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Aircraft availability remains
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Mammoth Freighters Hangar
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High Demand, Limited Supply

Challenges for the P2F Conversion Market

By David Dundas

The demand for efficient cargo transportation has surged, leading to a burgeoning market for passenger-to-freighter aircraft conversions. This transformation, though promising, comes with a myriad of challenges that shape the landscape of the conversion industry. Airbus foresees a demand for over 2,500 new freighter aircraft over the next two decades, necessitating fleet expansion and the retirement of older aircraft. About 1,600 of these new deliveries will be passenger-to-freighter converted aircraft. But the market of P2F conversions is facing challenges.

Airbus has estimated that there will be a need for 2,500 new freighter aircraft over the next twenty years, with roughly 1,600 of these being passenger-to freighter conversions. We wanted to know if there would be sufficient passenger aircraft available for conversion.

Brian McCarthy, VP of Marketing & Sales at Mammoth Freighters feels that while there is currently an abundance of converted freighters and committed conversion activity, the feedstock appears to be drying up. However, he is confident that in certain areas, there will be no shortage

of supply. "For the 100-tonne (777-300ER) wide-body market the answer is an absolute, 'yes'. We have 800 aircraft in the current world fleet, and we are anticipating a market of approximately 200-220, 777-300ERs converted in the decade ahead. Mammoth appears to have the 200LR all but cornered with orders of 29, and more in process which will conclude at about 48-50. The 200LR variant has a limited production build

but the variant was an ideal foundation for Mammoth's 300ER plan because both variants are close sisters that share the same wing, engine, wing box and landing gears." He added that: "The bow wave of production and orders will be intense for the next ten years and then it will slow to a steady stream with lower production levels extending for another ten years. The aircraft converted in the back half of our production cycle will provide operators with additive aircraft and replacements of the same freighters that get long in the tooth. Programme life cycles are in direct relation to engine feedstock and the 777-300ER will have no issues."



Waleed Sirrag, Director of Technical Services,
The Aircraft Group

Waleed Sirrag, Director of Technical Services at The Aircraft Group feels there are too many 'unknowns' to give a definitive opinion. "The adequacy of passenger aircraft for P2F conversions will depend on several factors, including the pace of retirements of older passenger aircraft, the introduction of new passenger aircraft into the market, and airlines' decisions about fleet renewals or expansions. Concurrently, the demand for passenger travel, economic conditions, and the impact of global events (such as



“ The bow wave of production and orders will be intense for the next ten years. ”

Brian McCarthy, VP of Marketing & Sales, Mammoth Freighters

pandemics or economic recessions) can accelerate or decelerate the retirement of passenger aircraft. These factors could directly affect the availability of aircraft for conversion.”

Robert T. Convey, Senior Vice President Sales & Marketing at Aeronautical Engineers Inc. sees shorter-term problems with supply of aircraft for conversion that will ease off over time. “The question about feedstock should be broken into two. Feedstock over the next three years, especially for the narrow-body aircraft will be very hard to come by and quite expensive as the Airframe and Engine OEM’s work through their reliability and manufacturing issues. From 2028 onward I believe there will be an abundant supply of feedstock to support the

number of conversions needed.”

Lucia Soffientini, Continuing Airworthiness Manager at Air Worthy acknowledges there is a current shortage of available aircraft for conversion but holds a similar view on the future as others. “It is well known that currently the industry is suffering a shortage of aircraft. Most of the operators are extending their leasing agreements due to the fact that there are no new aircraft available. It may be that in a couple of years this situation will be resolved. If so, the number of available aircraft for cargo conversion may be sufficient to meet the demand. For some models, such as the B777, there are many older aircraft already available for cargo conversion. These would, however, require

a specific retrofit in order to comply with future operational mandates.”

