

The availability of 757s on the used market has increased in the past year. This has brought down 757 values to a level which puts total build cost of a converted aircraft at a level that allows the aircraft to be leased at a rate acceptable to all types of freight carrier.

The 757 enters the economic zone of convertibility

The abundance of used aircraft has increased the circumstances that make the conversion of several aircraft types to freighter economic. The 757-200 is near the top of this list of types for some lessors and aircraft owners. The right time for conversion is determined by several economic conditions, and are analysed here.

Economic conditions

The conversion of a type is triggered by demand from a few leading airlines and the availability of a freighter at the right lease rate or build cost.

The biggest determinant of a low enough lease rate or build cost are aircraft being available at a low enough value. This is basically determined by the supply or availability of aircraft on the market, but is complicated by the willingness of owners or lessors to sell or convert aircraft.

The requirement for a new freighter type is often led by demand from one or two major express package carriers, or a lessor. Small freight carriers do not justify the conversion of a small number of aircraft by themselves.

757-200SF market

The 757-200SF is one of the leading types contesting 727 replacement. Most 727s are operated by many of the dominant express package carriers which are integrated with their own express

package courier companies; FedEx, United Parcel Service (UPS) and DHL. TNT also operated the 727, but has phased out its fleet.

There is also a group of smaller airlines which provide capacity for these larger carriers. These smaller carriers include Kitty Hawk, Express Net, Kelowna, Capital Cargo and Farnair.

The 727 replacement market is interesting, since emphasis is placed on airlines retaining the ability to interline containers between different types in their fleets. This favours aircraft with the same fuselage cross-section as the 727, thereby giving the 757 an advantage.

The major express package carriers, which also includes Airborne Express (ABX), operate hub and spoke systems. These have single or double daily flights to guarantee same day or within-24 hour delivery. These flight frequencies are sufficient to meet these delivery targets, and so these airlines do not need to increase flight frequencies on existing air routes. Traffic growth on mature air routes therefore leads to a requirement for larger aircraft. All major express package carriers have replaced their older fleets with larger types in the past 10 years, including: FedEx (A310s, A300s and MD-10s), UPS (757s, 767s & MD-11s); DHL (A300s and 757s); TNT (A300s); and ABX (767s).

This indicates the 757 is better placed as a potential 727 replacement, or has a larger potential market, than the 737-300/-400. The 737 variants may be used

to satisfy growth on smaller routes, where carriers still need to increase frequency or capacity. TNT, for example, has a fleet of BAE 146s.

The 757 is also well placed with the smaller carriers which sub-contract to the larger airlines. Many of these, including Express Net, operate larger types like the A300, in addition to the 727-200.

Continued traffic growth indicates some of these carriers could require a type larger than the 727-200. "The 757-200SF is not just a candidate to replace the 727-200, but also an A300 replacement aircraft," says Bharat Bhise, president of Freighter Conversion Partners. "Many airlines which use the A300 have payloads less than 100,000lbs. One alternative is the A310-300, but this is a heavy aircraft for long-range missions and is better as a DC-8-73 replacement. The 757 is a good 727 replacement for low frequency operations."

Initially, the most important market for the 757 comprises the express package carriers in West Europe and North America. This could be followed by express package carriers in other parts of the world, in particular Asia Pacific, as these markets develop. The 757-200SF will also become an interesting aircraft for general freight when larger numbers become available. One factor in the 757's favour is its superior field performance against the 727-200 at more challenging airports in Central & South America; thereby providing more payload capacity for operators.

727-200F & 757-200F SPECIFICATIONS

Aircraft type Conversion	727-200	757-200SF SIE	757-200SF Precision
MTOW lbs	190,500	240,000	240,000
MZFW lbs	150,000	184,000	184,000
OEW lbs	90,930	118,000	116,000
Structural payloads lbs	59,070	66,000	68,000
Main Deck			
Container types	125-inch X 88-inch	125-inch X 88-inch	125-inch X 88-inch
Number	12	15	15
Volume-cu ft	458	458	458
Total volume-cu ft	5,496	6,870	6,870
Volumetric payload-7lbs/cu ft	38,472	48,090	48,090
Lower Deck			
Volume-cu ft	1,525	1,680	1,680
Volumetric payload-7lbs/cu ft	10,675	11,760	11,760
Total volume-cu ft	7,021	8,550	8,550
Maximum packing density-lbs/cu ft	8.4	7.7	8.0
Total volumetric payload-lbs	49,147	59,850	59,850

757-200SF payload

Since the 757 is expected initially to attract interest from express package carriers, its volumetric payload characteristics with a packing density of 7lbs per cubic foot are relevant.

There are up to six passenger-to-freight conversion programmes proposed for the 757. The only one used so far is Boeing's conversion, which uses 14 of the same containers used by the 727. These containers are 125 inches wide, 88 inches tall and 82 inches long, and have an internal volume of 458 cubic feet. This gives the aircraft an upper deck containerised volume of 6,412 cubic feet.

Two conversions are under development by Structural Integrity Engineering (SIE) and Precision Conversions for supplemental type certificate (STC) award. Other conversion programmes may be developed by FSI and Pemco if the market demands them.

