

The medium widebody freighter market is the fastest growing sector. A close look at potential conversion candidates, however, reveals there are few good quality aircraft left to modify. The exception is the 767-300ER, but few aircraft are coming available, and market values remain too high.

Medium widebody freighters: sourcing the right aircraft

Selecting used aircraft for passenger-to-freighter (PTF) conversion requires airlines to take into consideration the aircraft's age, accumulated flight hours (FH) and flight cycles (FC), potential remaining life, maintenance status, and specification. For most aircraft, the economic zone for PTF conversions is 15-20 years, with some still being suitable up to 25 years.

An aircraft also has to be at a market value that makes investment in it, and its preparation for freighter service, financially and economically viable. Values must therefore be low enough that the total costs of preparing the aircraft for service are sufficiently low for its expected market lease rates to provide a return on investment for its owner. Values reach the required level when an aircraft type is being phased out in large enough numbers by first-tier passenger airlines.

Used aircraft may still provide economic capacity for second-tier airlines. Competition from the secondary passenger market will keep values up. The interest in the aircraft from passenger airlines will depend on a range of factors. Important issues are the condition of the used aircraft, and the supply and values or lease rates and alternatives. Passenger airlines that can afford, or are able to upgrade to, more advanced equipment, will typically retire 15-20-year-old aircraft in their fleet. This can provide the surplus of used aircraft that is needed to depress a type's market values.

Not all used passenger aircraft necessarily make good freighter conversion candidates. As well as a low value and suitable age, other essential factors are: the remaining operating life; engine type; maintenance status; and, depending on the type of cargo operation, the gross weight, potential for gross

weight increase, fuel capacity and potential range.

"Aircraft age alone is obviously not the only factor," explains Thomas Centner, director sales aircraft conversion at EADS EFW. "Another issue determining suitability for conversion is the accumulated FH and FC. We have found that the timing of aircraft conversions is often related to certain maintenance thresholds that favour the phase-out decisions from passenger services. Decisions about whether to proceed with costly investments, such as cabin refurbishment, are often linked to this process. It is therefore most reasonable to perform the freighter conversion at this stage of an aircraft's life."

"Over the past 10-15 years the medium-widebody freighter market has grown more rapidly than any other freighter segment," says Robert Dahl, managing director at the Air Cargo Management Group. "There are now two basic aircraft types of interest: the A300/A310 and the 767. Popularity has been driven by the requirements of express carriers, especially the larger operators such as FedEx." The interest for each type is varied according to type of freight operator.

Current situation

The recession has caused both passenger and freighter operators to look at their operations more carefully. Weaker revenues mean that all operations must be analysed closely. Despite this, there is still an overall shortage of widebodies in the market, and few good quality aircraft are being retired in large numbers. A degree of fleet consolidation has resulted in the retirement of some

A300-600s and 767-200s.

"I expect the air cargo industry will see a substantial number of medium-widebody freighters become available in the coming years," says Dahl. "The 767 will be the best candidate due to its much larger pool of stock aircraft, which will lead to a greater percentage of this segment being 767s." The 767 has yet to come onto the used market in appreciable numbers, however.

About a quarter of the freighter fleet comprises medium widebodies. "Although demand will increase," says Dahl, "this ratio will not shift."

The medium-widebody aircraft that freight operators are likely to be considering for replacement are the 707, L-1011, DC-8, A300B4, and DC-10; particularly the last two which are operated in the largest numbers. The replacement contenders are the A300-600, A310-300 and 767-200/-300 series.

Replacement of older aircraft aims to reduce flightcrew, maintenance, fuel and environmental cash operating costs. Financing costs and lease rentals will be higher, however, but should be balanced by the lower cash operating costs. The payload capabilities and accommodation, conversion programmes and their cost, and the total cost of preparing most of these aircraft for service as freighters have previously been examined (*see The costs of preparing medium widebody freighters for service, Aircraft Commerce, February/March 2009, page 70*).

A310

There are 75 active A310 passenger aircraft (three A310-200s and 72 A310-300s), plus 27 parked ones.