With regard to the future distribution between narrow-body and wide-body freighter aircraft, Waleed Sirrag feels that

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Lucia Soffientini, Continuing Airworthiness Manager, Air Worthy



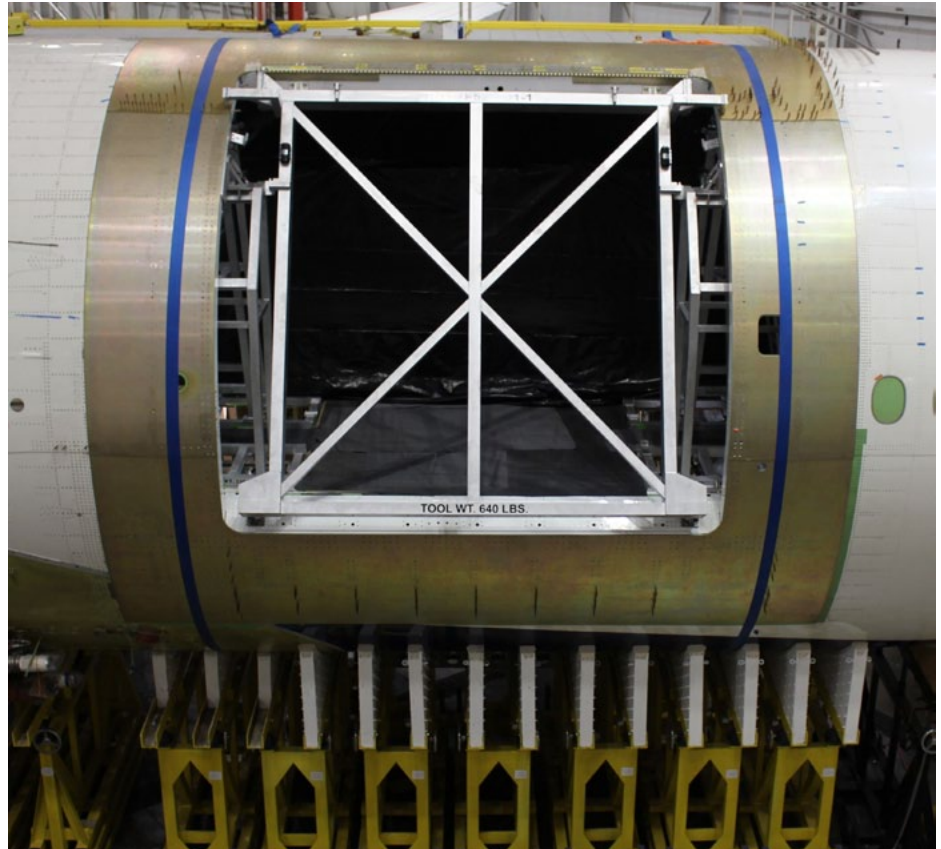
Lucia Soffientini, Continuing Airworthiness Manager, Air Worthy

the split will be dependent on increasing demand for rapid transportation versus the need for transportation of heavier cargo over longer distances. "The future balance between wide-body and narrow-body freighter aircraft is expected to evolve in response to the contrasting needs of the global cargo industry. With the boom in e-commerce demanding speedy, flexible deliveries, narrow-body freighters will become increasingly vital for their ability to serve short-haul routes and provide quick turnarounds. Meanwhile, the ongoing requirement for transporting large, heavy cargo over long distances will continue to underscore the importance of wide-body freighters. Environmental and technological advancements are likely to influence this dynamic further, steering the industry towards more efficient aircraft to meet emission and cost-saving goals. Ultimately, a strategic approach to deploying both aircraft types will emerge, optimizing efficiency and sustainability for various cargo needs."

Brian McCarthy takes a logical approach to the assessment of demand between the two freighter types. "Congested skies, route authority and emissions in the future will drive operators and air networks to consolidate more cargo into larger aircraft if possible. Aircraft have historically gotten bigger in good times when there has been an abundance of cargo. Tonne-mile costs and emissions will play a huge role going forward for obvious reasons.

"We are in a world rapidly moving towards a world where every drop of fuel and every pound of cargo being flown by air will matter. The operators that have enough cargo to fill larger aircraft will do so as long as the cost per cycle per engine can stay in line with sector lengths planned. Meaning, you can't operate a huge aircraft on short sectors unless you have the highest yield cargo on board or unless the operator can keep the cycles and flight hour ratios healthy by balancing long and short sector missions every week or month they operate.

"The air cargo industry has historically made the jump to larger and larger aircraft as density of cargo started falling. The operators of 727s eventually graduated to a 757. The DC8F became an A300B4 then an



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A300-600 followed by a 767-200. Then the Bigger 767-300F took over and is currently dominating the regional wide-body market. As the 767-300 starts to wind down in the decade to come, operators will have a choice in the A330-300 or will it be a 777 for missions at or above say, eight hours."

