

Is the continued growth in passenger widebody aircraft belly capacity affecting demand for long-haul freighters? How the logistics of shipping freight and fleet demographics influence the choice between passenger aircraft cargo space, and dedicated freighter services.

# Will the belly capacity of new passenger widebodies impact pure freight operations?

**W**idebody passenger aircraft are capable of carrying more volume and cargo in their lower-deck holds. In recent years new generation twin-aisle widebodies, such as the A350, 787 and 777-300ER, have been described as freighters in disguise. As the worldwide fleet of these types grows, so does the capacity to move a larger portion of the industry's cargo volume.

In recent years, lower-deck cargo has been capturing an increasing share of the overall air cargo market. How do passenger aircraft affect the demand for freighter aircraft?

By 2038, world economy gross domestic product (GDP) is forecast to rise by 2.7% and commercial freight services by 4.2%. Cargo traffic is often measured in revenue ton kilometres (RTK). It has been forecast that RTK cargo traffic will increase by an average of 4.2% per year over the next 20 years.

High RTK growth rates are forecast between East Asia and North America, and between East Asia and Europe. These routes are predicted to experience an annual growth rate of 4.7%. Intra-East Asia routes are expected to experience an annual growth rate of 5.8%. Domestic China routes are forecast the highest annual RTK growth rate of 6.3%.

Total air transport commercial flying revenue is worth about \$600 billion, 14% of which is derived from air cargo. It has been calculated that 60-65 million tons of cargo was moved by air in 2018. By comparison, the container ship industry moved over 2 billion tons of freight.

In terms of tonnage moved, the air cargo sector represents a small percentage of the global freight industry. Yet the value of goods moved and transported across international boundaries by air in both freighters and belly holds is \$6 trillion. This equates to 35% of the world's merchandise trade.

There can be variations in cargo traffic growth rates because of outside factors. Trade disputes, territorial disputes and oil prices can mean forecasted growth rates fluctuate slightly. Air cargo traffic growth for the first half of 2019 has seen a slight decline for the first time since the 2009 global crisis. Europe was the only market to record a positive year-on-year growth over the first half of 2019. Market growth across the passenger sector has slowed, but international growth was 4.8%.

## E-commerce

Global internet usage for e-retailing is led by China and the Asia-Pacific region, followed by the US. The global e-commerce market was worth \$2.8 trillion in 2018, and is expected to rise by 41% to \$4.8 trillion in the next three years.

E-commerce is the main driving force behind an increase in demand for air freight. One of the reasons for this is because e-retailers are making more aggressive promises to their customers. Amazon, for example, is claiming that it will be able to deliver Amazon Prime orders to customers within one day of receiving the order, anywhere in the US.

ICF consultant Mark Diamond says: "Online wholesale suppliers Alibaba have said they are going to be able to deliver anything, anywhere in the world within 72 hours. If you make such aggressive commitments to your customer, you have got to have the means to fulfil that."

Air transport therefore provides the perfect solution to move e-commerce goods across the globe.

## Freighter demand

The aircraft that made a huge impact on lower-hold cargo freight capacity is the 777-300ER. It has the capability to carry over 20 metric tons of cargo in its belly and more for shorter flights.

Divisional senior vice president at Emirates Sky Cargo, Nabil Sultan, is reported as saying that the 777 in passenger configuration has the potential to carry 25 tonnes of belly freight per flight. Therefore, any aircraft flying four segments per day on a popular route has the equivalent freight capacity to a single large freighter.

As passenger aircraft have become more capable, it is believed that the economic case for freighters has reduced. Passenger-aircraft belly freight is marginal revenue for the airline, since passenger yields cover all aircraft operating costs. Freighter cargo revenues have got to be high enough to cover all of the aircraft's operating costs.

