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Bounce back

Demand for freighters is growing as the worldwide economy, and subsequently the cargo industry, begins to recover. **Ian Harbison** spoke to the leading conversion contenders for their views on the market

According to the 2014 World Air Cargo Forecast from Boeing, published in October, traffic began to grow again in the second quarter of 2013. By July 2014, it had grown 4.4% compared with the first seven months of the previous year. This followed five disappointing years since the onset of the global economic crisis in 2008, when traffic averaged only 1.7% growth per year, stagnating entirely from mid-2011 to early 2013.

Forecasts for better economic and trade growth should lead to sustained air cargo traffic growth in 2015 and 2016. Longer term, traffic should more than double by the end of the forecast period in 2033, leading to the world freighter fleet expanding by more than half, from 1,690 to 2,730 aircraft.

Of the 2,170 projected freighter deliveries, 1,130 will replace retiring aircraft, with the remainder expanding the fleet to meet projected traffic growth. More than 60%

of deliveries will be freighter conversions, of which nearly 85% will be from narrowbody passenger aircraft. A projected 840 new production freighters, valued at \$240 billion, will also be delivered, of which more than 70% will be in the large freighter category.

The imperative for efficiency favours these large production freighters, driving their share

The new kid on the conversion block is the 737-800 – a number of companies, including Boeing, have announced plans for a freighter version (photo: Boeing)

of the fleet from 21% to 30% during the forecast period. Growing demand for regional express services in fast-developing economies will increase the narrowbody share of the fleet from 35% today to 40% in 20 years. All new deliveries of narrow-body freighters will be converted passenger aircraft.

Boeing

Boeing has made a new move into the market with the recent announcement that the board has given authority to offer a 737-800 Boeing Converted Freighter (BCF). Dan da Silva, Vice President of Modification and Conversion Services at Boeing, says the company anticipates having enough commitments in the first quarter of 2015 to formally launch the programme. If so, the first aircraft could be delivered in late 2017.

He describes the 737-800 BCF as possibly the simplest conversion Boeing has ever done; the result of a design philosophy that balances capability and the need for a very competitive price. The longer fuselage, compared to the 737-400, means it can carry 12 pallets (11 88in x 125in and one 53in x 88in) on the main deck – one more than the 737-400 – achieving a maximum payload of 26,300kg with a 2,000nm range. Most importantly, the 737-800 has been designed from the outset to have significantly lower operating costs. In addition Boeing is also looking at all the processes of the aircraft conversion to reduce flow times.

The need for the aircraft is driven by three main considerations: the first is regulatory pressure in key markets where there are age limits on aircraft, such as China; secondly, demand in China is such that by 2020 there will not be enough 737-400s to meet requirements; and finally there is a need for more advanced avionics to take advantage of RNP and FANS capabilities, which today require airlines to invest between \$2 and \$3 million to upgrade older generation 737-300s and -400s. There is still very high demand for the aircraft for passenger use though 737-800 deliveries started in 1998, with many being part of sale/leaseback deals. As 10-year leases are completed there will inevitably be returns as well as renewals, which should provide adequate feedstock, anticipates da Silva.

As for where Boeing will perform the touch labour for the conversion, the company says it released RFIs in June and July and has

received several expressions of interest. This will be followed by RFPs to suitably qualified providers, with the expectation that there will eventually be two or three BCF sites worldwide. These could be from a single touch labour provider or several organisations.

Boeing is also considering the 737-900ER BCF, but not until the early 2020s. This conversion would potentially offer higher payloads than the 737-800 BCF, getting somewhat closer to the 757-200SF, says da Silva. That aircraft is ideally suited to the Chinese market and, despite demand being strong, feedstock is extremely limited due to both the FedEx acquisition of more than 100 aircraft (the latest from United) and the fact current operators are hanging on to their aircraft until the end of their economic life.

SF Airlines, a subsidiary of package specialist SF Express, is the biggest 757-200SF operator in China. However, it has just placed an order with Boeing for an undisclosed number of 767-300ER passenger-to-freighter conversions. It will accept its first redelivered aircraft in the second half of 2015.

