

About only another 60 A300B4s and A310-200s are expected to be converted to freighters before the A300-600 and A310-300 will need to be modified. Their economic viability depends on lease rate, total bill cost and therefore market values. Are the A300-600 and A310-300 ready for the secondary market?

A300-600 & A310-300 queue for freight conversion

The diminishing number of A300B4s available for freight conversion and the expected retirement of large numbers of 707s and DC-8s will stimulate demand for small- and medium-sized widebody freighters in the next 5-10 years.

The immediate candidates are the 757, A300-600 and A310, since most airlines show no signs of being ready to retire their 767s. Since the first aircraft more likely to become available to fill a lot of this demand will be the A300-600 and A310, lessors and freight operators will have to consider the costs of acquiring, converting and making them available for lease and service.

Freighter demand

The A300, A310 and 767 are classified as medium-sized freighters. This category of the freighter fleet is expected to require about 540 additional aircraft in the next 20 years to cover growth and aircraft retirements (see *Where will all the new freighters come from?* *Aircraft Commerce*, January/February 2000, page 39).

This number of medium-sized widebodies comes partially from the need to replace many large

narrowbodies, such as the DC-8 and 707, but also from growth.

Some DC-8s and 707s will also be replaced by 757s, but this still leaves a demand for 540 medium widebodies.

A minority of these 540 additions will come from new factory-built aircraft. The remainder will be determined by the availability of each candidate type. These are the A300B4, A300-600, A310 and 767-200/-300.

More than 75 A300B2/4s have been committed to freight conversion and the majority leased out. There are still about 50-60 candidate aircraft left, but it is expected that only 30-50 will become available at the right time or be in a sufficient condition to justify modification. Most will be modified sooner than A300-600s and A310s. This will be followed by the conversion of many of the remaining passenger A310-200s. Once all the A300B4 and A310-200 candidates have been absorbed, A300-600s and A310s should be available and at the right market values to make conversion economically viable.

There are 34 A300-600s available, and these are aircraft operated by Korean, Lufthansa, Saudi and Thai. The A300-600R, which will be the

preferred choice of freight conversion, is operated in larger numbers. There are about 165 in the global fleet. The major fleets are operated by American, China Airlines, China Eastern, China Northern and Northwest, Egyptair, Emirates, JAS, Korean, Kuwait, Olympic and Thai.

There are only 40 A310-200s left for conversion, followed by 156 A310-300s. The large A310-300 fleets are smaller than the A300-600Rs. Some are operated by Aeroflot, Air France, Air India, Air Jamaica, Emirates, Hapag Lloyd, Lufthansa, PIA, Royal Jordanian, Singapore Airlines, Air Portugal and Turkish.

There are about 60 707s and 160 DC-8-50/60s that could all require replacing over a short period. These aircraft, which have served freight carriers well over the past 10-20 years, are reported to be experiencing rapidly rising maintenance costs. Spare parts are becoming harder to find.

A later need for more aircraft will occur when about 100 DC-8-70s will need replacing. These are used partially for trans-Atlantic services and so aircraft with long-range performance will be required. This may dictate the use of the 767-200ER for at least some of the aircraft, although the A310-300 and



A300-600R can operate some shorter trans-Atlantic services without payload restrictions. Moreover, freight traffic is not sensitive to technical stops and the A310 may provide better economics than a 767-200ER acquired at higher used market values.

DC-8 and 707 retirements would force a need for about 320 replacements. The payload range of these aircraft would mean the A300-600R and A310-200/-300 are well placed.

The A300B4 will fill some of this requirement, but not all aircraft of the right quality will be available at the right time. The more desirable A300B4 fleets may not be retired before the first A300-600s become available.

In addition to this replacement requirement, traffic growth will stimulate further need for more aircraft. The A300-600R and A310-200 will most likely satisfy demand for US domestic capacity. Emery, for example, has 20-30 aircraft it needs to replace and is considering A310-200s. They have low current market values in the \$8-12 million range and so will have low total build and therefore viable lease costs.

The A310-300 will fill a regional role. Part of this will be in replacing 707s and DC-8s used on the US-South American market. One market where the A310-300 is less likely to replace the DC-8 and 707 is Africa, although aircraft operated from Europe into Africa will be replaced.

Inevitably some A300-600s and A310s will be scrapped for parts, while others will serve the used passenger market for charter and other low-cost carriers.

