

# Flight International

14-20 February 2017

flightglobal.com

## Funding fight

Ottawa adding state support for Bombardier projects, as Brazil takes its case to WTO **7**

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## AIRLINES

# Cold shoulder


Ryanair freezes UK expansion over Brexit



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## Flight International



### COVER IMAGE

Maciej Ramos captured this seasonal shot of a Ryanair 737-800 during de-icing at Warsaw's Chopin airport in early January. The carrier is facing a profit freeze **P9**



### BEHIND THE HEADLINES

Craig Hoyle (pictured) was calm in the cockpit after attending British Airways' Flying with Confidence course at London Gatwick (P30). And at the A4E event in Brussels, Oliver Clark got an IAG update (P8)



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We celebrate the A320, some 30 years after its first flight. Plus, an Australian overview ahead of Avalon

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Supplier suggests 747 production could end by 2019 **P10**. A-10 to fly on for at least five more years **P17**



Boeing US Air Force



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## Image of the week

KLM Cityhopper resumed services to London City airport from Amsterdam Schiphol after an eight-year absence on 6 February. Its frequency will increase to four daily flights from 26 March. Flight Fleets Analyzer shows the carrier's 80-seat Fokker 70 PH-KZK is almost 20 years old

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KLM Cityhopper

## The week in numbers

# 90%

Flight Dashboard

Proportion of Ryanair delays attributed to air traffic control issues, according to chief executive Michael O'Leary

# \$50<sub>bn</sub>

Flight Dashboard

Amount received by three Gulf airlines in state subsidies, say US airline bosses, who want President Trump to take action

# 143

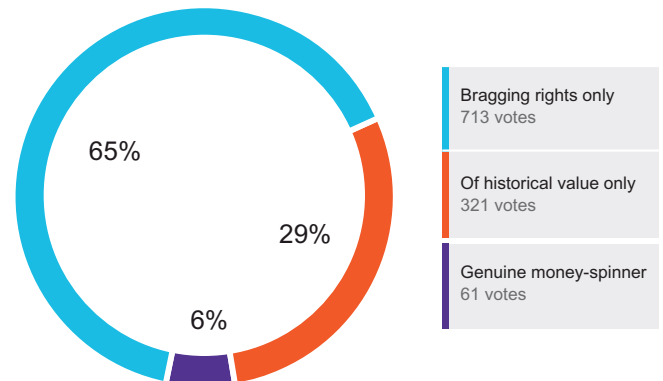
Flight Dashboard

Number of units delivered by Russia's United Aircraft last year; a slight reduction, blamed on a fall in military volumes

## Question of the week

Last week, we asked: **737 Max launch user wrangling?**  
You said:

**Total votes: 1,095**



This week, we ask: **Which giant will end production first?**

☐ Airbus A380 ☐ Boeing 747

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# Bailing Bombardier

The airframer's latest taxpayer cash injection is likely to provoke a dispute with Brazil that could last years. It is unclear whether it will be enough to save the CSeries and the company

**B**ombardier has picked up another C\$372.5 million (\$282 million) from Canadian taxpayers to repair a fractured balance sheet as it enters the most difficult phase of a multi-year financial rebuilding campaign.

After enduring a two-and-a-half-year delay with the CSeries and two-year lag on the Global 7000, the company now faces the existential challenge of ramping up deliveries of a loss-making commercial aircraft that is not expected to enter the black until 2020 at least.

At the same time, its sales team has to persuade new customers to pay a price that yields a profit. After booking a \$500 million provision in 2016 to cover losses on sales to Air Baltic, Air Canada and Delta Air Lines, that particular feat remains elusive – despite the type's undisputed fuel efficiency advantage in the 125-150-seat segment and class-leading flight control and materials technologies. So far, airlines haven't been convinced.

## If Bombardier survives on 28.2% of the amount it requested, so much the better for all involved

So the Montreal-based airframer needs all the financial help it can get, and Canadians have obliged. In addition to contributing \$350 million in repayable contributions from the federal government to launch the CSeries in 2005, the Quebec provincial administration in 2016 invested \$1.5 billion in Bombardier's rail division and another \$1 billion in a joint venture with the company to manage the CSeries programme.

