A350 DELIVERY
ON TIME ARRIVAL BUT RAMP-UP IS REAL CHALLENGE
REPORT P12

TANKER TAKE-OFF
Boeing performs delayed first flight of 767 variant that will be modified into KC-46A for USAF **11**

BALTIC WATCH
We join Luftwaffe as its Eurofighters complete their NATO air policing mission over Estonia **18**

FLIGHT INTERNATIONAL

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6-12 JANUARY 2015

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Nick Straker -
Trent XWB Systems Verification Airbus Integration

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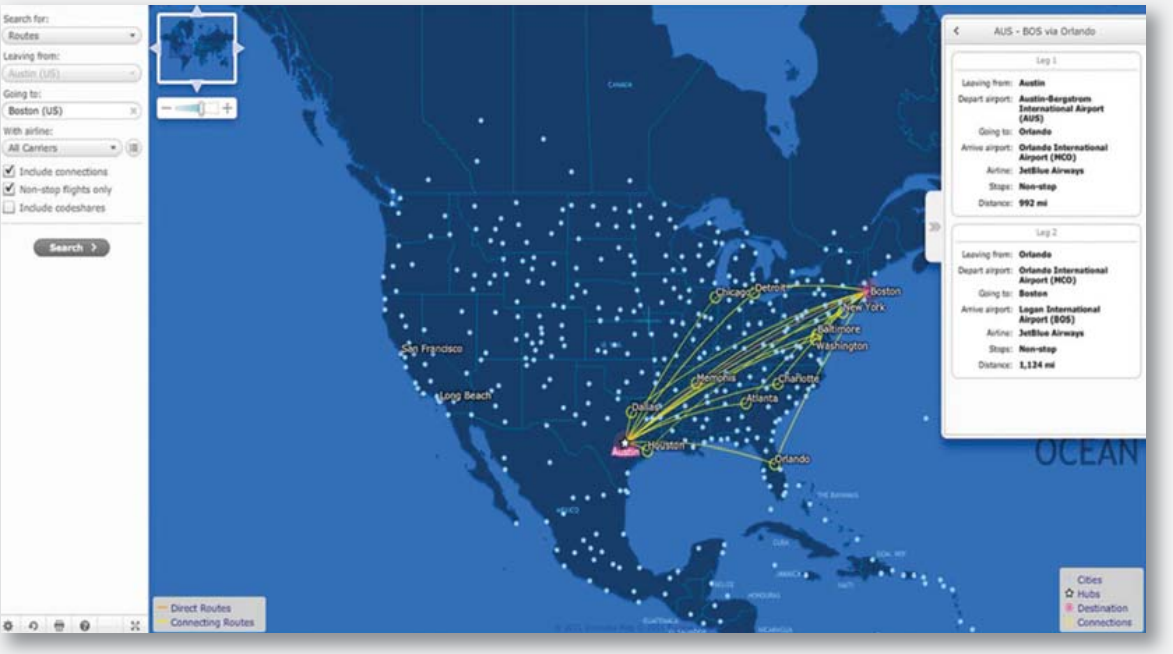

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VOLUME 187 NUMBER 5470

6-12 JANUARY 2015

Alamy

COVER IMAGE

Senior designer Lauren Mills produced this week's cover using an Alamy-provided radar illustration to accompany our annual forecasts feature P24

BEHIND THE HEADLINES

Airline Business Editor **Max Kingsley-Jones** was in Toulouse as **Qatar Airways** took delivery of the first **A350** (P12), while Aerospace and Defence Reporter **Beth Stevenson** watched German Eurofighters on Baltic policing duty in **Amari, Estonia** (P18)

Rex Features

NEXT WEEK SAFETY

We review the industry's accident record in a year that included the loss of Malaysia Airlines MH17 over Ukraine

NEWS

THIS WEEK

AIR TRANSPORT

DEFENCE

BUSINESS AVIATION

NEWS FOCUS

COVER STORY

Bombardier

Bombardier signs launch operator for CS100 P11

REGULARS

Northrop Grumman/Dassault

South Korea selects Global Hawk and Heron P16. Dassault rolls out ultra-long-range Falcon 8X twinjet P21

IMAGE OF THE WEEK

This Icelandair-operated Boeing 757-200, named "Hekla Aurora", is pictured at Amsterdam Schiphol airport sporting a special Northern Lights livery. Flightglobal's Ascend Fleets database records 1994-built TF-FIU as one of 23 757s operated by the carrier. The aircraft has a 183-seat capacity

View more great aviation shots online and in our weekly tablet edition:

flightglobal.com/flight-international

Airteamimages

THE WEEK IN NUMBERS

7.15%

Innovata

Year-on-year growth in seat capacity at Chicago O'Hare, leading an increase at most US hub airports

$250m

Avio Aero

The value of a 25-year contract between Airbus Helicopters and Avio Aero for gearboxes for aircraft including the X4

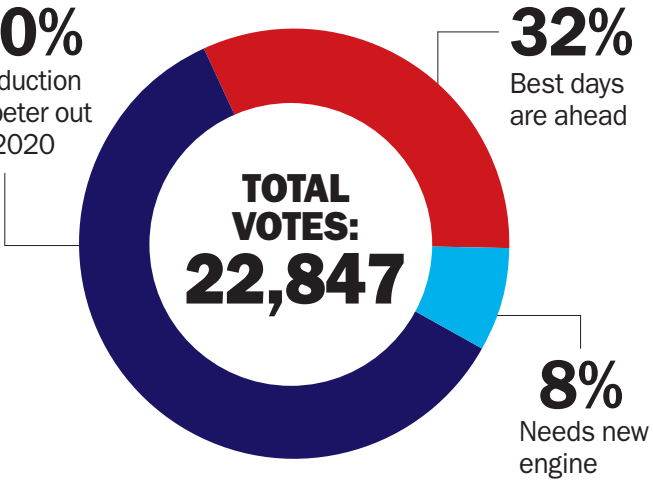
23.5

Airbus Defence & Space

Number of years the Inmarsat-2 F2 satellite lasted in orbit – adding a year to the world record

QUESTION OF THE WEEK

Last issue, we asked: **What has the future in store for the A380?** You said:



This week, we ask: **Can the industry continue to cut airline accidents?**
❑ Yes, but only if it tackles pilot complacency ❑ Yes, inevitable long-term trend ❑ No, sadly, flying can never be 100% safe

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Great wide hope

The successful delivery of the first A350-900 has given Airbus's troubled widebody prospects a boost. But the European airframer still faces huge decisions over its twin-aisle strategy

A year ago, Airbus's widebody strategy looked ragged at best. At one end of its offering, the A330 was a two-decade-old programme with a depleting backlog (its thirsty A340 sibling having already been killed off). At the other, the A380 was struggling to expand its appeal beyond Emirates. In the middle, Toulouse's great hope was the A350. But while the -900 variant was selling well, the smaller -800 looked doomed.

As 2015 begins, things appear tidier. Despite last-minute fussing from launch customer Qatar Airways, the first A350-900 was handed over just before Christmas, a week ahead of Airbus's year-end delivery deadline. The type has a healthy orderbook and the airframer is confident of meeting an ambitious production ramp-up. Meanwhile, the launch of the re-engined A330neo at Farnborough in July gave Airbus a credible contender in the sub-300-seat segment, where Boeing's 787 had the market virtually to itself.

While the next few years are about delivery, Airbus faces big decisions later this decade

But dark clouds remain. An admission from Airbus's chief beancounter in December that the A380 – Europe's most ambitious airliner programme since Concorde – would scarcely be making a profit by the end of the decade, and that halting production was an option, made investors shudder.

Despite a three-year head start in terms of availability, the largest A350, the -1000, is being comfortably outsold by Boeing's 777X, whose variants offer either more capacity or longer range.

Rex Features

Dream big but play safe

While the next few years will be about delivery – bringing the A350-1000, A330neo and A320neo into service and ramping-up both narrowbody and widebody production – Airbus does face big decisions before the decade is out. Should it risk billions revamping a product, the A380, of which the airline industry is far from convinced? (When Boeing launched the 777X it was refreshing the most successful long-haul aircraft ever). Should it consider an all-new small widebody, or focus instead in the 2020s on a clean-sheet single-aisle design, perhaps with Rolls-Royce?

These are choices a new generation of Airbus senior managers may have to take. Now that the company is largely freed from the governmental shackles that restricted its ability to manoeuvre during the EADS era, it will be largely institutional shareholders they will have to convince of the merits of any major decisions.

One thing is sure: there can be no vainglorious *grand projets*. Airbus will have to make sure the business case for any new programme proposal is absolutely tight. ■

See Air Transport P12

Hand-wringing is not enough

Modern airliners should not fall out of the sky, so why did an Indonesia AirAsia Airbus A320 do so with no emergency call? Unless it was some form of terrorism or sabotage one can only look to previous experience for answers.

In two other recent cases aircraft did drop out of the sky in similar circumstances. Their crews were also navigating tropical skies and manoeuvring to avoid storms, and both went missing without emergency calls. In both cases it took about two days to locate wreckage.

The most recent involved an Air Algerie flight from Ouagadougou, Burkina Faso to Algiers. Early in the cruise crew advised ATC they were changing course to avoid weather, then the aircraft crashed. The final accident report is not out, but data from the flight recorders is. The aircraft – clearly subject to turbulence, windshear and probably icing – underwent large changes in attitude and power setting before crew lost control.

The other event was Air France flight 447 in 2009. Atmospheric ice crystals momentarily blocked the A330's pitot tubes, robbing the crew of airspeed information and tripping out the autopilot. The pilot flying reacted as if shocked, and soon the aircraft was out of control. In both cases the aircraft could have been safely managed despite the adverse weather, but they were not. The industry is familiar with this syndrome, but still is doing nothing more than wringing its hands. ■

See This Week P9

David Learmount offers his succinct views on the complexity of aviation safety
flightglobal.com/learmount

BRIEFING

A320NEO ENGINE COMPLETES CERTIFICATION

PROPULSION Pratt & Whitney has completed US Federal Aviation Administration certification for the PurePower PW1100G-JM turbofan engine powering the A320neo flight test programme. Airbus has passed 50 flights with the combination since September 2014.

QANTAS BIDS FAREWELL TO LAST 767

RETIREMENT Qantas Airways conducted its final operational flight with a Boeing 767 on 27 December, operating on the Melbourne-Sydney route. Since introducing its first of the type in 1985, Qantas had used a total of 41 767s. Flightglobal's Ascend Fleets database records 16 of these as now in storage. Airbus A330s and Boeing 737s have taken over flying routes previously operated by the type.

CZECH GRIPEN UPGRADE TAKES OFF

FUNDING Saab has started developing updated mission software for the Czech air force's fleet of 14 leased Gripens, as part of a SKr576 million ($74 million) contract placed via Sweden's Defence Materiel Administration. Also covering support services out to 2027, the award will lead to aircraft modifications being made from late 2015. Separately, the Brazilian air force has agreed a contract worth SKr548 million for Saab and its industrial partners to maintain and support its future Gripen E fleet between 2021 and 2026.

RUSSIA PICKS TU-204 FOR PRESIDENTIAL FLEET

PRODUCTION Aviastar is to deliver a pair of Tupolev Tu-204-300s to the Russian presidential service at the end of 2015. One of the Aviadvigatel PS-90A-engined, long-range aircraft will be configured with 142 passenger seats, while the other will have 94.

NETJETS CONVERTS PHENOM OPTIONS INTO ORDERS

FRACTIONAL OWNERSHIP NetJets has converted 10 of its 75 Embraer Phenom 300 options into firm orders, at a cost of around $90 million. Deliveries to the fractional ownership firm are set to begin in January 2016. NetJets signed a contract in 2010 for up to 125 of the entry-level light business jets, including 50 firm orders. So far 36 aircraft have been delivered, with each equipped with the company's customised Signature Series interior.

ROME ADDS TO M-346 PURCHASE

FLEETS The Italian air force is to acquire three more Alenia Aermacchi M-346 advanced jet trainers under a €120 million ($146 million) contract awarded on 22 December. The aircraft are part of a larger requirement for 15 T-346As, including an order for an initial six for which Rome signed a production agreement in 2009.

CANADA APPROVES PW306D1 TURBOFAN

ENGINES Pratt & Whitney Canada has received Transport Canada approval for its 5,760lb-thrust (26kN) PW306D1 turbofan, for Cessna's Citation Latitude midsize business jet. US validation for the engine is expected before the end of March.

BERLIN WELCOMES INITIAL A400M ATLAS

AIRLIFTERS Germany took receipt of its first of 53 A400M tactical transports on 18 December, with aircraft MSN18 having touched down at Wunstorf air base the following day. Airbus Defence & Space also delivered the Turkish air force's second of 10 examples on 22 December, taking to 10 the number of Atlas airlifters accepted by four nations. France has received six transports, and the UK one.

Lockheed Martin

DELIVERY

US Marine Corps receives first F-35C

Lockheed Martin completed the delivery of 36 Joint Strike Fighters in 2014 by handing over the US Marine Corps' first of a planned 80 carrier-variant F-35Cs on 22 December. The 109th operational F-35 for the USA and partner nations, aircraft CF-19 will be assigned to the US Navy's VFA-101 squadron at Eglin AFB, Florida, to support training. Meanwhile, the Royal Australian Air Force's first two F-35As have arrived at Luke AFB in Arizona – home of the international training centre for the conventional take-off and landing model.

OUTLOOK **MAX KINGSLEY-JONES** TOULOUSE

Airbus boss sees long life for A380

Brégier dampens speculation that limited sales could kill off production, citing "brighter future" for flagship widebody

Airbus chief executive Fabrice Brégier says the suggestion that the airframer is thinking about killing off the A380 programme amid sluggish sales "is just crazy", given the efforts made to transform its loss-making production process.

Speculation around the future of the 550-seater was sparked after a comment made during an Airbus Group investor forum in December by chief financial officer Harald Wilhelm, who hinted that the company could "discontinue the product", instead of upgrading it with new engines.

But speaking at a Qatar Airways A350 delivery ceremony in Toulouse on 22 December, Brégier firmly backed the superjumbo.

"We are now fully in the industrial phase of this programme. In 2015/16/17 our orderbook is almost fully booked for the production of close to 30 aircraft a year," he says. While Airbus must "get more customers", Brégier notes that traffic is doubling every 15 years, driving demand for bigger aircraft.

"The trend is in favour of the A380, and in this context the fact that we would have in mind internally that we would stop the A380 is just crazy," he says. "We are about to break even [in production costs in 2015], so we will continue and one day we will look for incremental improvements."

"Clearly re-engining is one option, and we have potential for a stretched version," he adds. "The A380 will have a brighter future, as the market is getting bigger."

At the end of November Airbus's firm backlog for the A380 was 171 aircraft, with Emirates – whose boss Tim Clark is pushing for a re-engined version – accounting for 85 of this total. ■

See Air Transport P12

Osprey shows claws at last
THIS WEEK P10

INVESTIGATION **DAVID KAMINSKI-MORROW** LONDON **MAVIS TOH** SINGAPORE

Indonesia launches A320 crash probe

Answers sought following loss of AirAsia flight QZ8501 with 162 passengers and crew while pilots deviated around storm

An investigation is under way into what caused the crash of an Indonesia AirAsia A320 into the Java Sea after crew reported encountering bad weather.

Indonesia's national search and rescue agency Barsanas confirmed that debris located in the Karimata Strait on 30 December was from the aircraft which went missing three days earlier operating flight QZ8501 from Surabaya to Singapore.

Following a major air and maritime search of the Java Sea, the first objects were found 110nm (203km) southwest of Pangkalan Bun, on the south coast of Borneo. Barsanas chief Bambang Soelistyo says recovered debris includes what is believed to be one of the aircraft's emergency exit doors. The waters in the area are 25-30m deep.

Indonesia's transport ministry says the A320 disappeared from Jakarta's air traffic control radar at 06:18 local time on 28 December, 43min after it had taken off from Surabaya with 155 passengers and seven crew members on board.

French investigation agency BEA, citing preliminary data from its Indonesian counterpart NTSC, says the A320's pilots had been cleared to climb to 34,000ft following a request for 38,000ft. Four minutes after passing waypoint TAVIP at 32,000ft the crew reported a deviation to the left, due to weather, and requested a climb to the higher level.

The aircraft could be seen on Jakarta ATC's radar screen at 06:16, but could only be identified through its automatic dependent surveillance - broadcast signal a minute later, before disappearing.

Airteamimages

The low-cost carrier had operated PK-AXC since October 2008

Built in 2008 and registered as PK-AXC, the aircraft had accumulated about 23,000 flight hours in some 13,600 flights before the accident, says Airbus. The twinjet had been on lease from the Doric 10 Labuan Limited Company since October 2008, and was one of 30 A320s flown by the company's Indonesian operation prior to the loss.

AirAsia bought a 49% stake in Indonesian low-cost carrier AWAIR in 2004. It changed its name to Indonesia AirAsia the following year, and had since kept a clean safety record before the 28 December crash. ■

ANALYSIS **DAVID LEARMOUNT** LONDON

Accident has parallels with other weather-related losses

The operational conditions affecting the Indonesia AirAsia Airbus A320 before it crashed into the Java Sea with no emergency call appear to mirror the circumstances surrounding at least two other accidents within recent years.

On 24 July 2014 a Swiftair Boeing MD-83, flying from Ouagadougou in Burkina Faso to Algiers went missing shortly after its pilots had reported changing course to avoid storm clouds. About two days later its wreckage was found in Mali.

In the other instance, an Air France Airbus A330 operating flight AF447 was lost in the inter-tropical convergence zone over the South Atlantic ocean on 1 June 2009, while its pilots were known to be manoeuvring to avoid storm clouds. The aircraft's flight data and cockpit voice recorders were eventually recovered, revealing that the crew had been confused by icing-related loss of airspeed information before losing control of the aircraft. ■

DEVELOPMENT **MAVIS TOH** SINGAPORE

Comac clinches Chinese certification for ARJ21

The Civil Aviation Administration of China has issued type certification for Comac's 78-seat ARJ21-700 at a ceremony in Beijing, marking a major milestone in the nation's foray into the commercial aircraft manufacturing sector.

Aircraft 105, which is to be delivered to launch customer Chengdu Airlines, landed at Beijing Capital International airport two days before the 30 December event.

Certification of the regional jet marks the end of a long journey for China, where inexperience in development and certification has resulted in major delays to the programme. Comac has previously said attaining certification from the US Federal Aviation Administration remains a target.

Rex Features

Chengdu Airlines will be the first operator of the 78-seat type

The ARJ21 programme was launched in 2002, with the type having achieved its first flight in 2008. By the time of certification, the aircraft had accumulated more than 5,000 flight hours. Comac has so far secured commitments for 278 ARJ21s, mainly from Chinese airlines and leasing companies.

In September 2014, Comac officials told *Flight International* that discussions on plans to improve the ARJ21 have started, and that work to define improvements will kick into full swing after the aircraft secured its Chinese certification. The activity is intended to ensure that the much-delayed jet stays competitive in the market. ■

For more in-depth coverage of the global rotorcraft sector, go online to flightglobal.com/helicopters

FLEETS JON HEMMERDINGER WASHINGTON DC

Florida carrier to debut CRJ200 freighter version

Fort Lauderdale-based Gulf & Caribbean Cargo has signed an agreement to acquire the first freighter version of a Bombardier CRJ200.

Gulf & Caribbean's Michigan-based affiliate IFL Group says it hopes to take delivery of the converted CRJ200 SF (special freighter) by "mid- to late-summer" 2015. The aircraft is being acquired from US regional carrier SkyWest Airlines, and will be operated on routes throughout the Caribbean and the Americas.