The 767 conversion market should now start to move, says da Silva. Delays to the 787 have forced airlines to keep their older aircraft in service but he believes that, with

the 787 fleet now reaching 200, a critical mass has been reached and more feedstock will become available. Today, Boeing's sole provider of touch labour for the 767BCF Program is ST Aerospace Services Company (SASCO) in Singapore, which can increase capacity if necessary. Wagner Aeronautical has recently entered into an STC license agreement with Boeing for the 767-300/300ER variant, but da Silva says this will have a lower payload capability than the BCF version.

IAI Bedek

Unannounced until now, IAI Bedek has also applied for a licence for the 737-700/800 and is already in advanced discussions with a launch customer, says Jack Gaber, Senior Vice-President Marketing and Business Development. The first project will be the 737-700, with work due to start in the first quarter of 2015, for first delivery in 2016. The 737-800 will start in late 2017, with faster redelivery coming in early 2018. Though these aircraft are more expensive, this is a relatively low-cost conversion, he says, and there is a real effort to design to cost in order to make the project viable. The 737-800 variant should also have the greatest demand. ▶



While IAI Bedek is interested in the 737-800, it believes that mid-sized aircraft like the 767 will have much faster growth than narrowbodies, growing from 25-30% to 40% of the market over the next 10 years (photo: IAI Bedek)

Gaber notes that all the 737NG projects will produce aircraft with similar payload/range characteristics, thus he is slightly surprised by Boeing's entry into the market. The company will receive the licence fees from all the other players regardless, so he does not see how an OEM can either compete effectively on cost with specialist conversion houses or bring forth any unique product enhancements.

At the same time, he is keen to make the point that IAI Bedek is a fully fledged OEM across a range of aerospace product lines; this means it has engineering and design capabilities similar to Boeing and can utilise these for cargo modifications. "Size matters in this business," he says.

This business includes freighter conversions for the 737, 747 and 767. He says that Bedek has stepped back from the 737 market as it has been extremely busy with widebody conversions, leaving it solely to AEI and PEMCO. However, since the 747 has slowed in the last few years – and is unlikely to recover despite lower fuel prices – and, in view of the demand for narrowbody conversions, Bedek is planning to once again become active in this market. The company was also involved in a partnership with ST Aerospace on the 757 but this has lapsed, leaving it, for the moment, as the leader in the 767 market with some 75 aircraft in service, primarily 767-200s.

Unlike the Boeing World Air Cargo Forecast, Gaber believes that mid-sized aircraft like the 767 will have much faster growth than narrowbodies, rising from between 25-30% to 40% of the market over the next 10 years. There are several reasons for this: one is feedstock – in this regard he agrees with da Silva that there will be greater availability, saying that 2015 will see the arrival of more -300ERs; another is that the Airbus A330 is maintaining its value, so there are few surplus airframes available and even if there were, there is no conversion programme ready yet. China, as ever, is also proving influential, with its internal growth being driven by the package business, which is increasing rapidly as a growing middle class spends its disposable income on consumer products online. As they demand fast delivery, Gaber believes there will inevitably be a need for larger aircraft than the current 737 fleet. While these larger aircraft will be more efficient on longer routes, they will end up operating the 737 network. Finally, there is no alternative available offering a similar capacity for the aging McDonnell Douglas DC-10/MD-11



freighters – a capacity which is 1.5 times that of the 767. That means a 2:1 replacement ratio, with FedEx alone having over 100 of these aircraft currently in service with integrators.

The last Boeing model is the 777 freighter. The company has completed feasibility studies for this conversion and is planning to launch the programme in correspondence with the market conditions. The -200ER variant might become available in 2018 while the -300ER is likely to arrive in 2022 at the earliest.

Overall Gaber says 2014 will be an improvement on 2013, but it will still not be great. However, 2015 is looking far more positive.

