

Express package operators are experiencing a surge in traffic volumes while their old fleets are approaching retirement and fuel prices are at a record high. These airlines will soon have to select fleet replacements, and have the choice of the A300-600, A310-300, 767-200 & 767-300.

# Widebody selection for express package operations

Recent years have seen some recovery in the express package market. This comes at a time when many DC-8s are being retired, fuel prices have reached an all-time high, and passenger-to-freighter programmes for 1980s-vintage widebodies have come to fruition. Some express package carriers have begun to consider acquiring these widebodies now that their market values are approaching levels low enough to make conversion to freighter economic.

Freighter modifications for the A300-600, A310-300, 767-200SF and MD-11 are available, while programmes for the 767-300/-300ER are expected to come to the market within the next two years. Operators have to consider which aircraft type meets their operational and capacity requirements, and offers them the best operational cost per lb of payload they are likely to carry.

## Express package carriers

### TNT

TNT is one of the four largest express carriers in the world, providing mail, express and logistics services with a fleet of four A300B4-203Fs, eight BAe146-300QTs, three BAe146-200QTs and four B737-300SFs. It operates a hub-and-spoke network covering all of Europe from its Liege hub in Belgium.

"Since last year the business has recovered from recession and traffic is now picking up. We have recorded an annual traffic growth rate of 7.5%, which may lead to replacing the current fleet," says Nikey Terzakis, managing director at

TNT. "To strengthen our position in the market, we have been trying to improve the quality of service, distribution speed, reliability, and understand customers expectations. Since we have a large route network, I would like to keep the fleet flexible to adapt to changes in the market. The route network contributes about 30% of the total revenue and we will open new long-haul routes in the near future. We are now considering replacing the A300B4s with other freighters as we want to swap the current two-stop operation for a one-stop operation. The candidates are the A300-600, A310-300F, 767-200SF and 767-300SF, and even the A320 or A321. Although the freighter-converted A320SF and A321SF are not yet available in the market, I expect them to be in the next five years.

"Among all these aircraft, I prefer the 767 because it has higher reliability, more range, lower maintenance costs and larger volume," continues Terzakis. "Although the 767's lease rate would be higher than the A300-600SFs, we can strike a balance between the financial cost and cash operating costs because the 767's lower maintenance costs can compensate for its higher lease rate. The fuel cost accounts for 14-15% of the operation cost, but is not the most important cost in our operation despite current high fuel prices. This is because these aircraft operate at low rates of utilisation. The A300B4, for example, has an annual utilisation of just 900 hours, equal to no more than three hours per day. Its shortest flight is just 40 minutes and the longest is no more than two hours. So the fuel cost is not the most important item."

### DHL Middle East

"Since the end of the Iraq War, the economy in the Middle East has picked up and Iraq's reconstruction has stimulated economic demand," says Neville Karai, director of area aviation at DHL Middle East. Our company has recorded a traffic growth rate of 30%, which makes it necessary for us to increase the fleet. We are now using the A300B4, 727F and the MD-11 to fly on routes to Europe and Asia. We will wet-lease an A300B4 at the end of this year because we have a hub-and-spoke operation and this aircraft can fit our operation very well. It can carry high volume and will fly short range. The daily utilisation is up to four hours. Although it is undisclosed where DHL Middle East will lease the A300B4 from, it is likely the aircraft will come from DHL Europe, which has excessive capacity. This also partly explains why this company does not consider leasing modern aircraft.

### Air Hong Kong

Air Hong Kong (AHK) began scheduled flights to the UK in 1989. Cathay Pacific subsequently bought a majority stake in the all-cargo carrier, and remained the majority shareholder even after DHL invested in October 2002. AHK is now operating an Asian network with A300B4-200Fs and A300-600Fs.

The Hong Kong government is negotiating with the Civil Aviation Administration of China (CAAC) about increasing airline traffic rights to mainland China. What concerns the CAAC is that the express package operators in mainland China, such as



China Postal and Yangtze River Express, may be too weak to compete with AHK. When it can gain the traffic rights to the market has yet to be known, but it is certain that it will grow its business after entry to the market.

### Market preference

Although the A300B4-200F, A310-200F, A310-300F, MD-11F and 767-200SF are available in the market, and the 767-300SF and 767-300ERSF will come to the market over the next two years, the market's preference is based on the features of these aircraft. "Express package operators have five basic requirements for their freighters: fleet commonality; container compatibility; technological advancement; operating economics; and operational efficiency," says Steve Fortune, president at Ventura Aviation. "Operators seek to simplify their fleets to gain commonality benefits. FedEx, for example, has four aircraft types; the 727, A300/310, DC-10 and MD-11 and concentrates on Airbus aircraft for its regional widebody requirement. DHL mainly operates with Airbus aircraft, such as the A300B4. It is difficult to say which of these aircraft express carriers prefer because each operator has its own considerations based on their route network, cost structure and traffic volume.

