

Converting the A340

The case for an innovative A340 passenger to freighter (p2f) conversion programme



The A340 is one of the third generation Medium Wide Body (MWB) passenger aircraft (along with the A330 and B777) that deliver all the third generation benefits of economy, performance, low noise and in the case of the Airbuses, flightcrew commonality and in the case of the A340, good hot-and-high performance and no ETOPS restrictions.

These third generation MWB aircraft also introduced exceptional lower hold capacities that enabled standard passenger configured aircraft to generate substantial freight revenues in passenger operations.

A340 Residual Values are reducing more quickly than had been predicted – leading to potentially large asset

value write-downs as the aircraft's economic life is reduced

The A340 has been falling out of favour with some of its operators. As a result, A340-300s with book values in excess of \$20m are being sold for part out at less than \$10m – with the greatest part of their part out value in their engines. The situation for Rolls-Royce (RR) powered A340-500s and -600s is more complex because the only customer for their engines is RR and if these aircraft do not remain in service with their current operators then RR could also be faced with a significant financial write off.

The economic lifecycle of many aircraft types involves a move from

passenger to alternative use operations that extend the in-service life and therefore asset value of the airframes and engines. The trigger for the introduction of a conversion programme to an alternative use (typically a passenger-to-freighter (P2F) conversion programme) is normally:

- A fall in asset value to a point where donor aircraft can be acquired for conversion at sub market values, and
- Availability of an alternative use conversion installation at a competitive price

In the case of the A340, market prices have fallen to the point where they

would make the aircraft attractive donor stock for an alternative use programme – however, a contributor to the negative perception of the aircraft value is the lack of just such an alternative use programme. This is a negative spiral that can only tighten as more aircraft are parted out and the market becomes saturated with A340 unique parts with a declining fleet generating a reducing demand for those parts.

The fall in popularity of the A340 and its associated values has coincided with changes in the airfreight market and although there are no conventional P2F programmes being proposed by the OEM or other parties for the A340 family of aircraft, an entirely new P2F conversion concept is on offer for the A340 by the Eolia Group through its LCF Conversions subsidiary and this may offer the alternative to part out that the A340 needs if it is to retain its asset value.

The structure of the global airfreight market has changed – the past is no longer a good predictor of the future

Demand for conventional twin aisle / wide body P2F conversion programmes has collapsed as major changes have taken place in both the demand for and the supply of global airfreight capability:

- Changes in world economic activity – reduced economic activity; onshoring; modal shifts (moves to sea freight); etc
- Large increases in fuel prices - since 1990 the price of fuel has increased threefold
- The introduction of the third generation Medium Wide Body (MWB) passenger fleets of B777s, A330s and A340s has created a large supply of lower hold freight capacity in the world’s passenger fleets – cargo capacity that can be sold at highly competitive (marginal) ratesall creating an airfreight market squeezed by increasing costs and falling cargo yields.

While these changes have been happening, the conventional Main Deck freighter supply market (new build and P2F) has continued to focus on trying to sell what it has delivered for the last 30

PAYLOAD RANGE OVERVIEW

A340 LCF

Impressive Range and Payload Performance



A340-300

A340-300:

- Standard **65.4 tonnes / 4,650 nm**
- Enhanced **67.2 tonnes / 5,400 nm**



A340-500

A340-500:

- Standard **81.8 tonnes / 6,950 nm**
- Enhanced **83.8 tonnes / 7,350 nm**



A340-600

A340-600:

- Standard **84.5 tonnes / 5,550 nm**
- Enhanced **90.5 tonnes / 5,900 nm**

(Payload figures are tonnes of structural payload)

years – complex, heavy and increasingly expensive modifications – at prices that do not reflect the new world demand situation and the new competitive passenger MWB lower hold economics.

Sales of new build freighters struggled in 2013 - twenty-two new orders were offset by thirty-one cancellations. After adjusting for cancellations:

- Boeing’s net freighter order total was plus three - 1x B777F & 2x B767-300F
- Airbus suffered net freighter order cancellations of twelve - A330-200F’s

As a result, new build freighter order backlogs continue to reduce at a significant rate.