The question now is if that is enough. Until a few months ago, Bombardier had called on Ottawa to become an equal partner with Quebec in the CSeries



How much more do you need?

joint venture, implying a \$1 billion commitment. Notably, the Trudeau government's final offer – \$282 million – falls far short. Moreover, the majority of the central government's repayable contributions will be devoted to supporting development of the Global 7000, leaving only a minor share to help get the CSeries through a production ramp-up over the next four years.

Perhaps this is good news for Bombardier. If the company can survive on 28.2% of the amount it requested from Ottawa, so much the better for all involved. The government's contribution also appears to come without any strings, such as demands to reorganise the company's ownership structure to disempower members of the Beaudoin and Bombardier families.

The full costs of Bombardier's financial rescue are still to be counted. The formal launch of Brazil's case against the bail-out in the World Trade Organization began on 7 February, and that is likely to trigger a multi-year dispute that will scrutinise Brazil's support for Embraer as much as Bombardier's backing from Canada. ■

**See This Week P7**

## Past glories

**N**ot long ago it was the future. Now the A380 is officially a museum piece. Two flight test examples of the world's biggest airliner are set to spend the rest of their lives in heritage centres in Paris and Toulouse.

To be fair to the slow-selling superjumbo, lots of other types end up as dusty exhibits while still in the full flush of production – in February, curators also got their hands on the A320 testbed.

But the fate of the early A380s – just 12 years after they left the factory – symbolises perhaps the failure of a staggeringly ambitious project. Like its museum-mate Concorde, the twin-deck airliner exemplified European aerospace ingenuity, but it has struggled to find a mass market beyond its one true believer, Emirates.

When it comes to the latest version of the original jumbo, prospects too may be bleak, with rumours that Boeing is preparing to wind-up 747-8 production.

For Seattle, the survival of its largest airliner matters less. After leading a long-haul travel revolution, 747s have been museum fixtures for years. The 747-8 was simply an effort by Boeing to extend the life of one of the most successful aircraft designs of all time.

For the A380, the next three years are crucial. Unless Airbus can somehow persuade so-far sceptical blue-chip airlines that the superjumbo is a truly transformative type, it will not just be two test aircraft preserved for posterity. The whole programme will be history. ■

**See Air Transport P10 & P11**



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# BRIEFING

## AIRBUS STRATEGY CHIEF LAHOUD TO LEAVE

**MANAGEMENT** Veteran Airbus chief strategist Marwan Lahoud – an architect of the European consolidation that led to EADS in 2000 – has resigned. Lahoud left Lebanon for France in 1982 to escape the civil war. He was the head of mergers and acquisitions for Aérospatiale Matra when EADS was formed, and chief executive of missile house MBDA in 2003, aged just 36. He became EADS' chief strategy and marketing officer in 2007, where he led the failed bid to acquire BAE Systems.

## ICELANDAIR EYES MAX OPPORTUNITIES

**ROUTES** Icelandair has indicated potential routes for its Boeing 737 Max jets, which it expects to start deploying commercially in the second quarter of 2018. The airline will introduce three of its nine Max 8s next year, and start supplementing them with Max 9s in 2019. The type could support year-round services to Bergen, Billund and Geneva on its European network, as well as Halifax, Minneapolis and Newark in North America.

## NO INDONESIAN WELCOME FOR VIP ARRIVAL

**ROTORCRAFT** Confusion surrounds the reported delivery of a VIP-roled Leonardo Helicopters AgustaWestland AW101 to the Indonesian air force on 15 January. Originally built for India, it is one of three aircraft ordered by the service in late 2015 in a deal which was subsequently overturned by Indonesian president Joko Widodo. Jakarta says it has launched an investigation.

## THIRD A350-1000 BEGINS FLIGHT TESTING

**WIDEBODY** Airbus has flown its third A350-1000 within three months of the type's maiden sortie, with MSN65 taking off from Toulouse on 7 February. The first Rolls-Royce Trent XWB-97-powered -1000 in the flight test programme will be dedicated to interior testing. It follows the second, MSN71, assigned to testing landing gear, high-altitude performance and extreme-temperature exposure. The first aircraft, MSN59, launched the 500h flight test programme on 24 November 2016.

