

There are almost 900 A330s in operation, and the oldest aircraft are more than 20 years of age. The fleet is split between less sought after older lower gross weight, and more popular younger higher gross weight examples. The market options for used, older aircraft are examined.

# The used market potential for A330s and their engines

The A330 has been the most commercially successful Airbus widebody aircraft to date, with nearly 1,000 delivered to operators as of April 2013. In recent years production delays to new aircraft programmes such as the 787 will have helped to maintain demand for A330s, as airlines have looked to plug the capacity gap.

The oldest A330-300s have been flying for 20 years, while the oldest A330-200s are now approaching 15 years in service. There are a number of used market opportunities for A330 passenger-configured aircraft approaching this vintage. These are examined here.

First, they can continue to be operated for passenger services. An alternative would be tear-down and part-out to generate revenue from the engines and other valuable spares. From 2016 a third option will be a passenger-to-freighter conversion programme.

## A330 fleet

As of April 2013, 971 A330s had been delivered. Of these, 912 are active, 51 are parked and six have been destroyed. Two aircraft have been retired. There are a further 77 A330s on order.

Passenger-configured aircraft make up 878 of the active fleet and 39 of the parked airframes. Factory freighters account for another 19 active A330s. The remaining aircraft have corporate, government or military functions.

The A330 fleet can be sub-divided between -200 and -300 variants. It can then be further sub-divided by engine type and maximum take-off weight

(MTOW). These variables are significant, since they can influence the used value of the aircraft.

Values for used A330s might also be influenced by differences in engine maintenance costs and support options, along with spares availability.

There is a choice between three different engine families for the A330: the General Electric (GE) CF6-80E1; the Pratt & Whitney (PW) PW4000-100; and the Rolls-Royce (RR) Trent 700. The Trent 700 powers more than 50% of the A330 fleet and dominates the market.

The certified MTOW of an aircraft determines its maximum payload and range characteristics. Aircraft with larger MTOWs can carry a greater payload or fly longer distances.

## A330-300

The A330-300 was the first variant to enter airline service in 1994. It can seat about 295 passengers in a three-class layout. There are 457 active and parked, passenger-configured A330-300s (*see table, page 8*).

Unlike the smaller A330-200, early examples of the -300 were manufactured with low gross weights (LGWs). There is a distinct split between LGW A330-300s manufactured between L/N 012 to 244, up to 1998, and high gross weight (HGW) examples produced from L/N 256 onwards.

The LGW aircraft were produced in 1992-1998, with MTOWs ranging from 467,000lbs to 480,600lbs (212-218 tonnes (t)). There are 63 active and 10 parked aircraft in this L/N range (*see table, page 8*). Of these, 65 still have a

MTOW of 478,000lbs or lower. A further eight appear to have had upgrades to bring their MTOW up to 507,000lbs.

The LGW A330-300s manufactured between L/Ns 012 and 244, are equipped with a mix of PW4000-100 (34), Trent 700 (24) and CF6-80E1 (15) engines (*see table, page 8*).

The largest operators of LGW A330-300s are Thai Airways (11), Dragonair (9) and Philippine Airlines (8).

HGW A330-300s are those manufactured from L/N 256 onwards, built from 1999. L/Ns 256 to 370 had a MTOW of 507,000lbs (230t) with the option to increase this to 514,000lbs (233t). Aircraft built from L/N 375, in 2001, had a MTOW of 514,000lbs, with the option to reduce the weight if required. In 2012, aircraft with a new MTOW of 518,000lbs (235t) entered service.

There are 384 active and parked passenger-configured HGW A330-300s (*see table, page 8*). At least 12 of these aircraft have an MTOW of 478,000lbs or lower, suggesting they have been modified to reduce their gross weight. Trent 700s (238) power most of the HGW A330-300 fleet, with the rest split evenly between CF6-80E1s (72) and PW4000-100s (71) (*see table, page 8*).

The largest operators of HGW A330-300s are Cathay Pacific (31), China Airlines (22), Delta Airlines (21) and Singapore Airlines (21).