In addition, despite the OEM’s forecast market demand for their P2F conversions of in the order of 30 conversions per annum – something that historical trends do not support - the current impact of all the market changes is a moribund freighter conversion market. The chart below shows the impact on the global P2F conversion market. Of all the twin aisle / wide body P2F programmes only the B767 has an order backlog (2 aircraft). There are no other orders for the established players.

If the OEM’s forecast of 30

conversions per annum is to be realised then clearly they must do something different to what they have been doing.

The airfreight industry, and especially in the short term, the A340, needs access to affordable freighter conversion solutions. It is clearly time for a radically different approach to creating freighter capacity that is better aligned to the changed airfreight market structure - a 21st century solution that is innovative and affordable – and is applicable to all the MWB fleets including the A340 and all its models and variants.

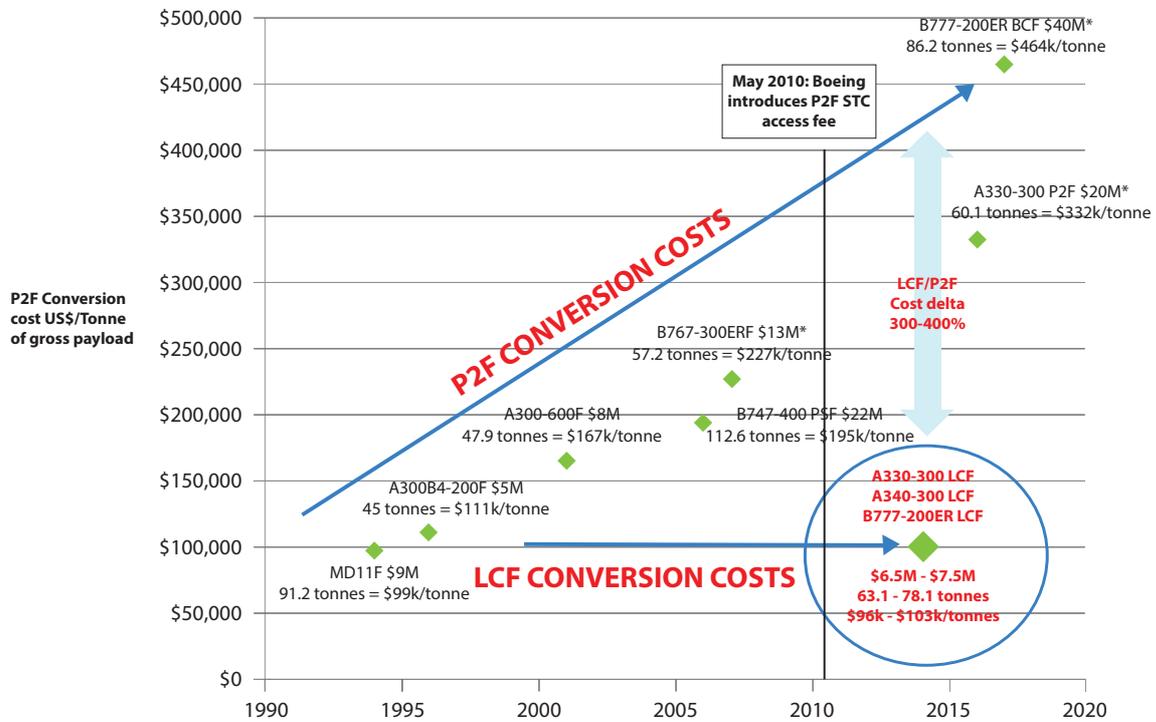
The opportunity to extend the economic life of the third generation airframes is being stifled by the unrealistic expectations of the OEMs

During the recent A340 conference in London and in supporting publications Airbus’s analysis of the cost advantages of A340s versus various Boeing aircraft (A340-300 vs B777-200ER; A340-500 vs B777-200LR; A340-600 vs B777-300R and B747-400) in each case highlighted the cost of ownership advantage of the A340 – largely the result of its depressed market value.

The OEMs (Airbus and Boeing), assuming they have now taken control of the widebody conversion market, seem to be assuming that the industry

PAYLOAD COST PER TONNE

The ever-increasing P2F Conversion cost per tonne of payload;
Only LCF bucks the unaffordable trend!