"Generally speaking, Airbus regional widebody aircraft have greater market appeal," says Fortune. "The A300-600 is more attractive to the operators due to a 10-12% unit cost advantage versus the 767-200F. The A300-600's unit cost advantage comes from its higher payload capacity. The 767-200 suffers from a

reduced fuselage cross-section and the lack of LD-3 capability in its belly. When the 767-300s fall in value to the point where freighter conversion is economically justifiable, its fuel burn advantage, lower maintenance costs and higher payload will provide a competitive threat to the A300-600F.

"Express package operators rely heavily on operational efficiency, in which the container handling system plays an important role. Each express carrier has established a unique container loading system, thereby reducing the importance of interline capability for containers," continues Fortune. "Due to the express carriers' low aircraft utilisation, a higher aircraft fuel burn has a smaller impact on the aircraft's operating cost versus passenger airlines. Fuel burn is not a primary factor to select an aircraft type. Maintenance costs will be more important in the long term. The air cargo boom and lack of available aircraft has pushed the lease rates up for regional widebody freighters. Estimated monthly market lease rates range from \$250,000-270,000 for the 767-200SF's, \$270,000-300,000 for the A300-600F, and \$200,000-225,000 for the A310-300F. The 767-300SF has yet to come to the market, so its lease rate is not available."

The market lease rate for the 767-300F will probably be in the region of \$300,000, considering its freight volume capacity and technology vintage of a mid-1980s widebody twin. The highest gross weight 767-300F has a structural payload up to 20,300lbs higher than the lowest gross weight 767-200F model, up to 27,000lbs higher than the A310-300F, and up to 3,900lbs more than the A300-600F.

*Older large express package freighters such as the A300B4, are increasing in age and have rising maintenance costs. Freight conversion programmes for younger widebody twins are coming to fruition, and the availability of A300-600s and 767-200SFs will increase over the next few years.*

### Aircraft selection

Express package operators can reach a profit margin only through high load factors and the lowest operating cost. Aircraft selection depends on closely matching those aircraft with the lowest finance charges or lease rates to airlines payload capacity and operational requirements.

The first consideration is the net structural payload or revenue capacity of the freighter. This is a function of the freighter's maximum zero fuel weight (MZFW), operating empty weight (OEW), and the number and tare weight of containers it uses.

The maximum packing density, the net structural payload divided by the total containerised volume, is a key indicator of the freighter's revenue earning capacity. Volumetric payload is the containerised volume multiplied by the packing density of the freight. Express packages are packed at about 6.5lbs per cubic foot, and at this density the volumetric payload of most types is less than their net structural payloads. Freight capacity for express package operations is thus maximised by an aircraft with a high containerised volume, provided its maximum packing density is higher than 6.5lbs per cubic foot.

Since the size, number and tare weight of these containers has been standardised for each type of freighter, the difference between different freighters' revenue-generating capacity only comes from the difference in their maximum possible volumetric payloads. These are determined by their volumes as well as their MZFWs in relation to their OEWs. The MZFW is in turn related to the

MTOW variant of the aircraft type, with higher gross weight aircraft generally having higher volumetric payloads and packing densities. The low gross weight variants of the converted 767-300 are likely to have a restricted packing density and volumetric payload, for example.

The second significant influence on the selection of express package aircraft is the operating cost. Like other freighter operators, express package operators have to meet fuel and maintenance charges, flightcrew employment costs, aircraft lease charges and other small costs, such as navigation and airport user fees. Unlike other airlines, express package carriers are not as sensitive to fuel burn or fuel price, but they are more sensitive to aircraft lease charges because of low rates of aircraft utilisation. Fuel cost therefore normally only accounts for about 15% of total operating cost.

Aircraft lease rentals, which can be derived from the freighter's acquisition and conversion cost, will account for 25-30% of the total operating cost. A reduction in aircraft acquisition cost or lease rental will have the largest impact on an aircraft's operating costs.

Maintenance cost is also an important concern for the express package operator, but since the A300-600F, A310-300F, 767-200F and 767-300F are from the same generation of aircraft and use the same material and engine technology, there is little difference in their maintenance costs. Flightcrew charges for these four types are also the same or similar, as they all use a two-pilot crew. There may be some differences in the handling system and other costs between these aircraft, but they are too small to affect the operator's final choice.