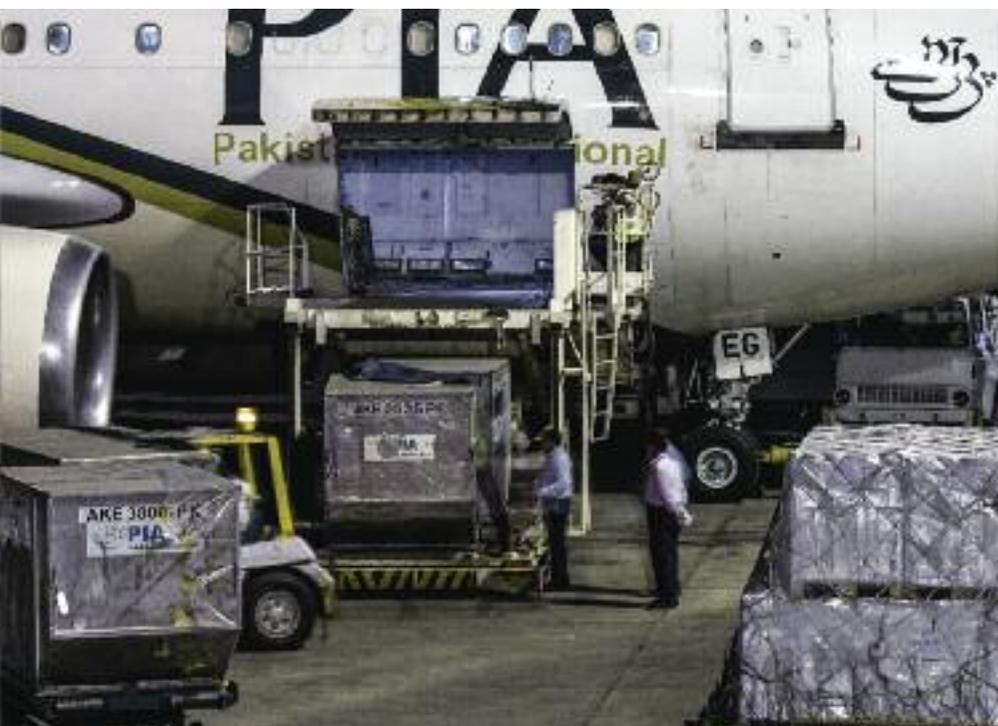
"The new 787 and the A350 are both highly capable in their cargo operating economics and lower-hold freight capacity," says Diamond. "Newer generation aircraft have more cargo capacity than the older types, such as the 747-400, and can transport it further."

According to Diamond, it is possible that the increasing amount of belly capacity is affecting the demand for freighter aircraft, especially in relation to the combination carriers, which operate both passenger and cargo aircraft types. Fleet data suggests that many combination carriers are reducing the number of pure freighters in their fleets, and increasing the number of passenger aircraft.

"It is important to keep all of this in perspective," says Diamond. "Freighters are not going to go away, and there are signs that they are back in fashion. Boeing is still producing the 747-8F, but it will be interesting to see how long for."

According to Boeing, UPS has exercised options to order 14 additional 747-8Fs, providing additional capacity in support of accelerating demand for US and international air services.

The 747-400BCF (Boeing Converted Freighter) is a passenger-to-freighter (P-to-



F) conversion programme for passenger 747-400s. Another 747-400 P-to-F programme is the 747-400BDSF (Bedek Special Freighter), carried out by Israel Aerospace Industries (IAI). Neither the 747-400BCF nor the 747-400BDSF has a nose cargo door. Freight can only be loaded through the side cargo door.

“There are not many 747-400 P-to-F conversions going on right now,” Diamond explains. “This is because the 747-400’s high cash operating costs make conversion less attractive to lessors and cargo operators alike.”

Apart from the 747-F8, Boeing’s other medium-to-large factory-built freighters include the 777F and the 767F. Boeing also has a medium widebody P-to-F programme to produce the 767-300BCF. Fleet data shows that Boeing aircraft make up 90% of all freighters.

“The 777F freighter is based on the 777-200LR and shares many features such as the airframe, engines and operating systems,” says Diamond. “I understand Boeing is looking very seriously at creating a P-to-F conversion of the 777-300ER.”

It is believed that the 777-300ER platform will make an excellent freighter, because the 777-300ER is 10 metres longer than the -200LR, and has a higher gross structural payload than the 777-200LR. The higher gross structural payload will allow a 777-300ER freighter to carry higher cargo loads, so a bigger aircraft will translate to lower unit costs for the shipper and to the transportation provider.