*B777-200ER BCF & A330-300 P2F: Estimated conversion cost at EIS

is going to swallow a massive increase in the conversion price just to gain access onto the fuel-efficient third generation platforms - published target OEM P2F conversion prices: Airbus A330-200 \$20m; B777-200ER \$40m (taking into account likely inflation hikes between now and EIS) - and only likely to be offered on these specific models. The industry is heading for a situation where turning older third generation wide body airframes into freighters capable of carrying 60 - 90 tonnes, will turn into a \$60m+ investment for a 20 year old converted airframe. And then only for those fleet types that the OEM's consider it worth their while investing in.

This is illustrated in the chart below showing how conversion prices measured in cost per kg of payload resulting from the conversion (bang for your buck in the conversion process) have and are now projected to move before the 787 and A350 will be entering

TWIN AISLE / WIDE BODY P2F ORDER BOOK – DECEMBER 2013

Aircraft	Convertor	Outstanding Order Book	Last Conversion	Last Contract Signed
A300-600	EFW / Airbus	-	Jun-13	May-11
A300-600	FSI / MNG	-	Sep-12	May-11
B767-300	BCF / ST Aero	X2		Nov-12
B767-300	BDSF / Mitsui	-	Aug-13	Jul-12
B747-400	BCF	-	Jul-12	Dec-11
B747-400	BDSF	-	Aug-12	Jul-11
A330-300	EFW / ST Aero	-		No order to date
B777-200ER	BCF	-		Yet to be launched
A340/A330/B777	LCF	-		No order to date

the fray circa 2030

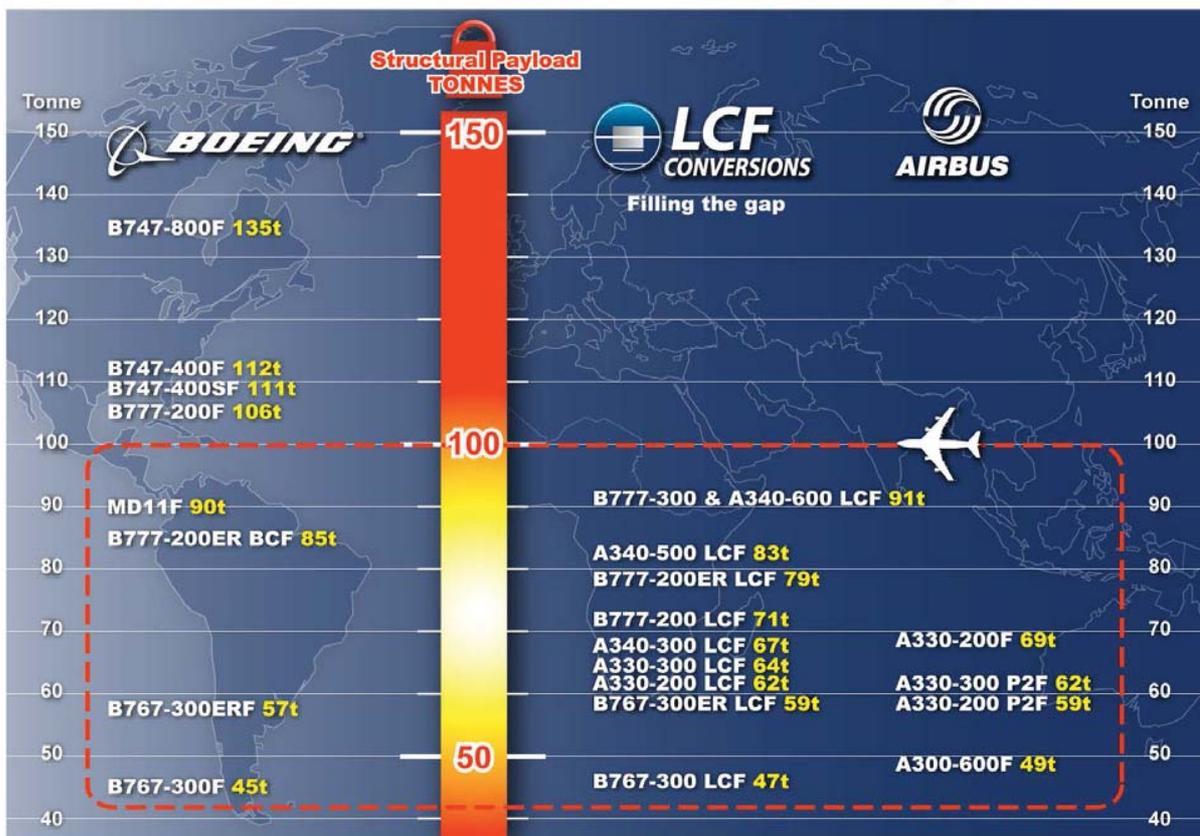
On the third generation MWB aircraft the only competitor to the very limited OEM P2F programmes is LCF Conversions who, alone, are offering an A340 P2F conversion option.