Hence, the net structural and volumetric payloads, together with the lease rate, are the main factors to influence an aircraft's performance in express package operations.

## Aircraft options

Most express package carriers will consider widebody twins. There are four main types: the A300-600F with an MTOW of 375,900lbs and a structural payload of 109,740lbs; the A310-300F with an MTOW of 361,554lbs and a structural payload of 86,300lbs; the 767-200F with an MTOW of 352,200lbs and a structural payload of 93,600lbs; and the 767-300F with an MTOW of 412,000lbs and a structural payload of 113,900lbs (*see table, this page*).

A payload-capacity and cost-performance analysis of these four types has been made. High gross weight variants of the 767-200ER and -300ER have been analysed, but lower gross weight aircraft are likely to be converted earlier and be available on the market

## WIDEBODY EXPRESS PACKAGE FREIGHTER PAYLOAD & TRIP COST DATA

Aircraft type	A300-600F	A310-300F	767-200SF	767-300SF
MTOW lbs	375,900	361,554	352,200	412,000
Gross structural payload lbs	109,740	86,300	93,600	113,900
Containerised volume cu ft	13,200	9,660	12,600	15,600
Container tare weight lbs	10,043	7,058	9,266	11,850
Net structural payload lbs	97,327	81,342	90,000	101,000
Volumetric payload @ packing density 6.50 lbs/cu ft	85,800	62,790	81,900	101,000
Sector length nm	900	900	900	900
FC/year	600	600	600	600
FH/year	1,500	1,500	1,500	1,500
Monthly lease rate \$	285,000	215,000	260,000	300,000
Total trip cost \$	20,100	17,800	18,000	20,000
Unit cost cents/lb	23.53	28.38	21.99	19.76

from lessors first. Some lower weight variants of the 767-200/-300 have lower net structural payloads and so limited volumetric payloads.

The A300-600F is the natural successor to the A300B4-100F/-200F. About 60 of these aircraft were converted from passenger aircraft in the mid 1990s, but most are 20-27 years old.

Only EADS-EFW offers passenger-to-freighter conversions for the A300-600F. Following conversion, the A300-600F can accommodate 21 maindeck containers, each with a volume of 476 cubic feet, and 22 LD-3 belly containers.

Overall, the aircraft has a containerised volume of 13,200 cubic feet. The containers' tare weight totals about 10,000lbs and the aircraft has a net structural payload of 97,327lbs (*see table, page this*), allowing it a maximum packing density of 7.3lbs per cubic foot. The A300-600 has a volumetric payload of 85,800lbs when freight is packed at 6.5lbs per cubic foot.

EADS-EFW is also the only provider of passenger-to-freighter modifications for the A310-300. The aircraft can accommodate 16 maindeck and 14 LD-3 belly containers. Total tare weight and volume of all containers is 7,058lbs and 9,660 cubic feet, which gives the aircraft a net structural payload of 81,342lbs (*see table, this page*). This gives it a volumetric payload of 62,800lbs when packed at 6.5lbs per cubic foot.

The 767-200SF converted by Boeing/Aeronavali and Bedek Aviation can accommodate 20 maindeck

containers and 22 LD-2 belly containers. The resulting aircraft will have a containerised volume of 12,600 cubic feet. Depending on which MTOW variant is converted, the aircraft will have a net structural payload of 83,500-92,000lbs. Either variant will have a volumetric payload of 81,900lbs (*see table, this page*).

Following conversion by Bedek Aviation or Boeing, the 767-300SF is expected to have a gross structural payload of 95,000-113,900lbs, depending on the MTOW and MZFW variant of the converted aircraft. The 767-300 can carry 22 maindeck containers, each with a volume of 502 cubic feet, and 30 LD-2s belly containers. This gives the aircraft a total volume of 15,604 cubic feet, and a container tare weight of 11,850lbs. The net structural and volumetric payloads are 83,250-101,000lbs, depending on the MZFW of the converted aircraft.

## Economic analysis

These four aircraft have been analysed on a stage or route length of 900nm and at low rates of utilisation that are representative of typical express package operations.

With the volumetric payloads described, the A300-600F generates 35,100 available ton-miles (ATM) per trip, the A310-300F 25,687 ATMs, the 767-200F 33,505 ATMs, and the 767-300F 41,482 ATMs (*see table, this page*).

The 900nm route has a flight time of 130 minutes and block time of about 145



minutes. The 767-200/-300 will have slightly longer flight and block times, but these will have little overall impact on their unit cost.