## RUSSIA GROUNDS PAIR OVER FAULTY AN-24

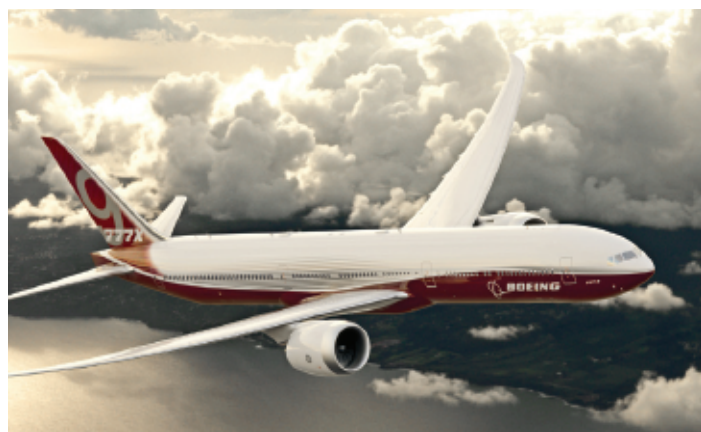
**SAFETY** Russian authorities have grounded Buryat Airlines and Pioneer Regional Airlines for safety violations. Rosaviatsia says Buryat flew an Antonov An-24 whose engine-life approvals had expired, while Pioneer flew aircraft not listed in its air operator's certificate – including the same An-24 used by Buryat.

## LIGHTNING TO STRIKE TWICE AT AVALON

**DEBUT** Lockheed Martin's F-35 will make its debut regional appearance at Air Show Australia at Avalon in late February. Two F-35As will be flown from the USA, according to the event's organiser. Canberra has committed to buying 72 Lightning IIs – two of which are in use at Luke AFB, Arizona – but could eventually acquire up to 100.

## DISTURBED START FOR SERENE AIR

**MISHAP** Pakistani start-up carrier Serene Air suffered a setback just days after commencing services from Islamabad on 29 January, with one of its Boeing 737-800s having been involved in a ground collision with a ramp vehicle. Flight Fleets Analyzer records aircraft AP-BNA as being less than three months old, having been delivered in November 2016.



Boeing has been waiting since June 2015 for new sale of twinjet

**FLEET** AARON CHONG SINGAPORE

# SIA looks to widen its prospects with 777-9 commitment

Airline says combined letter of intent, which also includes more 787-10s, shows its intent to develop Singapore hub

Singapore Airlines (SIA) is set to place a firm order for 20 Boeing 777-9s and 19 more 787-10s, after agreeing a letter of intent with the manufacturer.

The airline has confirmed the deal, which is valued at \$13.8 billion and also includes six options for each of the types. If exercised, these would bring its total order to as many as 51 aircraft.

SIA's 787-10s will start arriving in 2020, and it retains an option to substitute some of its -10 commitments for other variants of the Dreamliner family.

The carrier says its GE Aviation GE9X-powered 777-9s will follow from 2021 primarily for use long-haul, while the 787-10s will be operated on medium-range routes. It has chosen the Rolls-Royce Trent 1000 to power the latter type.

"Today's major order for wide-body aircraft enables us to continue operating a modern and fuel-efficient fleet, providing the SIA group with additional expansion opportunities to ensure that we retain our industry leading position," SIA chief executive Goh Choon Phong said on 9 Feb-

ruary. "This order is also another demonstration of our commitment to further growing the Singapore hub, as we will be able to offer even more travel options for our customers."

SIA was already a launch customer for the 787-10, having placed an initial order in 2013 for 30 examples due for delivery from 2018.

Flight Fleets Analyzer shows that the carrier operates a fleet of 109 aircraft, including 10 Airbus A350-900s. It has another 57 of that type on order, with the option of converting some to the larger -1000 variant.