With A340 selling prices at the

level they are this aircraft presents a good candidate for a P2F programme. However, there is no suggestion that Airbus will offer a P2F option on the A340 fleet but there is a perception that they are not unsupportive of the LCF approach.

COMPARISON OF FREIGHTER TYPES

FREIGHTER PRODUCT LINES Side-By-Side



Impact of MWB inherent freight capability

Currently 60% of world airfreight is carried in the lower holds of freighter and passenger aircraft – it has been estimated that 90% could be configured to be carried in the lower holds.

Historically, a conventional freighter conversion is designed to accommodate most of the conceivable loads that a freighter may be asked to carry, e.g:

- High pallets / containers - but in actual fact, as stated above most loads can be configured to fit into a MWB lower hold – maximum container / pallet height of 64 inches – so the need for a large Main Deck door is not essential for every freighter, and
- Heavy loads – there will always be a need for a Main Deck freighter with a

strengthened floor to accommodate a small number of very heavy pallets. But that is not the majority of the world's airfreight demand. Typical airfreight container / pallet densities of 8-10lbs are easily accommodated by the MWB fleet's designed-in passenger floor running and aerial load design limits without any additional floor strengthening

Accessing the lower holds of the third generation MWB aircraft such as the A340 is via large lower hold freight doors that allow containers with bases up to 125"x96" to be loaded. The maximum container height that can be loaded through the lower hold door is 64".

This is the reality of today's airfreight market and it begs the question as to why, when these third generation MWB aircraft such as the A340 have such an inbuilt alternative use capability

An A340-300 in a standard passenger configuration has a lower hold capacity of 41 tonnes and a main deck (passenger compartment) capacity of 44 tonnes – but the aircraft is restricted to a total payload of 65 tonnes. Therefore, if the lower hold is loaded with containers up to its 41 tonne max load then a maximum of just 24 tonnes can be loaded onto the main deck – so, why add weight / reduce payload by strengthening the main deck floor of every converted aircraft?

without any modifications, we need to continue to install expensive, heavy legacy style modifications (large main deck door; extensive main deck floor strengthening) that make conversions far too expensive (and heavy) when, in a freighter role, these changes are not needed to transport in excess of 60% of today's airfreight.

An expensive, legacy style P2F conversion will never be an economical proposition for the A340 fleets.

LCF CONVERSION OPTIONS

The LCF Conversion is Flexible Offering progressive levels of conversion

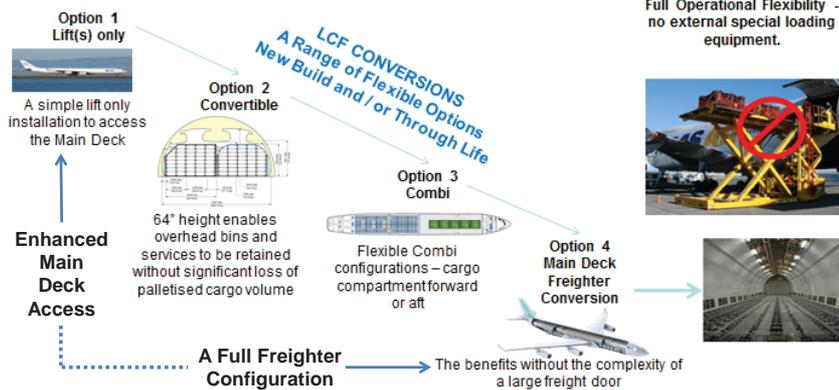
Starting from Option 1:

- A simple single lift system installation to aid Main deck access

Through to Option 4:

- A full Main Deck freighter conversion

...With other flexible options between



An LCF conversion results in a net reduction of 4060lbs (1842kgs) in the weight of an A340-300 aircraft compared with the weight of the donor passenger aircraft

airfreight supply structure – belly hold configured freight containers and pallets

- Designed to re-establish the economics of general airfreight - an A340 LCF P2F conversion price is a fraction of the cost of proposed OEM conventional P2F conversions on the A330 and B777

The passenger aircraft certified performance limits are unaffected by the conversion applicability to the A340 fleet.