These aircraft are assumed to only complete one return flight per day, six days per week and 50 weeks per year. They will thus generate 600 flight cycles (FC) per year, which is equal to about 1,500 flight hours (FH).

The Airbus aircraft have slightly higher burns than their Boeing counterparts. The current fuel price of 135 cents per US Gallon results in fuel costs of \$5,065 for the A300-600F, \$4,567 for A310-300F, \$3,757 for the 767-200F, and \$4,069 for the 767-300F.

The A300-600 and A310-300, however, have airframe and component related maintenance costs about \$50 lower per FH than the 767-200 and -300. Annual engine support costs have been calculated at \$163,000 for the A300-600F, \$119,000 for the A310-300F, \$167,000 for the 767-200F and the 767-300F.

These lead to a total maintenance cost per FH of \$1,620 for the A300-600F and A310-300F, and \$1,670 per FH for the 767-200F and 767-300F. In other words, the maintenance cost per trip for the A300-600F and A310-300F is \$4,050 and that for the 767-200F and 767-300F is \$4,175.

The four types of aircraft use the two-pilot crew and therefore have the same crew cost of \$1,208 per trip.

Although lease rates will relate to deals with lessors, insurance rates are based on market values. The market values of the A300-600F, A310-300F, 767-200F and 767-300F are \$26 million,

\$18 million, \$18 million and \$26 million respectively. With an insurance charge of 3.2% per year, the annual insurance cost per year is \$832,000 for the A300-600F, \$576,000 for the A310-300F, \$576,000 for the 767-200F and \$832,000 for the 767-300F.

This results in an insurance cost per trip of \$1,664 for the A300-600F, \$1,152 for the A310-300F, \$1,152 for the 767-200F and \$1,664 for the 767-300F.

Monthly lease rates used are \$285,000 for the A300-600F, \$215,000 for the A310-300F, \$260,000 for the 767-200SF and \$300,000 for the 767-300SF.

Since these aircraft fly 50FC per month, their lease rate per trip will be \$5,700 for the A300-600, \$4,300 for the A310-300, \$5,200 for the 767-200SF and \$6,000 for the 767-300SF.

Landing, navigation and handling fees are based on a total cost of \$9 per lb of MTOW. These fees total \$3,383 for the A300-600F, \$3,254 for the A310-300F, \$3,170 for the 767-200F and \$3,708 for the 767-300F.

These cost elements result in a total trip cost of \$20,100 for the A300-600F, \$17,800 for the A310-300F, \$18,000 for the 767-200F and \$20,000 for the 767-300F (see table, page 59).

### Economic performance

Because the highest gross weight 767-300F used here has the highest volumetric payload, the aircraft has the lowest unit cost of 19.76 cents per lb. This is 2.23 cents lower than the 767-200F, 8.62 cents lower than the A310-300F, and 3.77 cents lower than the A300-600F. Moreover, the high gross weight 767-

*The A300-600F has the largest payload and lowest unit cost of widebody twin-engine express package freighters currently available. It will face increased competition from higher gross weight 767-200SFs and the 767-300SF over the coming years.*

300SF's trip cost of \$20,000 is only \$100 less than the A300-600's, whose volumetric payload is 14,000lbs lower. This indicates a strong future market for high gross weight 767-300SFs when they come available at the right lease rate.

The lowest gross weight 767-300SF, however, has a 2,000lbs smaller volumetric payload than the A300-600. Not surprisingly the two have similar trip costs of about \$19,600-20,100, and so also have close unit costs. The fact that the 767-300SF is not yet available and that the A300-600 has the largest volumetric payload of the three widebody twins currently on the market underlines its popularity.

The 767-200SF is an interesting case. It has only recently entered operation, and is operated only by ABX for express package services but with a unique freighter modification. The 767-200SF will have a volumetric payload only 4,000lbs less than the A300-600. The 767-200SF's lower trip cost means that its unit cost will also be lower.

The A310-300F's volumetric payload is noticeably smaller than that of the 767-200F and A300-600F, so it will only interest airlines that do not require higher capacity. The 757-200SF has a volumetric payload of about 54,000lbs at the same packing density of 6.5lbs per cubic foot. The A310-300F's trip cost, however, at \$17,800, is similar to the 767-200SF's.

Overall, the A300-600F and 767-200SF have comparable payloads, trip and unit costs. The 767-300SF's higher capacity means demand is likely to be higher for the 767-200SF and A300-600F until overall growth in the market demands larger aircraft.