## A330-200

The A330-200 entered service in 1998 and can seat about 250 passengers in a three-class layout. The A330-200 has

## A330 ACTIVE &amp; PARKED PASSENGER FLEET APRIL 2013

Aircraft type	A330-200	A330-300LGW	A330-300HGW	Total
Active	434	63	381	878
Parked	26	10	3	39
Total	460	73	384	917
<b>Engine Family</b>				
Trent 700	217	24	238	479
CF6-80E1	138	15	72	225
PW4000-100	105	34	71	210
<b>Potential freighter feedstock</b>				
2013	11	71	0	82
2016	91	30	39	160
2019	158	0	79	237

longer-range capabilities than the LGW versions of the larger -300. There are 460 active and parked A330-200s in passenger configuration (see table, this page).

The Trent 700 is the most popular engine with A330-200 operators (217), followed by the CF6-80E1 (138) and the PW4000-100 (105) (see table, this page).

All A330-200s have had the option of an MTOW in excess of 507,000lbs.

The largest operators of A330-200s are Air China (26), Emirates (24) and TAM (20).

The new build A330 freighter programme is focused solely on the -200 variant. Malaysia Airlines and Hong Kong Airlines operate the largest fleets of A330-200Fs with four aircraft each.

## Passenger operations

Continued use for passenger operations is one revenue-earning option for used A330s. Operators adopting this strategy need to consider the variations in performance, values and potential lease rates of different A330 models.

## MTOW

"The used A330 market is fairly complicated," says Bert van Leeuwen, managing director, aviation research DVB Bank SE. "With the A330-300 you have almost two different types: the early LGW aircraft and the HGW variants. Each A330 variant also has three engine options."

"Avitas distinguishes between the early-build, lower MTOW A330-300s from a values perspective, and the latter-build high weight aircraft," explains Stephen Jarvis, managing director, Avitas Europe. "The low weight units in service as of April 2013 were built in 1992-1998,

after which higher MTOW capability became standard. Among the higher weight aircraft there have been a number of increases in MTOW. Taking the A330 fleet as a whole, there are value premiums associated with higher MTOWs, and these increase for younger aircraft."

"The limited range performance of the lower weight A330-300s means they have been employed as regional people movers in the Asia Pacific," explains van Leeuwen. They can be effective in this market due to large levels of demand over short to medium sector lengths.

"At the used end of the market the A330-200 is more attractive, due to its superior range performance over the early model -300s," says Dick Forsberg, head of strategy, at Avolon. "At the younger end, the market has partly shifted away from the -200 as the MTOW, and subsequently the range performance, of the larger -300 has gradually increased."

This outlook is echoed by others. "The used market for older A330s is stronger for the -200 than the -300," says Craig Papayanis, managing director, at BCI Aircraft Leasing. "This situation is reversed in the new market with extended range -300s providing lower seat costs, making it difficult to justify choosing the -200 variant."

## Engines

Engine type is also an important consideration for potential operators of used A330s. "For new A330s there has been a tendency for higher demand, and hence values, for Trent 700 engines" says Gary Fitzgerald, vice president commercial, at Avinco. "Values by engine type for the older aircraft are more mixed."

For used A330 operators the support services available for different engine

families are an important consideration. Integrated services, often referred to as total-care contracts, involve a multitude of services provided, in this case, by the engine manufacturers (see *The evolution & characteristics of engine maintenance contracts, Aircraft Commerce, February/March 2013, page 35*). These services might be included in a cost per engine flight hour (EFH) contract, including: spare engine and line replaceable unit (LRU) support; engineering management; engine health monitoring data collection and analysis; and on-wing support.

Advantages for airlines include avoiding up-front investment in spares when introducing a new engine type, and minimising staff costs by outsourcing maintenance functions.

Integrated services or total care contracts may not be as appealing to operators of older, 15-20-year-old A330s, as they may want the flexibility to choose from various maintenance providers, and to manage life-limited parts (LLPs). Total care contracts may restrict opportunities in these areas. They may also incur LLP reserve costs normally associated with younger engines.

"RR has been very focused on encouraging the adoption of its TotalCare package for the Trent 700," claims Chris Pelly, senior vice president of commercial at Total Engine Support (TES). "Around 70% of Trent 700s are signed up to TotalCare upon entering service. This is much higher than the take-up for equivalent CF6-80E1 and PW4000-100 integrated services, which I understand cover 50-60% of each of the respective engine families."

"The RR package of TotalCare services is typically less flexible than the GE and PW offerings," claims Pelly. "GE gives more opportunity to pick the



services you need.”