The average age of the fleet is 21-25 years, with actual ages ranging from 12.5

MEDIUM WIDEBODY FLEET DATA

Aircraft/engine	Passenger		Freighter	
	Active	Parked	Active	Parked
A310-200				
JT9D-7R4	1	2	9	6
CF6-80A	1	11	18	4
A310-200 TOTAL	2	13	27	10
A310-300				
JT9D-7R4		3		
PW4000-94	19	7	18	
CF6-80A	1			
CF6-80C2	53	4	15	
A310-300 TOTAL	73	14	33	0
A300-600				
JT9D-7R4	1	8		
CF6-80C2	9	3		
A300-600 TOTAL	10	11	0	0
A300-600R				
PW4000-94	49	3	94	
CF6-80C2	34	25	63	
A300-600 TOTAL	73	28	157	0
767-200				
767-200				
JT9D-7R4	4	18	5	
CF6-80A		5	42	4
CF6-80C2			4	
767-200EM				
JT9D-7R4	7	15		
767-200ER				
JT9D-7R4	5	5		
PW4000-94	11	2		
CF6-80A	18	3		
CF6-80C2	26	5	4	
767-200 TOTAL	71	53	55	4
767-300				
767-300				
JT9D-7R4	8	2		
PW4000-94	12			
CF6-80A	16	8		
CF6-80C2	52			
767-300EM				
JT9D-7R4	1			
767-300ER				
PW4000-94	169	9	1	
CF6-80C2	300	13	66	
RB211-524	31			
767-300 TOTAL	589	32	67	0

Source: ACAS

to nearly 29 years.

Few of the 75 passenger aircraft are likely to become freighters, since not all of them will meet the criteria mentioned above.

The potentially available A310-200 fleet numbers 16 aircraft, and consists of three active and 13 parked aircraft. Of

these, most have CF6-80A engines. All aircraft are more than 21 years old, while seven are over 25 years old. There has been little interest in the A310-200F, since it has a low payload capacity and is short on range. FedEx is the only operator with this type, and it started converting A310-300s when it had acquired all the good

quality A310-200s.

The fleet of available passenger-configured A310-300s is larger at 86. This is split between 72 active and 14 parked aircraft.

A closer look at the fleet of active aircraft reveals that there are few good quality aircraft to choose from. First, the fleet is divided into four groups according to engine type. Two aircraft have the less desirable JT9D and CF6-80A engines, so they are unlikely to be selected for conversion. There are another 19 PW4000-powered aircraft, and 54 CF6-80C2-powered examples.

Aircraft with PW4000-94 engines are operated by Bangladesh Biman, Pakistan International, TAROM and Yemenia. These aircraft are all less than 20 years old and have all accumulated less than 20,000FC.

Aircraft with CF6-80C2 engines are operated by Air India, Air Transat, Kuwait Airways, Pakistan International, Royal Jordanian, and SATA International. There are a few other small fleets operated by other airlines. These include Ariana Afghan, Iran Air, Kyrgyz TransAvia, Mahan Air and S7 Airlines.

Most of the fleet is less than 22 years old. The Air India aircraft have accumulated 25,000FC or more, but most of the others have up to about 20,000FCs and are up to 22 years old. The largest fleet is Air Transat's, which comprises 13 aircraft that are 18-22 years old and that have mainly accumulated 18,000-21,000FC. This fleet is probably the most attractive group of aircraft for freight conversion.

There is just one PTF conversion programme for the A310, offered by EADS-EFW in Dresden. "Our conversion solution is based on an Airbus supplemental type certificate (STC), which means that the basic aircraft type remains unchanged," says Centner. "The basic envelope of the aircraft therefore also remains the same. This includes all design weights, such as maximum zero fuel weight (MZFW), maximum take-off weight (MTOW) and maximum landing weight (MLW). The weight change from passenger to freighter depends on pre-delivery conditions before conversion (such as mid-life weight increase, the so-called mid-life service growth), and operator-specific items after conversion has been completed.

With no more A310-200s available to convert, the programme is left for just -300s. "Lack of availability, in large numbers, of suitable candidates for PTF conversions, could limit the A310-300 freighter market," says Dahl. There are, however, cargo operators with A310s that might want to add to them as they retire older examples. FedEx has 54 A310-200Fs freighters, while Air India, Deccan 360, Turkish Airlines (THY) and



ULS Airlines Cargo (formerly Kuzu) all have smaller fleets that could be increased.”