SIA's tentative agreement comes as Boeing waits to record its first firm deal for the 777X in 20 months, after Qatar Airways and an undisclosed customer each signed for 10 in June 2015. Qatar had been among the initial customers for the twinjet, having agreed a year earlier to take 50.

With 150 on order, Emirates remains by far the largest customer for the new widebody from a total order book for 306. ■

**Additional reporting by David Kaminski-Morrow in London**





Leonardo opts to fly solo in pursuit of T-X award  
This Week P8

INVESTMENT JON HEMMERDINGER BOSTON

# Bombardier boosted by Ottawa funds

"Repayable contribution" from Canadian federal government to be invested in development of CSeries and Global 7000

Canada's federal government will provide Bombardier with C\$372.5 million (\$282 million) over four years to help fund the development of its CSeries airliner and Global 7000 business jet.

The "repayable contribution", announced by Ottawa on 8 February, is considerably less than the \$1 billion investment that Bombardier had sought to help fund its costly development projects.

The latest cash injection follows an earlier investment of \$1 billion in the CSeries by Quebec's provincial government, and a \$1.5 billion investment by Canadian pension fund CPDQ in Bombardier's rail division. Canada's federal government also provided \$350 million in repayable contributions to Bombardier in 2005 to launch the CSeries project.

"This initiative will fund research and development for the new Global 7000 business jet and ongoing activities related to the development of the company's CSeries aircraft," says the Innovation, Science and Economic Development Canada agency.

Still subject to final agreements, the C\$372.5 million will be paid "over four years, in a number of instalments", the government says. It adds that the "majority" of the sum will be allocated to the Global 7000 through a partnership

called the Strategic Aerospace and Defence Initiative. The ultra-long-range business jet is due to enter service in the second half of 2018.

Ottawa says the investment will be made through the "government's existing contribution agreements with Bombardier".

"The repayable contributions will help to ensure that Canada remains at the centre of Bombardier's research and development activities," says company chief executive Alain Bellemare.

Flight Fleets Analyzer shows Bombardier has delivered seven examples of the CSeries, with Swiss operating five CS100s and Air Baltic two CS300s. ■

See Business Aviation P21



Launch operator Swiss has so far received five CS100s from Canada

DISPUTE STEPHEN TRIMBLE WASHINGTON DC

## Brazilian officials take Embraer's subsidy allegations to WTO

The day after Bombardier received a \$282 million cash injection from the Canadian government, Brazilian trade officials, with the support of Embraer, requested consultations with their Canadian counterparts in the World Trade Organization over alleged subsidies for the CSeries programme.

Brazil said two months ago that it would challenge what it considers \$4 billion in illegal subsidies

from the Canadian government to Bombardier's flagship airliner programme. São José dos Campos-based Embraer competes in the same market segment as the CSeries family with its E195 and next-generation E195-E2.

"Subsidies... from the Canadian government have not only been fundamental in the development and survival of the CSeries programme, but have also allowed Bombardier to offer

its aircraft at artificially low prices," says Embraer chief executive Paulo Cesar Silva.

Bombardier launched the CSeries programme in 2005 with a commitment from the Canadian government to invest \$350 million. By the time its CS100 entered service in 2016 the provincial government of Quebec had further shored up the company's depleted balance sheet with \$2.5 billion in cash injections. ■



UNMANNED SYSTEMS

## Aero India debut for new-look Heron

Israel Aerospace Industries (IAI) will give a show debut to a new export version of its Heron TP medium-altitude, long-endurance unmanned air vehicle at the 14-18 February Aero India event in Bengaluru. Adapted from the baseline Heron TP, the XP model has been designed to comply with restrictions imposed by the international missile technology control regime 2 agreement. IAI says the new Heron TP-XP is "a multi-mission, multi-payload strategic aircraft" capable of operating in extreme weather conditions. The company, which has previously supplied the Indian armed forces with its smaller Heron 1 UAV, says it hopes to "further strengthen and deepen" its relationship with local partners under the terms of New Delhi's "Make in India" procurement policy.



