

# FREIGHTER MARKET

## New Paradigm or Irrational Exuberance?

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In my years working in the freighter acquisition, conversion and leasing business, there has never been a period of sustained and broad market growth like that which is now occurring. A sampling of recent headlines tells the story:

*Freighter frenzy as peak season books in early* (Air Cargo News Sept 2017)

*Air Freight Demand up 9% in 2017* (IATA Jan 2018)

*Strong air cargo demand set to continue in 2018* (Air Cargo News Jan 2018)

*Air freight rates continue to rise* (Cargo Facts blog Mar 2018)

And...

*"Air freight demand growth starting to look sustainable"* (JOC.com Mar 2018)

In IATA's opinion, this extraordinary growth does not conform to market behavior in previous supply/demand cycles. In

fact, they bring up the issue of the "potentially increasing importance of areas such as e-commerce and pharmaceuticals — are helping airfreight growth to decouple from global goods trade." IATA forecasts that airfreight will grow 4.9 percent on average over the next five years — a higher rate than global GDP.

If these forecasts are accurate, there are significant freighter market implications.

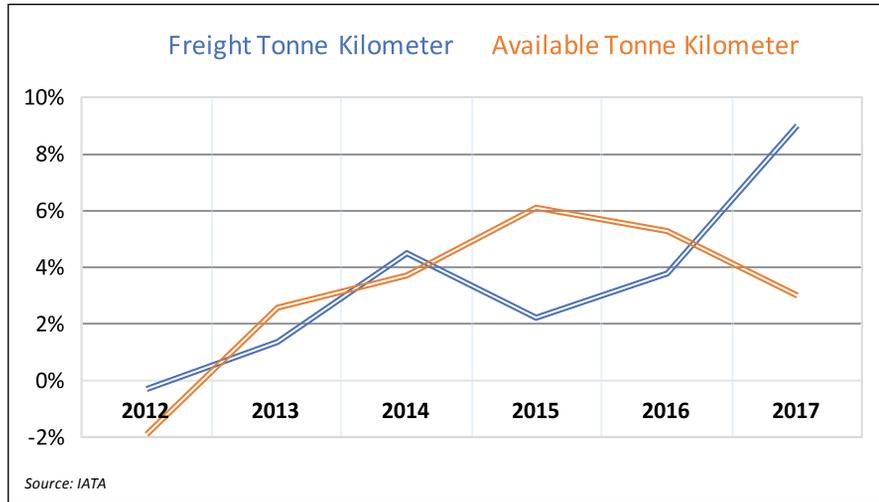


Fig. 1

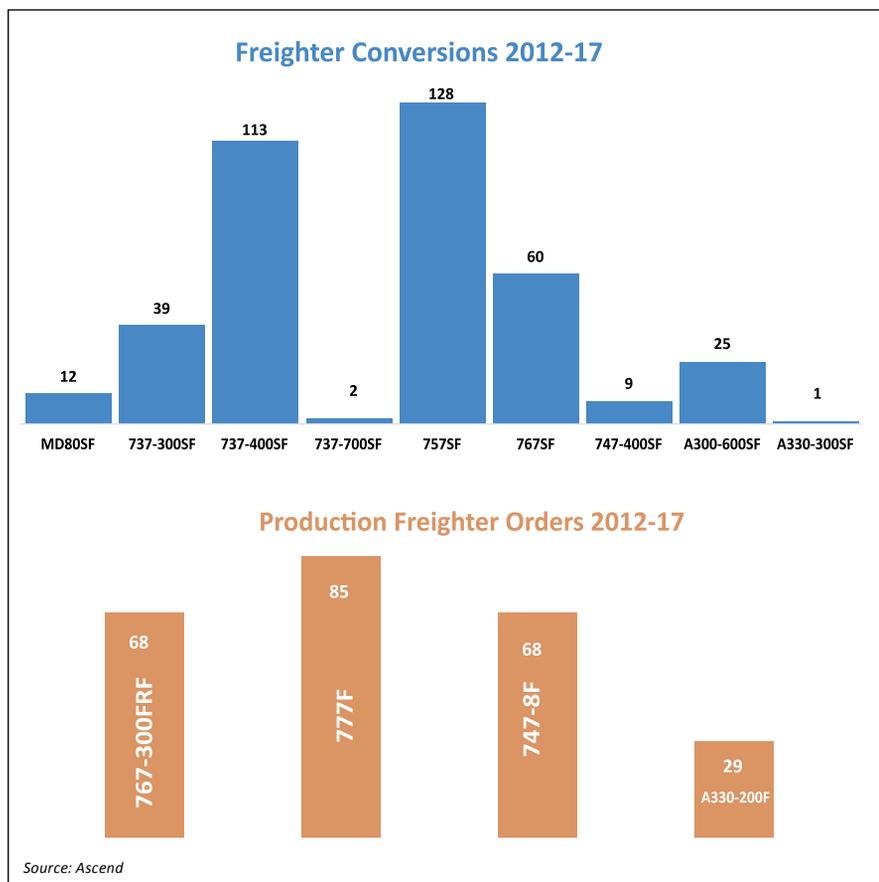


Fig. 2

As indicated in Fig. 1, demand and supply of air freight capacity have tracked closely until 2017 when demand grew and supply shrank. In addition, airfreight load factors have trended higher, indicating a scarcity of supply and a requirement for additional aircraft.