Miami-based Aeronautical Engineers (AEI) will convert the passenger aircraft to an all-cargo configuration. The CRJ200 SF will have positions for eight pallets and the capacity to carry 6,730kg (14,800lb) on its main deck. Its range will be 800-1,740nm (1,480-3,220km), depending on cargo weight.

"We are seeing interest in the CRJ100 and CRJ200 passenger-to-freighter conversions," says AEI vice-president of sales and marketing Robert Convey.

The company in November 2013 said customers from Canada, Mexico, the USA and southwest Asia had placed deposits for 24 conversions.

IFL says the CRJ200 will supplement its fleet of 11 Convair 580s and stretched 5800s. ■

PAYLOADS DAN PARSONS WASHINGTON DC

Osprey shows claws at last

Firing trials prove ability for tiltrotor to operate with rocket pod or Griffin missiles installed

Bell Boeing's V-22 Osprey has flown a collective 250,000h, much of it in combat, but only in late 2014 were engineers able to successfully test forward-firing offensive and defensive weapons with the tiltrotor for the first time.

Due to its high speed and long range, the US Marine Corps' MV-22s routinely outrun the service's Bell AH-1 Cobra attack helicopters, requiring pilots to either slow down or complete missions without armed escorts. As the V-22's tiltrotor configuration prohibits the use of waist-mounted weapons, due to the risk of hitting the rotors in forward flight, Bell Helicopter recently led an industry-funded demonstration to fire missiles and rockets from the type – a capability that has been sought since the Osprey's initial deployment in 2007.

Two launches of the Raytheon BGM-176B Griffin B missile were performed at the Yuma Proving Ground in Arizona – one each from the hover and during conversion mode while flying at 110kt (203km/h). Both resulted in direct hits, Raytheon says.

Mike Jarrett, vice-president of the company's Air Warfare Systems unit, says the US Air Force Special Operations Command (AFSOC) has shown "significant interest" in integrating a low-cost, precision strike missile with its fleet of CV-22s.

In another test, a BAE Systems Advanced Precision Kill Weapon System (APKWS) rocket pod was mounted to the left forward fuselage of the aircraft, for trials with the laser-guided 70mm (2.75in)-diameter weapon.

Bell demonstrated the ability for the V-22 to carry more than 132kg (290lb) on either side of the forward fuselage, with targeting performed by test pilots using an L-3 Wescam MX-15D electro-optical/infrared sensor with a laser designator and additional cockpit controls and displays.

"There were no noted impacts to aircraft control," Bell notes.

Flightglobal's Ascend Fleets database shows the USMC as having an active fleet of 223 MV-22s, and AFSOC 36 CV-22s. ■

Weapons deployed by the V-22 included BAE's laser-guided APKWS rocket

Bell Helicopter

PERSONAL JET KATE SARSFIELD LONDON

Triple Vision: third Cirrus SF50 begins flight tests

Cirrus Aircraft's ambition to be first to market with a certificated single-engined personal jet made another advance on 20 December, when its third and final production-conforming Vision SF50 test aircraft completed a 20min debut flight from Duluth, Minnesota.

Aircraft "C2 enters the programme with the goals of performing reliability and optional equipment testing, as well as serving as a catalyst for flight standards and training evaluations", Cirrus says. "We are full steam ahead with our plans to revolutionise personal transportation," adds chief executive Dale Klapmeier.

Cirrus flew the first Williams International FJ33-powered SF50 in March 2014. Aircraft CO has since accumulated around 250 flight hours, performing "a wide range of aerodynamic performance and handling tests".

CO was joined in late November by C1, the primary focus for which will be conducting flight tests in known icing conditions.

A first production example of the almost $2 million SF50, P1, will be flown in the second half of 2015, with certification and service entry expected in the fourth quarter.

Cirrus plans to deliver around three examples this year, rising to about 90 in 2016 and 125 in 2017. ■

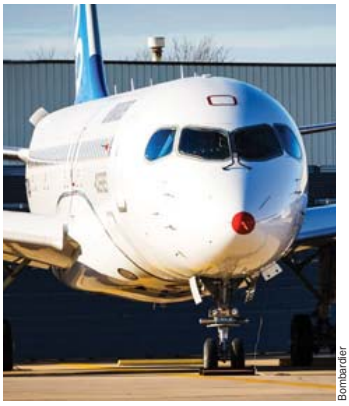
Cirrus Aircraft

The airframer plans to deliver three examples this year

Airbus relief as first A350-900 is delivered to Doha
AIR TRANSPORT P12

PROGRAMME **STEPHEN TRIMBLE** WASHINGTON DC

Unnamed customer commits to launching CS100



Bombardier

No details have been revealed about the CS100 agreement

Bombardier has signed up a customer as launch operator for the first CS100 to be delivered by the CSeries programme in the second half of 2015.

The Canadian manufacturer launched the CSeries in 2008 with an order by Lufthansa Group for 30 110-seat CS100s. Lufthansa plans to assign the aircraft to its Swiss International Air Lines subsidiary, but declined to be the launch operator.

For several months last year, Malmo Aviation – which will operate five CS100s and five 135-seat CS300s – was understood to be the first customer due to receive the aircraft, but also withdrew its name as a candidate.

Bombardier has not clarified whether its launch CS100 operator will be an existing customer, or a new one which has not yet been announced. In November, another Lufthansa subsidiary – Austrian Airlines – identified the CSeries in the terms of a new labour agreement with flight attendants and pilots, but stated that it had not yet selected the CS100 to replace a fleet of 105-seat Fokker 100s.

The launch operator signing comes as Bombardier starts to regain momentum with its CSeries flight test programme. In the first three months since restarting flight tests after a 100-day grounding, its four test aircraft accumulated the same number of flight hours as had been amassed during the first 12 months after the CS100's first flight in September 2013, with "well over" 600h now logged. The CS100 requires about 2,400 flight hours to complete a certification programme for Transport Canada. ■

MILESTONE **STEPHEN TRIMBLE** WASHINGTON DC

Take-off for USAF's tanker in waiting

Prototype 767-2C for KC-46A programme completes first flight, as airframer counts the cost of three-month delay

Boeing on 28 December carried out a 3h 32min first flight of a 767-2C prototype that will be modified to become the first KC-46A tanker for the US Air Force.

Conducted from Everett, Washington, the event came nearly three months behind schedule, and just weeks before a pending four-aircraft competition in South Korea between the type and the Airbus A330 multirole tanker transport.

Boeing's fixed-price, $4.4 billion development contract with the USAF leaves little room for further delays.

Within the next 32 months, the company is required to complete airworthiness certification of the commercial 767-2C, military certification of the KC-46A's refuelling systems and delivery of the first 18 operational aircraft.

Signed in 2011, the contract also allowed Boeing to recoup up to another $500 million in additional expenses.

The company has already absorbed this overrun, and in July 2014 reported a forward loss of $272 million due to problems with installing the aircraft's wiring harnesses.

Powered by Pratt & Whitney PW4062 engines, the 767-2C is a new commercial derivative that combines the fuselage of the -200ER, wings from the -300, the stabilisers of the -400ER and the cockpit displays from the 787.

Boeing is offering the aircraft for sale as a freighter to commercial operators, but so far has received no orders.

The -2C will be converted into a tanker/transport by installing a fly-by-wire refuelling boom modelled on the design used by the USAF's McDonnell Douglas KC-10s, a remote aerial refuelling operator station, under-wing hose and drogue refuelling pods and military electronics. Boeing will build four prototypes under its development contract. The first and third examples will be 767-2Cs, to be used to obtain certification by the US Federal Aviation Administration, while the second and fourth aircraft will be delivered as KC-46As.

Originally scheduled during January, the debut flight of the first KC-46A is now planned for April 2015. The USAF plans to buy as many as 179 of the aircraft, to replace part of its fleet of ageing Boeing KC-135s. ■

Boeing

The 3h 32min debut was carried out from Everett, Washington

NEGOTIATIONS **CRAIG HOYLE** LONDON

NATO trio could pool A330 MRTT fleet

A consortium of European NATO nations could share a pooled fleet of four Airbus A330 multirole tanker transports (MRTT), the European Defence Agency (EDA) has announced.

"The Netherlands, Poland and Norway have decided to prepare negotiations with Airbus Defence & Space for a fleet of A330 MRTT multirole transport and air-to-air refuelling aircraft," the multinational agency said on 19 December. "Only one military off-the-shelf solution met their key requirements in terms of capabilities and timeframe [and] user requirements in terms of passenger transport, strategic airlift and medical evacuation."

A configuration with under-wing hose and drogue refuelling pods and a refuelling boom has been chosen.

The fleet is expected to achieve initial operational capability in 2019, with the Dutch defence ministry hoping to see a contract finalised in 2016.

The EDA says the pooling initiative will be opened to enable additional nations to participate, "through joining the acquisition and/or in-service phase". ■

HANDOVER **MAX KINGSLEY-JONES** TOULOUSE

Airbus relief as first A350-900 is delivered to Doha

'Architect of the XWB' Al Baker blames cabin equipment suppliers – not Toulouse – for last-minute hitch in plans

Qatar Airways plans to debut the first Airbus A350-900 on its Doha-Frankfurt route on 15 January, after the aircraft arrived at its Doha base over a week later than planned.

The 23 December ferry flight from Toulouse – in the company of the airline's fourth A380 – was originally scheduled for 13 December, but was postponed after a last-minute hitch during the airline's acceptance process.

It was not the first time Qatar's outspoken boss Akbar Al Baker has forced Airbus delivery ceremony arrangements to be rearranged. The planned simultaneous handover of the airline's first three A380s was delayed from June 2014 to September after issues during acceptance.

"My friend Akbar, you are a tough customer. You are very demanding and sometimes perhaps a little bit too demanding," joked Airbus chief executive Fabrice Brégier at the 22 December handover ceremony in Toulouse. "But you were one of the architects of the A350 XWB. So without these demands, we would not have the best aircraft in this category."

Al Baker was quick to play down the delay, saying the hold-up had nothing to do with Airbus, blaming instead problems with buyer-furnished equipment.

Al Baker emphasised that despite the slip, the airline's first A350 was delivered "one week before schedule", as Airbus's commitment was for a handover before 31 December.

Qatar expects to receive eight more of the 37 A350-900s it has on order by the end of 2015.

The handover comes eight years after the A350 programme, in its current guise, was launched by Airbus to take on the Boeing 777 and 787.

The 23 December ferry flight from Toulouse was originally scheduled for 10 days earlier

Qatar's A350-900s will be configured with a 283-seat, two-class interior featuring a business cabin similar to that on its A380 and 787 fleets. The cabin layout was unveiled on a press flight during the Qatar A350 delivery ceremony.

The business cabin incorporates 36 seats in a four-abreast (1-2-1) configuration, each featuring 80in (203cm) lie-flat beds and 17in high-definition in-flight entertainment screens.

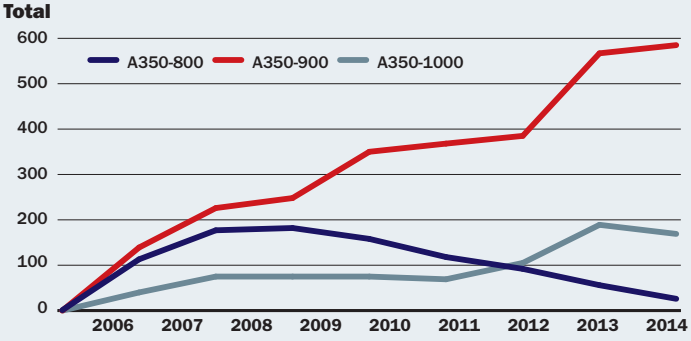
The economy cabin includes 247 18in-wide seats in a nine-abreast (3-3-3) configuration at up to 32in pitch. Each seat has a 10.6in screen.

At 283 seats, the A350-900's seat count gives it slightly higher capacity than the airline's 777-200LRs (259 seats) and 787s (254 seats). Like the A350, the 787's business cabin is configured in a four-abreast layout, whereas the 777 is six-abreast. Both the 777s and 787s feature nine-abreast economy cabins.

THE CHANGING SHAPE OF THE A350 ORDERBOOK

- As Airbus begins deliveries of the A350-900, the order backlog for its latest all-new widebody stands at a total of nearly 800 aircraft.
- Since Airbus launched the XWB at the Farnborough air show in 2006, it has racked up 780 firm orders from 40 customers. Appropriately, launch operator Qatar Airways is the largest customer, with orders for 80 aircraft.
- Data from Flightglobal's Ascend Fleets database shows that the A350's orderbook has actually declined over the last 12 months by 32 units, from 812 orders at the end of 2013. This was largely due to Emirates' decision to abandon its deal for 70 aircraft – 50 A350-900s and 20 -1000s. The programme's other recent cancellations came from Alitalia/Air One – which terminated its long-standing order for 12 A350-800s – and Hawaiian Airlines, which switched its deal for six -800s to the newly launched A330neo.
- Despite the cancellations, the current A350 orderbook is still good for up to seven years of production. By comparison, Airbus has shipped around 1,140 of its current widebody twinjet, the A330, over the life of the programme since deliveries began more than two decades ago in December 1993.
- The A350-900 is the most popular of the XWB variants, with its backlog of 585 aircraft representing three-quarters of total sales. The A350-1000, which is still almost three years away, has secured just 169 sales. Although Airbus has won some blue-chip customers for this largest XWB variant, including Cathay Pacific and British Airways, it is facing tough competition from Boeing's 777-9X. Launched in late 2013, the new Boeing has already outsold its Airbus rival, with its

A350 ORDER BACKLOG EVOLUTION



SOURCE: Flightglobal's Ascend Fleets database

NOTE: Year-end backlog (except 2014)

Pilot slip-ups preceded A320 crash
AIR TRANSPORT P14

Max Kingsley-Jones/Flightglobal

PRODUCTION **MAX KINGSLEY-JONES** TOULOUSE

'Constant improvement' promised for programme as ramp-up begins

With the first A350 delivery milestone behind it, Airbus is steadily building production towards a rate of five aircraft a month by the end of this year.

However, the manufacturer is under no illusions about the challenge ahead as it works towards its target rate of 10 aircraft a month by 2018.

Monthly A350 output is due to reach "rate three" in early 2015, says A350 programme manager Didier Evrard.

"We measure the ramp-up at the rate at which aircraft start the final assembly line," he explained to *Flight International* during the Qatar Airways A350 delivery ceremony on 22 December.

"At the end of next year [2015] we will be close to rate five, when the [first] -1000 aircraft enters the final assembly line."

Airbus has 14 customer aircraft at various stages of completion on the Toulouse assembly line, says Evrard, who took over as Airbus's executive vice-president of programmes on 1 January 2015, following the promotion of Tom Williams to chief operating officer.

"For the ramp-up we are well prepared," Evrard says – but he warns that Airbus "mustn't underestimate the journey" to reach its target of 10 a month.

"We need to go to rate 10 in four years. This rate was achieved on the 'long-range' [A330/A340 programme], so we know exactly what sort of status and quality you need to achieve," Evrard says. "But on the long-range we did it in 18 years – here we need to do it in four years, and this is the challenge we have."

Evrard is confident Airbus can achieve its target because the Rolls-Royce Trent XWB-powered A350's design is already mature and stable. "We can build on that to accelerate. Then it's about supply-chain performance.

"We've been working a lot with our suppliers over the last two or three years to make sure that they were ready to accelerate when the time would come."

The other aspect of the ramp-up that must be managed is cabin customisation. This is where Airbus came unstuck with the A380, when the introduction of each new "head of version" for a new customer became a complex and lengthy process.

> **"The A350 is much more friendly to customisation, and this is a key success factor for the ramp-up"**
> **DIDIER EVRARD**
> Executive VP of programmes, Airbus

"We have a good grip on customisation," Evrard says. "We have completely changed our way of customising aircraft. The A350 is much more friendly to customisation, and this is a key success factor for the ramp-up."

With Qatar Airways due to take delivery of eight more A350s in 2015, the next customers to receive the type will be Vietnam Airlines and Finnair. The initial aircraft for the pair are on the final assembly line, and both are due to receive their first aircraft this year.

Chief executive Fabrice Brégier says Airbus will work hard to keep its latest widebody fresh during the life of the programme. "We have constantly improved the A330, which was launched in the 1990s, with the insertion of new technology," he says. "We can increase the performance of the aircraft."

Brégier says the A350 is "just at the beginning" of its life, and Airbus will "constantly improve it during the next 20 years", as it has with the A330 and A320 family.

"The beauty is that we have invested more than €10 billion [$12 billion] up front, and these additional upgrades will be done at marginal cost compared with the initial investment," Brégier says.

"This is what we are looking for because we must constantly improve the performance of our products," he adds.

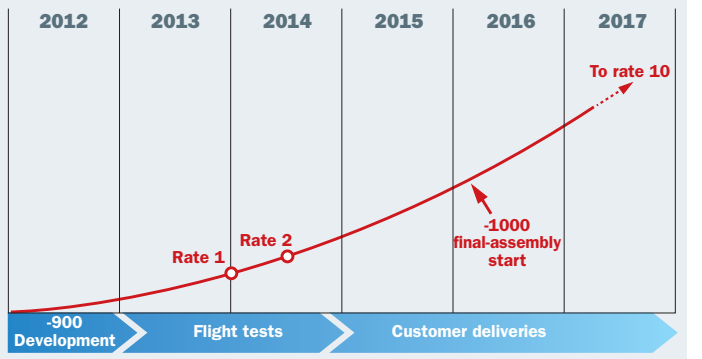
Meanwhile, production is under way of components for the first A350-1000, and final assembly will begin in early 2016.

The stretched variant is due for its maiden flight in the second half of 2016, with service-entry expected in mid-2017.

Rolls-Royce expects to have three examples of the higher-thrust version of the Trent XWB in ground testing by the end of January, with the first flying testbed engine – currently in build – taking to the air in the third quarter.

The 97,000lb-thrust (431kN) Trent XWB-97 will power the A350-1000. ■

A350 PRODUCTION RAMP-UP



SOURCE: Airbus

Qatar's A330-300s are operated in various layouts, seating 259 or 305 passengers depending on the size of the business cabin.

Although Qatar expects to have received nine A350-900s by the end of 2015, Al Baker has not disclosed any other destinations beyond Frankfurt. He says only that the type will be operated to other European destinations, as well as points in "the Far East, the Indian subcontinent and ultra-long-haul flights to the eastern seaboard of the USA". ■

orderbook of firm sales standing at more than 240 aircraft.

- Airbus still counts 26 of the now-defunct A350-800 in its order numbers. With the programme now officially suspended, these will all likely be cancelled, although Airbus will aim to transition the three remaining customers – Aeroflot, Asiana and Yemenia – to other models, as Hawaiian did when it signed up for the A330neo. This re-engined derivative is designed to succeed the A350-800 in Airbus's product line-up for the 250-300 seat sector.
- Our tablet edition, available on iPad, has a full A350 customer list.

EMERGENCY **GREG WALDRON** SINGAPORE

Crew suspended after depressurisation incident

The Civil Aviation Authority of Vietnam (CAAV) has suspended the flight crew of a Vietnam Airlines Airbus A321, after a depressurisation incident on 16 December.

The CAAV says it is looking into the incident, which occurred during flight from Ho Chi Minh City to Vinh.

The incident resulted in the aircraft making an emergency landing at Hanoi's Noi Bai International airport.

As the aircraft approached Vinh at 35,000ft, it suffered a sudden decompression, causing oxygen masks to drop. After the decompression, the crew descended to 13,000ft and the flight diverted to Hanoi.

None of the 135 passengers or seven crew on board was injured in the incident. ■

INVESTIGATION **JON HEMMERDINGER** WASHINGTON DC

Pilot slip-ups preceded A320 crash

FAA documents detail a succession of cockpit errors – rather than a blown tyre – led to US Airways incident at Philadelphia

New details about the 13 March crash of a US Airways Airbus A320 at Philadelphia reveal the accident was preceded by a series of pilot failures and may have been more serious than a blown tyre, which was initially reported as the cause.