Precision

Following a restructuring of the company earlier this year, Brian McCarthy, Vice President of Marketing & Sales, says Precision Conversions is now in a good place. Under the new structure, Precision Aircraft Solutions is the overarching organisation that will coordinate the operations of five subsidiaries: Precision Conversions, Precision Engineering, Precision Program Development, Precision Aviation Resources, and Precision Materials and Logistics.

Although the company will continue its

Boeing 757-200PCF Freighter programme, the aim is to use its internal capabilities to engineer, integrate, design, certify and support a wide range of repairs and changes for owners and operators. This includes interior, systems and structural modifications. For clients seeking a turnkey approach, it will even identify, source and acquire aircraft suitable for conversion.

Beyond the changes, the market has finally swung Precision's way, McCarthy says. Following the post 9/11 slump in the industry aircraft values were down, however there were no customers. This was followed by a period where 757 values spiked as major conversion programmes were proposed, pricing out smaller operators. Now, the freight industry is coming out of recession, just as aircraft values are reaching realistic levels due to major airlines starting to shed their passenger fleets. Additionally, older freighters like the 727 are becoming increasingly expensive to maintain, even if there is an abundance of spares.

By the end of 2014, Precision will have 45 completed conversions, with three more in progress. McCarthy sees the eventual market topping out around the 100 mark.



However, he does not expect any aircraft produced before 1990 to be a candidate due to reduced payload capability and the likely remaining airframe time. Flight cycles are key – a conversion candidate with 29,000 cycles remaining is a good target, making the asset viable for a total of 50,000 cycles, or more than 20 years of operation.

He points out that this will be the challenge facing operators of 737 freighters, who are flying three or four sectors a day and essentially wearing them out. As there are

only so many of these aircraft that can be thrown at the eastern seaboard of China, McCarthy says, the introduction of the larger 757 is almost inevitable. The aircraft will also be able to fly a 1500nm route followed by a short hop, which balances the flight hours to flight cycles ratio and controls the overall cost per cycle, per engine, in the tight 'dollar per pound' cargo world.

China is certainly an important market for Precision. It has conversion partners in Air China Technic at Chengdu and Taikoo Aircraft

Engineering Company (TAECO) in Xiamen, with Air China Cargo having four aircraft, two from each partner, which are operated for China Post. TAECO recently delivered an aircraft to DHL affiliate Blue Dart. This was the fifth aircraft overall delivered to the Indian carrier and the 16th 757 converted by Precision to fly in the DHL global network.

As noted above, the largest Chinese customer is SF Airlines, which has nine aircraft – seven from TAECO and one from Chengdu, the remaining aircraft having been converted at FlightStar in Jacksonville, FL.

Flightstar has carried out 29 conversions so far. Although no aircraft are being worked on at present, McCarthy expects the two sets of tooling that are kept in the facility will be back in use in the future. Also in the US, AeroTurbine in Goodyear, AZ – which recently expanded its MRO facility – was added as a conversion facility last year, the first aircraft being a 757-200PCF for Cargojet of Canada. In April this year, the company added a second hangar with more than 9,290m² of additional space for narrowbody aircraft maintenance and 757 freighter conversions.

In addition to the basic 15-pallet 757-200PCF, the company also received FAA STC approval in 2013 for a 757-200PCC combi variant that includes 10 full cargo positions and seating for 54 passengers, along with full galley and lavatory facilities. The first aircraft is owned by Cargo Aircraft Management, a subsidiary of Air Transport Services Group (ATSG), and is leased to, and operated by, Air Transport International, likewise a subsidiary of ATSG. ▶

Precision is feeling confident as the freight industry is coming out of recession, just as Boeing 757 values are reaching realistic levels (photo: Precision)

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AEI has production lines at Commercial Jet (nine lines); Flightstar Aircraft Services (one line); Boeing Shanghai Aviation Services (one line); and AIROD Aerospace Technology (one line) (photo: AEI)