During this period of air freight growth, operators introduced new aircraft into their fleets. As indicated in Fig. 2, 250

production freighters were delivered as well as 389 conversions, an amount that is significantly higher than the previous five-year period.

While it would appear that operators are adding capacity to keep up with the additional demand, that is simply not the case. During this same period, almost 600 freighters were retired. As shown in Fig. 3, the net narrowbody freighter fleet

increased only by 13 units between 2012 and 2017 (691 and 704, respectively).

Instead of adding aircraft for growth, operators were modernizing their fleets. In 2012, first generation freighters (DC8s, DC9s, 727s and 737-200s) made up almost 60 percent of the fleet. By 2017, first generation freighters composed only 21 percent of the fleet, having been replaced by 737-300s and 400s, as well as 757s.

# FREIGHTER PROGRAMS REVIEW

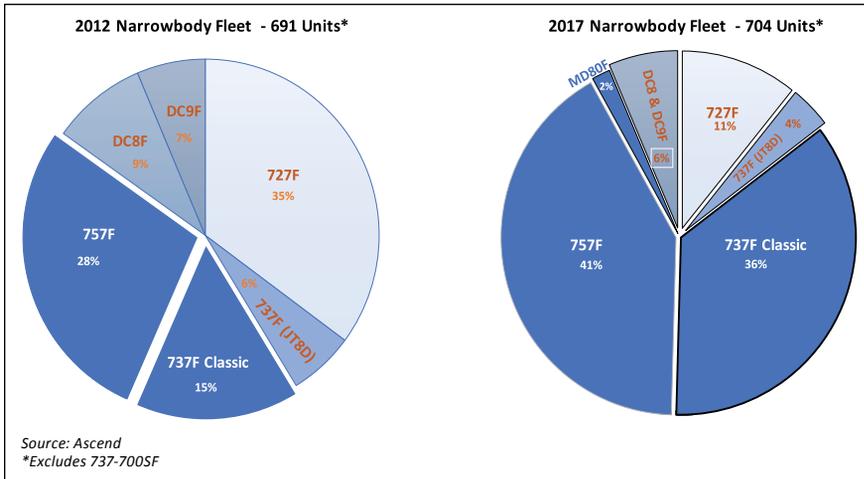


Fig. 3

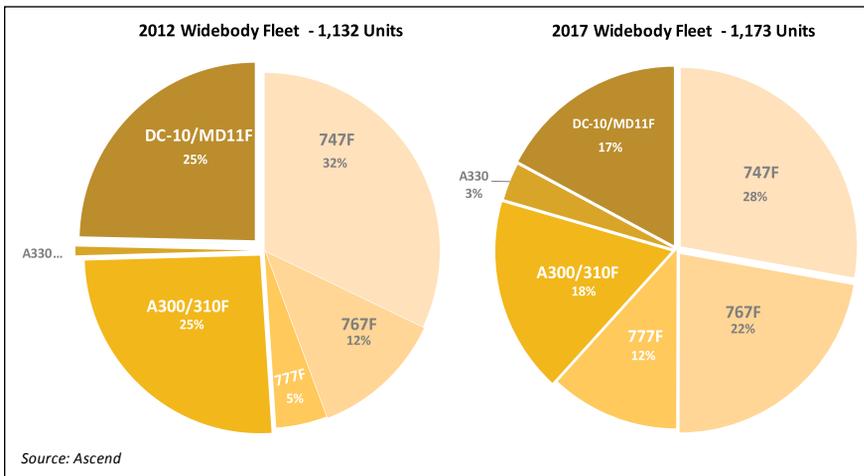


Fig. 4

The widebody freighter fleet followed a similar pattern, albeit for different reasons. As seen in Fig. 4, 113 early generation 747s were retired and replaced by 77 747-400 conversions and production freighters. First-generation A300B4s and A310s were retired, while the A300-600 converted freighter fleet grew. Production 777 and 767 freighters were added as well as 767 conversions, while the DC10/MD11 shrank. Despite an increase of 41 units in the widebody freighter fleet, the aggregate fleet payload capacity actually shrank by five percent.