“I am not aware that Boeing is thinking about creating a new-build freighter based on the -300ER. However, a P-to-F conversion looks like it will happen over the next few years to meet forecast freighter demand,” says Diamond.

IAI is also considering creating a

conversion programme for the 777-300ER, because it believes that the aircraft will offer similar freight carrier capabilities to a 747-400BCF. The primary benefit to operators will be the much lower operating costs of the 777-300ER compared to the older 747-400BCF. It is also forecast that financing and lease rates will be lower for the newer aircraft. Lower operating costs will allow a cargo operator to increase its revenue and yield per flight sector.

The only factory production freighter that Airbus builds is the A330-200F, which is based on its successful A330-200 platform. Elbe Flugzeugwerke (EFW) offers a P-to-F conversion for the A330-200 and -300.

“I do not think the A330-200F has been the best aircraft for general cargo operators, more for operational reasons than anything else. Etihad has sold all of all its A330-200Fs,” says Diamond. “Qatar Airways plans to return three A330-200Fs to its lessor upon the lease expiring in 2019, and it is believed that it is considering selling the five A330-200Fs that it owns.”

Demand for the A330-200F is low, because about one-third of the A330-200F fleet is on the market by lessors and airline owners. “This is something to do with the fuselage contour and needing different pallets. This makes it a little more difficult to operate and transport unusual loads. Recently Etihad sold five of its A330F aircraft to DHL,” says Diamond.

The EFW A330 P-to-F conversions, A330-300P2F and the A330-200P2F, are particularly suited for integrators and express carriers, because the A330-300P2F has a high volumetric payload capability when transporting lower-density e-commerce loads.

“Integrator operators, such as FedEx,

Many airlines view belly freight as opportunistic revenue that is marginal to their operation. Typical passenger aircraft freight departure loads for a 777 is about 11 tons and can be entirely be dependable on its route/direction.

UPS and DHL, carry lots of e-commerce cargo. The A330 is very suitable for this because of its large fuselage,” says Diamond. “FedEx and UPS have been operating A300s and A310s for a long time. Because the A330 has a similar fuselage contour to the A300 and A310 it is expected it will find a good home with integrator, rather than general freight, operators.”

Increased internet sales and services from e-retailers have affected the demand for medium-size freighter aircraft, such as the 767. Amazon Air is expanding its network by leasing 10 more 767-300 freighters from lessor ATSG to increase its fleet to 50 aircraft.

“E-commerce demand is putting a new premium on freighters. Amazon Air now has its own controlled fleet of 767s,” says Diamond. “It is buying every good passenger 767 on the market to convert into freighters, because it needs to increase the size of its fleet to meet demand.”

Many investors and lessors are interested in financing freighters because of the strength of the cargo sector. Major operating lessors such as GECAS are now expanding into the freighter segment. GECAS Cargo Aircraft Group leases about 100 freighters to operators worldwide.

## Jet Transport Fleet Analysis

Freighters comprise 7.6% of the world commercial jet transport fleet. Boeing’s regional marketing director, Tom Crabtree says: “At the end of 2018 there were 25,825 jet aircraft in service. Of these, only 1,975 are freighters, but they carry more than half the world’s air cargo.”

According to Crabtree, more than 90% of all jet transports are passenger aircraft. Of this number, 74.9% are single-aisle passenger aircraft, with the remaining 17.5% being widebodies.

“The fastest growing segment of passenger aircraft is the single-aisle market, such as 737 and A320s size aircraft,” says Crabtree. “Widebody passenger aircraft numbered about 3,000 in 2000. At the end of 2018, the number of widebody passenger aircraft had risen by 1,500 units to 4,500.”

Of all the twin-aisle aircraft manufactured in the last 19 years, 810 have been 777-300ER passenger aircraft. The -300ER has eight cargo pallet positions in the forward lower hold. Other

new widebody additions to the fleet are 882 787s and 300 A350s. All these types have much more available capacity for lower-hold freight than older generation types like the A340 and 767-300ER.

Research shows that the average cargo load on a day of departure in the 777-300ER lower hold is not as high as people think. "You will sometimes hear 20-30 metric tons cited around the industry. That is the exception, not the rule," says Crabtree. "The average departure load is more like nine to 11 tons, and at times much less than that."