RR dominates the maintenance market for its Trent 700 product. Even if an operator is not signed into a TotalCare package the likelihood is that their engines will go through an RR engine shop for maintenance. “The only third-party maintenance provider with Trent 700 capability is Abu Dhabi Aircraft Technologies (ADAT),” says Pelly. “The only other options available are RR’s own facilities or engine shops in which they have a joint venture. This has led to a situation where there is not much of a market for third-party-provided serviceable, used material. In contrast there are more independent or less restrictively original equipment manufacturer (OEM) -controlled engine shops with capability for the CF6-80E1 and PW4000-100 family engines. Over 60% of an engine’s shop-visit costs are likely to be accounted for by the cost of materials. If there are more spares on the market for the GE and PW engines, maintenance costs could be higher for Trent 700 operators in the long run,” claims Pelly.

### Lease rates

Estimated lease rates supplied by Avitas for the second quarter (Q2) of 2013 reinforce the suggestion that there is more demand for A330-200s, than for LGW A330-300s at the older end of the market. Based on aircraft in a half-life maintenance condition and a lease term of four-to-seven years, an A330-200 manufactured in 1998 will command \$350,000-410,000 per month in lease rentals. This compares to \$230,000-270,000 for a 20-year-old LGW A330-300. A younger LGW, 1998-built A330-

300 should earn \$300,000-340,000 per month.

HGW A330-300s can generate larger monthly lease revenues than equivalent vintage A330-200s. An HGW A330-300 with an MTOW of 507,000lbs manufactured in 2001 can obtain monthly lease rates of \$440,000-520,000 compared to \$400,000-470,000 for a similar age A330-200.

A330 lease rates so far do not appear to be influenced by engine family. This may change as more used aircraft come on to the market.

### Market values

Figures provided by Avitas for Q2 2013, for aircraft in a half-life maintenance condition, attach higher market values to the oldest A330-200s than similar vintage LGW A330-300s. An LGW A330-300 built in 1998 and equipped with PW4168 engines is valued at \$24.8 million. This compares to \$32.1 million for an A330-200 manufactured in the same year with PW4168A engines.

Conversely, an HGW A330-300 built in 2001 is assigned a higher market value than an A330-200s of the same age. Among the HGW aircraft, those with an MTOW of 514,000lbs have a higher value than 507,000lb examples.

There is some evidence among LGW A330-300s of a slight premium for aircraft with Trent 700 engines.

An LGW A330-300 manufactured in 1998 with Trent 772-60 engines has an estimated value of \$25.4 million. This compares to \$24.8 million for a PW4168 powered example and \$24 million for one with CF6-80E1A2 engines. These engine variants represent the most common, and highest specification

*At the older, used end of the A330 market, -200s are more attractive propositions than LGW -300s. This is reflected in estimated market values and lease rates.*

examples from each manufacturer, available for LGW A330-300s.

For 507,000lbs MTOW HGW A330-300s built in 2001 and 2003, Trent-powered aircraft are again assigned higher values than those with PW engines. This time CF6-80E1-equipped aircraft are of equal value to those with the RR powerplants.

Trent 772B-60 powered A330-200s manufactured in 2001 and 2003 have higher values than those with PW engines and the CF6-80E1A4. The CF680E1A3 is also available for this vintage of A330-200, but no information was available for the value of these aircraft.

### Transactions

Since the beginning of 2012 there have been 10 lease or sale transactions involving LGW A330-300s greater than 15 years of age. Six of these deals involved aircraft being leased to new operators with no change in ownership. Five of these aircraft went to Asia Pacific carriers. Only one aircraft saw a change in owner and operator.

A further three LGW A330-300s changed owner when they were purchased by Deucalion Aviation Funds for part-out. There were no sale-leaseback transactions involving LGW A330-300s.

During the same time period there was only one transaction involving an HGW A330-300 aged 10 years or more at the time of sale. This was a sale-leaseback deal between Rurik Ltd and SAS. In contrast there were at least 17 sale-leaseback transactions for A330-300s manufactured since 2012.

The oldest A330-200s are only turning 15 years old in 2013 so it is not surprising that there were no recent sale or lease transactions for these. There have been a number of deals involving A330-200s aged 10 years and over since the beginning of 2012. These include eight aircraft being leased to new operators with no change in ownership.