REQUIREMENT STEPHEN TRIMBLE WASHINGTON DC

# Leonardo opts to fly solo in pursuit of T-X award



Updated version  
of M-346 will be  
offered to USAF

Leonardo

Leonardo has decided to compete for the US Air Force's \$16 billion T-X trainer contract, despite the withdrawal last month of Raytheon as its US partner and prime contractor. Its decision creates at least a three-way competition to replace the Northrop T-38C with 350 new aircraft and training systems, with Boeing/Saab offering a clean-sheet design named T-X and Lockheed Martin and Korea Aerospace Industries proposing a slightly modified T-50A.

The Italian company's US-

based subsidiary, Leonardo DRS, will serve as prime contractor for a bid based on the T-100; a slightly modified variant of the Aeromacchi M-346.

The T-100 offers a "mature, readily available and technologically advanced solution that will also have a significant economic impact in the US", says Bill Lynn, chief executive of Leonardo DRS.

Leonardo has not disclosed where final assembly of the T-100 would be performed. Raytheon had said the type would be built in Meridian, Mississippi. ■

PROCUREMENT  
STEPHEN TRIMBLE  
WASHINGTON DC

## Lockheed says F-35 might not hit \$85m target

The F-35 will miss its \$85 million price target in three years unless the US Department of Defense invokes a package of special acquisition measures, Lockheed Martin chief financial officer Bruce Tanner has warned.

Speaking at the Cowen Aerospace/Defense and Industrials Conference in New York on 8 February, Tanner said the \$85 million price target for an F-35A – including its Pratt & Whitney F135 engine – would be impossible to achieve in the absence of another round of Blueprint for Affordability cost reductions in the manufacturing system, a block buy deal or an increase in the quantity purchased.

"One or a combination of those are required," he says.

Tanner's remarks came less than a week after the F-35 programme announced a preliminary agreement on the tenth lot of low-rate initial production. On 3 February, the White House said a "handshake" deal with Lockheed would save \$728 million across 90 aircraft. ■

See Defence P17

COMPETITION OLIVER CLARK BRUSSELS

## IAG sees 'significant' future in low-cost, long-haul flights

Barcelona the right place to start, Walsh says, and group could create new airline brand

Long-haul, low-cost flights will become a "significant part of IAG", with budget flights from Barcelona just the start of the airline group's ambitions, its chief executive Willie Walsh says.

Speaking at the Airlines for Europe (A4E) conference in Brussels on 8 February, Walsh said that "without question, in due course" IAG would seek to roll out long-haul, low-cost operations at other locations in Europe. "You've got to start somewhere and we think Barcelona is the right place to start," he says.

Late last year IAG disclosed plans to establish a new airline linked to the low-cost carrier Vueling at Barcelona El Prat airport. This would open long-haul operations in June, potentially serving destinations in North and South America, as well as Asia.

Walsh says tickets for the low-cost, long-haul service will go on sale "very soon", but the airline group is yet to decide whether it will start a brand new airline to operate them, or use an existing member of IAG.

He indicates that Vueling will not be the operator. "Vueling will feed the operation at Barcelona, but my view is that it's not appropriate for Vueling to do that [long-haul] operation," he says.

While not ruling out Aer Lingus, he notes that while it has a strong brand in Ireland and the USA, "it wouldn't necessarily work in Barcelona".

Walsh confirms that new Airbus A330s will be used for the

service. "We had options. These are aircraft that were available to us through the deals we have with Airbus and we are just taking them earlier than we had planned," he says.

Asked if it is a coincidence that Norwegian is also planning to start long-haul flights from Barcelona this year, Walsh says IAG had previously said it "would respond in a competitive way". ■

See News Focus P15



Aer Lingus

Aer Lingus "wouldn't necessarily work" as the new service operator





Boeing 'in talks' to end 747 production  
Air Transport P10

RESULTS DAVID KAMINSKI-MORROW LONDON

# Ryanair feels impact of Brexit instability

Carrier expects uncertainty over UK's relationship with EU to slow growth, and is prepared to shift capacity elsewhere

**I**rish budget carrier Ryanair says it expects its business in the UK to slow as the country heads towards a formal withdrawal from the EU, while disclosing a marked fall in its third-quarter profit for 2016.