An A310-300F is available with an MZFW of 249,120-251,320lbs and a resulting maximum structural payload of up to 88,400lbs. On its main deck an A310-300F can accommodate 16 88-inch X 125-inch pallets or containers. This drops to 15 when larger 96-inch X 125-inch containers are used. In the underfloor compartment an operator has a choice of 14 LD-3 containers loaded in seven pairs, or a combination of three pallets and six LD-3s. As this aircraft is wider than the 767, it accommodates two LD-3 containers side by side. Looking at the packing density, the A310-300F (see *The costs of preparing medium widebody freighters for service, Aircraft Commerce, February/March 2009, page 70*) has the highest figure of 8.2/8.4lbs per cubic foot, depending on actual weight configuration. This is higher than that of the 767 freighters, which makes the A310-300F a good option for heavier general freight operations. Its range of 3,400nm at maximum payload is also similar to that of the 767-300ERF, and fractionally better than that of the 767-200ERF.

The MTOW for the A310-300F ranges from 305,559lbs to 361,558lbs. A higher MTOW is desirable in order for a cargo operator to maximise their payload-range performance. The higher MTOW of 361,558lbs can be found on 13 aircraft.

An A310-300F would probably command a lease rental of \$225,000-250,000 per month. This limits the total investment on preparing an aircraft for service to \$15-17 million. Taking the cost of conversion at about \$8.5 million, and

additional maintenance at another \$2.0 million, the maximum price at which an aircraft can be acquired is \$4.5-6.5 million.

A300-600

There are 111 passenger-configured A300-600Rs. These are split between 83 active and 28 parked aircraft. There are also another 46 that have been converted to freighters.

An analysis of active and parked passenger aircraft reveals that the number of realistic freighter conversion candidates is 40-50 aircraft. The 83 active aircraft are divided between those equipped with CF6-80C2 or PW4000-94 engines.

The larger PW4000-equipped fleets are operated by China Southern, JAL, Korean Air and Thai International.

The JAL fleet comprises 19 aircraft, 14 of which are 1990s-build and have accumulated 25,000-32,000FCs. This makes them too old for conversion. The other five aircraft are younger. The whole fleet is being retired, so these five younger aircraft are potential conversion candidates.

The Korean Air fleet also comprises 1990s-vintage aircraft, which have accumulated 30,000-40,000FCs. They are therefore too old to be considered for conversion.

The Thai International fleet of 13 aircraft is split between: eight aircraft that are 17-20 years old and have high cycles; and five aircraft of about 12 years that have a total of 18,000FCs. These younger five examples are potential conversion candidates.

The three China Southern aircraft are young and have accumulated less than

A close look at the A300-600R reveals that once the older aircraft that have accumulated a high number of FCs and less accessible fleets have been removed, there are only about 45 suitable conversion candidates.

20,000FCs each.

There are therefore only 13 PW4000-94-equipped A300-600Rs that are realistic conversion candidates. There are also small passenger fleets operated by Iran Air, Libyan and Sudan Airways that could be considered.

The larger CF6-80C2-equipped aircraft are operated by China Eastern, Kuwait Airways, Monarch Airlines, Onur Air and Thai International. With the exception of the Thai fleet, these 22 aircraft have accumulated low FCs, which makes them suitable candidates for conversion.

There are also aircraft operated by Iran Air and Mahan Air, but these are unlikely to be considered.

In addition, there are 33 aircraft operated by American Airlines. These are split into two groups: 23 older aircraft; and 10 later-built units. The 23 older aircraft have all accumulated high FCs, so they are too old for conversion. Some have already been scrapped and parted-out. The 10 younger ones could undergo conversion, while two have been sold to Rus Aviation which will convert them for Maximus Air Cargo.

The number of realistic conversion candidates among the active and parked A300-600R fleet is about 45 units. The important issue is when these aircraft will become available. Besides JAL's aircraft, Kuwait Airways and Thai aircraft are expected to be retired over the next few years.

“Large fleets are important to potential converters and investors because they want as much fleet commonality as possible, so that they avoid the risk of scattered or segmented fleets. The fewer variants available the better,” says Centner.

EADS-EFW and B/E Aerospace Inc. (Flight Structures Inc.) in the US are PTF conversion-programme providers. Again, the aircraft is wide enough to accommodate LD-3s, loaded two-abreast in the underfloor compartment.

The aircraft has a lower-deck capacity of 22 LD-3s, or four pallets plus 10 LD-3s. The main deck has 21 88-inch X 125-inch positions, or 20 96-inch X 125-inch positions. The A300-600RF has higher specification weights than the A310-300, providing the A300-600RF with a maximum structural payload of up to 107,370lbs. This results in a packing density of 7.36lbs per cubic foot, which is



equal to the highest weight variants of the converted 767-300ERs (see *Investment & used market potential of 767-200s/-300s, Aircraft Commerce, December 2010/January 2011, page 7*). The A300-600RF's range of 2,600nm is shorter than that of the 767-200ERF and -300ERF.