Take a moment to consider the current situation:

- Strong growth forecast for the next five years
- Increasing yields and freighter load factors
- Little or no freighter fleet growth
- Freight feedstock shortage due to strong passenger demand
- Factory freighter production constrained

Unless an extraordinary event occurs to negatively impact demand for air freight, a pronounced shortage of freighter capacity is possible. However, previous forecasts have predicted the demise of cyclicality in commercial aircraft markets only to be proven wrong. IATA and others make a strong argument that the airfreight market is currently experiencing a paradigm shift due to a fundamental structural change in demand from rapidly growing markets such as e-commerce and pharmaceuticals. Will companies that perform freighter conversions and were previously impacted by overbuilding production capacity be convinced that this time will be different and that the market has fundamentally changed? If so, where will feedstock come from at the right price and in the right quantities? A review of the active and planned conversion programs will give a better picture of how well the market is prepared for these challenges.

## Narrowbodies CRJ-100/200

Aeronautical Engineers Inc. (AEI) launched the CRJ-100/200 conversion program in 2013. The aircraft provides eight main-deck pallet positions, a 15,000-pound payload and is designed to service small, short-haul markets, particularly those that have limited road and rail options. As of this date, seven aircraft have been converted and are serving markets in Mexico, the Caribbean and Scandinavia. An additional nine aircraft are scheduled for conversion in 2018.

## MD80

Like the CRJ, AEI undertook a speculative conversion program for the MD80 with the first delivery in 2013. The MD80SF is a very capable 46,000-pound payload freighter with 12 main-deck pallet positions. Although MD80 feedstock is inexpensive and plentiful with a reasonably priced conversion cost, demand for the aircraft is constrained by the advanced age of the fleet and a narrower fuselage cross section, which precludes carrying standard size pallets. AEI has converted 12 aircraft, which are operating in Mexico and Alaska with a backlog of six units.

## 737 Classic

The 737-300 and -400 have proven to be an excellent addition to the small narrowbody freighter market with 343 aircraft converted. Initial interest was in the 737-300 due to its lower feedstock cost, but demand has now switched to the 737-400, which offers two additional main-deck pallet positions. There are two primary conversion providers, AEI and PEMCO, who have a combined backlog of approximately 28 units stretching into 2019. Suitable feedstock is beginning to be in short supply, and the 737 Classic conversion programs can be 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 was quickly followed by Boeing and Israel Aircraft Industries (IAI) announcing their own programs. Boeing delivered its first unit in April with AEI's first delivery expected 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 will begin to fall, which will stimulate demand for converted freighters. The 737-800 conversion should reach sustainable production rates by 2021 or earlier.

## 757

The 757 converted freighter has proven to be a workhorse for the integrated operators, including DHL, FedEx and UPS. As of this writing, 249 aircraft have been converted with a backlog of 27 units. Precision Aircraft Solutions and ST Aerospace provide conversions at facilities in the United States and China. The airplane's success is almost completely attributable to the integrators who operate 75 percent of the converted fleet and Chinese express and mail carriers who operate 15 percent. Although B757 feedstock is sufficient with nearly 200 aircraft remaining in current passenger operation with low cycles accumulated, two factors point to a wind down of 757 freighter conversions beginning in 2020. First, the integrators have almost completed their 757 freighter additions while the Chinese carriers collectively have completed 55 percent of their known and anticipated freighter conversions. Secondly, the availability of engines with sufficient remaining operating life is already an issue and will only become more acute in the future, requiring an increase in shop visit activity.

## A320-200

Two companies — EFW, a joint venture between ST Aerospace and Airbus, and C<sup>3</sup> — have initiated engineering research and

development for an A320 conversion. This aircraft carries 10 full-size main-deck containers and has a 41,000-pound payload. Both the A320 and A321 have the option for containerized freight on the lower deck, a feature not available on Boeing narrowbody freighters. The A320SF will be a replacement for the 737-300SF and 737-400SF. EFW expect to deliver the first aircraft in 2020, however neither company has publicly announced a launch customer. Conversion-age feedstock is plentiful; however, availability and pricing are currently an issue. This limitation will ease by 2020 with the buildup of the A320neo fleet. It is too early to determine the market acceptance for the A320-200SF.

## A321-200

Two companies, EFW and 321 Precision Conversions — the latter of which is jointly owned by ATSG and Precision Aircraft Solutions — are actively developing an A321 freighter conversion. Interestingly, both companies have the same launch customer — Vallair Solutions. Although certification is expected in the next 12–24 months, neither company has secured a significant order, but active discussions are underway with the integrators and other potential operators. The aircraft will be available with as many as 14-main deck pallet positions, a payload up to 60,000 pounds and a range of 2,300 nautical miles. It's a suitable replacement for the 757SF and as a growth aircraft for the 737-400SF. The program faces two constraints to achieve a sustainable production rate. First, since the A321 production did not increase significantly until 2008, the population of aircraft in the age band typical for conversion is limited. Secondly, the cost and availability of aircraft in this age band is very limited as passenger carriers elect to renew leases and the impact of the A321neo deliveries has not yet been significant. Fortunately, both of these limitations will ease over time, and the A321 conversion can be expected to have a long, successful production run beginning in the early 2020s.