Robert T. Convey is very clear and succinct in his beliefs. "Of the estimated 2,500 freighter aircraft that will be needed over the next 20 years I believe 1,200 will be narrow-body, 700 will be medium wide-body and 600 will be wide-body." Lucia Soffentini is equally clear in her expectations. "Wide-body freighter aircraft will be in demand more than narrow-body freighter aircraft. This is because the major needs for freight transportation are on long-haul flights."

When it comes to the key challenges being faced by the conversion market, Aeronautical Engineers Inc's Robert T. Convey comments: "Over the next three years the primary challenge for the narrow-body conversion market will be

the availability of feedstock. Following in a close second will be the uncertainty that the global conflicts in Ukraine, the Middle East and Tiwan will bring."

The Aircraft Group's Waleed Sirrag feels that innovation will play an important role in future decisions. "The conversion market for passenger-to-freighter aircraft faces key challenges, including the technical and financial complexities of modifications, such as floor reinforcement and cargo door installation, alongside regulatory compliance hurdles. The limited availability of suitable aircraft for conversion, influenced by airline fleet strategies and the entry of newer models, further complicates the market. Additionally, fluctuating air cargo demand due to economic cycles and trade dynamics, as well as environmental regulations pushing for sustainability, impact both the feasibility and demand for conversions. "Addressing these challenges will require innovative approaches, strategic industry collaboration, and adherence to evolving standards to sustainably meet the increasing need for freighter aircraft."



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Mammoth Freighters' Brian McCarthy sees multiple challenges looming ahead, pointing out that: "The inflation of aerospace labour and material will remain a challenge in the near term which is increasing the costs for all converters.

"We see some signs that raw material and component pricing are coming down slightly, but the labor component is pretty alarming for just about any skill level including aircraft mechanics and installers. Engine shop visits are pretty unhinged for all engines and troubling for the future operators of our products. We need more competition and for the OEMs to license, designate, partner with and authorize more providers into the engine repair and overhaul arena. For narrow-body converters, it is clearly a log jam of oversupply and a growing shortage of feedstock for some platforms such as the A321 and 737-800. Too many private-equity players jumped into the market too rapidly thinking that COVID-induced cargo euphoria would continue forever."

Air Worthy's Lucia Soffientini is more concerned about the availability of parts, explaining that: "One of the main challenges that the market will have to



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“Aeronautical Engineers Inc. was founded in 1958 and has converted over 600 aircraft.

Robert T. Convey, Senior Vice President Sales & Marketing, Aeronautical Engineers Inc.

deal with is a parts shortage. Another one is avionics retrofit and software upgrades of older aircraft. Retrofits will be mandatory in order to be able to operate worldwide but the industry does not support avionics retrofits on older aircraft, especially if the cargo conversion is performed by a third party and not the original type certificate holder (TCH)."

We were also interested to know how long those who have contributed to this article have been carrying out passenger-to-freighter conversions and how many aircraft they have converted. According to Robert T. Convey, "Aeronautical Engineers Inc. was founded in 1958 and has converted over 600 aircraft. We are the oldest continually operating conversion house that has converted twice as many aircraft as our closest competitor and focuses exclusively on narrow-body and regional freighters." Lucia Soffientini confirmed that "So far, we [Air Worthy] have completed one B767 P2F conversion and we have two more projects in progress." With regard to capability and capacity, Mammoth Freighter's Brian McCarthy advised that: "Our entire engineering and certification team and many of our people have been hand selected from previous programmes including the 727, 737, 757, 767, 747, MD10, MD11, and A321. Mammoth Freighters has 280 Engineers and 16 DERs on the 777 program now. We are certifying both 777-200LR and 300ER over the next year or so. The 200LR Should be certified by 4Q 2024 and the 300ER in early 2025."

Waleed Sirrag advised that: "Our focus on transforming A321s and B777s has led to the successful completion of two A321 conversions, with a B777-300ER conversion currently underway. This showcases our deep understanding of

the intricate processes involved in adapting passenger aircraft for cargo use."

With regard to aircraft our respondents converted, Lucia Soffientini confirmed that: "As a specialist technical consultancy, we do not hold supplemental type certification (STC) for cargo conversion ourselves, but we are able to support operators, MROs or leasing companies on any model conversion." Brian McCarthy advised that Mammoth Freighters currently works solely on the 777-200/300ER, while Robert T. Convey confirmed that Aeronautical Engineers Inc.'s "current product offering includes the B737-800SF, B737-400SF, B737-300SF, MD80SF and the CRJ200 SF." According to Waleed Sirrag, The Aircraft Group's proficiency "extends beyond the specialized transformations of A321s and B777s to include a wide array of aircraft models, from narrow-body jets like the Boeing 737 and Airbus A320 families to wide-body behemoths such as the Airbus A330 and Boeing 767."