A further two aircraft, manufactured in 1999, were involved in sale-leaseback deals between Monarch Airlines and Guggenheim Aviation Partners. Two more A330-200s in excess of 10 years in age also saw a change in ownership. One was bought from Emirates by Airbus Asset Management, but has yet to be released. The other, an ex-BMI aircraft, was

*A330-300s built between Line Numbers 012 and 244, from 1992 to 1998, have low MTOWs. There is little demand for re-marketing these older low weight aircraft for continued passenger operations outside of the Asia Pacific.*

purchased and retired suggesting that it may be parted out.

As with the A330-300, there is far more activity related to younger A330-200s. At least 13 sale-leaseback transactions have been completed since the beginning of 2012 for A330-200s built since 2011.

“Due to regulatory pressures and the economic downturn, all banks are having to reduce their balance sheets,” explains Forsberg. “As a result the ability to provide debt to finance aircraft has been reduced substantially over the past three or four years. Fewer banks are now prepared to finance widebodies rather than narrowbodies. The three engine options available for the A330 could make banks even more wary of investing. As a result, the engine with the smallest market share will usually become marginalised from a value perspective, leaving lenders and investors with more asset risk.”

This could explain the limited number of transactions in which older A330s have been purchased for continued passenger operations. With less financing available, investments have been focused on younger aircraft, which in some cases have superior performance.

“Financing for young or new A330-300s is plentiful, especially if the operator is a well known airline,” says van Leeuwen. “Once the aircraft starts to age it becomes more difficult to find financing, and several operators of early A330s have discovered that there is no used market for these planes as flyers. Financing is available for these aircraft based on the net present value of the remaining lease, plus the part-out value. For a 10-15-year-old A330 it very much depends on whether there is a decent lease or lessee attached. Few financiers will be willing to step in for aircraft without a lease attached.”

The limited, or even non-existent, debt financing available for older aircraft will start to impact heavily on their values as more get retired. Options for financing used aircraft are effectively limited to equity financing or pure cash purchases by airlines. The implications of this are that the only market for the oldest aircraft will be part-out and conversion to freighter. Only a small number of aircraft will be acquired for continued passenger operations.



## Part-out

Another option for generating revenue from older, used aircraft is to tear them down and sell the most valuable components. Few A330s have met this fate so far.

It seems the A330 part-out market will initially be dominated by LGW A330-300s. DVB and its fund investors, via Deucalion Aviation Funds, purchased three LGW A330-300s, previously operated by Malaysia Airlines, for part-out in 2012.

“The previous owners worked hard to re-market these aircraft but there was not a great deal of interest,” explains Stephan Sayre, managing director, aviation investment management, DVB Bank SE. “LGW A330-300s are now regarded as old technology and operators prefer the economics and appeal of newer HGW aircraft.”

Traditionally, an aircraft’s engines are the highest-value items when parting-out for spares. For any potential A330 tear-downs the engine family installed on the aircraft in question will be a crucial consideration.

“Due to RR’s control of the maintenance market no-one is speculatively buying Trent 700s for tear-down,” claims Pelly. “As things stand it is a tough business case to justify buying a Trent 700 engine, because the only place to sell the materials will be to RR, which would probably source them internally.”

These sentiments are echoed by other spares providers. “The value of A330s for part-out is driven by the engine mix,” says Steve Williams, director of aircraft engine services, AJ Walter Aviation. “From a commercial perspective for the A330 we are only interested in CF6-80E1

and PW4000-100 engines, and not the Trent 700 family. This is because there are a number of independent engine shops supporting the GE and PW products, to which we could sell materials. In contrast, the market is locked for the Trent 700, and the only place you can sell is to RR. The A330 may be the first time that an aircraft has come to market where the engine OEM has dominated the MRO aftermarket from entry into service.”

“For part-out, a significant amount of money needs to be invested for handling the dismantling of the aircraft, together with the repair and overhaul of valuable removed spares,” says van Leeuwen. “The estimated proceeds from parting out a PW- or GE-powered LGW A330-300 are split 50:50 between engines and airframe. Although many A330-300 parts can be used for the A330-200 fleet as well, once 10 or 12 aircraft have been parted out airframe values could drop dramatically. For an older Trent 700-powered A330-300 it is difficult to realise any significant value from the engines, because the Trent MRO market is controlled by the OEM. It might be best to assume a conservative engine value of \$3-4 million for a shipset. Most of the part-out value will have to come from other high-value airframe parts,” van Leeuwen concludes

“In addition to the engines, other parts of an A330 that could return significant value include the landing gear, avionics suite and engine-mounted LRUs,” says John Avery, director of supply chain services, AJ Walter Aviation. “The 331-350 auxiliary power unit (APU) also remains very much sought after. The interior and structure will not return much value.”

