

Upward Bound



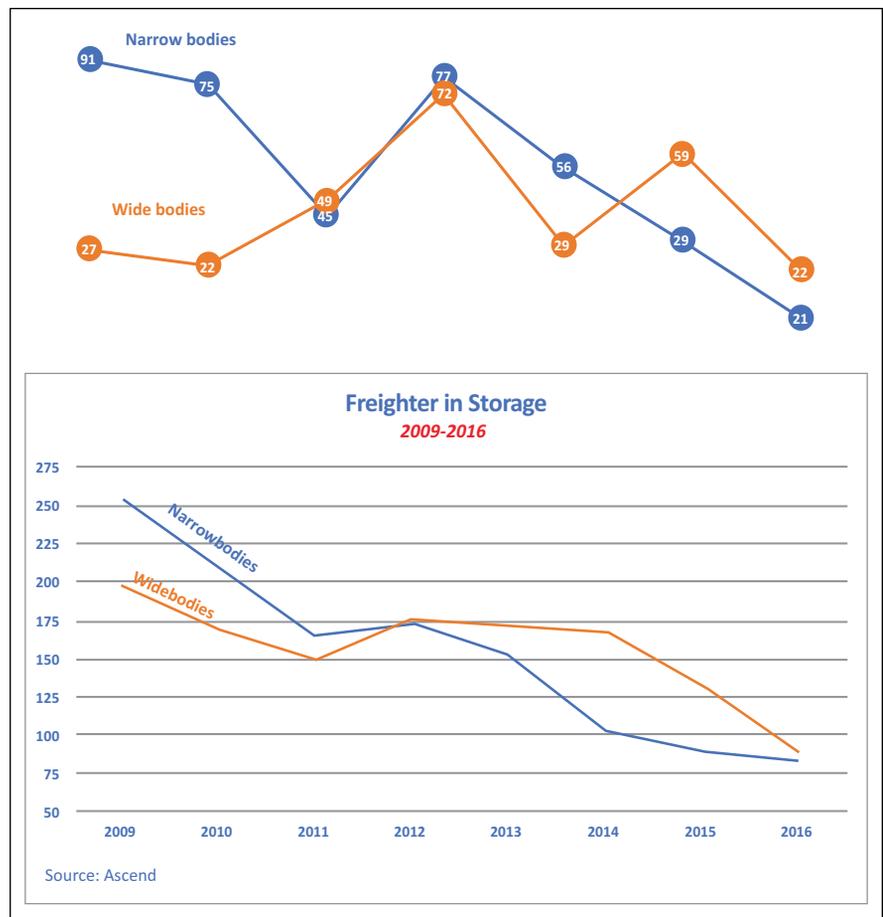
Freighter Market Recovery Finally Underway

