for a few international routes to Miami and Dallas-Fort Worth during the day." Our annual air freight growth rate was 40% in 2001-2002, and we conservatively estimate it will be 22% for 2002-2003. Future growth rates are conservatively estimated at 15-20%.

"We could add another 737 by the middle of this year, but we would prefer larger aircraft such as the 757 or A310 to accommodate predicted growth. There is the potential for a few more air routes, but most can be served by truck. For



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The potential market for freighters in the small narrowbody category is for up to 875 aircraft over 20 years. The actual market will be determined by fleet plans of express package carriers. This could follow a strategy of consolidation or aircraft downsizing. Other strong markets are expected to be China and South America.

example, we could add two more domestic and two more international routes," explains Rodriguez. "We really require larger rather than more aircraft in the future, and are not likely to need a large fleet. For example, in four years we might require four 737s and three 757s."

General freight carriers

Besides express package carriers, the 737 and 757 market will depend on how general freight carriers develop their fleets. One major factor in aircraft selection will be the capital and consequential financing costs of aircraft. Thereafter, maintenance costs in particular have a major effect on the long-term viability of a type. The A300B4, for example, has low and attractive capital costs, but has been



dogged by its high engine-related maintenance charges.

Replacement of the DC-8 by its operators will partially be determined by volume requirements, but these carriers will also be looking for aircraft with low capital costs that can deliver unit costs of operation capable of matching the DC-

8's. This means the 757-200SF having lease rates lower than \$200,000 per month in many operators' cases.

The 757 can compete with widebodies such as the A310-300 and 767 on the basis of low capital and leasing costs. If 757s can be acquired at a value of \$12 million their total

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acquisition cost following conversion and bridging maintenance will be less than \$19 million (see *Are aircraft values low enough to trigger a wave of conversions?* *Aircraft Commerce*, December 2002/January 2003, page 41). This compares to a total cost of \$21-25 million for the A310-300. Values of 757s are reported to be falling below \$10 million in some cases.

Arrow Air operates 12 DC-8-60s on its network connecting Miami with Central and South America. "The DC-8 is the right size for us, since we carry perishables such as flowers and fish from Guatemala, Honduras, Costa Rica, Panama, Ecuador, Colombia and other countries and need to have a daily operation six days per week. We also operate from hot and high airports in many cases," says Dick Haberly, president at Arrow Air. "I think the Central American market will be a narrowbody market for another 10 years, since it requires a daily service. We will eventually have to move out of DC-8s, and so may move to the 767, A300 or 757. The 757 could be an excellent freighter for the Central American market. Although it is a bit smaller than the DC-8, the 757 is very efficient in terms of fuel and maintenance and will have good hot and high performance. It may, however, have a payload-range performance problem in some cases. Our current utilisation with the DC-8 is about 2,400 flight hours (FH) per year. If the 757 was available at the right financing rates we could use about 15 aircraft. Non-OEM converted aircraft have 15 containers, compared to the DC-8-62's 14 and -63's 18. The -63 has poor hot and high performance, however."

Additional markets

In addition to straight replacement of current narrowbodies and growth in capacity of existing fleets, there are also other markets the 737 and 757 could satisfy. TNT, for example, operates a small fleet of Lockheed Electras, and is considering the 737-300 as a replacement. There are only 13 L-188s in operation, but many other large turboprops also need replacing. Replacement of these with the 737 would be a bonus in addition to market forecasts. These include several hundred Antonov aircraft. Many of these are operated outside Russia and the CIS, and so would be exempt from import duties that Russia applies to western aircraft.

This exemption also applies to the IL-76 freighter, of which there are 180 operational worldwide, many outside Russia and the CIS. The IL-76 has a payload capacity of 40-50 tons. This makes the 757 a possible replacement candidate, and would be a bonus in excess of long-term forecasts.

Overall market

Airbus' prediction that no medium narrowbody freighters will be replaced by the 757, thus resulting in a shrinking of the medium narrowbody fleet, is likely to be proved wrong given potential fleet plans of freight carriers.

Most predictions are that the medium narrowbody fleet will reach about 350. This indicates there will be a strong market for the 757 over the next 20 years, although it could later face a little competition from the A321. The non-OEM converted 757s will, however, have

A market for 300 757-200SFs is expected over the next 20 years. The 757 has the advantage of being in a class of its own, but the number converted will depend on which aircraft replace the majority of 707s and DC-8s, and also the fleet plans of express package airlines. FedEx is reported to be considering the 757.

15 container positions. The A321's fuselage will only allow it to accommodate 13. By the time the A321 has reached the market, however, a larger number of 757s will have been converted and will be operated by several carriers. The 757's early establishment will make it harder for the A321 to take marketshare.

About 230 of the current medium narrowbody freighters in operation will retire over the next 20 years. If the fleet increases to about 350 aircraft, a market for 300 757s will become available over 20 years. This figure will be influenced by the fleet plan FedEx follows when replacing its 125 727s. The actual market will depend on how many 707s and DC-8s get replaced with widebodies.

Prospects for the 737-300/-400 market are strong. A rise is predicted from a fleet of about 560 small narrowbodies to about 900. About 535 aircraft will retire over the same time, implying a market of 875 aircraft for replacement and growth over the next 20 years. Again this will be influenced by the by FedEx, UPS and DHL.

Analysis of individual markets show that about 270 aircraft could be required by the Chinese and Latin American markets alone. The majority will be in the small category, presenting a good opportunity for the 737 and 757. Another small market showing good potential is India, where Blue Dart operates with 737s.

The potential market for the 737-300/-400 is large, and will no doubt attract competition from more conversion providers. It will also be joined by the A320/321 after about eight years.

The total market for narrowbody freighters is expected to be 1,100-1,200 aircraft over the next 20 years. It is generally estimated that 70% of freighters added to fleets are converted aircraft, implying the market for converted freighters is about 810 aircraft. Larger aircraft types, however, tend to have a higher percentage of aircraft acquired new. This is particularly the case with the 747-400 and A380. A larger percentage of small freighters tend to be converted, indicating the market for converted narrowbodies could exceed 900 units.

These probable market estimates do not consider the possibilities of additional aircraft that could be required to replace large Antonov and IL-76 aircraft. **AC**