## A330-300HGW P2F PAYLOAD CHARACTERISTICS

Aircraft Type	A330-300HGW P2F	B767-300ER BCF
MZFW (lbs)	385,800	309,000
OEW (lbs)	247,950	184,220
Gross structural payload (lbs)	137,850	124,780
Type main deck containers	96" x 125" x 96"	88" x 125" x 86"/A2
Number main deck containers	26	22/2
Unit volume main deck containers - cu ft	536	502/420
Unit tare weight main deck containers -lbs	562	470/500
Total volume main deck containers - cu ft	13,936	11,844
Total tare weight main deck containers	14,612	11,340
Type lower deck containers	LD3/AKE	LD2
Number lower deck containers	32	30
Unit volume lower deck containers - cu ft	153	125
Unit tare weight lower deck containers -lbs	168	132
Total volume lower deck containers - cu ft	4,896	3,750
Total tare weight lower deck containers - lbs	5,376	3,960
Bulk cargo compartment volume - lbs	695	430
Total volume - cu ft	19,527	16,024
Total tare weight - lbs	19,988	15,300
Net structural payload - lbs	117,862	109,480
Maximum packing density - lbs/cu ft	6.04	6.83
Volumetric payload @ 6.5lbs/cu ft	117,862	104,156
Volumetric payload @ 7.0lbs/cu ft	117,862	109,480

## Notes:

- 1). HGW A330-300 from 514K lbs/233t MTOW (integrator loading system)
- 2). Container volumes, tare weights and aircraft weights may vary
- 3). 767-300ER BCF based on Max weight PW4062 powered aircraft

Another important consideration for potential A330 part-outs is commonality with other aircraft types. "There is a strong level of airframe commonality between A330s and A340s," says Avery. "A number of A340s will be coming on to the part-out market soon, which could cover some of the need for A330 spares."

"Depending on the age, and the industrial standard of each MSN built, the A330 and A340 can have quite a lot in common in terms of the structure, fuselage and basic LRUs," says Jose de Almeida, A330 fleet manager & IFEC systems projects, at TAP maintenance & engineering. "The most common parts between the two types are probably the LRUs. Both aircraft also use the 331-350 APU, although those used on A330s might need extended-range twin operations (ETOPS) approved and compatible modifications. The A330 and A340 have different engines and a different engine layout. The A340 has

four engines to the A330's two. This means there are significant differences between the two types in terms of hydraulic, electric and pneumatic systems," says Almeida. "The A330 and A340 also have a different landing gear design, even if sharing some parts. While there is some commonality, the significant differences mean that the spares market for the two types will be quite segmented. An investment in A330 spares by means of a part-out should be relatively safe and immune from contamination by A340 parts, especially if the industrial standards differ."

### Freight conversion

From 2016 another revenue-generating option for older A330s will become available in the form of a passenger-to-freighter (P2F) conversion programme for A330-200s and -300s.

The programme is being developed by

Airbus, ST Aerospace and EADS-EFW. Airbus has provided data for the project, while ST Aerospace is responsible for the modification and design work. EADS-EFW will perform the conversions at its Dresden facility.

"There is no launch customer yet, but airlines have been pushing for this conversion programme," claims Jon Howey, director of sales, aircraft conversion, at EADS-EFW. "We expect the first conversion to start at the end of 2015. This will take about a year due to flight test and certification requirements. Based on current market demand we expect the first converted aircraft to be an A330-200. The first converted -300 will then follow by the end of 2017."

"Target payload for converted A330-200s is 59t," explains Howey. "For A330-300s up to MSN 244 it is 60t. For -300s from MSN 256 onwards the target payload is 61t."

There will be two cargo loading



system configurations available for converted A330 freighters. A manual loading system will be suitable for integrator operations, while a powered system would be required for higher-density and heavier general freight operations.