Internal Federal Aviation Administration documents obtained by Flightglobal show that prior to take-off the crew failed to enter into the flight computer data it needed to calculate power settings.

They also continued the take-off roll amid audible warnings urging them to pull back the throttles. In response to those warnings, the captain said, "We'll get that straight when we get airborne," say the documents, which include an FAA accident report and copies of notes taken by FAA inspectors dispatched the scene.

The documents also say the captain flew too soon after taking prescription medications.

The US Airways A320, registration N113UW, crashed at Philadelphia International airport at 18:35 local time as it took off for Fort Lauderdale.

All 149 passengers and five crew exited the aircraft via emergency exits. Although no serious injuries were reported initially, one passenger has filed a lawsuit against US Airways and parent company American Airlines Group, seeking damages for a shoulder injury suffered from using the emergency slides.

In the hours following the accident, US Airways told media outlets that initial reports indicated a blown tyre led the pilots to abort the take-off.

Dennis Ree via Facebook

All 149 passengers and five crew exited from the beached aircraft

But newly-obtained documents trace the accident to failures made by the pilots during taxiing, and reveal the tyre blew after the captain aborted the take-off just after the aircraft became airborne.

The FAA and National Transportation Safety Board (NTSB) decline to comment on the new information, citing the NTSB's ongoing investigations. American Airlines and the Allied Pilots Association, which represents US Airways pilots, will not comment due to participation in the investigation.

The documents say that, prior to take-off, captain John Powell noticed the aircraft's primary flight display wrongly indicated 27R as the departure runway.

Co-pilot Lynda Fleming then correctly inputted 27L into the multifunction control display unit, but did not enter take-off V-speeds or a "flex temperature", which allows the aircraft to take-off at lower-than-maximum thrust. The computer needed those values to calculate takeoff power, and required their re-entry after a runway change.

> **"The aircraft had no data available to compute and perform a flex take-off or display speeds"**
>
> **INTERNAL DOCUMENTS**
> US Federal Aviation Administration

"The crew failed to accomplish this step and so the aircraft had no data available to compute and perform a flex take-off or display speeds," say the FAA documents.

As a result, when the captain advanced the throttles for takeoff, a warning chime sounded and a screen displayed "ENG THR LEVERS NOT SET; SET TOGA", an instruction to set the throttles to take-off/go-around power.

The copilot, who had 4,784h in A320s, read the first part of this message aloud, but not the instruction to increase power, the report says. The captain, who had 4,457h of A320 time, responded that "the power is set", adding that he had advanced the throttles to the flex position.

Meanwhile, the aircraft accelerated along runway 27L into a 19kt headwind.

When it reached 80kt, an audible warning sounded "retard, retard, retard", instructing the pilots to idle the throttles, the FAA report says. The first officer told the captain she had never heard that warning during take-off. "We'll get that straight when we get airborne," the captain responded.

The documents give varying indications of how high the aircraft climbed; one inspector says 20ft, another 70ft. Regardless, shortly after take-off the captain aborted.

"The captain indicates that, once the wheels were off the ground, he had the perception that the aircraft was unsafe to fly, and moved the throttle to the idle position, which resulted in the accident," the documents say.

Surveillance video reviewed by inspectors showed that, shortly after take-off, the aircraft's nose dropped and it began to sink. The nose then pitched up and, still sinking, the A320's tail struck the runway, followed by the main gear. ■

Boeing seeks to sell final C-17s as end of line nears
DEFENCE P16

PROGRAMME **STEPHEN TRIMBLE** WASHINGTON DC

Foldable wingtips open more airport access for 777-9X

Design will allow new widebody to operate from gates and taxiways that would have been otherwise out of bounds

Boeing has revealed a preliminary set of external dimensions for the 777-9X aircraft as part of its campaign to prepare airports far in advance of a scheduled entry into service in 2020.

A presentation delivered four months ago, but which has only just come to light, gives the length of the 777-9X fuselage as 76.7m (251ft 9in), or about 0.2m longer than previously reported and 2.8m longer than the 777-300ER.

It also lists the estimated tail height of the 777-9X as 19.7m.

The closely guarded dimensions were revealed at an ACI event in September as Boeing officials lobbied airports and international regulators to prepare for increasingly longer and wider commercial aircraft.

The Airbus A380 still holds the record for longest aircraft wingspan at 80m, but the fully extended wingspan of the 777-9X will come second at 71.8m. That would make the A380 and 777-9X among the very large aircraft only allowed to operate from Code F-standard airports.

Boeing, however, is introducing a folding wingtip on the 777-9X that reduces the wingspan on taxiways and at gates to 64.8m. At that length, the 777-9X will qualify for taxiways and gates with clearances designed for narrower, Code E aircraft.

But that change will not address all of the regulatory issues. On take-off roll, the 777-9X wingspan will be fully extended to ICAO airport classification Code F dimensions. ICAO requires that Code F runways be at least 60ft wide, versus only 45ft wide for Code E aircraft.

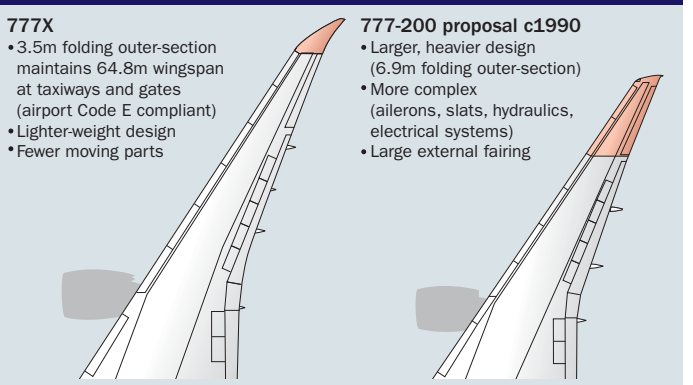
For Boeing to introduce the 777-9X to airports with only Code E-compatible runway widths, the 777-9X will require an exemption.

Boeing [previously] studied a wing fold when it launched the original 777-200 around 1990

Boeing notes that ICAO approved a similar exemption request to allow the 747-8 to operate on Code E-rated runways. Boeing studied a wing fold when it launched the original 777-200 around 1990 to enable the aircraft to fit on stands sized to accommodate the widebody trijets it was designed to replace. The airframer dropped the proposal when it finalised the 777's configuration.

Our diagram shows the dimensions of that earlier design proposal compared with the 777-9X's folding wingtip. ■

COMPARISON: 777X WITH 777-200 FOLDING WING PROPOSAL



SOURCE: Boeing (preliminary information)

SUPPLIERS

Boeing turns to trusted technologies as it borrows from 787

A new round of supplier selections on the Boeing 777X re-affirm Boeing's strategy to emphasise commonality with the computing and display systems on the 787.

Boeing has already announced its intention to "harvest" such 787 technologies as composite wings and reduced pressure altitude inside the cabin. The same strategy is now evident in the cockpit and electronic systems on board the 777X.

Rockwell Collins announced on 16 December that Boeing has selected it to provide 787-style, 15.1in displays and an integrated surveillance system on the 777X, displacing technology formerly supplied by Honeywell.

Combined with Boeing's selection for fly-by-wire control system actuators on the 777X last July, Collins has trebled its work package on the 777X compared to previous models of the widebody.

"We saw a pretty much across the board 787 package come on to the 777X," says Kent Statler, Collins' chief operating officer and vice-president of commercial systems. "That was our strategy all along because that makes for a good day for us."

The integrated surveillance system includes several devices – multi-scan radar, traffic collision avoidance system and transponders – that on previous 777 models offered customers a choice of competing options.

Boeing transferred the systems to standard equipment on the 787 programme. That policy continued on the 777X, and Collins was selected for the winner-take-all award.

"The great thing about that is the competition is over," Statler says.

Boeing also selected the Collins head-up display (HUD) for the 777X, also leveraging technology developed for the 787. Unlike the multi-function displays beneath the glare shield and the integrated surveillance system, airlines can choose whether to install a HUD in the 777X. If the customer acquires a HUD, Collins will supply two displays in each cockpit – one for the pilot and co-pilot, Statler says.

Separately, Boeing has selected GE Aviation to supply the common core avionics computer and the electrical power system for the 777X.

In the case of the common core avionics computer, Boeing selected the 787 supplier over the incumbent on previous 777 models, which was Honeywell. ■

Boeing

Rockwell Collins has trebled its work package on the 777X

For the latest news on design, development and delivery, visit **flightglobal.com/aircraft**

Commonwealth of Australia

Australia could boost its strategic transport fleet to 10 aircraft

PRODUCTION **DAN PARSONS** WASHINGTON DC

Boeing seeks to sell final C-17s as end of line nears

Deal to supply undisclosed customer with two "white tails" leaves company with eight airlifters yet to secure buyers

Two more aircraft from Boeing's final batch of C-17 strategic transports have been sold to an undisclosed customer, but the company was likely to end 2014 with eight "white tails" still unsold.

As of mid-December, Boeing had 10 C-17s in various stages of assembly at its Long Beach, California, production facility. Two of these have already been spoken for by an unnamed customer, the company says, while it continues to try to sell off the other eight. These will be the last aircraft produced before the factory is closed around the middle of the year.

The 279th – and final – C-17 fuselage will be mated to its wings in January or February, says programme spokeswoman Tiffany Pitts.

"When we do that major join of the airplane with the wings, it will be a big deal," she says. The Long Beach site opened in 1941 as a Douglas factory.

Australia and Canada have publicly announced an intention to purchase additional C-17s, although Pitts says neither will factor into Boeing's future planning until contracts are finalised.

The nations currently operate fleets of six and four C-17s, respectively, but Canadian news outlets reported in early December that Ottawa could buy one more. Australia is further along with its bid to purchase additional examples, with the US Defense Security Cooperation Agency having announced in November that Canberra could acquire up to four more, plus support equipment, under a deal worth a potential $1.6 billion.

Other existing operators are India, Kuwait, Qatar, the United Arab Emirates, the UK and a consortium of NATO and Partnership for Peace nations. Of these, India and Qatar having previously listed options to acquire a combined seven more.

While it continues to pursue confirmed deals for the remaining eight unassigned aircraft, Boeing has already drawn up plans to store any unsold C-17s following the closure of its production line.

"I'm hoping they all will be sold before then, but we've had plans in place for a very long time to store and maintain the aircraft if that doesn't happen," Pitts notes. ■

ORDERS **ARIE EGOZI** TEL AVIV **CRAIG HOYLE** LONDON

South Korea swoops for Global Hawk and Heron

South Korea has approved separate deals to equip its armed forces with Northrop Grumman RQ-4 Global Hawk and Israel Aerospace Industries Heron 1 unmanned air vehicles.

Worth more than $657 million, Northrop's contract will lead to the company providing South Korea with a surveillance fleet of RQ-4B Block 30 Global Hawks, each fitted with an enhanced integrated sensor suite mission payload, and also cover the delivery of "the applicable ground control environment elements".

The US Department of Defense confirmed the Foreign Military Sales deal on 16 December, with its notification revealing that work will conclude by June 2019.

An earlier programme outline detailed by the US Defence Security Cooperation Agency had valued a four-aircraft deal as being worth a potential $1.2 billion.

Potential applications for the high-altitude, long-endurance Global Hawk include enabling Seoul to maintain surveillance cover of North Korean military activities, as the US armed forces decreases their presence on the Korean peninsula.

IAI on 17 December confirmed the selection of its Heron 1 system to meet what the company describes as a Corps-level UAV upgrade project requirement with Seoul's military.

The Israeli airframer – which declines to detail how many systems will be supplied under the deal – quotes South Korea's Defense Acquisition Program Administration as saying that it "comprehensively evaluated price, capability, operational suitability, terms and conditions, and selected the equipment that had a higher score".

Industry sources suggest that South Korea's requirements include that some of its Heron air vehicles be capable of conducting maritime patrol tasks. ■

Northrop Grumman

Four Global Hawks will be supplied at the USA's Block 30 standard

PURCHASE

US Chinooks to join Greek army

Boeing has been given the go-ahead to sell up to 10 surplus US Army CH-47D Chinook heavy lift helicopters to Greece, under a deal worth around $150 million.

The US Army is in the process of replacing its CH-47Ds with improved F-model Chinooks, including by upgrading only some of its existing airframes.

As part of its request, the Greek government will also acquire spare parts and support equipment for the surplus rotorcraft, plus common missile warning systems and other equipment.

Announcing the planned sale on 11 December, the US Defense Security Cooperation Agency said the transfer "will facilitate greater interoperability of Greek systems both bilaterally and within NATO". Flightglobal's Ascend Fleets database records the Greek army as already operating 15 CH-47D/SDs. ■

NATO keeps a wary watch for Moscow misbehaviour
DEFENCE P18

PROGRAMME **CRAIG HOYLE** LONDON

Dutch F-35 orders ready for take-off

Netherlands' defence ministry plans to field first operational Lightning IIs in 2019, as part of eventually 37-strong fleet

The Netherlands' defence ministry has announced plans to order a first batch of eight operational Lockheed Martin F-35s, with deliveries of the the type to commence from 2019.

In a programme update published on 15 December, the Dutch ministry says it still plans to obtain a total of 37 F-35s. This includes two conventional take-off and landing F-35As already delivered to the Royal Netherlands Air Force to let its pilots participate in US-led initial operational test and evaluation of the Lightning II from 2015, and five which will be dedicated as training assets.

According to its plan, the Netherlands will receive eight aircraft per year between 2019 and 2022, with its final three examples to arrive in 2023. Initial operational capability with its air force is anticipated to occur during 2021, and its planned fleet should be fully available by 2024. Operations will initially be conducetd from Leeuwarden air base, with the F-35 also to be later stationed at the service's Volkel site.

The introduction of the F-35A will coincide with a reduction in the nation's active fleet of Lockheed F-16s, from a current 61 fighters to 45 in 2021 and 24 in 2023, the defence ministry says. The current model will leave use the following year.

Once it reaches full strength, the Netherlands' F-35 fleet will be sufficient for the nation to defend its airspace and also declare up to four of the type as available to support international operations with NATO.

Under its current forecast, the Netherlands' total investment in the Joint Strike Fighter is expected to total €4.6 billion ($5.8 billion) over the life of the programme, the defence ministry says. ■

Lockheed Martin

The Joint Strike Fighter fleet will defend the nation's airspace as well as support NATO operations

ROTORCRAFT **DOMINIC PERRY** LONDON

Resolution for NH90 corrosion dispute

Deliveries to the Dutch armed forces of its remaining seven NH Industries (NHI) NH90 maritime helicopters – halted on the back of corrosion issues – are set to resume.

The Netherlands in June stopped its acceptance process for additional NFH-variant rotorcraft, after problems were found on two aircraft that had been deployed at sea. The Dutch National Aerospace Laboratory found a number of design faults had contributed to the corrosion.

Under the terms of a deal announced on 16 December, the NHI consortium of Airbus Helicopters, AgustaWestland and Fokker accepts full responsibility for the issue, and will bear the cost of any modifications and repairs. Of 100 identified issues, the Netherlands' defence ministry says 75 now have solutions, with the remainder to be addressed in early 2015.

Following the deal, two further deliveries to the Netherlands Defence Helicopter Command were expected by the end of 2014. Flightglobal's Ascend Fleets database shows the nation already possess an active inventory of nine of the 11t rotorcraft, with four more in storage. ■

ORDNANCE **CRAIG HOYLE** LONDON

Six appeal for Typhoon in Brimstone missile trials

BAE Systems has installed MBDA Brimstone air-to-surface missiles beneath the wing of a Eurofighter for the first time, offering a glimpse of the Typhoon's future multirole configuration for the UK Royal Air Force.

Six Brimstone 2 training rounds were fitted to a single-seat Typhoon at BAE's Warton site in Lancashire, using a pair of three-missile launchers. The trial marked the conclusion of a £5 million ($7.8 million) feasibility study linked to adding the precision strike weapon.

"The aircraft was also fitted with two [Raytheon Systems] Paveway IV precision-guided bombs, showing the baseline Phase 3 enhancements air-to-surface configuration," says BAE. "The trials are helping to pave the way for Brimstone 2 integration by 2018."

BAE Systems

BAE added the precision-strike weapon on three-round launchers

Enhancing the ground-attack capabilities of the Typhoon is a key requirement for the UK, which will retire its last Panavia Tornado GR4s in 2019. Its Eurofighters also will gain the ability to deploy MBDA's Storm Shadow cruise missile.

The RAF's swing-role credentials with the Typhoon will be tested in January, when its Lossiemouth-based 1 Sqn will participate in a Red Flag-series exercise at Nellis AFB, Nevada.

The service will also deploy one Boeing E-3D Sentry airborne warning and control system platform and a Bombardier Global Express-derived Sentinel R1 battlefield reconnaissance aircraft during the exercise. ■

TENSIONS **BETH STEVENSON** AMARI AIR BASE

NATO keeps a wary watch for Moscow misbehaviour

Eurofighter fleets rotate the strike as Baltic Air Policing operations remain on alert in 2015

Increased tensions in eastern Europe as a result of Russia's advances into Ukraine resulted in NATO's Baltic Air Policing (BAP) effort ramping up in May 2014, including the establishment of a permanent detachment at Amari air base in Estonia.

Operations at Amari were bolstered to 24/7 readiness, and are set to continue at this level until at least the end of 2015, as a series of full-time detachments are planned to provide quick reaction alert (QRA) capabilities in the region.

NATO has decided that a Eurofighter Typhoon capability will extend throughout 2015 for QRA operations from Estonia. A German air force deployment concluded at Amari on 2 January, handing over to a Spanish air force detachment. To last for four months, the latter commitment will be followed by one from the UK, and then another from Germany, taking the BAP capability at the site to year-end with "extensive Eurofighter operations".

"We can't deliver kinetic effects," says Col Jakk Tarien, commander of the Estonian air force. "What we do do is support allies that are delivering that effect on our behalf."

German Eurofighters arrived at the site in September for the nation's sixth rotation of BAP duty – although its first in Estonia. By 17 December, they had carried out 255 sorties, deploying on an average two flights per day from Monday to Friday. The Luftwaffe detachment included four aircraft stationed at the base, plus two more on a 96h standby in Germany. Typically two aircraft carry out each sortie, while two remain at readiness at Amari.

> **"We can't deliver kinetic effects. We support allies that are delivering that effect on our behalf."**
>
> **COL JAKK TARIEN**
> Commander, Estonian air force

The air policing effort is designed to provide QRA cover for Estonia, Latvia and Lithuania, which the alliance has been carrying out on a rotational basis since they joined NATO in 2004.

In light of the tensions between NATO and Russia that heightened in 2014 – the former has openly condemned the latter's advances into Crimea and Ukraine – the BAP was ramped up to include three detachments, based in Estonia, at Siauliai air base in Lithuania and at Malbork in Poland, conducting air policing missions at any given time.

PREPARED

Deployments concluding in early January are the second bolstered rotations, which include ensuring that Estonia now maintains a 24/7 readiness – something which was not previously expected to happen until mid-2015.

"It took a lot of work – it was not in our plan to increase to 24/7 readiness so soon," Tarien says. "In our plan we had foreseen the 24/7 coverage beginning in 2015."

Estonia had also expected to host 24/7 rotations that would intermittently be followed by recuperation periods, Tarien says, rather than providing a non-stop coverage throughout the year.

"This will continue unless something drastic happens – in a positive sense – with the situation in Ukraine," he adds.

The mission is split into two main areas, with Air Policing Area (APA) 1 controlled by the Combined Air Operation Centre (CAOC) Finderup in Denmark, and APA 2 – which covers the Baltic states – controlled from CAOC Uedem in Germany. These both feed into the NATO Allied Air Command in Ramstein, Germany.