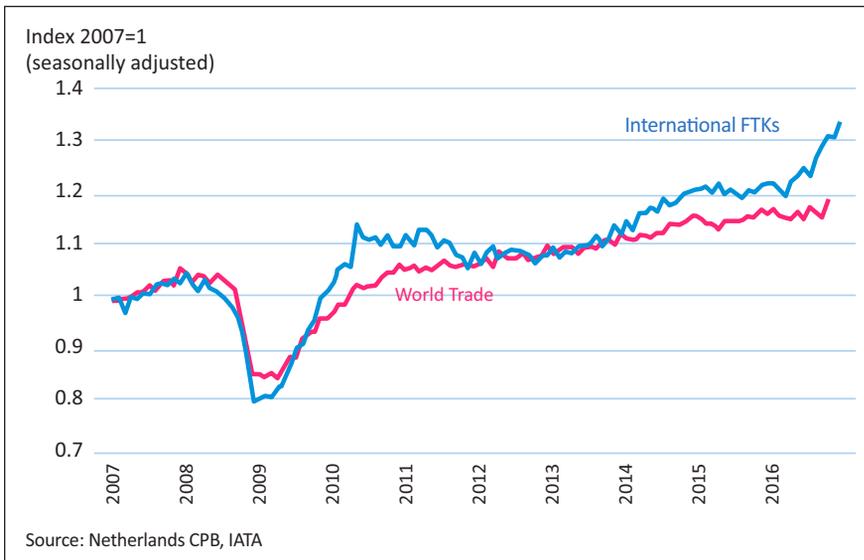
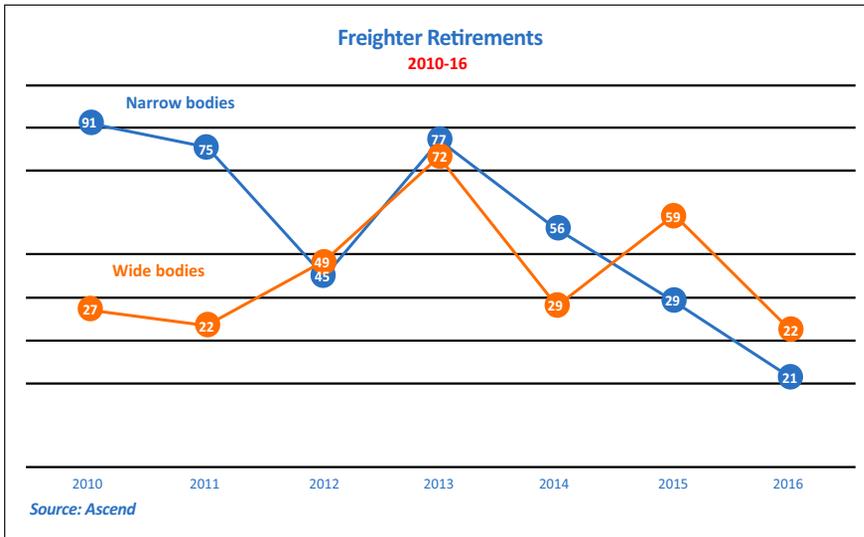
By Stephen Fortune, Principal, Fortune Aviation Services LLC

For those familiar with the freighter aircraft market, 2009 seems like an eternity ago. At that time, freighters of all ages and types were flying into desert storage in record numbers. Air cargo demand had fallen dramatically as the impact of the global recession set in. Some international carriers grounded most of their long-haul freighters, and 777 passenger bellies were considered a real threat to the future of main deck airfreight. Meanwhile, ocean and rail shipping, always more cost effective, became faster and more reliable and with track-and-trace capability formerly only available from the integrators.

What a difference a few years makes. As indicated in the graph below, the deserts began to empty out with older aircraft scrapped and younger units going back into service. By the end of 2016, the number of stored freighters had dropped by 60 percent.

Concurrently, freighters were being retired in record numbers. In the past six years, 50 percent of the narrowbody freighter fleet (almost 400 aircraft) was retired. While the global recession was partly responsible, the age and reliability of the existing fleet of 727s, DC9s and older 737s was the primary driver that compelled





operators to replace these aircraft with next-generation freighters such as the 737 Classics and 757s. The abundance and favorable pricing of feedstock resulting from the passenger airline replacement cycle also contributed to narrowbody freighter turnover.

In the case of widebody freighters, retirements were predominantly the result of the global recession. The 747 freighter, which carried trans-Pacific and Europe-Asia traffic, experienced a 35 percent fleet reduction between 2010-2016, with 138 units permanently taken out of service. The global downturn was the catalyst, but A300B4s, DC-10s and MD11s were also forced into retirement due to high operating costs (i.e. fuel burn, crew and maintenance costs).

Fortunately, the freighter market has turned the corner, and a resurgence in

freighter conversions and new deliveries is underway. Global trade has recovered, shipments lost to ocean shipping are returning, and yields and load factors are rising. Adding to existing freight flows, two specific markets stand out as key drivers that should sustain long-term growth in the freighter fleet.

e-commerce

While e-commerce — formerly known as business-to-consumer (B2C) — has been in the market for many years, it is now experiencing tremendous innovation and explosive growth. e-commerce has provided a profitable segue for the integrators as the overnight document market declined. Sales volume on Cyber Monday and Singles Day (China) alone topped \$18 billion in 2016. Although global e-commerce sales exceeded

\$1.9 trillion in 2016, this was still only a fraction of the total global retail sales of \$27.7 trillion. With continued movement from brick-and-mortar retailers to online shopping and a rapidly growing global middle class, e-commerce is widely expected to capture a larger market share of retail sales.

B2C market growth will, in turn, be a major component in the demand for additional freighters. The best example of this additional demand is Amazon's aggressive move to bring a portion of its delivery network in house. Last year, Amazon signed agreements with Atlas Air and ATSG to operate 40 767-300SFs, as well as taking an ownership interest in both companies. More recently, Amazon announced its intentions to build a \$1.5 billion air hub in Cincinnati. Amazon's actions clearly foreshadow their interest in air transportation of their products, and further freighter acquisitions can be expected.