Some A330s might be more suitable for freight conversion than others. "The more likely A330 candidates for conversion are -300s which have greater volumetric capacity than -200s, but still retain acceptable range for regional operations," says Stephen Fortune, principal, at Fortune Aviation Services LLC. "The most suitable A330-300s are those that were produced from 1999 or L/N 256 onwards. These have higher structural weights and so offer superior payload and range performance. A330-300s built before L/N 256 would have payload limitations that limit their economic utility.

"Monthly lease rentals could be \$475,000-525,000 for HGW A330-300 converted freighters and \$425,000-475,000 for -200s," continues Fortune. Once the programme is up and running conversion costs are expected to be \$15.5 million for an A330-200 and \$16 million for a -300 based on 2016 rates.

The A330 could be considered as a potential replacement candidate for ageing A300, A310 and even DC-10 freighters. "The primary function for converted A330 freighters will probably be growth rather than replacement," suggests Fortune. "The A300-600 could be around for another 10 years."

The main rival for converted A330 freighters is clear. "Our conversion programme's closest competitor is the 767," says Howey. Fortune agrees.

The A330 and 767 do not offer a like-

for-like comparison, since the A330 is larger. The 767, however, represents the biggest threat to A330 conversion orders in the mid-size freight market.

"The aircraft, crew, maintenance and insurance (ACMI) block hour plus fuel costs are more expensive for the A330-300 than the 767-300ER," claims Fortune. "These costs for the A330-300 come to \$8,250 per hour compared to \$7,700 for the 767 in a typical freighter operation. Nevertheless, this difference is outweighed by the A330's superior net structural payload."

The A330-300P2F's advantage in terms of net structural payload will vary depending upon the containers or pallets used and their tare weights. In a typical containerised situation the difference could be 8,500lbs (*see table, page 12*). The HGW A330-300 P2F will be able to accommodate more higher-volume containers in its main and lower decks (*see table, page 12*). It also has a larger bulk cargo compartment (*see table, page 12*).

Aircraft that are considered suitable for conversion, sometimes referred to as feedstock, are generally 15-to-20 years in age. "By 2016 the feedstock for A330s will continue to grow while the 767 will be in decline," says Howey. Currently, about 82 A330s would be considered suitable feedstock for freighter conversion (*see table, page 12*). Most are LGW -300s with a small number of -200s. By 2016 there will be 160 A330s of the right age, including 91 -200s, 30 LGW-300s and 39 HGW-300s.

By the time the conversion is available, it is possible that market values for potential feedstock aircraft will be at a more suitable level for potential freight operators.

EADS-EFW's A330 P-to-F programme will convert -200s and -300s. The first aircraft should be modified by 2016. The -300P2F will offer the greatest volumetric capacity.

## Summary

Engine type and MTOW are important factors in determining the potential revenue-generating options for older, used A330s.

Most A330s aged 15 years and over are LGW -300s. There is little new demand for these aircraft in a passenger-carrying role outside the Asia Pacific. Older A330-200s are seen as more attractive than LGW A330-300s. This is reflected in current lease rate estimates.

In several years' time when HGW A330-300s begin to enter the 15-20 year age range, it is likely that these aircraft will be the most sought-after used variants.

Although financing is available for younger A330s it is more difficult to come by for older used aircraft.

CF6-80E1- and PW4000-100-equipped aircraft may be the best option for those operators that are looking to generate revenue from older used A330s.

For passenger operations these powerplants are supported by more independent engine shops than the Trent 700 which could lead to lower maintenance cost exposure. In addition, fewer of the GE and PW engines are supported under integrated service contracts. Such contracts may not appeal to operators of older aircraft which prefer more flexibility to choose maintenance providers and manage LLPs.

From a current part-out perspective, aircraft with CF6-80E1 and PW4000-100 family engines are likely to realise more value. Because CF6-80E1 and PW4000-100 family engines are supported by some independent engine shops in addition to OEM facilities, there is more of a market in which to sell parted-out spares and materials for these engines.

Few A330s have been parted out so far, but LGW A330-300s are likely to dominate this market initially.

The HGW A330-300 represents the best candidate for freight conversion from a volumetric capacity perspective. By the time the P2F programme becomes available in 2016, there will be about 39 of these aircraft in the suitable 15-20 year old feedstock age range. **AC**

To download 100s of articles like this, visit:  
[www.aircraft-commerce.com](http://www.aircraft-commerce.com)