As the state with the largest air base within proximity to Kaliningrad – the sea port capital of the Russian territory between Lithuania and Poland – Lithuania is best positioned to conduct missions that involve carrying out surveillance in that area, although the decision on which base will scramble to an area is decided by the Uedem CAOC.

Portuguese and Canadian air force personnel have been stationed at Siauliai for the past rotation, with Lockheed Martin F-16s and Boeing CF-18 Hornets respectively, while the Netherlands has been based out of Poland with its F-16s.

The detachments engage in alternate "hot" and "cold" weeks. Both of these involve the full aircraft capability, but during cold weeks personnel numbers are not at full capacity.

"Alpha" missions are active sorties in response to activity in NATO airspace that needs assessing, while "tango" sorties are training missions. A tango sortie

Four German Eurofighters were on duty between September and January

Beth Stevenson/Flightglobal

Dassault bets on Falcon 8X to go far
BUSINESS AVIATION P21

Lithuania's bolstered QRA presence included Canadian and Portuguese fighters

Royal Canadian Air Force

can be recategorised as an alpha in mid-flight if need be, and training missions are flown as operational ones, with weapons integrated.

NATO standards dictate that an alpha sortie deploys within 30min, but the German air force aims for 15min and often achieves it in 10min, it says.

TRAFFIC

Although neither Estonia nor Germany consider there to have necessarily been an increase in aggression from Russian aircraft in the region, there has certainly been an increase in the number of flights that skirt around and into NATO airspace, and in turn an increased alertness has been activated from the alliance.

By mid-December, the number of alpha missions that had to be carried out by the German air force that month significantly increased, with one week in particular featuring more than 10 operational alpha sorties. One such mission during that week required all four German Eurofighters to be deployed from Amari, which is a rare occurrence, the air force says.

"When we had exercises in June, we saw an increase in their [Russia's] activity," Tarien says. "In an ideal world I'd like to see Russia act as a normal Western-like democracy so that there is no need for special defence measures, but I don't see this happening any time in the next 10 years, so we need allied presence here long term."

Sharing a border with Russia, Estonia is in a vulnerable position, and Tarien says an increased NATO readiness provides comfort.

"We know NATO allies will defend us, but we don't want this to materialise. We want to prevent it," he says. "We feel most secure when there is a bolstered allied presence here."

Most interceptions with Russian aircraft occur in the same location. Russia regularly takes a quick route over Estonian territorial waters, although the short time it takes for it to do this takes rarely results in a NATO BAP scramble.

"NATO's orders are extremely clear," notes Lt Col Gordon Schnitger, commander of the German detachment. "We are supposed to be defensive, not offensive. We are only ID-ing the aircraft. Our aim is to be visible. We're here as a political statement."

Schnitger adds that a four-ship formation of varying aircraft is ideal, so as to train against different aircraft types, and that it was advantageous when the opportunity to fly with the Portuguese and Canadian aircraft arose.

Also based at Amari are four Robinson R44 helicopters, two Aero Vodochody L-39 trainers and two Antonov An-2 transports. The last of these have been in service for 50 and 55 years, respectively, and although they are operational and provide transport and low-speed surveillance – they only fly at 90kt (166km/h) – they are expected to be replaced with Short C-23 Sherpas in 2015.

Four Estonian R44 helicopters are also based at the Amari site

Beth Stevenson/Flightglobal

> **"NATO's orders are extremely clear. Our aim is to be visible. We're here as a political statement"**
>
> **LT COL GORDON SCHNITGER**
> Commander, German air force detachment

For information exchange, as Link 16 is not available, the NATO BAP nations bring their own Link 16 capability to Amari. However, Tarien says that a domestic implementation of this for secure communications is high on the Estonian air force's priority list.

INTEGRATION

The base has also held a number of multinational NATO exercises, and several are planned for 2015. US President Barack Obama visited Estonia in October, and claimed that the USA wanted to increase training in the country.

"We're excited about this," Tarien says. "Of course the integration details are pending, depending on US defence budgets."

Amari also has an air surveillance wing that is operated in parallel to the flying wing.

Two ThalesRaytheonSystems Ground Master 400 air defence radars will provide the required air radar coverage for Estonia. One has already been delivered.

Russian military aircraft are renowned for not carrying transponders or for submitting flight plans, so using radar allows NATO to keep track of their movements in the region.

Meanwhile, Hungary is expected to carry out its first BAP rotation in 2015, using Saab Gripens, and Italy will also debut, adding to the 14 member nations that have already contributed to the effort. In January, Italian Eurofighters will replace Portuguese F-16s, while Poland will deploy RAC MiG-29s to Siauliai. Belgium will base F-16s in Malbork. ■

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Airbus begins a new chapter
NEWS FOCUS P23

LANDMARK **KATE SARSFIELD** LONDON

TBM delivers for Daher-Socata

Daher-Socata has smashed its 700th TBM single-engined turboprop delivery milestone, 25 years after the first of the high-speed aircraft series – the TBM 700 – entered service.

The landmark aircraft, a TBM 900, was handed over to a private US customer last month.

The TBM 700 was the first series-production pressurised single-engined aircraft to be certificated. When the upgraded and re-engined TBM 850 replaced this version in 2005, more than 320 had been delivered worldwide.

The TBM 850 marked the introduction of the Garmin G1000 glass cockpit to the turboprop single. When this model was superseded in March by the current iteration, the TBM 900, around 340 of the model had entered use.

Daher-Socata was planning to deliver 50 of the $3.7 million, Pratt & Whitney Canada PT6A-66D-powered aircraft by the end of 2014, which will mark the largest annual TBM shipment tally since 2008, during which a record 60 examples were handed over. ■

APPROVAL **KATE SARSFIELD** LONDON

Legacy 500 gets all-clear for European operations

Embraer has received European approval for its Legacy 500 business jet and is preparing to deliver the first midsize aircraft into the region this quarter.

The airframer received Brazilian and US certification for the clean-sheet twinjet in August and October 2014 respectively, and was planning to ship between three and six of the type to customers before the end of last year.

The Honeywell HTF7500E-powered Legacy 500 was launched in 2008, raising the benchmark for midsize products by offering features usually found on a large-cabin business jet such as fly-by-wire flight controls, a 2m cabin height and an extensive baggage area.

Embraer's next task is to bring its mid-light Legacy 450 to market. The aircraft first flew in December 2013, and is on track for certification in mid-2015. ■

DEVELOPMENT **KATE SARSFIELD** MERIGNAC

Dassault bets on Falcon 8X to go far

French manufacturer rolls out ultra-long-range variant as competition with Gulfstream and Bombardier rivals hots up

Amid chandeliers, champagne and a parade of ultra-wealthy customers, Dassault rolled out its longest-range Falcon yet in a ceremony at its Bordeaux-Merignac assembly plant on 17 December.

The Pratt & Whitney Canada PW307D-powered 8X nudges the French airframer into the 6,000nm-plus ultra-long range segment for the first time, a small but lucrative prize it will tussle over with Gulfstream's G650, and longer-range G650ER variant, and – when they enter service in 2016 and 2017 – Bombardier's Global 7000 and 8000.

Although these competitors have longer legs than the 8X – the 7,000nm-range G650ER currently holds the record – all three manufacturers are keen to tap a still-burgeoning Chinese market with aircraft that can comfortably reach London from Hong Kong. Despite economic slow-down in China and Brazil and turmoil in Russia, the new elites in emerging regions are still pushing for larger, longer-range business aircraft and the three airframers are obliging.

The $57 million 8X trijet is one of two new types being developed by Dassault, which has been producing business jets at the Bordeaux facility since the Mystère 20 in the early 1960s. The roll-out of the all-new wider-cabin but shorter-range 5X will follow in about six months, with the models due to enter service in 2016 and 2017 respectively.

Dassault

Eric Trappier, Dassault's president, believes the "future looks big and bright" for the Falcon 8X

The 8X is a stretched and longer-legged version of the seven-year old 7X – which is about to hit its 250th delivery milestone.

The aircraft boasts a range of 6,450nm – 500nm more than its stablemate. This performance boost opens up new and vital city pairs – such as Beijing to New York and Hong Kong to London – to the Falcon brand for the first time. To help give the fly-by-wire aircraft this vital extra range, the airframer has added another fuel tank within the centre fuselage section and redesigned the wing to minimise drag and reduce weight.

While Dassault expects this extra range to be a key factor in the 8X's success, the aircraft's interior is also a vital component, and Dassault has invested heavily in creating an ideal environment for passengers and crew. The 13m (42ft) cabin, for example, has a choice of 30 interior configurations and up to 34 cabin windows – compared to the 7X's 28. The cockpit has also been redesigned and features the latest iteration of the Honeywell Primus Epic-based EASy flightdeck.

Dassault is eager to get the 8X into customers' hands by the end of 2016. The first test aircraft is now being readied for its maiden flight before the end of March. This model will be dedicated to flight envelope expansion, while a second 8X – now assembled and scheduled to fly before the end of June – will focus on performance. A third fully conforming aircraft – currently being assembled in Merignac – will help with cabin systems and preparation for entry into service, says Dassault.

Speaking at the roll-out ceremony, Dassault president Eric Trappier said the company's newest and biggest Falcon has been well received by the market. "The aircraft is selling well," he said. "With the 8X, Dassault's future looks big and bright." ■

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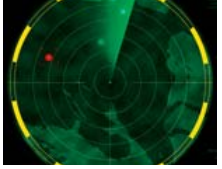


A clear view ahead
FEATURE P24

ROTORCRAFT **DOMINIC PERRY** MARIGNANE

Airbus begins a new chapter

Even as the manufacturer and customer NHV celebrate delivery of the first EC175, the civil helicopter market is turning

Another blue sky day in Marseille. No clouds mar the horizon, but a stiff breeze whips across the airfield, snapping out the bright orange safety tags attached to the helicopter's rotorblades. The yellow-liveried aircraft – and its sister ship parked inside the nearby hangar – is an EC175: "the first brand-new product in more than a decade" for manufacturer Airbus Helicopters.

Accordingly, the handover event at its Marignane site on 11 December – nearly five years to the day since first flight and two years later than planned – marked a hugely important step for the airframer.

Inside the hangar it was all smiles and handshakes. Assembly line workers and programme chiefs past and present mingled with representatives from launch customer Noordzee Helikopters Vlaanderen (NHV), including its pilots, technicians and even financiers.

EXCITING CHAPTER

After the usual round of speeches, Eric Van Hal, the boss of NHV, and Guillaume Faury, his counterpart at Airbus Helicopters, posed for photographs in front of one EC175. And, as is customary, Van Hal signed a page of a thick, lectern-perched tome the airframer keeps specially for these occasions. His message: "First step into a new exciting chapter in our story."

For Ostend-headquartered NHV, the delivery should mark the beginning of an ambitious plan, targeting growth of around 25-30% in 2015 alone. It has orders for 16 of the new-generation rotorcraft in place, and intends to have taken at least half by the end of the year.

Van Hal views the 7.5t EC175 – which will see its maximum take-off weight rise to 7.8t by 2016, offering more payload or range – as the perfect platform for around 80% of missions in the North Sea. With capacity for 16 passengers, he thinks it will take work away from heavier types like the EC225, which although transports three more people, also carries at least an additional tonne of empty weight.

Dominic Perry/FlightGlobal

NHV has orders in place for 16 of the P&WC PT6-engined helicopters

"Everybody is always looking for something bigger, it's a typical male thing," says Van Hal. "But the oil companies are listening to what we are saying: [the EC175] is more modern, safer and cheaper."

Such is Van Hal's confidence in the EC175 that NHV intends to use it to open a new base in Aberdeen in mid-2015, despite having yet to secure any contracts to operate from the Scottish site.

Although NHV received its first helicopters later than planned, Van Hal remains realistic about the situation. "If you are launch customer for a new product then you know there will be delays. It was longer than we thought, but we had good reassurances," he says.

The wait, however, did mean that any plans NHV had for growth in 2014 were put on ice. And while declining to give details, Van Hal indicates that a compromise agreement on additional costs incurred has been reached with Airbus Helicopters.

For the manufacturer, beginning the delivery phase of the EC175 programme is a crucial step. A two-year delay – caused by a complex certification process, internal resource issues and a change of leadership at the top of the company – is not unheard of, but nonetheless problematic. Sales have been modest in the interim, particularly against the rival AgustaWestland AW189.

And, in the meantime, the previously benign outlook for commercial helicopter sales – once as cloudless as the Marseille skies – seems overcast.

> **"The oil companies are listening to what we are saying: that the EC175 is modern, safer and cheaper"**
>
> **ERIC VAN HAL**
> CEO, NHV Aviation

In fact, Faury warned an Airbus Group investor conference the day before the handover that in 2014 the civil and parapublic market had experienced an unexpected "downturn" of around 15-20% against 2013. "We are considering this a trend for the next one to two years," he added.

What this means, he says, is that "the former generation [of helicopters], the ones which are the cash cows today, are bringing less profitability than we were expecting". As a consequence, the current "phase of deep renewal" of its product line assumes ever-greater importance.

COST ADVANTAGES

But even then, its next-generation helicopters are not immune from short-term market volatility. For instance, Russian airline and helicopter operator UTair is a big customer for the EC175, with 15 firm orders and 15 options. Airbus Helicopters hopes to deliver the first of these before the end of 2014, but with the rouble having weakened and Russian economic growth following suit, it has no clarity on the pace of further deliveries. Faury describes the situation in Russia as "fast evolving", and says the manufacturer is in regular contact with the operator "to find appropriate delivery dates for them".

Assuming the UTair handover goes ahead, Airbus Helicopters will still meet its target of three deliveries in 2014 – albeit to two operators rather than three as initially planned, as Héli-Union had pushed its initial example into 2015. And although oil and gas customers are reining in expenditure on the back of tumbling crude prices, Faury sees the operating cost advantages presented by the EC175 as offering "an opportunity to address the new challenges in the oil and gas market".

But with total orders amounting to just 64 helicopters – of which only around two-thirds are firm – the airframer needs to get selling, or planned rate rises will have depleted the EC175's backlog by 2017.

Ensuring the longevity of the programme appears a "new exciting chapter" all of its own. ■

A CLEAR VIEW AHEAD

Some things can be foretold. There was always a strong chance Airbus would launch an A330neo in 2014 and that defence manufacturers would face constraints. Other events of last year – the oil price plunge, the loss of two Malaysian airliners – were less predictable. Forecasting is an inexact science, but, regardless, our journalists assess what are likely to be the big stories, themes and developments of the coming year

Alamy

Norwegian continues to seek US approval for long-haul flights

GRAHAM DUNN LONDON

This year has been one of the most profitable on record for airlines, and with the benefits of lower oil prices and stronger economic growth filtering through, 2015 is set to be even better.

If it has not felt that way for many airlines this year, it reflects the reality of widely differing fortunes between regions, and carriers within those regions.

Of the nearly $20 billion net profit IATA estimates airlines will have made in 2014, $11.9 billion is expected to come from North American airlines. The revived fortunes – after a tumultuous last decade – have been driven by financial restructuring and the airline consolidation of the last couple of years – the last piece of the jigsaw being American Airlines' merger with US Airways.

By contrast much of Europe's airline industry – and its network carriers in particular – are still working through this stage. While IAG secured game-changing cost reductions at Iberia – after a drawn-out battle with unions – its counterparts at Air France-KLM and Lufthansa continue to face labour challenges in their efforts to restructure their short-haul operations.

The impetus to restructure has been driven by the continued pressure from Europe's low-cost carriers, which continue to step up their efforts to tempt business travellers onto their aircraft. Strong results at EasyJet and a bumper start for the new "cuddly" Ryanair will further encourage these and other LCCs.

DYNAMIC COMPETITION

Long-haul seems more encouraging for European network carriers, with most remaining upbeat on prospects for the North Atlantic – a market all the more tempting given the expanding Gulf carrier competition on Asian routes.

Competition remains dynamic in the fast-growing Asia-Pacific region. And even if economic growth in China is not in overdrive, it still continues to be a strong force behind Asian expansion.

Airlines continue to add capacity in the region rapidly, but IATA chief executive Tony Tyler says he is not worried about over-capacity here – or in other emerging markets. "You look at the huge potential for growth in markets like Asia, Latin America, Africa, where we still see air travel as a relative novelty in [parts of] those places. There is plenty of opportunity," he says.

IATA is forecasting improved profitability in all regions for airlines in 2015, driving projections for a record industry profit of $25 billion. This is helped by lower fuel costs kicking in during the year. Encouragingly, the sudden fall in oil prices seems to be related to supply factors rather than being an indication of weakening economies, meaning airlines could – at least for a short period – be in a position to enjoy lower costs and strong demand. But IATA believes the lower costs will ultimately be reflected in ticket prices.

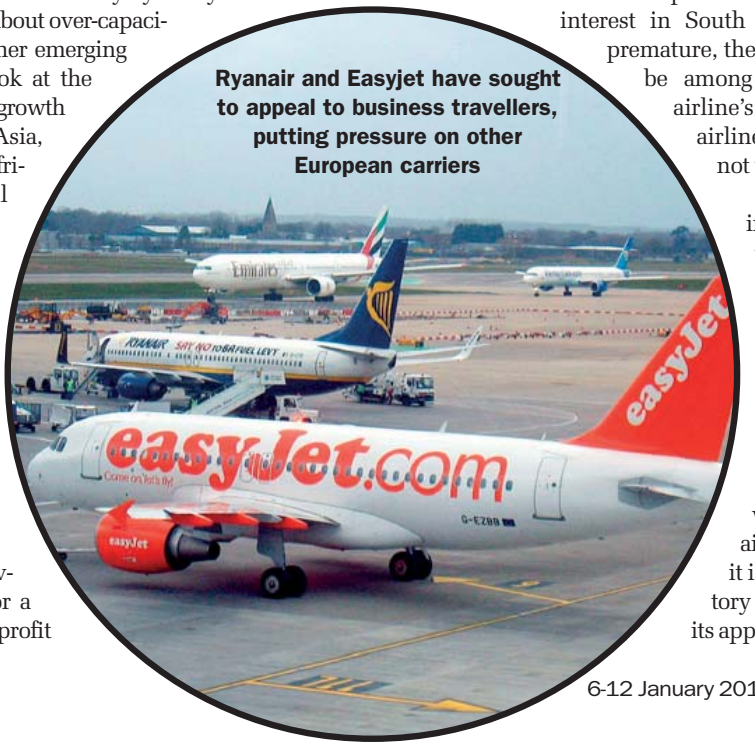
"Once airlines see costs coming down, that is almost always followed by a reduction in fares or cargo rates because it is such a competitive industry," says IATA chief economist Brian Pearce. "Many airlines have got a significant proportion of the fuel bill hedged. So a lot of airlines are not seeing the benefit yet. But that will start to come through in 2015, which is why we think fares will fall."

As ever, 2014 had its share of political and socio-economic crises which continue to impact air travel. That includes the Venezuelan currency crisis – foreign airlines have struggled all year to repatriate money earned from local ticket sales and connectivity to the country suffered as a result. The devastating Ebola outbreak has hit African air services, while fallout from the political crisis in the Ukraine has added economic pressure to the human tragedy of MH17.

"It is still a very risky business environment," says Pearce. "There are still lots of things that could go wrong. There are lots of geopolitical conflicts in the Middle East and in Russia, eastern Europe and in Asia. Ebola hopefully won't lead to a shock, but there are a number of issues that could cause problems."

Meanwhile, all eyes will be on other potential game-changers. Will Etihad Airways – having added Alitalia to a rescue list already including Air Berlin and Jet Airways – move for further partners? While media reports of interest in South African Airways appear premature, the Star Alliance carrier may be among those hoping the Gulf airline's appetite for struggling airlines with strong markets has not waned.