Single-aisle aircraft typically depart with 100-200 kilos(Kg) of belly freight. "We have calculated that air cargo carried by freighters has exceeded 50% of all air cargo carried for the past five years. Earlier in this decade it was almost 60%," says Crabtree.

Typical cargo loads on departure to and from the US on widebody passenger aircraft are four to 11 tons. The highest average cargo departure loads of 11 metric tons are carried in the holds of 777-300s and -300ERs. Next are the A350-900s, 777-200ERs/-200LRs and 787-9s that typically fly with an average cargo departure load of less than 8.0 tons in their lower holds. Both 787-8s and 747-400s depart with an average departure load of 6.0 tons. The lowest performers in terms of passenger aircraft cargo departure loads are the A330 series of aircraft, carrying an

average 5.5 tons; and 4.0 tons for the 767-300ER.

Thanks to world economic growth and demand, the world freighter aircraft fleet continues to grow. In 2000, the freighter fleet totalled 1,899 units: 1,035 narrowbodies, 555 medium widebodies, and 309 large widebodies. The jet freighter fleet comprises 1,974 units: 735 narrowbodies, 658 medium-widebodies, and 581 large widebodies.

The biggest growth sector for freighters since 2000 has been the increasing demand for large widebody freighters, whose numbers have increased by 272 units. Medium widebody freighters increased by 103 units, and the number of narrowbody freighters dropped by 300.

The air cargo industry historically has grown at an annual average of 5.0-5.3% since 1980. It has slowed over the past 10-15 years because of the global economic downturn in 2008/2009.

"We are going through another soft patch again. However last year we sold 124 freighters," says Crabtree. "Of these 40 were 777Fs and 18 were 747-8s, so lots of large widebody freighters. This is because most air cargo is carried on widebody freighters that can lift more than 80 metric tons."

In the past 20 years the fastest-selling segment in the freighter market has been large widebodies and not narrowbodies. The reason for this is down to growth on

long-haul trade lanes, and because large widebody freighters tend to have the lowest unit cost per ton carried.

Boeing's long-term forecast for air cargo growth is 4.2% a year over the next 20 years, so the total amount of air cargo will double over the next decade.

It is predicted that the freighter fleet will grow to 3,400 aircraft over the next two decades. Because of age and operators' increasing need for more efficient aircraft, it is forecast that only a third of freighters flying today will be operational in 20 years, so a net addition of 2,820 freighters will be needed to meet demand during this period.

These will comprise: 540 large production units, 560 widebody conversions, 500 medium production units, and 1,220 narrowbody conversions.

## Specialised Cargo

Reasons for the increasing demand for freighter aircraft can be attributed to the fact that the passenger belly cargo market is operated opportunistically, while cargo carried by pure freighter aircraft and operators is clearly purposely placed. "I cannot emphasise enough that air cargo transportation differs fundamentally to passenger transport," says Crabtree.

This is because most passenger belly capacity does not service key world trade routes. Often there is a deficit between freight capacity for cargo in key cargo

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## BELLY FREIGHT SPECIFICATIONS OF PASSENGER-CONFIGURED WIDEBODY AIRCRAFT