This aircraft was the first to be fitted with Blended Winglets from Aviation Partners Boeing, which were approved by EASA in August 2014. This is an important development, he says, making the aircraft more attractive to potential customers, as it promises improved fuel efficiency and a higher payload, the latter being more important. Of course, the weight of the winglets has to be offset, but Precision Conversions already has FAA and EASA STC approval for a Maximum Zero Fuel Weight (MZFW); this allows for a payload increase up to an additional 3,628kg for both Rolls-Royce and Pratt & Whitney-powered 757-200PCFs above line number 210. This was developed with Leth & Associates in 2011 and increases the potential total payload of the 757-200PCF up to 36,287kg.

McCarthy describes the 757-200PCF as “a racehorse”, compared to the “cart-horse” 727, while the 737 is “a dump truck for a depressed economy short on cargo for bigger freighters”. However with cargo volume and traffic improving, there is pressure on ramp space, routes and slots. This means freighters will gradually get bigger and he believes the 757 has the pedigree and performance to succeed in that market.

AEI

Robert Convey, Vice President – Sales & Marketing at Aeronautical Engineers Inc (AEI), says this has been a record year for the company, predominantly for 737 conversions. Seven 737-400SFs and one

737-300SF were delivered during the third quarter of 2014 alone, while the annual total will be in excess of 30 aircraft. If feedstock remains available, AEI is forecasting over 35 unit deliveries in 2015.

With those rates, nearly all 12 production lines are up and running at the company's partners that carry out the touch labour. These include: Commercial Jet at Miami International Airport, FL (four lines); Dothan Regional Airport, AL (five lines); Flightstar Aircraft Services in Jacksonville, FL (one line); Boeing Shanghai Aviation Services at Pudong International Airport, Shanghai, China (one line); and AIROD Aerospace Technology in Kuala Lumpur, Malaysia (one line). With such large numbers, the partners have started to develop flow processes, while turnaround times are reducing for the actual conversion – although there are still items arising during the associated maintenance, reflecting the age of the aircraft.

The popularity of the 737-400 is based on low acquisition costs and high numbers of feedstock from major airline retirements, although Convey notes that some customers have acquired aircraft from the desert. Either way, a figure of about \$7 to \$8 million is a good guideline price for a converted 737-400SF aircraft: \$2 to \$3.5 million for aircraft feedstock; \$2.75 million for conversion; and \$750,000 to \$1.5 million for maintenance. Also, many older 737-300 freighters are now coming up for replacement. In addition, he says the AEI

737-400SF 11 position freighter has become the aircraft of choice for DHL Express, while TNT is replacing their BAe 146 fleet on a ‘one for two’ basis. However, despite major players actively seeking airframes because of the wide availability, prices remain unaffected. Finally, there are start-up airlines appearing in developing economies.

Despite a very recent order for two firm and five optional 737-400SF conversions from Airwork of New Zealand, Convey says Europe is the hotspot in the market right now. In September, Swiftair of Spain ordered four firm 737-400SFs plus an additional four options, however the US is catching up, he adds.

Convey acknowledges that certain customers are flying more than usual – Sideral in Brazil is operating eight or nine sectors most days of the week, while DHL is operating 45-minute sectors out of Cincinnati – but some take the view that they can simply get a replacement and thus have no concerns. He also points out that high utilisation equals higher revenues.

He sees the market for the AEI 737-400SF continuing strongly through 2018 as the AEI 737-800SF starts to take over. The company has already anticipated this, having finalised an STC license agreement with Boeing for the 737-800 passenger-to-freighter and the 737-800 combi conversion. The agreement also includes engineering data for the 737-900.

Convey believes the purchase price of the 737-800 will be relatively high, thus customers for the conversion will most likely be companies who already own the aircraft – especially leasing companies.

AEI: MD-80

In February 2013, AEI gained Boeing-licensed STC approval for its McDonnell Douglas MD-80SF passenger-to-freighter conversion, which covers MD-81, MD-82, MD-83 and MD-88 models, of which there were 779 passenger units manufactured. Most of the conversions will be carried out at Commercial Jet in Miami, FL, although a single line will be available in Dothan, AL, as well.