The LCF conversion solution offers flexible 'solutions'

In addition to the full freighter concept LCF has developed a number of Main Deck derivatives and options (all equally applicable to the military as well as the civil market) ranging from simplified access to the Main Deck for unusual loads through combi/quick change versions through to the full freighter config on the Main Deck. The LCF concept offers extensive flexibility and can be installed in a way that allows economical reversal of the installation to revert the aircraft back into a conventional passenger configuration with no impact on its passenger operational performance.

The comparative economics of an A340 as a freighter (LCF configuration)

The LCF conversion enables an A340 to provide competitive range and payload compared with other new build and planned OEM P2F freighters - at significantly lower capital cost.

As illustrated below, in all cases the LCF product can match or better the payload and/or range where there are (or are anticipated to be) competing programmes on offer. In addition, LCF brings on stream alternative-use solutions for airframes (the A340 and the 777-200 fleets for instance) where the OEM will never develop a solution

The LCF conversion makes use of the existing large freight doors installed in the lower holds of the third generation MWB passenger aircraft and the LCF patented Lift Systems installed in the lower holds enable freight to be moved between the lower and main decks.



... avoiding the complexity and additional weight associated with the installation of a large main deck freight door and floor strengthening mods.

The lift operating mechanisms are contained within the lift platform structure and are fully interchangeable across lifts and are identical across all the MWB applications. Therefore the economies of scale that can be achieved across the 3rd generation widebody fleets enables LCF to offer economically viable applications on multiple aircraft types and market applications.

What are the alternative use options for the A340 that are going to extend its asset life and enhance its value?

Apart from part-out there is only one alternative use programme on offer for the A340 fleet – and that is the Low Cost Freighter (LCF) conversion programme being developed by LCF Conversions Ltd, a subsidiary of the Eolia Group.

LCF Conversions is challenging the status quo by offering a P2F solution based on an innovative approach to converting 3rd generation MWB aircraft – Boeing B777s and Airbus 330s and A340s - into freighters and other alternative-use configurations by exploiting the built in capability of these aircraft.