A probable market lease rate of \$250,000-275,000 per month caps the maximum investment in aircraft purchase, conversion to freighter and maintenance at \$17-18 million. Taking into account the cost of conversion at about \$9.5 million and maintenance at \$2.0 million, the maximum aircraft value will therefore be \$5.5-6.5 million. Although this is higher than the current values of some available A300-600Rs, these values are likely to drop to the required levels once several fleets have been retired.

767

The delay in 787 deliveries has had a knock-on effect on the retirement by major airlines of a large number of 767s. Both major and secondary operators of 767s are only likely to release large numbers of these aircraft following further A330-200 deliveries and the eventual commencement of 787 deliveries.

The age distribution, specification weights, range performance, and sheer number of 767-300ERs make it the best medium-widebody candidate for PTF conversions. The 767 is expected to dominate this segment of the freighter fleet for at least the next few years.

Limited feedstock is keeping 767-200ER market values high. Even if aircraft were available, values make the total cost of converting a 767-300ER to a

freighter too high compared to the market lease rate of up to \$300,000 per month.

There are 220 767-300ERs in passenger configuration equipped with PW4000-94 or CF6-80C2 engines that are 15-23 years old, which makes them suitable freighter conversion candidates (see *Used market prospects for 767-200s/300s, Aircraft Commerce, December 2010/January 2011, page 7*). The larger fleets of CF6-80C2-equipped aircraft are operated by Air Canada, Air New Zealand, American Airlines, Delta, JAL, LAN, Qantas, Thomas Cook and Thomson Airways. The larger fleets of PW4000-powered aircraft are operated by Air Canada, Austrian, Condor, Delta, Hawaiian and United. Few of these airlines show signs of retiring their aircraft in the next few years.

The 767-300ER has two main conversion programmes. There is again one offered by Bedek Aviation, and another Boeing-linked conversion carried out by ST Aerospace.

Both programmes are similar and have MZFWs of up to 309,000lbs. This results in the highest maximum structural payload of just over 125,000lbs for a maximum weight aircraft. With a range that is similar to that of the -200ER, the -300ER can carry more, but at a slightly reduced packing density of 7.0lbs per cubic foot.

The 767-300ERF can accommodate 24 88-inch X 125-inch containers on the main deck and 30 LD-2s on the lower deck. The lower-deck loading is the same as that of the passenger model, and an alternative configuration is 14 LD-2s and four 96-inch X 125-inch pallets/containers.

The 767-300ER is a balanced aircraft

There are 469 CF6-80C2- and PW4000-powered 767-300ERs in operation, and many with major passenger airlines. These aircraft are the prime medium widebody candidates for conversion to freighter.

in terms of payload, volume, operating costs and lease rentals. Its payload capacity, range and operating cost characteristics suit more airlines' operations.

At the time of writing no 767-300s have been converted, but there are PTF conversion programmes planned for the type. Wagner Aeronautical and Boeing both have programmes in the development stage, while Bedek's conversion programme is awaiting its first customer.

While there are many potentially suitable 767s, the delay to the 787 programme and first deliveries means that 767 conversion candidates will have accumulated more FH and FC by the time the 787 does come into service, thereby reducing the remaining age that these converted aircraft have left to operate as freighters.

Future conversions

The A300-600 accounts for most conversions, but these will tail off over the next few years as fewer candidates remain.

The next few years could see interest in 767-300 conversions, with it placed as an A300B4 replacement candidate.

The main additional aircraft to the medium-widebody freighter segment in the future will be the A330. There is already a factory-built A330F, but PTF conversions are now planned. "Within this freighter segment, we are watching the fleet movements closely and we know that the candidate feedstock of the current conversion generation is coming to an end in the next couple of years," comments Centner. "We have started to prepare for the new generation of freighter conversions and are looking forward to the launch of the A330P2F conversion programme."

There is a large pool of passenger A330s, and conversion programme is likely to come available for the A330-300 in the 2015-2017 period. The A330-300 freighter will have a structural payload of about 133,000lbs, and will also have a high volume and capacity. This aircraft could thus have more appeal than the 767-300ER. [AC](#)

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