Another market for the A310-300 is half-size aircraft to substitute the long-range 747. "Many carriers have been forced to use the 747 until now because of its range performance," explains Jurgen Haberman, head of sales and marketing at Elbe Flugzeugwerke. "The A310 will stimulate and satisfy a fairly new market sector, because small, long-range freighters have not been available until now. An example of a market that could use this aircraft is Russia-China".

FedEx has already had success in using the A310 as a two-for-one 727 replacement. Emery is considering the same strategy. This practice is acceptable if an airline's routes are busy and frequency is not an issue.

A300 & A310 retirements

The first A300-600 and A310-300 fleets are now becoming due for retirement. Korean Air has concluded a sale and leaseback transaction for some A300-600s for two years. These could later be converted and sold to FedEx. They are expected to be the first A300-600s to be converted, and so the programme will need to start in 2001 or 2002.

Emirates has already made its A300-600 and A310-300 replacement plans, but still operates several of its

Current values of A310-300s have fallen below \$15 million for distress sales. Values of most aircraft are above \$20 million. Values need to be less than \$15 million for freight conversion to be viable.

aircraft. Airbus has taken the A310s and these will soon be available for conversion. The A300-600s will also be available shortly.

Lufthansa will increase its A300-600 fleet by taking ex-Emirates aircraft, but may convert two of its A310-300s for its own freight operations.

FedEx is a large prospective customer for used A300-600s. UPS still has outstanding orders for A300-600s and is speeding up its delivery of these aircraft. It will therefore soon require used and converted aircraft.

Air France's A310-300s will be available from 2001 and there are already prospective buyers. Turkish Airlines is in the process of selling its A310-200s and may convert two -300s for its own use.

There are other fleets that will also come to the end of their leases and be retired in the next few years.

Aircraft acquisition

Although the freight carriers depend on aircraft being available, they still have to make an economic case from operating the aircraft.

The A300 and A310 have direct cash operating advantages in every cost category over the DC-8 and 707. Because freight operations are based on low utilizations, the most important cost category is finance, lease and depreciation. This will have to be low to make the A300



The market value situation of the A300-600 is similar to that of the A310-300. Once a few large fleets are retired, values will fall within a range that makes freight conversion economically viable. This is expected to occur within the next three years.

and A310 acceptable DC-8 and 707 replacements.

Low enough lease rates are dependent on total build costs to make the aircraft operational as a freighter. The elements that constitute this build cost are aircraft acquisition, freighter conversion and maintenance required to make the aircraft operational.

Lessors and airlines will have to be aware of the lease rates that make the economics of the A300-600 and A310-300 acceptable. "The A310-300 needs to have a maximum monthly rate of \$300,000 per month for it to be considered," says Haberman. "Most operators will actually only really consider the aircraft if rates are closer to \$225,000-250,000, or up to \$275,000. These rates will determine what acquisition price of a used passenger aircraft will make the A310 acceptable".

The A310-300 is in the dilemma, however, of having similar cash operating costs but a smaller payload than the A300B4. This puts pressure on A310 lease rates to be lower than those of the A300B4. "The A300B4's monthly rates are in the region of \$230,000-250,000 and considered to be high. To make the A300-600 work, rates will have to be about \$300,000," says Richard Greener, market analysis officer at BAE Systems Aviation Services.

"Lease rates will have to be similar and not much higher for the A300-600," explains Haberman.

Monthly lease rate factors for used aircraft usually have to be in the region of 1.25% of build cost per month to provide acceptable returns to equity investors, service debt payments and also to leave a reasonable return and minimise residual value risk for the lessor.

An acceptable monthly lease rate of \$250,000 for the A310-300 and A300-600 indicates the maximum build cost for the aircraft can be no higher than about \$20 million. A build cost of \$25 million will be viable if financing can be structured to generate a lease rate factor of 1.0% per month.

Aircraft acquisition cost will depend on current values and the maintenance condition of individual aircraft. *The Avitas Blue Book* puts current market values of the earliest 1983-build A300-600 at about \$12.7 million. This climbs to about \$15.7 million for a 1986-build aircraft.

The A300-600R is more likely to be in higher demand from freight carriers, and most will wait until their values are low enough. *The Avitas Blue Book* puts current market values of the oldest 1988-build A300-600Rs at \$25.1 million and this climbs to \$30.6 million for a 1991-build aircraft. These values are still high in relation to acceptable build cost and subsequent lease rate. "Values for

-600Rs are in the \$27-29 million region," says Greener.