SIE and Precision Conversions both offer aircraft that can accommodate 15 of the same 125-inch X 88-inch X 82-inch containers. These generate a main deck volume of 6,870 cubic feet (*see table, this page*). Total volume for freight is 8,550 cubic feet when this is combined with the

aircraft's lower deck volume of 1,680 cubic feet. Both conversions expect to provide aircraft with a maximum structural payload of 66,000-70,000lbs. Maximum packing density of these two aircraft will therefore be 7.7-8.0lbs per cubic foot.

This exceeds typical express package packing densities of 7.0lbs per cubic foot. At this packing density, the 757-200SF converted under either programme will have a volumetric payload of just under 60,000lbs (*see table, this page*).

This compares to a volumetric payload of about 49,000lbs for the 727-200 (*see table, this page*). The 757-200 therefore provides a capacity increase of 22% over the 727.

The cost of conversion varies with programme. Boeing's conversion, which only provides 14 container positions and a volumetric payload of 56,000lbs, has a list price of about \$8 million.

Conversions offered by SIE and Precision Conversions are cheaper. SIE and Precision have a list price of \$4.5 million, including cargo loading system.

SIE's conversion programme is funded by aircraft aluminium supplier Alcoa. SIE has also selected UK maintenance facility ATC Lasham as its conversion centre.

Aircraft values & lease rates

Demand for the 757-200SF is dependent on the aircraft availability at a low enough lease rate. This raises the question of how low does this lease rate need to be, as well as the issue of the lease rate being sufficient for the lessor to make a profit on its investment, considering the acquisition and total build cost of the aircraft. Since the majority of build cost is accounted for by the acquisition of the aircraft, the likely lease rate will determine the maximum acquisition cost the lessor can justify.

Aircraft values will have reached a low enough level when age has reached 12-15 years and supply has increased to a level that forces down market values.

The lease rate airlines are likely to pay will depend on their operation. Although express package carriers have higher yields than other freight airlines, express package airlines have lower rates of utilisation and so require low financing costs.

Bhise comments that the 757-200SF will need to have a unit cost per available ton-mile (ATM) of about 99 cents at a sector length of 500nm to be competitive against the 727-200. "This will make it 5-10% cheaper than the 727-200, and also better than the 737-400 and a converted A320. This cost per ATM is possible if the 757 has a monthly lease rate of \$205,000-225,000. Typical small package operations will find it hard to justify a lease rate higher than \$200,000 per month."

Opinions vary about an acceptable lease rate, although estimates of what the market will bear are similar. "We think the lease rate of an aircraft needs to be about \$220,000," says Robert Convey, director of operations at SIE.

Brian McCarthy, vice president of sales and marketing at Precision Conversions comments that converted freighters have often been older types with high cash operating costs, and so low lease costs have been a necessity. "The 757's relatively low cash operating costs allow some room for moderate capital cost. I expect the 757 will require a lease rate of about \$200,000 per month, and this will be equivalent to a lease rate factor of 1.1-1.3% per month of capital cost."

This lease rate factor puts a ceiling of total build cost at about \$18-19 million, for aircraft leased at \$200,000-220,000 per month. This has to be considered against likely maintenance costs during conversion.

The 757s that come available first will be a maximum of 18 years, and most will have a good maintenance condition. The 757 also has a relatively light structural check compared to older types, and engine and heavy component

The number of 757s available on the market is at least 40. These include 35 ex-US Airways aircraft, plus others from small fleets. This surplus of 757s has seen values of 1986-1989 aircraft being marketed at values of \$14-18 million. Values are expected to drop further to \$11-12 million, and this will take total build cost of 757-200 freighter down to \$17 million. This will comfortably allow a monthly lease rate of \$200,000, and at this rate the 757-200SF would have a lower ton-mile costs than a 727-200F.



maintenance status will be reflected in the value or purchase price of the aircraft. Bhise estimates airframe and component maintenance cost incurred during conversion over and above adjusted aircraft purchase will only be about \$1.5 million. Combined with a conversion cost of \$4.5 million, total cost for all elements other than acquisition will be about \$6 million.

This leaves room of \$12-13 million for the acquisition cost of aircraft, indicating that values of the 757 will have to be low before lessors and owners can justify conversion.

The increased supply of used 757s on the market in the past year has pushed down market values, thereby increasing the possibility of conversions to freighter. These market values theoretical, however, since they are lower than book values by as much as \$20 million. Owners of a large number of aircraft would have to take large book losses if they converted aircraft. Some may be more willing to retain their aircraft, particularly younger examples, in passenger configuration with the hope of re-marketing them when the passenger market improves. The 757's problem is that it has limited market appeal. Similar to the 747, the 757 is concentrated in first tier passenger fleets and is too large for second tier carriers to fill.

Aircraft availability

There are 757s being actively marketed which are older and have low market and book values, and their owners are more likely to be willing to consider conversion.

The increase in 757s on the market means some owners and lessors will decide they cannot re-market their aircraft to passenger carriers. They may therefore decide to convert their aircraft and refinance them for a longer depreciation period using a lower lease rate of a freight aircraft.