A/C TYPE	767-300ER	A330-200	A330-300	777-200	777-200ER	777-200LR
MTOW (lbs)	412,000	513,677	513,677	545,000	656,000	766,000
MZFW (lbs)	295,000	374,786	385,809	420,000	430,000	461,000
OEW (lbs)	198,440	267,031	277,593	306,500	317,000	320,000
Gross structural payload (lbs)	96,560	107,755	108,216	113,500	113,000	141,000
Max payload range (nm)	3,900	4,200	3,700	3,300	5,800	7,700
Passenger capacity (OEM)	218 (3-class)	246 (2-class)	300 (2-class)	305 (3-class)	305 (3-class)	301 (3-class)
Passenger capacity (average)	229	258	295	338	279	279
Belly containers	30-LD2	26-LD3	32-LD3	32-LD3	32-LD3	32-LD3
Belly volume (cu ft)	3,720	3,978	4,896	4,896	4,896	4,896
Container tare (lbs)	6,090	5,200	6,400	6,400	6,400	6,400
Net structural payload (lbs)	90,470	102,555	101,816	107,100	106,600	134,600
Total pax & baggage weight (lbs)	58,498	65,916	75,343	86,348	71,268	71,268
Hold bag volume (cu ft)	2,200	2,480	2,832	3,248	2,680	2,680
Containers required	17.74	16.21	18.51	21.23	17.52	17.52
Containers remaining	12	9	13	10	14	14
Remaining payload for cargo (lbs)	31,972	36,639	26,473	20,752	35,332	63,332
Remaining belly volume (cu ft)	1,488	1,377	1,989	1,530	2,142	2,142
Max packing density (lbs/cu ft)	21.49	26.61	13.31	13.56	16.49	29.57
Belly freight @ 8lbs/ cu ft (lbs)	11,904	11,016	15,912	12,240	17,136	17,136
Belly freight @ 6.5lbs/ cu ft (lbs)	9,672	8,951	12,928	9,945	13,923	13,923
A/C TYPE	777-300	777-300ER	747-400	747-8	A380-800	
MTOW (lbs)	660,000	775,000	875,000	987,000	1,235,000	
MZFW (lbs)	495,000	524,000	542,500	651,000	796,000	
OEW (lbs)	347,800	370,000	394,088	485,300	596,000	
Gross structural payload (lbs)	147,200	154,000	148,412	167,700	200,000	
Max payload range (nm)	3,650	5,700	5,750	5,900	6,650	
Passenger capacity (OEM)	368 (3-class)	370 (3-class)	400 (3-class)	515 (3-class)	525 (3-class)	
Passenger capacity (average)	394	338	381	362	487	
Belly containers	44-LD3	44-LD3	32-LD1	38-LD1	38-LD3	
Belly volume (cu ft)	6,732	6,732	5,600	6,650	5,814	
Container tare (lbs)	8,800	8,800	5,760	6,840	7,600	
Net structural payload (lbs)	138,400	145,200	142,652	160,860	192,400	
Total pax & baggage weight (lbs)	100,639	86,348	97,296	92,375	124,357	
Hold bag volume (cu ft)	3,784	3,248	3,656	3,464	4,672	
Containers required	24.73	21.23	20.89	19.79	30.54	
Containers remaining	19	22	11	18	7	
Remaining payload for cargo (lbs)	37,761	58,852	45,356	68,485	68,043	
Remaining belly volume (cu ft)	2,907	3,366	1,925	3,150	1,071	
Max packing density (lbs/cu ft)	12.99	17.48	23.56	21.74	63.53	
Belly freight @ 8lbs/ cu ft (lbs)	23,256	26,928	15,400	25,200	8,568	
Belly freight @ 6.5lbs/ cu ft (lbs)	18,895	21,879	12,513	20,475	6,962	
A/C TYPE	787-8	787-9	787-10	A350-900	A350-1000	
MTOW (lbs)	502,500	557,000	557,000	590,839	681,000	
MZFW (lbs)	355,000	400,000	425,000	423,288	485,000	
OEW (lbs)	259,700	274,000	300,563	305,781	343,480	
Gross structural payload (lbs)	95,300	126,000	124,437	117,507	141,520	
Max payload range (nm)	5,450	5,250	4,250	5,900	5,550	
Passenger capacity (OEM)	242 (3-class)	280 (3-class)	323 (3-class)	315 (2-class)	369 (2-class)	
Passenger capacity (average)	246	316	323	315	369	
Belly containers	28-LD3	36-LD3	40-LD3	36-LD3	44-LD3	
Belly volume (cu ft)	4,284	5,508	6,120	5,508	6,732	
Container tare (lbs)	5,600	7,200	8,000	7,200	8,800	
Net structural payload (lbs)	89,700	118,800	116,437	110,307	132,720	
Total pax & baggage weight (lbs)	62,817	80,695	82,517	80,451	94,254	
Hold bag volume (cu ft)	2,360	3,032	3,104	3,024	3,544	
Containers required	15.42	19.82	20.29	19.76	23.16	
Containers remaining	12	16	19	16	20	
Remaining payload for cargo (lbs)	26,883	38,105	33,920	29,856	38,466	
Remaining belly volume (cu ft)	1,836	2,448	2,907	2,448	3,060	
Max packing density (lbs/cu ft)	14.64	15.57	11.67	12.2	12.57	
Belly freight @ 8lbs/ cu ft (lbs)	14,688	19,584	23,256	19,584	24,480	
Belly freight @ 6.5lbs/ cu ft (lbs)	11,934	15,912	18,895	15,912	19,890	