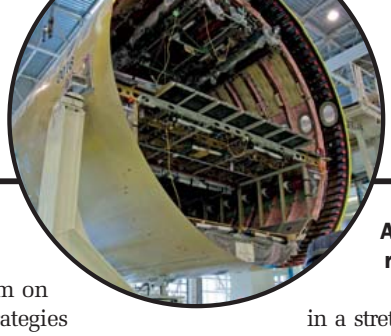
There will also be much interest in Norwegian's continued attempts to secure US approval for its plan to fly long-haul routes to the USA through an Irish-based company. The move, rounded on by critics as a means of circumventing local labour rules, may also have wider implications both for airline models and the strain it is putting on EU-US regulatory relations over the delays in its approval. ■



Ryanair and Easyjet have sought to appeal to business travellers, putting pressure on other European carriers

Boeing, Rex Features

WIDEBODIES



Airbus hopes to deliver A350s at a rate of 10 per month by mid-2017

STEPHEN TRIMBLE WASHINGTON DC

Airlines will continue a referendum on the opposing widebody aircraft strategies of Airbus and Boeing.

In the narrowbody sector, Airbus and Boeing arrived at an unexpected consensus more than three years ago, with both companies rolling out re-engined and aerodynamically tweaked versions of their existing products.

No such strategic concord exists in the widebody segment of the market. Boeing has decided to attack the middle of the segment with three variants of the 787, a clean-sheet design featuring a new airframe, engine and systems architecture. While the 747-8 soldiers on at or near minimum output, Boeing plans to attack the high-end of the twin-aisle market with two versions of the 777X, featuring a new engine and wing but keeping the fuselage cross section identical.

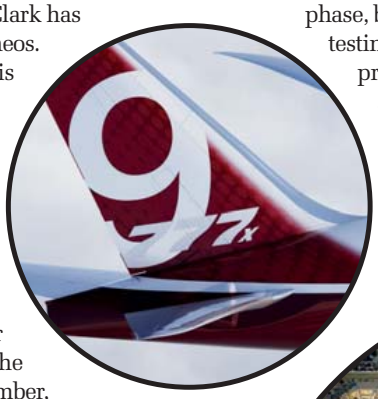
For Airbus, almost the reverse is true. In 2014, Airbus finally clarified that it would offer a re-engined A330 family versus the 787-8, and attack at least three Boeing offerings – 787-9, 787-10 and 777-8X – at the high end of the widebody segment with the all-new A350-900 and A350-1000, while bracketing the 747-8 and 777-9X with an A380 burdened with an increasingly uncertain future.

Boeing's launch of the 787-10 and 777X family in 2013 and Airbus's launch of the A330neo family in 2014 clarified the future of the twin-engined widebody segment for at least the next two decades.

The only question that hangs over the industry now is the fate of both four-engined superjumbos – the 747-8 and A380.

Boeing's second re-engining of the venerable 747 has so far had disappointing results, with 119 orders split between two variants and fewer than 40 remaining in the backlog.

The launch of a re-engined and updated A380 could top the 747-8 with one order by a single customer. Emirates chief executive Tim Clark has long pledged to buy more A380neos. In December, Clark raised his ante, saying he could buy enough A380neos to replace all 140 A380s on order.



Whether such enthusiasm is enough to persuade Airbus to launch a new widebody development programme is unclear. Even after cancelling the A350-800 last September and the scheduled delivery of the first A350-900 in late December, Airbus still has four widebody development projects in the pipeline, including the enhanced A330-300 due for delivery in mid-2015, the A350-1000, and the A330-800 and -900. Launching another – while also completing all three variants of the A320neo family – seems ambitious.

Boeing may wish for such enthusiasm for the 747-8. As late as 2005, Emirates considered the venerable superjumbo a viable candidate, as long as Boeing offered enough range to reach the US West Coast from Dubai. Instead, Boeing heeded a demand from eventual launch customer Lufthansa for more passenger capacity in a stretched 747-8 Intercontinental. Now, Boeing is making a late push, offering enough improvements to put the US West Coast in reach of the 747-8I. So far, however, no passenger airlines have stepped forward to accept Boeing's offer, while annual output is slowing from a peak of 24 aircraft last year to 16 aircraft by September 2015.

Boeing's 787 programme will focus on new engines, and the 777X familiy is in the detailed design phase

POWER PLANS

Meanwhile, Airbus and Boeing will also be challenged to ramp up production of the A350-900 and 787-9, respectively, while seeking to avoid the serial reliability and safety crises that enveloped the entry into service of the 787-8.

It took Boeing nearly 2.5 years to escalate production of the 787 from one per month to 10. Airbus plans to undertake a similar escalation with the A350, ramping up to 10 deliveries per month by mid-2017. At the same time, Airbus will be completing development of the A350-1000.

Rolls-Royce plans to begin flying the Trent XWB-97 powerplant for the A350-1000 next year. Engine certification will support first flight of the A350-1000 prototype in 2016 and entry into service in mid-2017.

After a steep ramp-up on the 787, Boeing will be taking a breather from production increases in 2015. The focus on the 787 programme will turn to introducing the next major engine upgrade. Rolls-Royce is planning to certificate the Trent 1000-TEN by the end of the year, with test flights beginning on the company's 747-200 flying testbed by the middle of the year. The TEN variant is expected to improve performance for all 787 variants but is designed to support the thrust requirements for the 787-10, which enters flight testing in 2017 and service in 2018.

The 777X programme remains in the detailed design phase, but GE Aviation is poised to enter a critical period of testing on the GE9X engine. After several runs of the 27:1 pressure ratio compressor rig in 2013 and 2014, it is scheduled to begin testing a full-scale engine core in 2015. Completing those tests is critical to supporting scheduled milestones, including first flight in 2016 and certification in 2017. The 777-9X prototype begins flight testing in 2018, with certification expected in 2019 and entry into service planned for 2020. ■

Boeing, Airbus

NARROWBODIES

STEPHEN TRIMBLE WASHINGTON DC

As Airbus and Boeing enter 2015, the two companies will have a combined order backlog for the 737 Max and A320neo families of almost 6,000 aircraft, one aircraft flying between them and a lot of schedule and performance promises to keep.

Since the launches of the A320neo in 2010 and the 737 Max in 2011, the year 2015 has always been expected to be a pivotal one for both programmes. For the A320neo, the next 11 months will see the delayed certification of the Pratt & Whitney PW1100G geared turbofan, the delayed first flight of the CFM International Leap-1A engine and – assuming the flight test programme remains on track – first delivery in November.

In Renton, Washington, the details are different, but the milestones are similarly significant. Over the next 12 months, Boeing plans to complete first flight of the CFM Leap-1B engine, begin final assembly of the first 737 Max 8 and again attempt to reach the company's stated goal of drawing even with its rival in terms of market share in the narrowbody segment.

The A320neo started with a year-long, first-mover advantage in December 2010 and has never looked back. Airbus has a 57% share of the market, with 3,362 firm orders up to mid-December, compared with 2,558 orders for the 737 Max family.

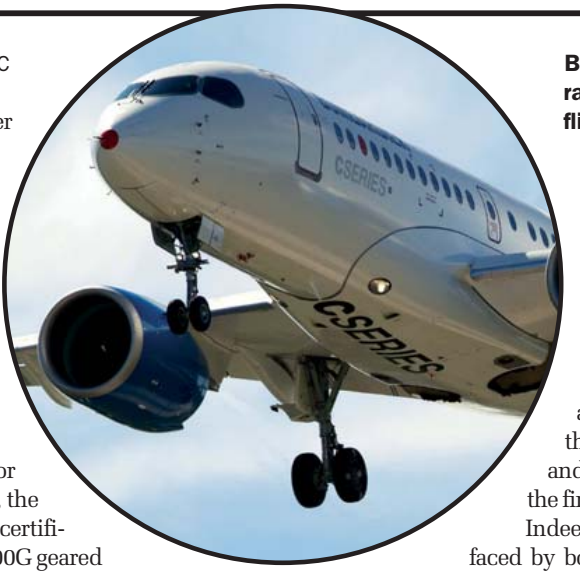
Following several years of ideal economics for narrowbody market orders, the global economy is sending mixed signals as 2015 begins. An unexpected 50% reduction in fuel prices from June to December may be positive signs. Airlines with favourable hedging policies may have spare cash to finance fleet growth through new orders.

INCREASED EFFICIENCY

On the other hand, lower fuel prices reduce the value of buying new aircraft whose greatest selling point is a more efficient engine. Boeing chief executive and chairman James McNerney said in October that he sees little threat of order cancellations unless the price of a barrel of oil travels "well south" of $70 and remains there for a long period. Flightglobal Ascend analyst Rob Morris has calculated that the fuel savings generated by an A320neo outweigh its lease costs until the price of oil falls to $55 per barrel.

By mid-December, oil prices had reached that level and were widely expected to continue to drop. For the first time since the global financial crisis in 2009, which caused a brief dip in the price of oil to about $35 per barrel, the integrity of manufacturers' backlogs will be tested against falling oil prices. At the same time, central bankers in Russia, western Europe and the USA have already raised interest rates or warned markets that the era of cheap financing may soon be ending.

As long as oil prices remain low and interest rates go up, finding new narrowbody orders could prove challenging.



Bombardier is set to ramp up the CSeries flight-test programme

The good news for Airbus and Boeing is that the existing backlog is a buffer against market fluctuations. In addition to the 5,920 combined orders for re-engined narrowbodies, Airbus and Boeing have more than 5,000 existing A320 and 737NG family aircraft in the firm-order pipeline.

Indeed, the next big challenge faced by both companies is to raise output by another 20% over the next three years while introducing the re-engined models.

As output grows, production capacity is also rising. Boeing is activating a third production line in Renton for the 737 in 2015, as the monthly production rate grows from 42 today to 47 in 2017 and 52 in 2018. Meanwhile, Airbus is opening a fourth final assembly line for the A320 family in Mobile, Alabama, this year. The first aircraft produced in the factory will be delivered shortly after Airbus raises output to 46 per month by mid-2016, allowing company officials to consider further increases.

The challenges look different among the three companies seeking to challenge the Airbus-Boeing duopoly in the narrowbody sector, but are no less imposing.

Bombardier has finally switched the CSeries flight test programme into high gear, following the activation of the fly-by-wire flight envelope protection system and a 100-day hiatus caused by a design flaw in the P&W PW1500G turbofan. A redesigned sales team will seek to add to the 243 combined orders for the CS300 and CS100. Bombardier officials hope to attract 300 firm orders by the time the CS100 enters into service in the second half of 2015. By that time, the first CS300 flying prototype should be flying, as Bombardier ramps up production.

Keeping a new commercial airliner programme on schedule is a common struggle. CFM began flight testing of the Leap-1C for the 158-seat Comac C919 five months late last October, but company officials still expect to deliver the first certificated engine by the middle of next year. Comac had wanted to begin flight testing by now. However, the current schedule now calls for completing final assembly in September, with customer deliveries about one year later.

In Moscow, development challenges could be compounded by Russia's ongoing economic crisis. The 180-seat Irkut MC-21-400 is supposed to be in service from 2017, two years after P&W is scheduled to deliver the first PW1400G engine to support the flight test programme. Since August, however, Russia's economic situation has deteriorated, with the plummeting rouble forcing central bankers to raise interest rates sharply. Irkut was expected to release design details for the 150-seat version – the MC-21-200 – by the end of 2014, but no announcement had been made at press time. ■

Boeing, Airbus

REGIONALS

STEPHEN TRIMBLE WASHINGTON DC

After more than 20 years of being dominated by the Americas, Asia will be the focus of attention in the regional jet market in 2015.

The Mitsubishi MRJ should begin flight testing in Japan around the same time that China's Comac delivers the long-delayed ARJ21 to its first customer.

The ARJ21 has been in development for 13 years and is currently running eight years late to reach certification. If Chinese and US regulators approve certification around mid-2015, Comac will deliver its first indigenous, jet-powered commercial product – but the ARJ21 will wear the burden of its delays. The GE Aviation CF34-10 engine has been the standard in the regional jet market since the early 1990s but will soon be outclassed by the Pratt & Whitney PurePower engines entering service on the competing MRJ in 2017 and the Embraer E-Jet E2 in 2018.

Perhaps mindful of the complexities of a modern certification programme, Mitsubishi has booked about two years to complete flight testing of the MRJ, the country's first attempt at a civil transport aircraft since the NAMC YS-11 was retired in the early 1970s. To underscore the manufacturer's caution, the MRJ was rolled out in October 2014, giving Mitsubishi engineers nearly six months to complete ground testing before a first flight.

Meanwhile, longtime market leaders Bombardier and Embraer will be running in different directions.

In Brazil, Embraer is still deep in the detailed design phase of the E2 family, which features the PW1700G and PW1900G and a new wing design. The company's priority in 2015 will be filling the order backlog for the E-Jets now in production. Embraer will look again to the US market to fill the gap, as a second wave of orders is expected to replace some 600 50-seat jets with larger and more efficient models.

For Bombardier, there is still no higher priority for the commercial division than delivering the CSeries on time in the second half of 2015. As a result, the company plans to leave the CRJ900 and CRJ1000 to compete in the market against the E2 and MRJ unaided by new engines or wings. ■

Embraer E2 is in detailed design phase

Embraer

DAN THISDELL LONDON

It has been a lean few years for large mergers and acquisitions – and not just in aerospace. Broadly, since the shock of the 2008-9 financial crisis settled, companies have held onto cash and waited out a period of stability characterised by low interest rates and inflation, high fuel and commodity prices, and minimal GDP growth in major economies.

In aerospace, strong civil market growth and full order-books have kept everybody moving forward. Defence-focused companies have been holding fire, as uncertainty about US government spending plans makes it difficult to value potential acquisition targets.

Surprisingly for a period following such a traumatic financial upset, distress sales have been few. Private equity owners have had to postpone their exits, as trade sales have been hard to arrange and market hunger virtually nil for initial offerings – despite soaring equity prices.

The 2012 deal that saw Pratt & Whitney, Sikorsky and Hamilton Sundstrand parent UTC absorb Goodrich for an industry-record $16.5 billion was a very high-profile exception. Likewise the ultimately abandoned plan to merge Airbus – then still called EADS – with BAE Systems.

Things started to change in 2014. A brief mid-year burst of mergers and acquisitions – so-called "corporate activity" – raised expectations but then petered out, in any case not really touching aerospace, where M&A deals have been reasonably large in number but relatively small in value. Tactical acquisitions, that is, rather than strategic manoeuvres.

But the broad economic background of the post-crisis period is best described as an unstable equilibrium, which suddenly looks more like unstable than equilibrium. During the second half of 2014, the US and UK economies finally started showing signs of sustained growth. But while that growth has led to speculation about when the Federal Reserve and the Bank of England will finally raise interest rates from effectively zero, the eurozone has lurched back toward crisis, Brazil has stagnated and China is looking like a crisis waiting to happen.

OIL AND UPHEAVAL

Russia, meanwhile, is reeling from economic sanctions imposed over its disruption of the European geopolitical environment, and the powder keg that is the Middle East is actually on fire, with all the potential for global upheaval that implies.

All of these events – unravellings – have shown up in what is probably the shift that is most significant, at least in the short term, for aerospace:

It is hard to say how long oil prices will remain low, but the drop is predictably impactful

the price of oil. After holding steady for nearly three years in the $110-120 per barrel range, Brent crude (followed in lockstep by jet fuel) is toying with $60. Few oil watchers will be surprised if it ends up closer to $40.

Where oil goes from there is for the future to tell, but the overarching lesson to take from the past several months is that investors are getting nervous. In recent years, low interest rates have meant poor returns from lending, and likewise from government bonds. Equities have been the main source of returns, but investors are clearly sensing that the bull run is stumbling, if not ending.

Companies, then, are going to have to start taking action – and there's plenty of evidence that the "animal spirits" that drive M&A are finally rising.

For aerospace, the sum total of all these movements promises to make 2015 a year of at least minor upheaval. The year is set to start out with the late-January closing of the merger between ATK and Orbital Sciences, to form a pure-play rocket and spacecraft company. Three facts stand out. Firstly, ATK has its eye on a looming US Air Force requirement to end the reliance for national security launches on the RD-180 rocket motor used in the Atlas V. RD-180s come from Russia, and their supply has been cut off in the sanctions battle over Ukraine. Secondly, both companies have substantial solid-fuel rocket motor expertise. Thirdly, ATK is spinning off its sporting ammunition business prior to marrying Orbital.

This deal, then, says a lot about what should be driving the broader aerospace industry.

By merging, ATK and Orbital probably both improve their chances if the US Air Force looks for an all-new launch system. Their merger could give them a genuine technology advantage at a critical moment. Also, their merger is looking like a sound response to a shifting geopolitical environment. And ATK is shedding a non-related business. Generally, investors do not like conglomerates, and there are recent examples of corporate splits that suggest companies – their share prices, anyway – can benefit from falling into line.

All three of these angles may feature in aerospace this year, and a rising number of small deals are likely. Big, transformative M&A moves, though, look unlikely – if only because companies have also learned caution.

One firm to watch is Rolls-Royce. The UK engine maker made the news in late 2014 when one analyst proposed it spin off its non-aerospace businesses. Such a drastic move is unlikely, but do expect a major strategy statement around mid-year – possibly including a roadmap for getting the company back into the narrowbody market.

FRENCH CONNECTIONS

Airbus, meanwhile, enters 2015 with profitability taking a tumble, hit by A380 sales woes and an A330 slump as airlines wait for the neo version. A350 ramp-up execution matters, so don't expect any big, BAE merger-style moves. However, one thing we know about Airbus is that it really does have the capacity to surprise.

Also intriguing is Dassault Aviation. With Airbus looking to sell down its minority stake in the company – a legacy of Mitterand-era nationalisation – the maker of Falcon business jets and Rafale fighters is on the spot. Simply, the opportunity to buy out Airbus leaves Dassault having to define just what it would do differently. A buyout would cost several billion euros, and Dassault would have to justify the investment – to itself (there are no other significant shareholders) and to the French government, which is its principal stakeholder beyond its parent, Groupe Industriel Marcel Dassault.

Do not expect any dramatic moves from Dassault. It could, though, look to offload the short quarter of shares it holds in Thales to pay for buying out Airbus, and that move would open the way for a broader ownership shuffle in the French aerospace industry. The best guess is that nothing will happen in 2015 – but if shares shift, expect Dassault, Safran and Thales to close the year in charge of their own destinies, free of the cross-shareholdings and partial state holdings that have made French aerospace a parallel universe.

Speaking of parallel universes, Finmeccanica faces another difficult year. Its debt burden may be paid down a bit with the sale – finally – of its struggling rail businesses. But management will have to start showing that its plan for turning the core aerospace businesses into profit-spinners has real legs.

Meanwhile, keep an eye on ATR. Rumblings near the ground suggest Airbus is less anxious than Finmeccanica to push ATR forward with, say, the launch of a 90-seat turboprop. If that dream is to move ahead, Finmeccanica may need a new partner – or to buy out Toulouse. Crazier things have happened. ■

DEFENCE GLOBAL

CRAIG HOYLE LONDON

The coming year will bring greater challenges for nations that can only dream of being as well resourced as even a sequestration-hit US military. Many of the coalition members active in Afghanistan had expected a period of comparative calm following the end of combat activity, but their withdrawal from that country has coincided with a fresh – and likely prolonged – commitment to striking Islamic State militants in Iraq and Syria. Few will be expecting that task to be completed any time soon.

Russia's influence on world events also should not be underestimated, following the instability in Ukraine that was stoked by Moscow's annexation of Crimea in 2014. What might have been expected to be a brief spike in activity by the Russian air force's strategic bomber force in international airspace around other European nations has developed into unprecedented numbers of quick reaction alert flights mounted by NATO nations. What was originally expected to be a brief increase in fighter deployments to countries including Lithuania and Estonia is now looking more permanent, and responding to Russia's shows of force is hitting already-stretched budgets.