We were also curious to know how many aircraft could be worked on in a year. For Mammoth Freighters, Brian McCarthy commented that: "We have four aircraft in conversion and at our Fort Worth Facility, we should get this to about 15 aircraft per year once we achieve a steady state in 2025/2026-time frame. We have additional lines planned at STS in Manchester so this capacity should get us to 21 conversions per year." The Aircraft Group has a capacity of up to three aircraft per year, while Aeronautical Engineers Inc. can handle up to 40 aircraft.

We then asked our respondents what specific modifications and upgrades were typically included in a passenger-to-freighter conversion. According to Mammoth Freighter's Brian McCarthy, "Typically, heavy maintenance events are

accomplished, and some avionics work is expected for standardization of flight decks to an operator's current fleet. This may consider avionics systems and displays and satcom systems as an example." Waleed Sirrag advised us that: "The Aircraft Group's comprehensive transformation process begins with the removal of passenger seating and amenities to create a cargo-friendly interior. Key structural modifications include reinforcing the aircraft floor to accommodate heavy freight loads and installing a large cargo door on the side of the fuselage for easy loading and unloading of goods. Additionally, we request to upgrade the aircraft's electrical, cooling, and fire suppression systems to meet the specific requirements of cargo operations. Avionics systems are also updated to support the unique navigation and communication needs of cargo flights. To ensure the aircraft can operate efficiently in its new role, we might also recommend modifying its fuel systems for extended range capabilities." Lucia Soffientini informed us that: "Air Worthy deals with all avionics modifications needed for current and future mandates." For Aeronautical Engineers Inc. Robert T. Convey confirmed that: "The typical narrow-body conversion consists of the installation of a main deck cargo door, 9G barrier, reinforced floor beams and installation of a new main deck interior."

We then asked our respondents to walk us through the steps they take during the conversion process. Waleed Sirrag advised: "It starts with a comprehensive assessment where our team examines the aircraft for its structural soundness, system operations, and conversion feasibility, including an in-depth review and documentation of its condition. Once the aircraft is brought into the hangar, we work with the MRO to initiate the conversion work by stripping down the passenger amenities to prepare for cargo use. This involves reinforcing



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the structure, installing a cargo door, and upgrading the electrical, cooling, and fire suppression systems to meet the demands of freight operations. Avionics and potentially the fuel systems are enhanced for improved navigation and extended range. The conversion process is stringent, with ongoing testing and certification to adhere to aviation standards. Upon passing all inspections and quality control, the aircraft is then painted and branded according to client requirements, culminating in a handover that marks its readiness for cargo service."

At Aeronautical Engineers Inc. Robert T. Convey walked us through their operations, providing a simplified version of the conversion process: "Base line the aircraft, engine runs and pressure test. Aircraft enters the hangar and is jacked and shored. Main deck cargo door surround skin is replaced with thicker gage material. Main deck cargo door jamb is then installed. Main deck floors are reinforced and or

replaced. 9G barrier is installed. Main deck cargo door is installed. Main deck liner structure and liner is installed. Lower deck liner structure and liner is installed. Main deck cargo loading system is installed. The freighter is then painted."

Lucia Soffientini shared Air Worthy's processes, commenting that: "The hardest part of the process is keeping the aircraft configuration under control. Cargo conversion does not just involve adding a door and emptying the fuselage. Any modifications that were previously installed need to be removed and some are only partially removed or modified themselves. Also, Airworthiness Directive (AD) and Service Bulletin (SB) assessment can be highly complex, which requires a very good technical understanding of the whole process."

To complete the understanding of the passenger-to-freighter services, our final question was to ask how long it took to carry out a conversion. For Aeronautical Engineers Inc. this depends on the type of aircraft but is typically between 100 and 130 days. For Air Worthy: "For a B767 it is normally around 5 months, but it all depends on the complexity of the project, so this could stretch to 10 months." The Aircraft Group advised us that it would take them between 90 and 120 days.

“ It starts with a comprehensive assessment where our team examines the aircraft. ”

*Waleed Sirrag, Director of Technical Services,
The Aircraft Group*