## Notes:

- 1). Stated OEWs are estimates only - actual OEW will vary by individual aircraft.
- 2). 777-200 OEW based on aircraft with PW4077 engines.
- 3). 777-200ER OEW based on aircraft with GE90-94B engines.
- 4). 777-300 OEW based on aircraft with TRENT engines.
- 5). 747-400 OEW based on aircraft with GE engines.
- 6). Range is rough estimate with max payload.

airports, and the trade lanes where it is needed.

Typically, widebody passenger schedules do not meet shipper timing needs. Essentially, air cargo facilitates many industrial requirements. “The main use for air freight transportation is the movement of goods between factories to different parts of the world, often between different continents,” says Crabtree. “Many general freight and express carriers say that air cargo tends to accumulate and aggregate in the evening and over the weekend.

“Project cargo is a term that is not well known outside of freight transportation,” continues Crabtree. “This is the aggregation of individual shipment pieces that are part of one aggregate movement.”

Project cargo shipments include many items with different airway bills. Yet all the items in the shipment need to arrive at the same place at the same time. For example, large engineering companies in Germany often equip new factories in the Far East with manufacturing kit that must move together for optimal transportation and logistical purposes. Freighters are far better at aggregating and shipping project cargo than passenger belly cargo operations.

Passenger belly space cannot be used to carry many hazardous materials. Rules for sending freight in passenger lower holds are more stringent because of safety and security than for freighters.

The Dangerous Goods Regulations (DGR) stipulate that it is not possible to place certain types of cargo into the belly of a passenger aircraft. The Federal Aviation Administration (FAA) issued a restriction on carrying lithium batteries in bulk on passenger flights after the loss of a UPS 747-400F.

Freight forwarders prefer to use large pallets over loose bulk loading due to the flexibility of load build-up, ease of movement, and protection from theft en-route. Since about 75% of passenger aircraft are single-aisle units that do not offer the ability to carry pallets, forwarders tend to avoid their use. Finally, because passenger aircraft need to operate to strict schedules, airlines do not want to delay a flight because of cargo loading.

## Cargo routes

Cargo demand can overlap the capacity offered by passenger aircraft, but many of the world's major cargo routes are not popular passenger routes.

In addition there is not always a confluence between world cargo trade lanes and cargo demands. Freighters can fill a role because they are more flexible and can be on hand ready to meet the changes in freight demand. Freighters can also provide supplemental capacity for passenger routes. “If there is not enough belly capacity, operators can add a couple of freighters to supplement fluctuating

demand on those routes,” says Diamond.

East Africa, Ethiopia and Kenya are major flower exporters, and need a high freight capacity. “Ethiopian Airlines operates 10 777Fs and needs all of this capacity to transport flowers to Europe,” says Diamond. “As a passenger airline, Ethiopian Airlines is increasing its freighter fleet, because its passenger belly capacity is unable to meet the demand.”

Middle Eastern carriers with access to large route networks are looking at their

available passenger lower-hold capacity and their major hubs to increase airline revenue. Emirates Sky Cargo is calculating how to ensure that every possible part of a passenger aircraft is being used. This means operating with a lower hold full of cargo at every opportunity. To do this, they are focusing on the booming e-commerce market. To make sure this freight traffic is not omni-directional, a Dubai-based e-commerce enterprise is needed to generate the needed export freight.



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“A lot really depends on the trade lane or the direction,” says Diamond. “Most trade lanes have an imbalance in directional demand. For example, between Asia and the US there is more freight demand travelling from Asia to America.

“Often the thing that matters to airlines is not the load factor, but the revenue being generated by the hold cargo,” continues Diamond. “Airlines could fill their aircraft bellies full of sawdust at really low yield, but they would not make much money doing it. Therefore, the question is how can airlines generate cargo revenue on the backhaul.”