Airbus will be looking to push sales of its A400M transport

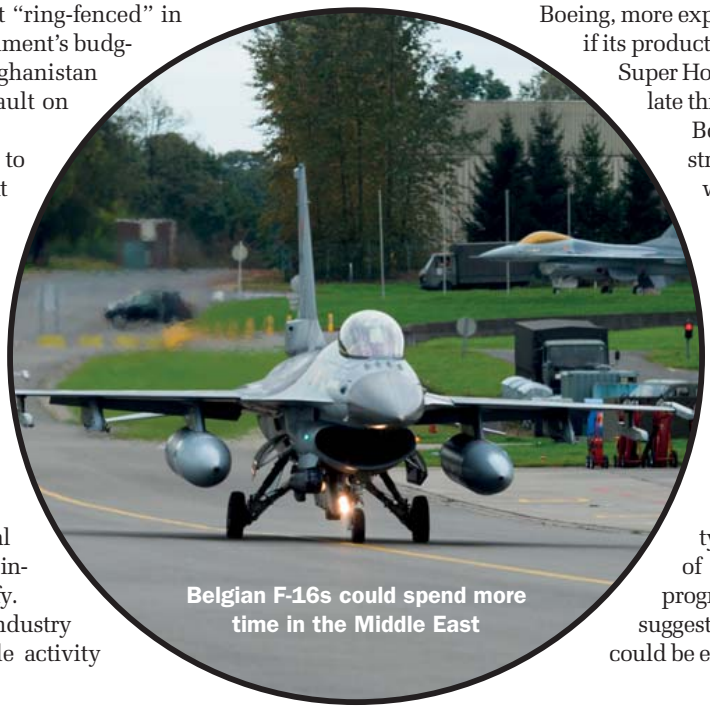
BUDGETARY PLANS

While they are still recovering from the swingeing cuts that resulted from a Strategic Defence and Security Review (SDSR) in 2010, the UK's armed forces can expect further pain as the process is repeated in early 2015. With military spending not "ring-fenced" in the current coalition government's budget plans, and with the Afghanistan campaign over, a fresh assault on cost is all but inevitable.

One of the key questions to be answered by the next SDSR will be whether the UK can afford to pursue an acquisition to reinstate its lapsed maritime patrol aircraft capability. While any buy of the favoured Boeing P-8 Poseidon would be a major undertaking at a time of collective belt-tightening, an increase in Russian military activity in international waters in 2014 suggests that inaction would be hard to justify.

Looking at the defence industry as a whole, there was little activity with relation to several expected fighter procurements in 2014. So could things get interesting over the coming 12 months? New Delhi has yet to close its long-running discussions with France for a planned buy of 126 Dassault Rafales, and clarity over its plans could possibly emerge at February's Aero India event in Bengaluru. Several Gulf states also have spaces to fill in their combat inventories, with Bahrain, Kuwait and Qatar all looking to splash out on new fighters.

With Saab having sealed deals in 2014 to produce new-generation Gripen Es for Sweden and Brazil, the pressure is now on Dassault and Eurofighter to score much-needed sales of the Rafale and Typhoon to safeguard their production programmes. Likewise, for Boeing, more export deals must come if its production of the F/A-18E/F Super Hornet is to run beyond late this decade.



Belgian F-16s could spend more time in the Middle East

Boeing's last C-17 strategic transports will roll off the line in 2015, and Airbus will be pushing hard to conclude potential sales of its A400M Atlas beyond its seven European launch customers and Malaysia. With five of the nations to be operating the type by the early part of the year, the programme's momentum suggests at least one deal could be expected. ■

Rex Features

DEFENCE US

STEPHEN TRIMBLE WASHINGTON DC

If you ask the US Department of Defense, the pain inflicted so far by sequestration – a four-year-old budget policy with no public defenders yet somehow little chance of repeal – is nothing compared with what is just around the corner.

If President Barack Obama's administration submits a sequestration-compliant budget request to Congress in 2015, it will be absolutely brutal. At a time when the Lockheed Martin F-35 programme needs to ramp up orders to reduce unit costs, a sequestration-compliant budget will cut a full F-35 squadron from the five-year budget plan. In an era of the "Pacific Pivot", requiring long-range aviation, the US Air Force will also be forced to divest the McDonnell Douglas KC-10 tanker fleet.

That is the just the tip of a jagged budget iceberg. The backbone of the unmanned surveillance fleet – the General Atomics Aeronautical Systems MQ-1 Predator – also would be mothballed, along with Northrop Grumman RQ-4 Block 40 Global Hawks. Meanwhile, the US Army would have to reconsider whether it could still afford to recapitalise its current fleet while continuing to invest in demonstrating the next generation of high-speed-rotorcraft technology.

Those budget cuts would come on top of the long-term spending reductions already imposed by the sequestration policy. Pentagon planners have already slashed more than $600 billion from long-range spending since fiscal year 2012, when congressional gridlock over how to deal with rising deficits yielded the automatic, across-the-board, yearly budget cuts known as sequestration.

In a sign of the depths of US political dysfunction, nobody expected the Obama administration to submit a sequestration-compliant budget plan to Congress in 2014, as required by law. The administration proposed a long-term, six-year budget plan that is more than $115 billion over the sequestration-mandated spending caps. Most of the spending overages came after the FY2015 budget.

Instead of punishing the Pentagon for its impertinence, Congress rewarded the department. Republicans and Democrats agreed to restore more than $30 billion in requested cuts, reversing plans to retire the Lockheed U-2 and Fairchild Republic A-10 fleets, while blocking the Pentagon from making any move to divest the KC-10 and swap Boeing AH-64s and Sikorsky UH-60s between the army and the National Guard.

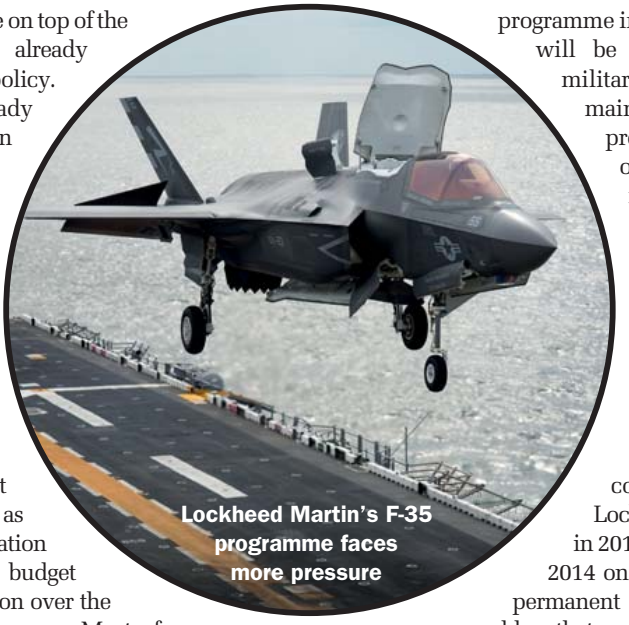
The political climate in the US Capitol is hard to read. The gridlock between a Republican-controlled House of Representatives and Democrat-led Senate is over, replaced with a Republican hegemony over both Houses for the first time since 2008. Meanwhile, Obama's administration will be entering the last two years of a presidency marked by deep hostility with Republican lawmakers. How both sides now come together to determine the future of US military spending is going to be the most important issue to watch in 2015.

In the midst of the spending debate, the wheels of military acquisition keep spinning. Few new-start programmes are anticipated while budgets remain flat or decreasing, but that only magnifies the value – and consequences – of winning or losing each one.

There are several new programmes in various stages of the acquisition process, such as a new trainer to replace the USAF's Northrop T-38Cs, an unmanned carrier-launched surveillance and strike aircraft, a combat rescue helicopter, a new fixed-wing presidential transport and a replacement for the Northrop E-8C JSTARS fleet.

HIGH STAKES

The most consequential new-start programme, however, is the one with the least visibility. The USAF plans to buy 100 new aircraft to fulfill the Long Range Strike-Bomber (LRS-B) requirement. The two competing teams – Boeing/Lockheed Martin and Northrop Grumman – expect to hear a final decision early this year. The details – including the design, technologies and capabilities of the new bomber – have been classified. The winner will have control of the most important US military aircraft contract since Lockheed won the Joint Strike Fighter programme in 2001. The losing team will be forced to sustain its military aircraft business mainly on its existing programmes or be pushed out of the market. The implications extend deep into the supply chain. It could be GE Aviation's last chance to find a customer for a new combat military platform to replace the F404/414 and F110-series engines.



Lockheed Martin's F-35 programme faces more pressure

Pressure will only continue to build on Lockheed's F-35 programme in 2015. The company ended 2014 on a high by identifying a permanent fix for the engine problem that caused a fleet-wide grounding in June, completing the F-35C's first carrier-based tests successfully and negotiating the eighth lot of low-rate initial production with a unit price reduction.

The stakes, however, grow larger in 2015. Programme officials have conceded the F-35B will miss a July deadline for declaring the first unit ready for initial operations. How long the delay lasts – and the potential knock-on effects on milestones for the F-35A and F-35C – will be closely watched, and not least by congressional appropriators.

Boeing will halt production of the C-17 in the second quarter, bringing an end to more than seven decades of aircraft production at the former Douglas plant in California. Boeing will have assembled 279 C-17s, including 15 that still do not have customers. Slightly more optimistic is Boeing's production operation in Missouri, which will continue to assemble F/A-18s until 2017 thanks to an extra 15 aircraft added to the FY2015 budget by lawmakers. ■

Lockheed Martin

DOMINIC PERRY LONDON

Helicopter manufacturers enter 2015 looking nervously at the condition of the market, at least in the short term. The boom in civil rotorcraft seen in the early part of the decade appears to have given way to a much flatter sales landscape.

The growing civil market had been seen as a welcome refuge from military budget cuts. However, as governments look to trim public spending across the board, reduced investment in the parapublic segment – plus the relative modernity of the Western fleet – is also beginning to tell. Airbus Helicopters, for instance, has consistently warned throughout the year that the market for civil rotorcraft in 2014 will be below forecast. And it is predicting no pick-up over the next 12 months either.

Until recently the high oil price had been the one saving grace for manufacturers, meaning that those companies operating in support of offshore oil and gas exploration were still investing in new-generation heavy and medium/super-medium helicopters, driving out backlogs well into 2017 – particularly for larger types like the Airbus Helicopters EC225 and Sikorsky S-92. But with Brent crude now at around $60 per barrel, oil companies are reining in spending on new exploration, therefore reducing the need for capacity growth.

THE PIPELINE

However, despite this gloomy backdrop, development activities at the Western manufacturers continue unabated. All being well, 2015 will see some notable milestones. The first of these is the initial delivery and service entry of AgustaWestland's 4.5t twin-engined AW169. The manufacturer has given no sign of any delay to the programme, and the AW169's imminent arrival will complete its medium-weight helicopter family, which also includes the 6.4t AW139 and 8.3t AW189. With strong sales across all three types – the AW189 has outsold the rival EC175 by around two to one – there are signs that the family concept of common cockpits and components is paying dividends.

Meanwhile, on the other side of the Atlantic, Bell Helicopter enters a crucial year with two development programmes on its books. The 505 Jet Ranger X is already flying – and indeed flying out of the door with its brisk sales – but the more important and complex programme is the 525 Relentless. Although it overstates the case to suggest that the 525 determines whether Bell is holed beneath the waterline, it is worth remembering that it needs to sell about 20 of the $1 million Jet Ranger X to match the likely sticker price of one Relentless. First flight of the 525 is due in early 2015, and by year-end Bell should be demonstrating smooth progress towards certification – not an easy task given the level of technology on board.

At Airbus Helicopters, all eyes will be on Orlando on 3 March when the Marignane-headquartered airframer will, at the Heli-Expo show, attempt to rejuvenate the middle of its product line with the launch of the X4. This is intended to replace the moribund Dolphin line, which in recent years has been consistently outsold by the AW139.

Interestingly, given Bell's push in the other direction, the X4 will have little in the way of advanced technology in the cockpit. While the X4 was initially conceived with fly-by-wire controls and next-generation displays, Airbus Helicopters has quietly rowed back from this position and has opted for a less costly and less risky development instead. Nonetheless, the X4 will feature the manufacturer's new Helionix avionics suite, advanced rotor blades and a choice between engines from Pratt & Whitney Canada and Turbomeca. Certification for the new rotorcraft is scheduled for 2017. Elsewhere, the airframer will continue to ramp-up production of the now-delivered EC175, as it targets building 30 per year by 2017. Of course, with a backlog of just 64 units, it will first have to sell some EC175s to justify that rate rise.

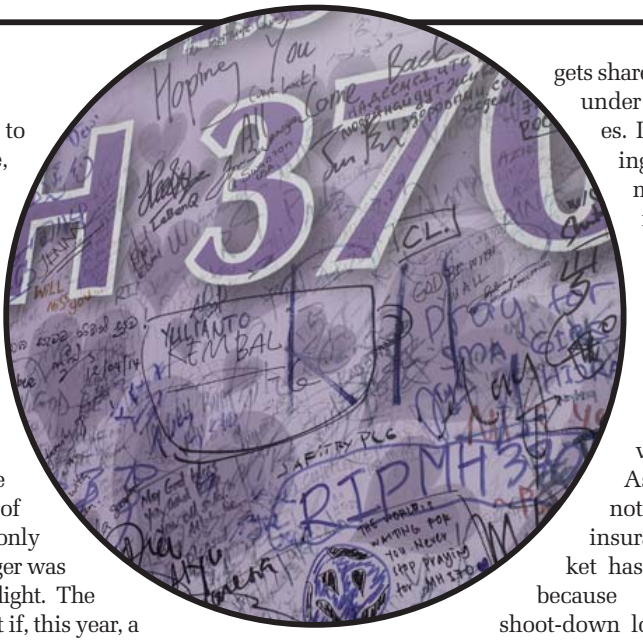
One additional trend that may gain traction is government outsourcing of search and rescue. Countries planning such a move will be watching the UK with interest in 2015, as it begins to transition its SAR operations from the Royal Navy and Royal Air Force to private Bristow Helicopters. Success on the 10-year contract will likely spell more lucrative opportunities, but if teething troubles are not solved quickly countries will rethink. ■

Expenditures on energy exploration have fallen with crude prices, but SAR could give a lift to the market

Airbus Helicopters, Bell Helicopters, AgustaWestland

SAFETY

DAVID LEARMOUNT LONDON



Airline safety is likely to continue to improve, even though the number of serious airline accidents is already lower than it has ever been. The law of diminishing returns seems to have been trumped by industry performance.

Leaving out the two Malaysia Airlines losses on the grounds that one aircraft was shot down and the other is believed to have been lost by deliberate action of some kind, in 2014 there were only five accidents in which a passenger was killed on a revenue passenger flight. The other side of the same coin is that if, this year, a large fatal aircraft accident occurs, it will have a disproportionate effect on safety statistics.

Meanwhile, several studies or projects aimed at reducing threats to airline safety are likely to come to fruition in 2015. In one of these, reacting to French investigator BEA's recommendations in the report on the loss of Air France flight 447 over the South Atlantic in 2009, Airbus says it is preparing to fit deployable flight data recorders with embedded emergency locator transmitters in A350s and A380s. Airbus says there is more work to do yet, and at the same time there is debate in the industry about how practical this is. No aviation authorities – at present – are planning to mandate deployable FDRs (see next week's issue for a study on this).

ICAO's task force on risks to civil aircraft from conflict zones, set up after the shoot-down of Malaysia Airlines flight MH17, will almost certainly produce its conclusions this year – perhaps as early as February at the ICAO High-level Safety Conference. So far the task force has been exploring how the existing Notice to Airmen (NOTAM) system could be better used to share urgent and critical conflict zone risk information, and "key ICAO partners" are working on setting up a new centralised system for "the prompt sharing of conflict zone risk information". But it will remain the responsibility of airlines to decide where they fly, says ICAO.

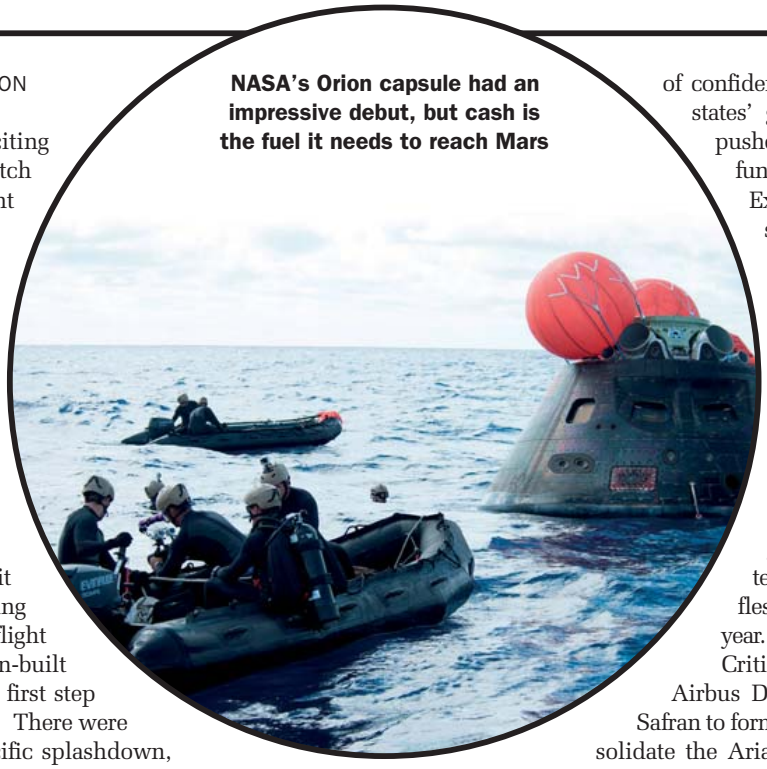
During 2014, ICAO, with the full backing of the International Air Transport Association following the loss of Malaysia Airlines flight MH370, also set up a task force on flight tracking which should report this year. ICAO wants to develop a flight tracking "concept of operations" covering how the new tracking data gets shared, with whom, and under what circumstances. It is also investigating setting up performance-based international standards to ensure "the broader adoption of airline flight tracking throughout the aviation system".

Flightglobal advisory service Ascend's analysts note that the aviation insurance war-risk market has hardened slightly because of the MH17 shoot-down loss and fighting in Libya, but not as much as the providers had hoped. Ascend predicts that unless there are more war losses next year, rates will soften again. Meanwhile, remarks Ascend: "The 'all-risk' market has hardened a little in that they are not giving so many reductions, and they are either holding the line or getting small increases, but nothing to write home about. If nothing much happens, next year the market will soften again. The problem for the risk takers in both the war and all-risk markets is huge overcapacity." ■

Malaysia Airlines' two tragedies – a disappearance and a shoot-down – stood out in 2014

Rex Features

DAN THISDELL LONDON



NASA's Orion capsule had an impressive debut, but cash is the fuel it needs to reach Mars

The most exciting thing to watch in spaceflight in 2015 will not, of course, actually happen in 2015 – or, probably, in anything resembling the foreseeable future. Sorry, space people, but nobody is going to Mars.

NASA's PR machine has been working overtime to make it seem inevitable, billing the 5 December test flight of its Lockheed Martin-built Orion capsule as the first step in a Journey To Mars! There were two orbits and a Pacific splashdown, and Americans had plenty to be proud of. NASA, after all, did what it is supposed to do: high-tech to perfection. And the prospects are exciting: Orion will not carry a crew until at least 2021, but while all other current and in-development spacecraft can go no further than low-Earth orbit, this new machine is designed to lift crews to the Moon and beyond.

But while Orion is a very nice spaceship – think Apollo on steroids, for four astronauts and with better avionics – and it will have the biggest, most powerful rocket in history to heft it into the beyond when the Space Launch System gets flying from a planned 2018, Mars remains about as far away as, well, a distant planet with no food, air or water.