Airlines considering selling their A300-600s are still asking for values that are high compared to what will make a conversion deal viable. "The asking price is \$23-30 million, but some deals have recently been done at less than \$20 million," says Haberman. "The first aircraft to be retired are about 15 years old, and these are low gross weight -600s operated by Korean and Saudia. Saudia has a replacement campaign in process. Although there is still demand for a few passenger A300-600s, they will soon approach conversion age".

Values for the A310-300 are similarly still high. Avitas puts value for a 1983-build aircraft at \$18.3 million and up to \$22.4 million for a 1988-build aircraft. "The first two A310-300s which have been converted were bought for in the region of \$12-15 million. These aircraft had maximum take-off weights (MTOWs) lower than the highest of 160 tonnes, but they can be upgraded. These upgrades cost \$0.5-2.0 million," says Haberman. "Despite the book values of \$25-30 million, A310-300s can be acquired for as low as \$15 million. Values need to be this low to make conversion deals viable".

Book values of aircraft are not always achieved when aircraft come to

the market. The secondary market opportunities for the A300-600 and A310 are limited, and distress sales and a supply of aircraft will push values down. In many cases, aircraft can only be sold if their values are low enough for the freight sector to make an economic case from converting them.

Freight conversion

Conversion to freighter has an approximate cost of \$7.5 million. This includes the cargo loading system.

Elbe Flugzeugwerke's programme for the A310-300 has already been launched, and two aircraft have been converted. The customer has yet to be announced. The first aircraft will start conversion in July 2000, with first delivery in early 2001.

Elbe Flugzeugwerke has already started work on its supplemental type certificate (STC) for its A300-600 conversion programme. "We have already had requests and enquiries about the A300-600 and so have speeded up development work," says Haberman. "We aim to have the first aircraft operational by March 2001".

Although the A300-600 is young it is basically a continuation of the A300B4. Most are used on low utilisation and

short cycle operations. This is very expensive, especially for the engines that have high cycle-related costs. The A300-600 has better engine maintenance costs. Conversion cost is similar to that for the A310: \$8 million.

Following conversion, the A300-600 can accommodate 21 88 x 125 x 96-inch containers on its maindeck (*see table, page 48*). The internal volume and tare weight on these is 10,500 cubic feet and 11,130lbs. The lower deck can hold 22 LD-3s, which total another 3,212 cubic feet and 4,730lbs.

Taking into consideration flightcrew weight and other items, this provides the aircraft with a net structural payload of 93,350lbs. Because maximum packing density is 6.81lbs per cubic foot, freight packed at a density of 7lbs per cubic foot cannot exceed a volumetric payload of 93,242lbs. The A300-600 has a range of about 2,100nm with a full payload, while the A300-600R has 2,600nm capability.

The A310-300 can carry 16 of the same upper-deck containers and 14 LD-3s. Total volume and tare weight is 10,044 cubic feet and 11,490lbs. Net structural payload is 76,404lbs, and volumetric payload is 70,308lbs when packed at 7lbs per cubic foot. The A310-200 has a 2,200nm range with a

full payload. The highest gross weight A310-300 has a 3,350nm range.

Maintenance

The majority of aircraft in the A300-600 and A310 fleets have remained with their original operators. As a consequence, lessors and freight operators can expect to acquire aircraft with good maintenance status and of uniform specification, in particular the A300-600. This is in contrast to the A300B4s that were acquired for conversion.

Maintenance during conversion should therefore be minimised, since many components and the engines will be in a time-continued condition. The airframe check status will have the largest impact on aircraft value.

The A300 and A310 have a heavy check interval of eight years. They also have an intermediate check, an IL check, every four years. "When aircraft are being converted it makes sense to do either of these checks for the sake of economy," explains Haberman. "The last check performed will determine which has to be done, but the IL check means at least a full heavy check can be avoided if one had been performed up to four years prior to purchase".