The conversion includes an 85in x 136in cargo door in the forward port fuselage, a low profile 1.25in Ankra cargo loading system (CLS) and a 9G rigid cargo barrier with a sliding door supplied by Ventura Aerospace. Up to five supernumerary seats can be fitted. The configuration on the E-class main deck has 12 positions for an 88in x 108in CLS, with options for eight 125in x 88in

CLS or 125in x 96in CLS, longitudinally oriented. The main deck payload is 20,870kg or 410m³, with average 2,040kg position weights for the 88in x 108in configuration.

Customers to date have included Everts Air Cargo in Alaska (one MD-82SF), Aeronaves TSM based in Saltillo, Mexico (two MD-82SF), Astral Aviation of Nairobi, Kenya (one firm and two optional high gross weight MD-83SF) and FITS Aviation of Sri Lanka (two MD-82SF).

Convey says demand has been slower than anticipated but interest is growing as suitable 737-400 feedstock becomes harder to find. He anticipates up to four conversions annually over the next few years.

AEI: CRJ

The third product line for AEI is the Bombardier CRJ. In October 2012, the company signed an agreement with Bombardier Aerospace to explore market interest in a Large Cargo Door (LCD) freighter conversion programme for the CRJ200 aircraft. A market study found significant interest and opportunity as

traditional regional feed operators were providing increased service to large cargo carriers. At the same time, older CRJ100/200 aircraft were being phased out by airlines transitioning to larger regional aircraft, as values had fallen to a point where conversion was viable. As a result, AEI became a Bombardier-licensed third-party STC provider in February 2013. The Preliminary Design Review (PDR) was completed in November of that year.

The CRJ100/200 SF aircraft will provide a maximum payload of 6.7 tonnes, with a volume of 52.8m³. It will come equipped with an Ancre CLS capable of hauling pallets, containers or bulk-loaded material. The main deck converts to a Class E cargo compartment with a 94in x 77in forward door, featuring AEI's hydraulic actuation and latching systems which have been installed on more than 400 freighters. The door is located in the forward part of the fuselage, just aft of the standard passenger door, which is retained. Safety features include a single vent door and a rigid 9G

barrier, while the cabin windows are replaced with lightweight aluminium plugs.

Convey says the AEI CRJ200 SF cargo door is about 25% of the size of the 737 door, and will incorporate the latest FAA/EASA requirements for improved latching. These improvements will then be reincorporated into the design of the AEI 737-800SF and 737-900SF doors.

He expects the first delivery to be made in the second half of 2015. Just as the AEI 737-400SF is the workhorse of its sector, he expects the AEI CRJ200 SF to carry out the same role at the bottom of the market.

PEMCO

Kevin Casey, President of PEMCO World Air Services in Tampa, FL, says his company expects to deliver 20 aircraft this year, a level of activity similar to 2013 and one that looks likely to continue into 2015. He points out that 2014 has seen an equal mix of 737-300 and 737-400 freighters, but that the latter activity may dip within a couple of years as heavy-weight feedstock becomes limited. ▶




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China has been an important market for several years; as such, one of the company's conversion partners is Taikoo (Shandong) Aircraft Engineering Company (STAECO) at Jinan Yaoqiang Airport, Shandong. This facility recently delivered the third of five 737-300 conversions for Beijing-based China Postal Airlines EMS, which is expanding its fleet in support of its '56 Cities' expansion campaign. In fact, PEMCO and HAECO Group (STAECO and Taikoo (Xiamen) Aircraft Engineering Company (TAECO)) have partnered on nearly 50 737-300 and 737-400 freighter modification projects since 2006. Other key Chinese customers include HNA's Yangtze River Express in Shanghai – which has 17 PEMCO-converted 737-300/400s, including three converted by STAECO and TAECO which were delivered in July this year – and SF Airlines, which will soon take delivery of its 10th PEMCO-converted freighter.