The carrier says there is still "significant uncertainty" regarding the eventual relationship between the UK and the EU, particularly given the signals that the UK is preparing for a complete separation, rather than an agreement retaining certain market-access rights.

Such uncertainty will "continue to represent a challenge for our business" over 2017-2018, Ryanair says in a third-quarter financial statement, adding that it expects the UK's currency to "remain volatile for some time".

"We may see a slowdown in economic growth in both the UK and Europe as we move closer to [the UK's exit]," it adds. "While there may be opportunities to expand at certain UK airports... we expect to grow at a slower pace than previously planned in the UK."

Ryanair says it will continue to shift capacity to other markets in Europe if opportunities for UK expansion diminish.

"We hope that the UK remains



While yields fell in the third quarter, overall load factor rose to 95%

**"We expect to grow at a slower pace than previously planned in the UK"**

Ryanair

a member of Europe's 'open skies' system," it says. "Until the final outcome is known, however, we will continue to adapt to changing circumstances in the best interest of our customers, people and shareholders."

On 6 February the carrier revealed an 8% fall in its third-quarter after-tax profit for 2016, to €95 million (\$101 million).

Ryanair says the decline in the three months to 31 December followed a 17% fall in average fares. Revenues increased by only 1%, to just over €1.3 billion.

Chief executive Michael O'Leary says the decline in yields has been "exacerbated" by the drop in the value of sterling following last June's Brexit referendum result. However, as fares fell, the airline's load factor rose to 95% over the quarter.

The carrier is also expecting a sharp decline in fourth-quarter yields, partly because the 2017 Easter holiday falls outside of the financial year, but is maintaining a full-year forecast of a €1.3-1.35 billion profit.

Meanwhile, Ryanair finance chief Neil Sorahan says he expects Lufthansa's wet-lease deal with Air Berlin to be investigated by the EU on competition grounds, despite its recent approval by German regulators.

Speaking to FlightGlobal, Sorahan says that while the "so-called ACMI transaction" has secured German approval, "other parties" would want to look at the agreement in more detail. He describes the arrangement under which Air Berlin will lease 38 aircraft to Lufthansa as a "good old-fashioned merger [that] falls under competition rules both in the EU and in Germany".

"I appreciate that they have called it something else, but when you look at it on its own it absolutely is a merger. It would be unusual for somebody to go out and wet-lease as many aircraft at one time as is happening in this instance," he says. "We will see hopefully a more detailed eye thrown over the submission when it gets to the EU level."

Lufthansa Group chief executive Carsten Spohr has defended the wet-lease deal, saying the carrier will continue to compete with Air Berlin. ■

**Additional reporting by Oliver Clark in London**

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PROGRAMME STEPHEN TRIMBLE WASHINGTON DC

# Boeing 'in talks' to end 747 production

Key supplier of fuselage panels points to mid-2019 contract expiry, but airframer says 50-year-old type still has a role

A major Boeing supplier says discussions have opened over possibly ending 747 production as early as the first half of 2019, but the airframer says there are no plans to close the 50-year-old production line.

Triumph Group makes fuselage panels and sections, lower rudder sections and the empennage of the 747 under a contract with Boeing that expires in mid-2019. Last year, Boeing withdrew a plan to switch fuselage panel production to a company-owned factory in Macon, Georgia.

In ongoing talks with Boeing, the manufacturer is discussing the timing for finally halting production of the venerable widebody, says Triumph chief executive Dan Crowley, who spoke to analysts on a fourth quarter and 2016 earnings call in early February.

"We're in discussions with Boeing about the end of the 747



Everett line is turning out six aircraft per year, with a backlog of 26

programme: when will it come? They had planned to offer some of our work to Macon, Georgia. They've stepped back from that plan. And now, based on the market demand for that platform, they're going to decide: does the programme go beyond our cur-

rent contract obligation or end early?" Crowley says.

Triumph's aerostructures division has reported a forward loss on every fuselage panel it delivers to Boeing for installation on the 747 through the contract period. That means Triumph would

financially benefit if Boeing decided to close the 747 production line when the supplier's contract expires in mid-2019.