A300-600, A310-200 & A310-300 PAYLOAD SPECIFICATIONS

Aircraft type	A300-600	A310-200	A310-300
MZFW lbs	286,600	245,800	251,324
OEW lbs	176,860	162,200	162,900
APS lbs	177,390	162,730	163,430
Structural payload lbs	109,210	83,070	87,894
Upper deck			
Container type	88/125/96	88/125/96	88/125/96
Container numbers	21	16	16
Container volume cu ft	10,500	8,000	8,000
Container tare lbs	11,130	8,480	8,480
Lower deck			
Container type	LD-3	LD-3	LD-3
Container numbers	22	14	14
Container volume cu ft	3,212	2,044	2,044
Container tare lbs	4,730	3,010	3,010
Total volume cu ft	13,712	10,044	10,044
Total tare lbs	15,860	11,490	11,490
Net structural payload lbs	93,350	71,580	76,404
Volumetric payload @ 7lbs/ cu ft	93,242	70,308	70,308

Haberman estimates that with an IL check and work performed on repairing LRUs as required, additional maintenance will be in the region of \$1.5 million. A D check alone would incur a cost of \$2 million.

“A buyer has to be careful in avoiding too much maintenance,” advises Greener. “If heavy maintenance is deferred during conversion, a heavy check is required later and a lessee will lose productive operational time”.

Maintenance may still be required for heavy components and engine work, although this will be minimal for aircraft if they are acquired straight from an airline retiral. A large cost will be incurred if an engine has to be put through a shop visit or requires replacement of life limited parts (LLPs). A shop visit for a CF6-80C2 or PW4000 will incur a cost of up to \$2 million, while a full set of LLPs costs \$2.3 million.

Like D and IL check status, aircraft value will reflect airframe and engine maintenance condition. On-wing times of these powerplants are 5,500-10,000 engine flight hours (EFH). This compares with annual utilisations of 3,000 flight hours, implying that an A300 or A310 might expect to have an engine removal and shop visit on average once every 12-15 months. Aircraft purchase price

can make an adjustment for engine maintenance condition. Aircraft will be inspected and engines borescoped.

“It is sometimes a good policy to consider zeroing engines and components,” says Greener. “This will avoid unexpected maintenance costs shortly after the aircraft goes into operation”.

Haberman notes that “it is advisable to get engines that are in half-time shop visit condition. The aircraft values quoted reflect this condition for the engines and the need to perform an IL check”.

Total build cost will therefore depend on purchase price, freight conversion and additional maintenance. Freight conversion and maintenance will total \$9-10 million. Aircraft acquired for up to \$20 million will have a total build cost of about \$30 million. This cost will require lease rate factors of less than 1.0% of build cost per month to get the required lease rate of \$250,000-275,000. This implies that market values or purchase prices need to fall to about \$15 million for a total build cost of approximately \$25 million. This will be low enough to generate the lease rate required. Values of A310-200s are already low enough at their \$8-12 million level and a few A310-300s are already low enough, but this is at distress level. The majority of

A300-600s and A310-300s need to fall by a few more million dollars before conversion becomes viable.

“Overall total costs for an A300-600 will exceed \$30 million, which is expensive,” says Greener. “It is more likely that at current market values this total build cost investment will come from an airline, and not a small lessor as was the case with the A300B4. It is still possible to build an A300B4 freighter for \$12-15 million. There are enough of these aircraft left before the industry needs to consider the A300-600 and A310. In the meantime the value of these aircraft will fall”.

Haberman concedes that values of most aircraft might still be too high, but expects them to fall to the right level in two or three years. “By this time quite a lot of aircraft will have been retired from passenger service and it will be hard to place most of them as passenger aircraft in the secondary market,” claims Haberman.

The rate of A300-600 and A310 retirements is likely to match closely demand for freighter conversions. “I estimate about 70 A300-600s will be converted by 2009 and a similar number of A310s over the same period,” says Haberman.

Financing

While assessment of likely build costs is one consideration, financing the build cost is an additional obstacle. Debt financing will depend on appraised values, rather than actual build cost. This can present a problem for some types because of weak market prospects. “The A310-200 is one example,” says Greener. “The estimated residual value is the maximum level of financing that can be achieved. A poor estimated residual value limits the ability of leasing companies to get involved because it is hard for them to make a deal work with respect to debt portion that can be raised”.

This issue and high market values for passenger aircraft and build costs may mean lessors will be unable to make aircraft acquisition and debt financing work. “I expect many A300-600, A310 and 767 conversions to become operator-driven because of their current values. Airlines will have to get their own cheap financing,” says Greener.

Competition from other aircraft and later retirements of A300-600s, A310-300s and will push their values down and make lessor financing a viable option. Deals could also be made viable with original equipment manufacturer financing. 