Bhise says that there are 15 757s built between 1986 and 1989 being actively marketed at values of \$14-18 million. In addition to these he cites 35 ex-US Airways aircraft that are for sale. "This means there are at least 40 aircraft available, and there are probably more," says Bhise. "This will put downward pressure on values and these will drop to \$11-12 million, which is the right value range for a lessor to make an investment case of lease rates of \$200,000 per month."

Values as low as this will reduce total build cost to the region of \$17 million, which is the level a lessor requires to make an economic case from a probable lease rate of \$200,000 per month. This compares to a probable total build cost of \$23-25 million about 18 months ago using a conversion programme with the same list price.

This indicates that some aircraft are already in the economic zone of convertibility. The number will increase with the prospect of values falling even further.

It is also possible that large numbers will come onto the market over the next four years, putting values in a distress position and reducing build cost to less than \$15 million. At this rate lease rates could fall to the region of \$165,000 per month. This will increase the

attractiveness of the 757-200SF, and be major factor in accelerating retirement of older types, in particular the 727-200.

The aircraft currently available should also be considered against the number of aircraft that are 15 years or older. McCarthy points out that in 2003, the first year an aircraft converted under a programme other than Boeing's, there will be 169 757s older than 15 years. This will increase to 209 in 2004 and up to 453 in 2007. About 100 aircraft will therefore become eligible each year. Many should actually come onto the market, resulting in further falls in values and making conversion more economic.

Lessors are now actively considering conversion for 757s. Aircraft as young as 1993 are being considered as conversion candidates. Although these have high book values, airlines and lessors may be more prepared to take a large write down in book value in 2003 and 2004 when the overall market has regained some strength.

Market forecast

Expectations for the 757 conversion market are high. Bhise is optimistic that several hundred of these aircraft will be converted, and expects the 757 will become a premier freighter like the 727.

Precision Conversions forecasts conversion of about 600 757s over the next 20 years. It is even possible this will be exceeded, thereby accounting for the majority of 757s built.

McCarthy expects the 757's first market to be 727 and DC-8 replacement in first tier freight airline fleets, since some DC-8s are operated at low load



factors. The next market will be second tier freight operators, which also operate 727s, 707s and DC-8s.

The 757 has the advantage of low cash operating costs, and has the modern technology that will protect its position as a freight for several decades. Potential threats are the smaller A320 and A321. These will be converted by a programme already under development by EADS-EFW, although this will only occur when market values are low enough. This may not be for another 5-8 years, since the A320 and A321 fall into the size category around which passenger carriers are focussing their fleets.

757-200SF economics

The prime consideration for the 757-200SF's economics is its ATM costs compared to the 727-200 on a low utilisation express package style of operation.

The 727-200 is handicapped by its high cash operating costs of flight crew, fuel and maintenance. A sector length of 800nm and just 600 flight cycles (FCs) per year will generate an annual utilisation of about 1,450 flight hours (FHs).

At a packing density of 7lbs per cubic foot, the 727-200 will generate about 10.7 million ATMs each year, while the 757-200SF will produce about 13 million ATMs annually.

The overall economics depend on the lease rate paid for the 727-200. Market rates for high-variant 727-200Fs were in the region of \$100,000. These will be under distress without the presence of 757-200SFs on the market. A lower lease rate of \$80,000 will generate a unit cost per ATM of about 50 cents for the 727-200AF. This is for the four costs of fuel, maintenance, flight crew and lease rate.

A 757-200SF with a lease rate of \$200,000 under the same utilisation programme will have a unit cost per ATM of about 44 cents. If airlines can use the 757's higher capacity they will be able to justify replacement of the 727-200 with the 757-200SF.

The economic cross-over between the 727-200 and 757 will depend on freight capacity that can be utilised and trip cost. With the lease rates and utilisation described, the 757-200SF's trip costs for fuel, maintenance, flight crew and lease rate are about \$900 more, or about 10% higher, than the 727-200's. This compares with the 757's 22% higher capacity. Thus

The various conversion programmes coming available for the 757-200 allow 15 125-inch X 88-inch containers to be accommodated. With lower deck volume this gives the aircraft a total freight volume of 8,550 cubic feet, and a volumetric payload of about 60,000lbs when freight is packed at 7lbs per cubic foot. These freight conversion programmes have list prices in the region of \$4.5 million.

operators which immediately require 10% more volume can make an economic case for 727-200 replacement.

With the probability of 757-200 lease rates falling below \$200,000 it will be easier for airlines to replace 727s without any consideration of additional freight.

Summary

While 757 market values have fallen to the zone of economic convertability, lessors' and owners' reluctance to accept large write downs on book values are one factor holding back initial 757 conversions.

Both SIE and Precision Conversions appear to be close to finalising their STC programmes and selecting conversion facilities. Both converters report significant increases in interest in their programmes from 757 lessors and owners. SIE expects to induct its first aircraft in 2003, with delivery of the first converted aircraft for service before the end of the year. With the likelihood of more 757s coming on to the market, it will be one of the first of the new generation converted freighters to enter the market in the next few years, and its numbers will increase in years to follow. **AC**