PROGRESS AND PATIENCE

Technical problems abound. Radiation protection is a serious issue. No life-support system exists that can keep people alive for a very long time without top-ups from Earth. Fuel for the return leg probably needs to be made on Mars.

A Mars return trip is at minimum an 18-month commitment, and the best that can be said is that some ideas of how to resolve these issues are promising.

Arguably, the biggest hurdle is money. Year-in, year-out, NASA's budget is about $17 billion, and spending every penny of it on Mars development between now and 2035 or so – when the roadmap to Mars could supposedly get people to the red planet – is neither practical nor adequate. Money, manpower and technical input are needed from international partners. The European and Japanese space agencies are keen enough, but nobody's taxpayers are likely to put up with pouring vast sums into what is going to seem like a very, very distant – and possibly elusive – objective.

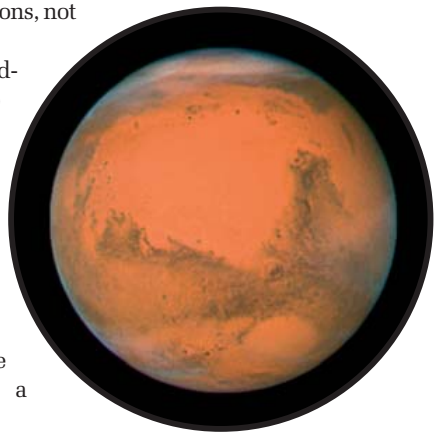
Meanwhile, 2015 may be mostly characterised by work on far more achievable projects. Boeing and SpaceX will continue development of their CST-100 and Dragon human-rated capsules, which should carry crews to the International Space Station from 2017 – an eventuality of no small significance to those who are galled by NASA's post-Shuttle reliance on buying rides on Russian Soyuz rockets.

And, the European Space Agency closed 2014 with a vote of confidence from its member states' governments and so pushes into 2015 with full funding behind its ExoMars rover missions, to launch in 2016 and 2018. The Ariane 6 programme – aiming to replace the hugely reliable but expensive Ariane 5 with a more cost-efficient rocket from about 2020 – has also been given a second-stage green light, so expect technical details to be fleshed out around mid-year.

Critically, a proposal by Airbus Defence & Space and Safran to form a joint venture, consolidate the Ariane programmes and streamline their industrial structure also got the nod. Ariane 6's solid-fuel and modular design is a leap forward, but easy to achieve compared with the overhaul of a rocket-building system defined by European consensus politics rather than any industrial sense. Good luck to Airbus and Safran – which fortunately are showing much backbone and have the backing of France.

Down on the ground, ESA director general Jean-Jacques Dordain will retire on 30 June. Dordain has been a most able leader and will be missed for his political skills as much as his mission focus, not to mention his endearing sangfroid. However, he will leave ESA in the sure hands of Johann-Dietrich "Jan" Wörner, head of Germany's DLR aerospace agency since 2007.

Wörner is the obvious choice – and a good one, given his proven ability to marshal a wide range of resources from many partners. But what makes his appointment really exciting is his belief that we are all at the beginning of a new stage of a long-running industrial revolution in which progress depends on a shift from public acceptance of new technologies to public support for new technologies. To Wörner, then, nothing substantial can happen without public engagement; the key to progress is for politicians, scientists, engineers, business people and organisations such as DLR and ESA to recognise that the public is a driver of technological solutions, not just a receiver of them.



Wörner's stewardship also promises to continue Dordain's legacy of an ESA that shows the way when it comes to realising projects that rely on deep-rooted, reliable collaboration, such as the International Space Station or, perhaps, a journey to Mars. ■

NASA, Rex Features

BUSINESS AVIATION

KATE SARSFIELD LONDON

Last year was hectic period for the business aviation industry with a crop of aircraft launches and market entrants, from Embraer's all-new Legacy 500 to Cessna's revamped Citation X+.

With recovery widely expected across most sectors of this still-fragile industry in the coming 12 months, airframers are preparing for another spell of intense activity. An array of new and upgraded aircraft are scheduled to enter service or reach milestones in their development. There could also be a further trickle of new and long-awaited entrants into the sector.

Top of this list is the corporate version of the Airbus A320neo family. Faced with growing competition from Boeing with its rival BBJ Max – launched in April 2014 – Airbus last month gave the strongest hint yet that it would offer a re-engined version of the VIP airliner this year. The go-ahead would finally put an end to months of speculation about the long-term future of the baseline ACJ320 family once the Neo versions of the commercial airliner enter service later this year.

The top end of the business jet sector has been in good health for some time and is likely to remain so.

Against this backdrop, leading traditional high-end aircraft developers are preparing their latest flagship offerings for service entry.

First off the mark is Gulfstream, which is poised to hand over the first all-new G650ER early this year. The $66.5 million, 7,500nm-range twinjet was launched in May 2014 and a retrofit version of the world's longest-legged in-production business jet entered service in November.

Dassault's Falcon 8X is being readied for its first flight this quarter. The 6,450nm-range trijet – launched in May – is slated for certification and service entry in 2016. Also making its maiden sortie in the first half of the year is the French airframer's all-new 5X. The large cabin, long-range twinjet was unveiled in 2013 and is scheduled for service entry in 2017.

Cirrus will be hoping for certification of the SF50 this year

Embraer's Legacy 450 features a flat-floor cabin and fly-by-wire controls in a midsize jet

RESURGENT ECONOMY

Meanwhile, Bombardier is planning to deliver its revamped Challenger 605 large cabin business jet in the second quarter. The $32.4 million Challenger 650 was launched last October and will feature Rockwell Collins Pro Line 21 Advanced avionics, more powerful GE Aviation CF34-3B engines and revamped interior.

This year could mark the start of a recovery at the bottom half of the business jet sector triggered by a resurgent US economy. Airframers are preparing for this with a bounty of new products, many of which should enter service or reach development milestones in the coming months.

Pilatus Aircraft is scheduled to fly its PC-24 early this year, having rolled out its first business jet offering in August. The Swiss developer of the popular PC-12NG single-engined turboprop says demand for the PC-24 has been so strong that production of the Williams International FJ44-4A-powered aircraft is already sold out for the next three years.

Fellow independent light jet developer Honda Aircraft is hoping to reach the finishing line with its HondaJet in the first quarter after an 11-year certification effort. The seven-seat, $4.5 million aircraft is slated for approval before the end of March, leading to first deliveries immediately after.

Cirrus Aircraft will be hoping to start clearing its impressive 500-plus orderbook backlog for the SF50 Vision later this year when the world's first certificated single-engined personal jet is scheduled to enter service. Two test aircraft are currently undergoing flight testing at Cirrus's Duluth Minnesota headquarters and a third will join the programme this quarter. Getting the $2 million SF50 to customers will end an eight-year certification effort for the Chinese-owned developer of the SR piston single family.

Privately-funded US start-up SyberJet is hoping to fly its $8 million, SJ30i in the first half of the year, leading to certification and first delivery of the high-speed light jet – the latest incarnation of the 28-year-old SJ30 – in 2016.

This year will also mark the service entry of two competing all-new midsize category business jets from the stables of established airframers Cessna and Embraer. The $16.3 million Cessna Latitude is more than two-thirds of the way through the certification programme and remains on track for airworthiness certification in the second quarter with service entry soon after. This will coincide with the planned arrival of the $16.6 million Embraer Legacy 450 – the first aircraft in this category to feature a flat-floor cabin and fly-by-wire controls. ■

Cirrus Aircraft, Embraer

DID WE GET IT RIGHT?

Forecasting is easy – until somebody calls you up on it. So, to pre-empt any assaults on our prescience, here's our own scorecard from our last round of year-end horizon-gazing

DAN THISDELL LONDON

Where will Boeing build the 777X?

A lengthy and sometimes bitter terms and conditions battle between Boeing and its shop floor machinists union, the IAM, left open the prospect that the airframer would build the successor to its 777 not at its traditional Seattle-area home – where the current 777 takes shape – but elsewhere. We reckoned cooler heads would prevail and, indeed, Seattle union members voted to accept a deal that keeps them on the job, building the X's composite wing and handling final assembly.

1 FOR 1

When will Gulfstream move to replace the G450?

We said the then-secretive "P42" project would be unveiled "sooner rather than later" in 2014. October, it turned out – which is later rather than sooner but well inside 2014. Unfortunately, the aircraft turned out not to be a G450 replacement, but two new large-cabin models: G500 and G600.

1.5 FOR 2

How profitable will airlines be in 2014?

We fell in line with IATA's December 2014 global industry forecast of $19.7 billion in profits, an all-time high that would obliterate 2013's $13 billion and make for a fifth consecutive year in the black. In the end, falling oil prices helped lift the industry to about $19.9 billion on a margin of 2.9% – bettering IATA's expectation of 2.6%. The tailwind from slumping oil prices was pure windfall, but good luck counts the same as being clever.

2.5 FOR 3

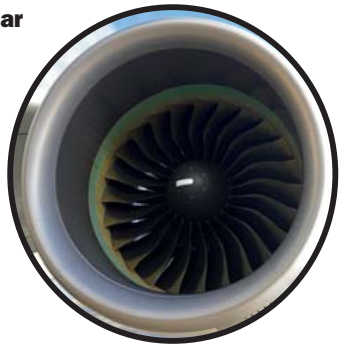
Which defence programmes will survive US budget cutting unscathed?

A year ago we said: "The USAF will not sacrifice one dollar of spending on the Boeing KC-46A tanker, the Lockheed Martin F-35 fighter and an unselected new bomber." We might have been a tad rash to talk USAF and ignore the Navy, but our thrust turned out to be broadly on target. Acquisitions of the F-35 totalled 38 of all variants, four fewer than budgeted. But for fiscal 2015, Congress granted full funding for the F-35, the long-range strike bomber and the KC-46. Call that a win a fiendishly difficult category.

3.5 FOR 4

Will peace break out in Afghanistan before the year ends?

"Not a chance," we said; sadly, that call was too easy.



4.5 FOR 5

What will be the key developments and milestones in the propulsion sector during 2014?

We said nobody should be surprised if Emirates went with Rolls-Royce rather than Engine Alliance on its latest A380s order, Pratt & Whitney's PW110G would win certification and Gulfstream would choose the PW800 for its P42. We nailed it on Gulfstream, and the A320neo-powering PW1100G-JM cleared the FAA hurdle just before Christmas. Emirates A380s are more complicated – no formal selection yet, but the carrier is implying that at least 25 of 50 will be Engine Alliance-powered, with the rest going R-R but only if Airbus decides to develop an A380neo, which looks like a Rolls-only affair that nobody was talking about a year ago. Figure that out. We'll claim 3 out of 3.

7.5 FOR 8

Will the trio of tardy major fighter buyers sign contracts?

That meant Brazil (Saab Gripen NG), India (Dassault Rafale) and the United Arab Emirates (Eurofighter Typhoon). We said yes-no-no: full marks.

10.5 FOR 11

Can we expect a turnaround in the entry-level/light business jet market?
Our simple answer was "yes" – which in retrospect seems rather ebullient.

10.5 FOR 12

Has China's Moon landing kicked off a new space race?
This one is harder to judge, but we have to accept nul points here. China's Moon mission rapidly dropped out of the headlines, to be replaced by India's triumphant Mars mission and not a lot else new, until NASA's publicity machine started talking up Mars-or-bust with its Orion test flight. Nobody's talking about the Moon, not even the much-hyped private sector, which could snaffle the $30 million Google Lunar X-Prize by landing safely on the Moon, travelling 500m and sending back pictures by the end of 2015 – but won't, even with a new extension to end-2016.

10.5 FOR 13

Will Virgin Galactic get into space?
Really, we should refresh the tea leaves. "If the next flights go to plan," we said, a Virgin test pilot "may well mark 2014 with a peek at the topside of the atmosphere." With one pilot dead, one badly injured and no realistic prospect of a paying customer flying any time soon, we'll dock ourselves a mark.

9.5 FOR 14

Will Dassault unveil an ultra-long-range business jet?
Unlikely, we said – underestimating a Falcon team which launched its 6,450nm (11,950km) 8X trijet.

9.5 FOR 15

Will 2014 be the year – finally – of European defence industry consolidation?
Our unequivocal "no" - or, perhaps, "non" given the inevitably French character of such a question, was correct in the most literal sense. But when Dassault Aviation, Airbus and Paris reached an accord to see Airbus begin to sell down its pointless 46% stake in Dassault, prospects brightened for a wider rationalisation of cross-shareholdings in the French aerospace sector. Call it half a point.

10 FOR 16

Are private equity investors going to run for the exits?
We actually predicted a "substantial" rise in the amount of private equity money in aerospace. That's hard to quantify, but anecdotal evidence suggests we hit the trend square-on – denied clear exit routes through the traditional channels of trade sales and initial public offerings, private equity investors appear to have not merely resigned themselves to holding companies for longer than planned, but actually to be ramping up investment.

11 FOR 17

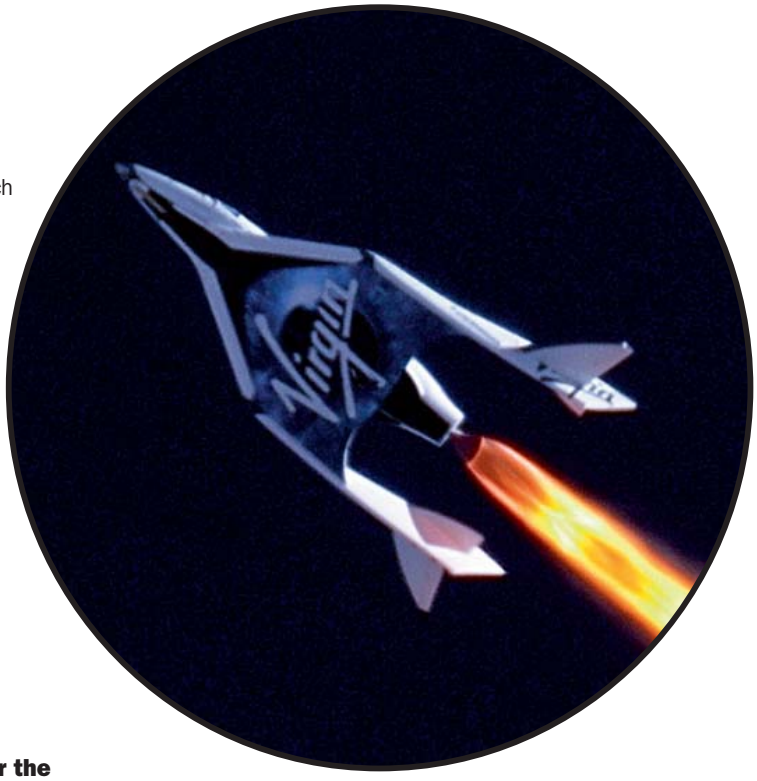
Will the industry finally do something about automation-related degradation of airline pilot skills?
Interest in and discussion of an issue that many see as a crisis waiting to happen continues, but 2014 saw no meaningful action. Sadly, we were right.

12 FOR 18

Will Embraer hit its first flight target with the KC-390?
For a planned 2014 first flight of the airlifter, we went with "should" happen. A roll-out did happen, but on the eve of the Christmas holiday break flight had proved elusive. Given our bet-hedging, call it half-right.

12.5 FOR 19

So, that puts the Flight team's crystal ball working accurately two-thirds of the time. Good? Bad? Indifferent? You tell us…



Rex Features

From yuckspeak to tales of yore, send your offcuts to murdo.morrison@flightglobal.com

Let's Improvise Acronyms Time

Chris Barnes has returned from the southern Caribbean, where he learned that local carrier LIAT – Leeward Islands Air Transport – is also known as Leave Island Any Time, "which we certainly did", and Luggage In Another Terminal, "which we were spared".

Yuckspeak #981

Two excellent examples of yuckspeak, courtesy of those habitual manglers of the English language, the US military-industrial complex.

From a KC-46A acquisition official: "We are continuing to see them (KC-46As) being challenged by their near-term schedules" = "They're late".

And: "The Marines are operationalising the Marine Air Ground Task Force Cyberspace and Electronic Warfare Coordination Cell and Raytheon is part of this forward-thinking solution to a complex problem." We think this means: "We are delivering some stuff."

On R100's trail

Almost 90 years ago, the tiny Yorkshire market town of Howden was giving birth to a new industry pioneering luxury transatlantic air travel. It was here – at the former Royal Naval Air Station – that the R100 airship was born, designed by Barnes Wallis. Now Howden is bringing that history to life with its R100 Airship Trail; bronze plaques in the town's marketplace which mark the length and features of the craft.

Rex Features

Howden: home of the airship

AirTeamImages

"Can't wait to get out of here"

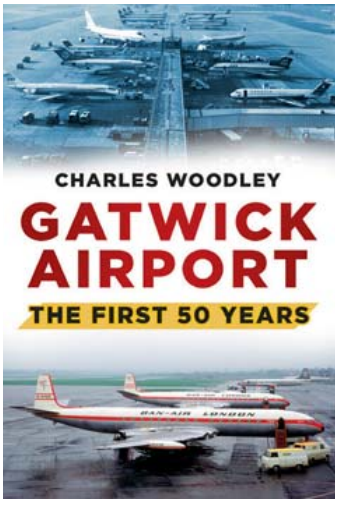
Although R100 was launched in 1929 and completed a return trip to Canada in 1930, its fate was sealed in October that year when R101, its rival in a government contest to build commercial airships to serve the empire, crashed in France on its maiden voyage to India.

The programme was subsequently cancelled and R100 never flew again.

Glory of Gatwick

Gatwick Airport, the First 50 Years by Charles Woodley (The History Press) presents a comprehensive history of the world's busiest single-runway airport. It is known for being the first to bring multiple transport links together under one roof, and the book recounts the development of not only the buildings, hangars and aprons of this innovative airport, but also the airlines that have come and gone, too.

The appendices include some very detailed information, including biographies of the long forgotten independent carriers that operated from Gatwick in the early years. A wealth of great photos, sketches and maps are also included to show how the airport grew from its beginnings just before the war to its 1980s heyday as a holiday gateway.



Caught short

100 YEARS AGO

A somewhat difficult situation arose when a bomb, which was being dropped, caught in a string, and remained suspended three or four feet below the aeroplane. There was no way of reaching the bomb, and it was impossible to land. Finally the observer kicked a hole through the floor of the fuselage, hooked the string with his foot, and shook it until the bomb fell off.

Festive failures

75 YEARS AGO

The Saturday before Christmas was a day of gloom for a considerable number of passengers who wanted to get to various neutral countries for Christmas, because fog stopped flying to Holland and Belgium so far as midday departures were concerned.

Rushing rotorcraft

50 YEARS AGO

Typical of current US developments to increase the speed capability of helicopters is the Lockheed XH-51A, powered by a Canadian PT68 turboshaft and P&W J60-P-2 auxiliary turbojet, which reached a record 242mph during November.

Alaskan ash cloud

25 YEARS AGO

A KLM Boeing 747-400 suffered a simultaneous flame-out of all four engines after flying into a cloud of volcanic ash over Alaska. The crew managed to relight two engines as the aircraft passed through 13,000ft and the other two came back on line at 6,000ft.

FLIGHT INTERNATIONAL

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UK F-35 reliance is a 'great error'

Looking through the World Air Forces directory (*Flight International*, 9-15 December) it seems as though the UK is the only country which is going to be dependent on the dubious [Lockheed Martin] F-35B.

The only other countries that also have the B on order have hedged their bets by also including the F-35A.

I think it goes without saying that our government made a very rash decision by giving away our Harriers – but have they also made a great error of judgement by banking on the F-35?