The company has also extended its partner network this year, adding its eighth conversion line at Coopesa in Costa Rica. This is strategically located between North and South America with the facility completing its first PEMCO 737-400F for Brazil's Rio Linhas Aéreas (Rio Cargo). Interestingly, the carrier is planning to replace its current fleet of 12 727s and two 767s with the 737-400F. These will fly operations for DHL Express and also Correios, the courier division of the Brazilian Postal Service. The Coopesa mod site recently completed a 737-300 for UK-based Plane Business Leasing, and is in the final stages of completing a 737-400F for a Middle East-based customer too.

Rio Cargo's plans clearly differ to the general view of the industry, in that it sees a larger aircraft as the next step. Casey also holds similar views, having a different take on the market for 737NG freighters. His argument is that the residual value for the 737-800 is far too high, quoting current prices of \$13.5 million for a teardown and \$15 million for a flyable aircraft built in 1998. Allowing for the actual conversion and maintenance, that could mean a final bill of around \$20 million – far more than the market can stand. He does not see these values decreasing significantly before the aircraft's supposed entry into service in 2017.

He is also not surprised by scepticism regarding Boeing's direct involvement in the 737-800, opining that the market does not value OEM involvement with proven



PEMCO's latest conversion partner is Coopesa in Costa Rica – a strategic location for customers such as Rio Cargo of Brazil (photo: PEMCO/Fabrizio Jimenez)

STC holders, like PEMCO, on smaller aircraft, simply because it usually comes with a cost penalty. Of course, there will be an eventual need for the 737-800 and PEMCO will be offering it to customers, with Casey saying that it will make a "terrific freighter", though he projects it will only be converted in large numbers once passenger aircraft exit service at prices approaching half the current market values.

In addition to the 737-800, PEMCO's STC 737NG freighter development programme includes the 737-700. This will form the basis of the company's initial foray into the 737NG freighter market.

The current values for the -700 are such that Casey believes PEMCO can hit the sub-\$9 million price tag for a fully converted aircraft with C check – something he feels is workable with today's freight economics. While it carries two pallets less than the -800, he points out that the -700 is superior to the -300 in all critical freighter attributes, therefore he expects the customer base is likely to consist of current customers with aircraft coming to the end of their useful life, with no need for more capacity. This is particularly true of express package operators, namely those with networks supported by a mix of aircraft sizes, such as 737-300/400s or 737-300/757s.

In contrast, the 11-pallet -800 is seen as a -400 or 727 replacement. With IATA reporting global freighter load factors around 50%, he says it may be hard for carriers to justify upgauging (by just one pallet position versus the -400) to a 737-800F, as it costs 250% of the price of the 737 Classic freighter.

He points out that early adopters of new freighter options like the 737NG tend to be high-utilisation carriers. They are often more sophisticated companies with well-planned networks and right-sized aircraft options. In regard to some of today's customers, having just invested in -400s they will be in no rush to upgrade within the next few years.

Experience also suggests that integrators tend not to get involved at the early stages of a new freighter option, as they are often very price disciplined, whereas early adopters are driven by strategy. Further still, greater efficiencies come with larger aircraft and the 757 – which he calls 'the elephant in the room' – has just four more pallets than the -800F while, at less than \$10 million today, the 757-200F offers better economics.

Casey also mentions that PEMCO's 737 freighter STC is not restricted to pure freighter conversion. The company will continue to offer Quick Change, Combi and Convertible variants – something that has become a useful part of the business. In the last year or so, it has delivered 737-400 Combi aircraft with four and a half pallet positions and seats for 72 passengers for operators including: First Air, for services in the far north of Canada; Safair, for humanitarian and charitable relief operations in Africa; and two aircraft to the Colombian Air Force for special missions and humanitarian operations.

Taking all this into consideration, he believes the company's different view of the market is the winning one and expects the first 737-700F to enter service in 2016, followed immediately by a suite of -700 and -800 variants based on customer demand. ■