Intra-China Air Freight

China is rapidly building out the country's air transportation infrastructure to support growing demand for passenger and freight growth, driven by ongoing urbanization and a burgeoning middle class. As a vivid illustration of how underdeveloped the intra-China airfreight market is, one need only consider that China has a population four times the size of the U.S., but the U.S. domestic freighter fleet is more than three times larger. Although several Chinese carriers have added converted narrowbody freighters in recent years, future growth clearly points to the need for a significant number of additional aircraft.

Freighter Aircraft Review

Narrowbodies CRJ-100/200

AEI, which has a long history in the freighter conversion business with 440-plus conversions, saw a market opportunity for a regional jet freighter and in cooperation with Bombardier launched a CRJ-100/200 conversion program in 2013. The aircraft provides eight main deck pallet positions and a 15,000-pound payload. The aircraft is designed to service small, short-haul markets — particularly those that have limited road and rail options. Despite a degree of skepticism from the competition, the prototype is completing certification, and six units are expected to begin the conversion

process in the next four months with an additional order backlog of 48 aircraft.

MD80

Like the CRJ, AEI undertook a speculative conversion program for the MD80 with the first delivery in 2013. On paper, the aircraft makes a productive freighter with low feedstock and operating costs coupled with a payload greater than the 737-300SF. Despite plentiful feedstock, the program has failed to catch on with only eight conversions completed and an additional

two in progress for operators in Alaska and Mexico. A modest number of additional aircraft are likely to be converted.

737 Classic

The narrowbody replacement requirement mentioned previously has largely been filled by the conversion of 737-300s and -400s. Since the end of 2009 through March 2017, 168 737 Classics have been converted at an average of 27 units per year. Feedstock pricing initially drove operators to consider the smaller -300; however as -400 values fell

in the past few years, operators switched to the -400 with two additional pallet positions and little additional cost. As a result, only 53 300s were converted as opposed to 115 -400s. Despite a combined backlog at the two providers (AEI and Pemco) of 35-40 aircraft, the supply of good -400 conversion candidates is rapidly dwindling, and 737 Classic conversions are expected to wind down in the early 2020s.

737-800

The logical replacement for the 737 Classic is the 737-800 — a successor aircraft with one additional pallet position versus the -400 and improved operating economics. AEI was the first to announce a program with an order for GECAS, but this was quickly followed by Boeing and Israel Aircraft Industries (IAI) announcing their own programs. AEI is projected to deliver its first conversion by the end of 2017. Currently 737-800 passenger aircraft values are too high to produce a cost-effective freighter despite its improved operating economics versus the 737 Classic. When the 737 MAX reaches a mature production rate, 737-800 values should begin to fall, stimulating demand for converted freighters. Conversion programs should reach sustainable production rates by 2021 or earlier.

A321-200

The ST Aerospace/EFW consortium is currently developing an A321-200 freighter conversion using engineering data provided by Airbus. The aircraft will be available with as many as 14 main deck pallet positions, a payload up to 60,000 pounds (later delivery aircraft) and a range of 2,300 nautical miles. These performance characteristics position it between the 737-800SF and the 757PCF. Although getting a later start than the 737-800SF, it has advantages in feedstock pricing and unit cost economics that will make it an effective competitor. However, this will be the first Airbus narrowbody freighter and will need a compelling argument to replace aircraft with existing Boeing operators. Program certification is projected for 2018.

757

The 757 converted freighter has been a solid success with 238 aircraft converted, a backlog of 36 with conversions available primarily from two vendors — Precision



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Weighing in with an OEW as low as 115,500 lb., the Precision conversion is the lightest 757 conversion in production today. With the highest available payload of any converted 757, plus winglet compatibility, Precision Aircraft Solutions is the undisputed conversion champion.

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Aircraft Solutions and ST Aerospace. Although the three major integrators, DHL, FedEx and UPS operate the aircraft in their networks, smaller airlines struggle with the greater complexity and higher engine overhaul costs. As a result, more than 80 percent of the fleet is operated by the integrators with most other fleets at less than five aircraft. DHL is currently renewing its 757 fleet, but when that is completed, the primary market for converted aircraft will be in China. Conversions will begin to taper off in the next 2-3 years with no equivalent replacement available. Operators with a 757 size requirement will most likely down gauge to the A321-200SF or 737-800SF.