## Widebody Freighters 767-300ER

Although the 767-300ER conversion program had a rocky start 10 years ago due to

the delay in initial 787 deliveries, which reduced available feedstock, it is now well established with 69 units converted and a backlog of 28. Much of the credit for this resurgence goes to Amazon's Prime Air operation, which is nearing its goal of 40 aircraft in operation. Air Japan operates a fleet of nine aircraft on Asian regional service and Cargojet Airways has a fleet of nine aircraft primarily in service for Canada Post. Given the continued growth in e-commerce and air freight in general, plus a growing supply of feedstock from carriers such as American and Delta, the 767-300ER conversion programs offered by Boeing and IAI Bedek will be active into the 2020s.

Several years ago, Boeing planned on shutting down the commercial 767-300 production line to focus on the KC-46, the 767 military variant repurposed as an in-flight refueling aircraft. FedEx was approached about taking "end-of-the-line" 767s but convinced Boeing to keep the line open. As a result, FedEx has taken 111 aircraft with a backlog of 54 more units with seven more units on order from other customers. Boeing, which foresees strong and sustained demand for the aircraft, recently announced a production increase beginning in 2020 from 30 to 36 units per year.

## 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/longer range version of the A330 was unable to achieve broad market acceptance due to the capital cost and volumetric payload limitations. With 42 units delivered, only four additional aircraft remain to be delivered.

In February 2016, ST Aerospace expressed its commitment to the A330 conversion when it increased its shareholding in EFW to 55 percent with Airbus retaining 45 percent. EFW continues to enjoy access to Airbus proprietary engineering data, a critical element in achieving the aircraft's full potential as a freighter. In December 2017, EFW delivered the first A330-300P2F to launch customer DHL. Three additional aircraft are in work for delivery this year. While DHL can be expected to ultimately have a large fleet, no additional orders have been announced. Many operators are closely

watching DHL's experience with the aircraft and, given the aircraft's technical and economic capability, the program should eventually reach and maintain a solid production rate for many years to come.

### 777

As of April 2018, Boeing has delivered 138 aircraft to 18 operators with a backlog of 30 units. The current production rate is approximately 10 aircraft per year, which should be sustainable well into the 2020s as carriers continue to replace MD11s and 747s.

A 777 conversion program is once again under evaluation by Boeing. IAI reportedly has a 777 test bed fuselage and is likely completing the engineering required for certification. At this point, neither company has given any indication as to a converted aircraft's capability nor the expected conversion cost. Given the complexity of working with a carbon fiber fuselage and other 777 unique engineering elements, a high conversion price can be expected, thereby lowering the acceptable feedstock cost needed to produce a competitive freighter. Realistically, feedstock prices are not expected to reach acceptable levels until the early 2020s, and 777 lessors with aircraft returning from passenger lease are not inclined to speculate on a freighter conversion. If and when the 777-300PTF enters service, it will likely be used to replace the remaining MD11Fs and 747-400BCFs and -400SFs.

### 747

With the strong recovery in international air freight markets, 747-400 freighters are now back in demand. A few years ago, more than 70 units were parked while today it is quite difficult to find an aircraft that can be quickly placed back in service. The fleet can be broken down into two main categories: production units with a nose-loading cargo door and converted units without this capability. The average age of the production aircraft is only 15 years, and these aircraft will be in service for many more years. In contrast, the converted freighters average age is 26 years with one-third in long-term storage, and all are destined to be parted out.

The 747-8F production freighter, most likely the last variant of a type first

delivered in the 1960s, stabilized after a period with no orders and potential production shutdown. UPS has now ordered 24 aircraft, ensuring production through 2022. Since the 747 production freighter is the only Western-built aircraft with nose loading and outsize cargo capability, as 747-400 factory freighters retire in the 2020s, if the 747-8F is not in production after 2022, the world market will face declining availability of this capability.

After reviewing active production and conversion programs, the question of

whether sufficient capacity will enter the fleet to meet expected demand is debatable. While some conversion providers have the ability to increase capacity, it is unclear whether they are prepared to invest the necessary capital or whether properly priced feedstock will be available when needed. The widebody fleet is more vulnerable than narrowbodies since it is more directly affected by changes in world trade. In any event, these are exciting times ahead for the freight aircraft market. 



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