For its part, Boeing says it remains "confident" in the sales outlook for the 747, pointing to an order last year by UPS for 14 747-8 Freighters.

"We continue building 747-8s, and there are no plans to discontinue that work," Boeing says. "We fully expect the cargo market to rebound in the coming years, as existing freighters are in need of replacement."

Production has been cut from a 2012 peak of 31 deliveries. After delivering only nine 747-8s in 2016, the Everett assembly line is now producing six per year.

Having delivered 110 747-8s up to 31 January, Boeing has a backlog of 26 aircraft, but that includes four for defunct Russian carrier Transaero. ■

OPERATIONS EDWARD RUSSELL WASHINGTON DC

## United and Delta suffer ACARS dropout issues

Delta Air Lines and United Airlines have faced issues in recent weeks with their connections to the aircraft communications addressing and reporting system, known as ACARS.

Delta cancelled roughly 280 flights and delayed numerous departures after a "system outage" attributed to its ACARS connection on 29 January. Chief executive Ed Bastian apologised to customers and said the issue was "not acceptable".

United faced its own 2.5h ground stop due to a "server slowdown" attributed to its connection to ACARS on 22 January, with 250 flights delayed and another 12 cancelled.

Multiple sources emphasise that both issues were local to

each airline rather than an issue with ACARS itself.

Carriers use ACARS to communicate information ranging from weight and balance to aircraft tracking and weather data between their operations centres and aircraft, both on the ground before a flight and in the air.

The system is acknowledged as very reliable, with Rockwell Collins-owned ARINC, which designed and supports it, claiming 99.9% availability.

"ACARS was a really amazing piece of technology when it was designed but it's not up to current wi-fi type of standards that we're used to today," says one industry technology adviser. The protocol was developed in the 1970s and implemented in the 1980s. ■

TERRORISM

## Cairo says Sharm was deliberate

Egypt's foreign ministry has described the 2015 crash of a Russian-operated Airbus out of Sharm el-Sheikh as having resulted from a deliberate attack.

Investigators in Egypt have yet to give the results of their inquiry into the loss of the MetroJet A321 over Sinai on 31 October 2015.

But the ministry, in a statement underlining the need for an international counter-terrorism strategy, referred to "terrorist op-

erations" which have resulted in "hundreds" of fatalities "such as the Russian aircraft crash".

Investigators have not confirmed sabotage despite a long-held claim by Russian analysts that the aircraft was brought down deliberately.

The statement followed the release of a list of attacks by the US Trump administration in support of tightened security measures including travel restrictions. ■



Egyptian investigators have not given an official verdict on the crash





Lufthansa powers A350 growth plan from Munich hub  
**Air Transport P11**

**REPORT** JON HEMMERDINGER BOSTON

# Nosewheel defects led to ERJs leaving runway

**M**anufacturing defects have caused several Embraer ERJs to experience unexpected nose wheel turns upon landing, including two incidents in which aircraft veered off runways.

The US National Transportation Safety Board (NTSB) has detailed the events, and called on Embraer and the Federal Aviation Administration to address them, in a safety recommendation report released on 2 February.

The defects could potentially affect three types: the ERJ-135, ERJ-140 and ERJ-145.

Embraer tells FlightGlobal it has co-operated with the NTSB

on the investigations and will “continue to work... on a resolution, where applicable”.

One event involved a China Eastern Airlines flight at Shanghai Hongqiao International airport on 7 June 2013. On landing, the aircraft, an ERJ-145 registered B-3052, veered left and departed the runway, damaging the aircraft

**Pieces of degraded O-rings left over from manufacturing could have caused the uncommanded turn**

but not injuring passengers or crew.

The other event involved an ERJ-145 operated by ExpressJet Airlines. That aircraft, registration N27152, departed the left side of the runway when landing at Quad City International airport in Moline, Illinois, on 29 August 2011, the report says.