Widebody Freighters

767-300ER

The 767-300ER freighter conversion program launched almost 10 years ago with a Boeing order from ANA and high expectations for a successful program. Unfortunately, the program encountered strong headwinds with the delayed introduction of the 787 and, subsequently, the global recession. In addition, the aircraft continued to be popular with passenger carriers and, as a result, feedstock values remained too high to produce an economically competitive freighter. FedEx, which needed additional capacity in this size category, eventually opted for the 767 production freighter. Due to these factors, only 24 units were converted through the end of 2015.

With the eventual drop in feedstock values and Amazon's recent requirement for 40 aircraft, the 767 conversion programs have rebounded and, with 250 or so good feedstock aircraft remaining, is likely to continue for the next 5-7 years. The production aircraft is also on solid ground with nine firm and 59 options stretching to 2022.

A330

The principal competition for the 767-300ERSF will come from the A330-300SF. Initially, Airbus offered the A330-200 production freighter. This shorter fuselage version of the -300 never achieved broad market acceptance due to the high capital cost and limited payload. Only 46 aircraft are now in service with firm backlog of four aircraft.

Airbus eventually decided to support an A330-200/300 conversion and provided engineering data to ST Aerospace/EFW for program development. The company received a launch order for a single -200SF from Egypt Air and more recently an order from DHL for four -300SFs. The DHL order provides momentum and stability for the program, and as suitably priced feedstock with the proper weight configuration become available, the program should flourish. The aircraft is a natural replacement for the A300B4 and A300-600 and

will compete very effectively against the 767-300ERSF.

777

With 18 airlines operating a combined fleet of 139 aircraft and 38 orders/options, the 777F can already be considered a highly successful freighter program. The combination of range and payload allowed operators to replace or add markets served with MD11s and 747s.

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NOVUS AVIATION CAPITAL

ON AN ASCENDING JOURNEY

<p>Virgin America 3 x A320-200 2016</p>	<p>Avianca 2 x A319-100 2016</p>	<p>VietJet Air 3 x A321-200 2016</p>
<p>Lion Air 3 x B737-900ER 2016</p>	<p>Emirates Airline 5 x B777-300ER 2016</p>	<p>Vim Airlines 1 x B777-200ER 2016</p>
<p>Ortus Aviation Leasing Fund 2016</p>	<p>LATAM Airlines EETC C-Tranche 17 aircraft - 2017</p>	

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A 777 conversion program has been discussed and evaluated for several years. Boeing has indicated in various forums that the conversion cost would be much higher than comparable aircraft and would produce a freighter less capable than the production aircraft. Israel Aerospace Industries (IAI) has indicated that they are studying the feasibility of offering a conversion. If a program is launched, it must compete effectively against the 747 converted freighter — a tall order considering the engineering challenges, feedstock pricing and higher conversion cost.

747

As previously discussed, the 747 freighter was hit hard by the global recession with

more than 70 aircraft sitting idle in the desert at one point. Through a combination of retirements and renewed demand, the stored aircraft fleet has been reduced to 40-or-so units with most destined for retirement. Not surprisingly, lease rates have been depressed with some lessors agreeing to power-by-the-hour arrangements to keep the aircraft flying. With the “right sizing” of the fleet during the recession (35 percent reduction), a more normal rate of attrition for the 220 remaining aircraft can be expected. As a result, the 747-400 freighter fleet with an average age of 17 years should continue to operate well into the 2020s, barring an oil shock or black swan event.

The 747-8F, most likely the last variant of a type first delivered in the 1960s, has

achieved a turnaround from a near-death condition. At the beginning of 2016, the backlog for the -8F was seven units, which was insufficient to continue the production line until the anticipated order to replace Air Force One in the early 2020s. However, with new orders from UPS and Air Bridge Cargo, the backlog now stands at 20 units with 49 options stretching to 2022. Additional large orders prior to 2020 are unlikely, but after that point, demand should increase as 747-400s begin retiring in greater numbers. It is important to consider that the 747 production freighter is the only Western-built aircraft with nose loading and outsize cargo capability and therefore likely to remain in operation until 2050 and beyond.