Dave Hayfield
Acol, near Manston, Kent

AIRLINE ORDERS

Why Delta opted for Airbus

Regarding your story "Boeing admits lack of slots behind big lost Delta order" (*Flight International*, 2-8 December) – are we really meant to believe that an airline would contemplate operating a large fleet of widebody aircraft that are regarded as second best for 20 to 25 years, simply because it had to wait an extra year or so for their first choice? I think not!

Airbus

Delta has ordered A330neos

Furthermore, it seems half the airline industry fail to do their economic evaluations accurately.

Whatever type Boeing offers it is always, according to Boeing, up to 5% better than its competitor. Considering that industry profit margins are in the 2% range, if this were true the industry could almost double profit margins simply by only purchasing Boeing products. Again, I find their shrill claims difficult to believe.

Isn't it about time that industry news outlets aimed to be a bit more objective in evaluating outrageous claims, and started taking them with the large pinch of salt that they deserve?

Anthony J Lawler
Sonoma, California, USA

Where Embraer?

Good article on the outlook for the narrowbody market (*Flight International*, 2-8 December), but is something missing? There is no mention of Embraer. This is a representative company in the production of single-aisle passenger aircraft.

Enrique M Bóo
London, UK

***Editor's reply**: Embraer's product range was covered in our analysis of the regional airliner market in the previous issue. We focused on widebodies in our final issue of the year.*

Rex Features

The history of aerospace inevitably includes tragic accidents

Path of progress

I am not sure of the opposite to hubris, but it seems to me there is a lack of confidence surrounding possible space tourism in general and Virgin Galactic in particular. Is a reality check in order?

I remember hearing Mike Lithgow's prototype 1-11 as it entered a deep stall and eventually pancaked brutally onto Salisbury Plain.

My father saw Mr Rolls crash.

Air France 447 has not called a halt to air transport, although it should have caused a crisis of confidence.

None of these tragic accidents called the future of aviation into question and SpaceShipTwo's equally tragic crash should and will not halt progress in reaching towards space.

It may seem brutal but the French saying "You can't make omelettes without breaking eggs" is very true.

The test pilot for reasons unknown appears to have initiated a control outside of operational parameters causing an unexpected and catastrophic response. The *why* has to be identified and an improved mechanism designed.

The path of experimental and developmental aviation has been paved with accidents. Each, despite the inevitable sadness, added to the store of knowledge just as much and sometimes more than the routine testing.

It should not be forgotten that those engaging in test flying are aware they run a certain risk and should be saluted for their courage and appropriately mourned if they pay the price.

If this single event were to cause even a pause in aerospace development it would be both a tragic waste of effort and a condemnation of humanity's supposed pioneering instinct.

Richard Chandless
Crêches sur Saône, France

How very British

Tom Sheppard's quote of an engineer's response to reports of poor braking during the landing of a Beverley (*Flight International*, 9-15 December) demonstrates a peculiarly British assumption. Why was it assumed or inferred – and perhaps it still is – that maintenance engineers are inarticulate oiks?

Christian Hollyer
Apteros, Milford Haven, UK

EVENTS

1-3 February
Routes Americas
Denver, Colorado
routesonline.com

8-10 February
Abu Dhabi Air Expo
Al Bateen Executive airport, UAE
abudhabiairexpo.com

16-18 February
Loyalty conference
Istanbul, Turkey
flightglobalevents.com/Loyalty2015

18-22 February
Aero India
Air Force Station Yelahanka, Bengaluru
aeroindia.in

24 February - 1 March
Avalon Airshow
Geelong, Australia
airshow.com.au

17-20 March
Asian Ground Handling International Conference
Conrad Hotel, Macao
groundhandling.com

23-24 March
Operating Lease Masterclass
Park Plaza County Hall Hotel, London
everestevents.co.uk/events

25 March
European Corporate Aviation Summit
The Broadgate Tower, London
aeropodium.com

20-23 April
AeroDef Manufacturing
Hilton Anatole, Dallas
aerodefevent.com

29-30 April
Loyalty@Freddie Awards
Atlanta, USA
flightglobalevents.com/loyaltyfreddies2015

4-7 May
AUVSI's Unmanned Systems
Atlanta, USA
auvsishow.org

10-11 May
Aviation Africa
Dubai, UAE
aviationafrica.aero

19-21 May
EBACE
Geneva, Switzerland
ebace.aero/2015

26-28 May
AP&M Europe
Olympia London, UK
apmexpo.com

31 May - 3 June
1st International Symposium on Sustainable Aviation (ISSA)
Istanbul, Turkey
issasci.org

4-6 June
France Air Expo
Lyon-Bron airport, France
franceairexpo.com

15-21 June
Paris Air Show
Le Bourget, Paris
siae.fr

For a full list of events see **flightglobal.com/events**

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Candidates shall meet the following requirements:

PILOT IN COMMAND

- A320 type rated and currently flying the A320;
- Minimum 4000 hours total time;
- Minimum 1000 Command hours on A320;
- FAA/EASA ATPL;
- Class 1 medical;
- English ICAO level 4;
- Dominican Republic Citizenship or Residency is preferred.

FIRST OFFICER

- A320 type rated and currently flying the A320;
- Minimum 1500 hours total time;
- Minimum 500 hours on A320;
- FAA/EASA ATPL;
- Class 1 medical;
- English ICAO level 4;
- Dominican Republic Citizenship or Residency is preferred.

Please apply online at http://www.tailwindcrew.com/pages/jobs/

CATHAY PACIFIC

Operations Training Specialist

Department: Flight Operations

Reports to: Technical Training Manager

Cathay Pacific Flight Operations Technical Training School (TTS) based in Hong Kong, provides training to the highest standards for both Cathay Pacific Flight Crew and Cathay Pacific Line Maintenance Engineers. TTS holds both HKAR 147 and EASA 147 type rating approvals.

We are seeking Airframe/Engine Technical Instructors with a keen commitment to providing training to the highest standards.

Key Responsibilities:

As an Instructor you will be part of a team of instructors that provides Classroom and Fixed Base Simulator Training for Flight Crew and Classroom and Practical Training for Line Maintenance Engineers. Being an integral part of the instructional expertise within TTS, you will also assist in developing and maintaining these essential training programmes to the standards required by the Hong Kong CAD and EASA.

Requirements:

- Excellent English language communication and presentation skills are a must.
- Must be able to demonstrate knowledge of aircraft systems and maintenance practices.
- Experienced with Windows based presentation and word applications.
- Formal instructor qualification or other recognised instructional training and experience is highly desirable.
- Part-66 B1.1 (or equivalent) Aircraft Maintenance Licence is desirable but not a pre-requisite.
- Three (3) to five (5) years work experience (Line and/or Base maintenance) on wide bodied commercial aircraft like the B777 and A330 is desirable but not a pre-requisite.

Cathay Pacific is an Equal Opportunities Employer. Personal data provided by job applicants will be used strictly in accordance with our personal data policy and for recruitment purposes only. Candidates not notified within eight weeks may consider their application unsuccessful. All related information will be kept in our file for up to 24 months. A copy of our Personal Information Collection Statement will be provided upon request by contacting our Data Protection Officer.

http://careers.cathaypacific.com

Charles Taylor

Charles Taylor Adjusting – Aviation provides a wide range of claims, technical and consultancy expertise to aviation insurers and their clients worldwide. Due to continued growth and demand for our services, we invite applicants with either previous adjusting experience and/or comprehensive Aerospace engineering experience to apply for the following positions:

Aviation Insurance Surveyors
London and Dubai

Applicants will have a strong Aerospace engineering background with technical and management experience of aircraft maintenance, structural repairs and aircraft inspection on large commercial, business or general aviation aircraft, ideally including helicopters. The holder of an EASA (or equivalent) aircraft maintenance engineers licence, with proven experience would be preferred. In addition, Pilot experience would also be useful, but is not essential.

The Surveyor role involves considerable client liaison, demands first class communication skills and a confident personality. Fluency in written English is essential for the preparation of both technical and non-technical reports. Also, the ability to speak a second language would be useful, as would overseas work experience.

Previous adjusting experience is desirable, although not essential. Extensive training will be provided to applicants new to the industry, in order to assist their development in this challenging and rewarding occupation.

You will be based either in London or Dubai and must also be prepared to travel overseas, often at short notice. The ability to work both as part of a team and independently is essential.

For these positions we offer a competitive salary and benefits package, which will be linked to the technical qualifications and experience of the applicants.

To apply for a position, please email your CV and covering letter, together with your current salary to recruitment@ctplc.com. Closing date for applications is 26th January 2015.

AVION EXPRESS

Avion Express is recruiting Airbus A320 pilots for ACMI operations in European and Caribbean bases.

Candidates shall meet the following requirements:

TYPE RATING EXAMINER

- A320 type rated and currently flying the A320;
- Type rating examiner qualification and experience;
- Minimum 4000 hours total time ;
- Minimum 1000 Command hours on A320;
- EASA/JAR-FCL-ATPL;
- Class 1 medical;
- English ICAO level 4;
- Right to live and work in EU.

PILOT IN COMMAND

- A320 type rated and currently flying the A320;
- Minimum 4000 hours total time;
- Minimum 500 Command hours on A320;
- EASA/JAR-FCL- ATPL;
- Class 1 medical;
- English ICAO level 4;
- Right to live and work in EU.

FIRST OFFICER

- A320 type rated and currently flying the A320;
- Minimum 1500 hours total time;
- Minimum 500 hours on A320;
- EASA/JAR-FCL-ATPL / ATPL frozen;
- Class 1 medical;
- English ICAO level 4;
- Right to live and work in EU.

Please apply online at http://www.flyavex.com/career-opportunities

Join Our Growing Team

A VVIP airline based in Qatar is looking for highly qualified and motivated individuals to be part of the team.

Handling Co-ordinator (Load Master)

Weight & balance qualified, preferably licensed
Practical manual handling/loading experience of both commercial and freighter (preferable) operations to IATA operational standards
Pushback – Headset – Marshalling – Deck Loader – Manual Loading – De-icing (preferable) practical experience alongside the operating of all other basic GSE to service aircraft
Awareness of Ramp Safety to current IATA standards
Qualifications and practical experience in the handling and loading of Dangerous Goods
2 years minimum in a loadmaster/Load controller position
Plus 3 years minimum Ground Handling experience

Basic Requirements:

- Team and Service Orientated
- Social Competence in a multicultural environment
- Effective communication skills to organise and accomplish planning and implementation of goals
- Flexibility and creativity
- Leadership skills combined with the ability to work on own initiative
- Experience of working in fast paced high stress environment
- Computer literate (MS word, excel, outlook etc)

Applicants who have previously worked or held this position and have at least 5 years of airline experience, possess high school education and can speak fluent English and Arabic (optional) may apply.

Flight Operations Engineer

The Flight Operations Engineer ensures that all work is performed in compliance with QCAA regulations and all other applicable standards (safety, industrial and VVIP operational). He/she prepares and administers LPC NG and OPT performance packages, acts as focal point for aircraft performance analysis, assessment and reporting. Assists in Flight Ops Engineering projects and provides technical input to operational documentation (OM, MEL, FCOM, etc). Tracks and monitors ADs / SBs / EOs and disseminates information to Ops Technical, Flight Support and planning engineers.

Qualification/Experience

- Bachelor of Science in Aeronautical Engineering or a related field
- Five (5) years experience in airline flight operations
- Experience in using OEM flight ops engineering programs, utilities and toolsets
- Proficiency in MS Office products, data analysis and good programming skills

Skills

- Excellent standard of English language
- Motivated, self-starter and team player
- Social competence in multi-cultural environment
- Excellent communication skills

Crew Planning Officer

Reporting to the Head of Crew Services. Crew Services Department is responsible for ensuring all Flights are assigned with correct crew compliment, compliant with QCAA and Company Regulations.
Working as part of a Team on a shift basis often in a dynamic and challenging environment associated with a non scheduled VVIP Operation. It's expected that suitable candidates will possess demonstrated competencies such as initiative, flexibility and strong decision making along with excellent interpersonal skills in a multi-cultural environment. Ideal candidates should have previous Scheduling/Planning experience on the Industry standard systems such as AIMS/SITA (Crew Watch).

Qualification/Experience

- High School/College
- Previous Airline experience
- Ideally from VIP/Unscheduled Operator
- Sub Part Q Flight Time Limitation knowledge
- Crew training and licensing knowledge
- Computer Literate ideally with industry standard scheduling software

Skills

- Planning and Organizing
- Time Management
- Social Competence
- Strong Communication Skills
- Team Orientation
- Ability to work under pressure

Applicants may apply to: farecruitments5@gmail.com

Saftey Analyst

The Safety Analyst is a flight safety specialist who reports to Manager Safety and supports the Safety Management System with the following duties:

- collating safety, incident and accident reports and collecting safety data
- tracking and trending of FDM/FOQA data
- disseminating reports for investigative action by process owners and line managers
- conducting incident investigations and participating in accident investigations
- assessing and categorizing risks
- analyzing safety trends throughout the organization
- reporting to regulatory authorities as required
- reviewing closing action
- providing ASR, FDM and other safety data analysis to Safety Action Groups and Safety Review Board
- providing safety training to all staff
- preparing revisions to manuals (SMS, Flight Safety, ERP, OM-A)
- maintaining records for internal and external audits
- maintaining and exercising the Emergency Response Plan
- representing the company at industry meetings

Qualification/Experience

- Tertiary education, preferably with technical emphasis
- Qualification in SMS and/or core safety disciplines such as risk assessment, incident and accident investigation, FRMS, Flight Data monitoring, Emergency Response, Quality Assurance/auditing
- Aviation experience (preferably within a Flight Safety Department) is required

Skills

- Proficiency in MS Office, data analysis and good programming skills
- Excellent team orientation skills
- Numeracy, critical thinking and communication skills
- Organizational skills
- Fluent business English proficiency (oral/written)

Air Worthiness Engineer

Will be responsible for monitoring the Continuing Airworthiness Management Organisation (CAMO) in accordance with QCAR Part M, Subpart G and Subpart I with regard to the extension and renewal of aircraft, Airworthiness Review Certificates (ARCs).
He/she will be responsible to the management of the organization in providing Technical Engineering and Continuing Airworthiness Management functions from the following viewpoints:

- Regulatory Compliance
- Airworthiness and Safety
- Efficiency and Product Quality/Reliability
- Cost of ownership
- Individual ownership of performance

Basic Requirements:

1. The development and establishment of the Airworthiness Review Certificate (ARC) extension and renewal policy and procedures in accordance with QCAR Part M, Subpart G and Subpart I requirements.
2. To ensure that aircraft Certificates of Airworthiness (C of A) remain valid by carrying out the annual review of aircraft for the extension or renewal (as required) of the ARC.
3. Continuous monitoring of airworthiness regulatory requirements for changes or amendments to policy or requirements.
4. Review and implementation, as appropriate, of any additional QCAA Airworthiness requirements.
5. As required, conduct planned and ad-hoc internal and external audits of maintenance related activities of the organisation and provide written reports.
6. Assisting with the amendment and control of the Maintenance Organization Exposition (MOE) and Continued Airworthiness Management Exposition (CAME).
7. Assist in the application for any Permits to Fly that may be required.

Qualification/Experience

- School
- Apprenticeship in Technical Profession or B.Sc. degree in Aeronautical Engineering discipline
- 8-12 years as a B1, B2 or C Licensed Aircraft
- Engineer (ICAO Annex 1 license) or an
- Aeronautical degree
- 5 years in a continuing airworthiness and quality
- assurance/auditing role
- Comprehensive aviation knowledge
- Familiarisation with EASA / ICAO regulations

Flight crew

Flight crew

Maintenance

Maintenance

Engineering

WORK EXPERIENCE GREG MARSHALL

Marshalling the safety of the skies

Greg Marshall has come a long way since his days as an apprentice avionics technician and now keeps the pulse of safety culture from Alexandria, Virginia, as vice-president of global programmes for Flight Safety Foundation

What was your first aviation job?
I first started in aviation back in 1974 as an apprentice avionics technician for a company in Australia called AWA. They were contracted to provide avionics support for Trans-Australia Airlines (now a part of Qantas) and Ansett Airlines of Australia (no longer in existence) under what was then known as a pool arrangement, where avionics equipment was shared across the entities. I worked out of their avionics workshop opposite Essendon airport, with some stints at Melbourne airport.

When did you join Flight Safety Foundation?
I joined the foundation in February 2011 as managing director of the then newly introduced Basic Aviation Risk Standard (BARS). This programme is managed from the foundation's regional office in Melbourne and established a common global aviation standard that could be used by onshore resources companies to assess contracted aircraft operators against.

You moved to Virginia in September?
I have recently been appointed to the position of vice-president of global programmes for FSF. The portfolio of this position includes the full range of safety initiatives and activities in which the foundation is involved.

We are about to embark on a programme designed to identify the scope of safety-related data: who has it and how it is managed. This will then lead to discussions relating to the capture and de-identification of this data for the purpose of examining it in a consolidated manner, which would have significant benefits regionally and globally.

I also retain oversight responsibilities for the BARS programme, which continues to grow and is now being used by organisations outside of the resource sector that use outsourced aviation to support their activities in remote and challenging environments.

What are the foundation's goals?
As a truly independent, impartial and international organisation, FSF's mission is to be the leading voice in safety for the global aviation community. It does this in a number of ways including, but not limited to: representing the industry at senior levels within government and other industry forums; developing global solutions to key aviation challenges; being the forceful "just culture" advocate for the global aviation community; bringing members of the aviation community together by facilitating safety forums and seminars on key issues involving aviation safety; and representing the global aviation community on safety matters for news and industry media.

You chart courses for regulation?
I was fortunate to have come from a large aircraft operator that was a very early adopter of safety management principles – certainly well before it was legislated or defined as it is today. The

Flight Safety Foundation

Marshall continues to oversee the BARS programme in his role at FSF

rollout of safety management systems (SMSs) across the global aviation community is taking time, and while some countries and their operators are very advanced in the process, others are lagging quite significantly. The main challenge with an SMS is not so much in its adoption in terms of a philosophy and a process; it is with its integration throughout the organisation. While some aircraft operators and airlines have achieved significant strides in this area, the true model of a completely integrated system is rare. It often requires what is seen as a significant cultural shift throughout the various layers of the organisation for implementation to succeed. Organisations that are geographically diverse with many different workforces are particularly challenged in this regard.

So support isn't universal?
As a general rule, everyone is very positive and supportive of safety programmes and initiatives; however, there are some parts of the world where the "just culture" concept is lagging. I see this as one of the great challenges of the future because without it, our ability to adopt and integrate a safety culture at all levels of the organisation is compromised. In a similar manner, our ability to collect truly objective and highly beneficial safety data is questionable. In general terms, we are all seeking the one common goal of improving aviation safety; however, it is clear that different regions and sectors of the aviation community are at varying phases of this journey.

Can aviators ever rest easy?
I think that maintaining a true sense of "chronic unease" with respect to safety is a healthy perspective for any company to have. But it is only truly effective if this sense is felt at all levels of the organisation, irrespective of an individual's role or activity. While this attitude has to start at the executive level, it is irrelevant if it remains at that level and undesired attitudes and behaviours are allowed to exist elsewhere. ■

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Flightglobal

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21st – 22nd April 2015, London, UK

Are you a key player in the maintenance, repair and overhaul market? If so, you should be a part of the inaugural Flightglobal MRO strategy conference.

KEY QUESTIONS TO BE ADDRESSED:

- Should carriers with existing MRO facilities stay in the game?
- Should airlines without them invest in new facilities, staff and training?
- Can your MRO services really become a sustainable profit generating arm of your business long term?
- Who should you be working in partnership with? Who should you be pooling resources with?
- If outsourcing is the right strategy, who should you outsource to? Are independent MROs really up to the task? How are they responding to changing market conditions?
- To what extent will IP restrictions force carriers to use OEMs? What negotiating power do you really have?

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