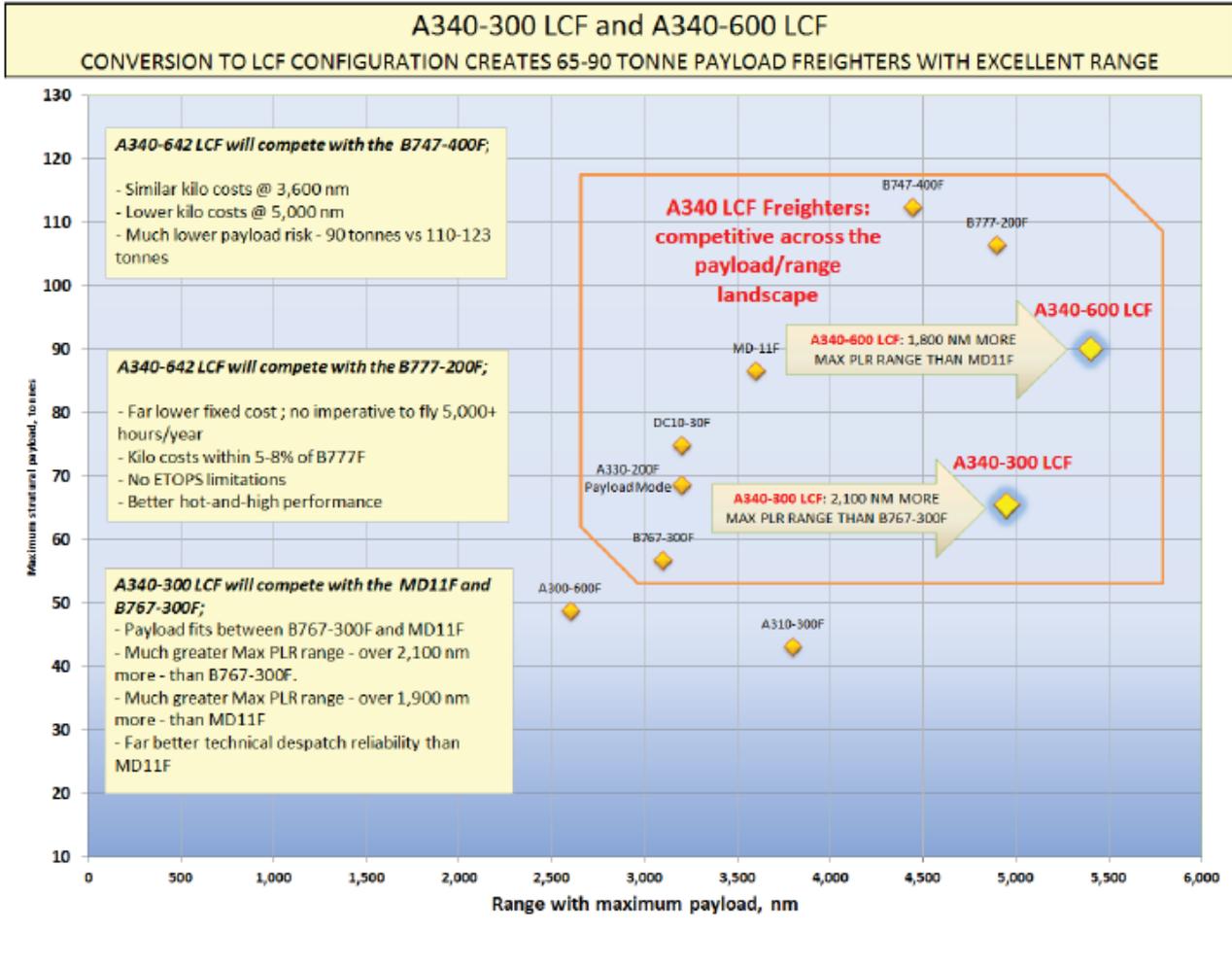
Unlike a conventional P2F conversion that adds weight to the aircraft, an LCF conversion removes weight from the donor passenger aircraft and:

- Maintains the range performance to be at least as good as the passenger aircraft
- Provides a payload of at least that of the donor aircraft

It is an innovative and cost effective conversion that is:

- Fully aligned with the new

A340-300 & A340-600 PAYLOAD AND RANGE



LCF is a novel, simple solution that has been developed to satisfy the needs of the 21st century freighter market. It challenges the need to simply replicate the conversion format that has traditionally supported this market by offering an alternative solution that significantly reduces the development cost (by a factor of 10) and the on-going conversion cost (by at least two thirds) – it has an immediate

There is an Option to undertake a reduced strip (with associated weight penalty) to retain the capability to restore an LCF back into its original passenger configuration - the LCF modification can therefore be planned to be reversible and the conversion 'Kit' can be removed and reinstalled on other airframes

beyond the passenger use.

The Industry needs access to affordable freighter conversion solutions

- not to be faced-off with the same old solutions (or in the case of the A340 – no solution) linked to a fivefold increase in their conversion cost. LCF Conversions is the only company offering a flexible, affordable alternative use (freighter) A340 solution to challenge the status quo. The LCF P2F conversion programme provides the opportunity to turn 15 - 20 year old A340s into freighters capable of carrying 60 - 90 tonnes as a cost effective investment.

The LCF programme addresses the changing freighter conversion environment in terms of 'affordability', the move to belly freight and the need for operators to be able to access the 3rd generation aircraft platforms with their inherent benefits.

Since going public on the LCF programme in March 2012 LCF Conversions has communicated the

programme concept to a broad spectrum of the aviation community. From all quarters LCF has received a positive response. Despite the underlying Industry resistance to change, the facts are that the industry structure is changing and demanding more pragmatic (cost-effective) solutions. Applying the traditional conversion solution onto third generation MWB airframes is potentially 'unaffordable' and unlikely to ever be an option for the A340.

LCF Conversions is confident of delivering an A340 conversion at the target price of \$6.5m and with indications that donor passenger aircraft are available at sub-\$10m prices this provides the opportunity to have a 65+ tonne freighter on the ramp for a total cost (aircraft + conversion) in the region of \$15m