Generally, airlines will try to fill up the lower holds as much as they can, because the belly capacity is a perishable commodity. The thinking is that if airlines are not using their lower hold cargo capacity they are losing out on revenue.

## Payload-range

Airbus and Boeing are building aircraft that can operate for flight sectors of more than 18 hours. The non-stop Perth to London route uses 787-9s for the 9,000-mile journey. When a passenger aircraft is pushed towards its flight duration limits, however, its remaining capacity for carrying belly cargo decreases, because of the net increase in the weight of the aircraft caused by the extra fuel needed. Shorter flights equal less weight in fuel, which enables the aircraft to carry more cargo.

Long-distance routes during high-peak season mean aircraft will be loaded with fuel, passengers and baggage. The additional weight in fuel within the aircraft needed to meet its operational range requirement significantly reduces the cargo capacity freight forwarders can use.

For the airline, yields transporting

passengers and their baggage per kilogram are much higher than yields for general freight, so passenger payloads will always take priority over lower-hold cargo payloads. Moreover, passenger airlines have to prioritise passengers over general freight that generates incremental revenue.

Therefore as a passenger aircraft operates closer to the limit of its payload-range performance capability, the less belly cargo it will be able to carry over the passenger and baggage payload.

A significant portion of long-haul aircraft such as the A350, 777 and 787 are being increasingly used on more ultra-long-haul routes. While these aircraft can carry large cargo loads on medium- and long-haul routes, they will be unable to carry any belly freight on ultra-long-haul routes.

## Types of freight

Packing density is the average density of cargo measured in lbs per cubic foot (cu ft). E-commerce and express freight consist of small parcels, and typically have a lower packing density than general freight.

The packing density for e-commerce freight is typically 6.5lbs cu ft. General freight has a packing density of 8.0lbs per cu ft.

An aircraft loaded with general freight will reach its maximum weight limit before its capacity limit, but an aircraft loaded with e-commerce freight will likely fill the maximum available volume before reaching its maximum weight limit. This means that shippers and operators reliant on e-commerce cargo increasingly want to use aircraft with a high volumetric capacity.

According to ITW managing director of commercial aviation, Charles Roberson: “Integrators such as FedEx, UPS and DHL

*Freight aircraft account for 7.6% of the commercial jet aircraft fleet and have the flexibility to operate to schedules that are not dictated by passenger demands. Cargo operators need to ensure that cargo revenue is high enough to cover all an aircraft’s operating costs.*

together control about 60% of total air freight moved. Integrators are not interested in passengers, so they will always choose freighters to fulfil their fleet requirements.”

With the global boom in e-commerce and the fast-growing demand for specialist services, such as pharmaceutical transport, many integrators and cargo operators are taking new freighter deliveries.

“As well as transporting high volumes of e-commerce cargo, freighters can be used in niche markets to move a diverse mix of goods, such as oversize loads that will not fit in the bellies of aircraft,” says Diamond. “There are markets such as Houston, where there is a lot of petroleum exploration going on. Some of the equipment exported there is too big to fit into the belly of passenger aircraft, and must be transported by freighters.”

The trend towards the freight market is changing from the traditional business-to-business (B2B) mould to facilitate more business-to-consumer (B2C) traffic. Therefore, it is becoming possible for shippers to take advantage of passenger airlines’ aircraft lower-hold capacity. Yet it is reported that belly-hold cargo capacity is exceeding the demand to use it.

## Summary

Long-haul passenger aircraft have increased airlines’ abilities to generate extra revenue by transporting freight. Over the last 30 years, however, dedicated freighters have carried 50-60% of all air cargo.

Demand for freighter aircraft is strong and is expected to remain so for the next 20 years. Dedicated freighters can ship a multitude of different types of freight that are not suitable for carriage in a passenger aircraft’s lower deck.

Freighter aircraft are not restricted by passenger schedules and can operate routes that suit seasonal and economic demand.

New passenger aircraft have a large ability to transport belly freight. Many of the routes they operate mean that their freight-carrying ability is not, or cannot, be utilised. Freight forwarders can use belly capacity to ship goods to major hubs, yet airline schedules may not be aligned to those of the shipper. **AC**

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