It is thought that both runway excursions were caused by foreign object debris in the nose wheel’s electro-hydraulic servo valve, which converts electrical command inputs to hydraulic outputs, according to the NTSB. The debris, determined to be pieces of degraded O-rings left over from manufacturing, could have caused the uncommanded turn by blocking a hydraulic port, the report says.

The board also determined that foreign debris in the servo



The incidents involved ERJ-145s but other types may be affected

valve of another ExpressJet ERJ-145 caused several uncommanded turns in March 2013.

Parker Aerospace manufactures the steering manifold, while Woodward HRT makes the servo valves. ■

**RETIREMENTS** DAVID KAMINSKI-MORROW LONDON

# Early A380s become museum pieces

Test aircraft built in 2005 will go on display in France as flag carrier converts remaining two orders for type to A350s

**T**wo of Airbus’s A380 test aircraft are to be transferred to museums, along with two other testbeds including the first A320.

Airbus is moving its A380 MSN4 to the air and space museum at Le Bourget, the site of the Paris air show. The aircraft, built in 2005, will be the first to be transferred and is set to be relocated on 14 February.

MSN4 is powered by Engine Alliance GP7200 engines – having originally been fitted with Rolls-Royce Trent 900s – and has been used as a demonstrator aircraft at various displays.

Airbus says the “iconic” jet will be structurally preserved and refurbished to “showcase its operational role”, and will have an internal exhibition for visitors from 2018.

MSN2 is a Trent 900-equipped aircraft, produced in 2005, and was long associated with a deal with Saudi Arabia’s Kingdom Holding for a VIP A380, before the order was cancelled in 2014.

Airbus will move this to the



One of the two retirees was used as a demonstrator, while the other had been intended as a VIP aircraft

new Aeroscopia museum in Toulouse, along with A320 MSN1, which dates from 1987, and A340-600 MSN360, built in 2001. They will be maintained by Airbus Heritage.

Airbus had five A380s in its test fleet, and Etihad Airways had once been in line to take four of them before it opted instead for new-build aircraft.

Two of the five – MSN7 and MSN9 – were subsequently de-

livered to Emirates for commercial service, while Airbus retained aircraft MSN1 for product development.

Meanwhile, Airbus has formally recorded the cancellation of two outstanding A380s intended for Air France, which instead is taking three more A350-900s.

The swap, originally disclosed by the airline about a year ago, increases the Air France commitment for A350s to 21 aircraft.

It brings the backlog for the A380 down to 110 aircraft. Airbus did not deliver any A380s during January, according to the airframer’s revised backlog data.

Air France had originally ordered 12 A380s fitted with GP7200 powerplants, and has already taken delivery of 10.

The flag carrier had previously indicated that the final of its A380s were due to arrive during 2018. ■



EXPANSION MICHAEL GUBISCH MUNICH

# Lufthansa powers A350 growth plan from Munich hub

Chief executive says first 10 of its widebodies will operate from Bavarian airport, with seven to be in use by year-end

German carrier Lufthansa's A350 fleet is growing fast, with six more of the Airbus widebodies to be delivered this year.

Lufthansa – Europe's second operator of the type after Finnair – took delivery of its first A350 in

December 2016 and planned to put it into service on the Munich-Delhi route on 10 February.

At an unveiling ceremony for the long-haul twinjet in Munich on 3 February, Lufthansa Group chief executive Carsten Spohr said



German carrier took receipt of new Airbus twinjet last December

the airline was scheduled to introduce seven A350-900s this year.

This is part of a group-wide investment of about \$2 billion in new aircraft this year, also spanning 14 Bombardier CSeries jets and two Boeing 777-300ERs for

Swiss, plus a total of 14 A320neos and A320neos.

Lufthansa's second A350 is to be delivered later this month and enter service on the Munich-Boston route on 14 March. A third is slated for delivery in late March.

The airline's in-house maintenance division is completing the interior installation for its A350 fleet as Airbus is delivering the aircraft without premium economy seats or a self-service area for business-class passengers.

Lufthansa has orders for 25 A350s and has decided to station the first 10 aircraft in Munich.

Spohr describes that decision as testimony to Lufthansa's "first-class co-operation" with the airport, which he describes as "Europe's best by a wide margin".

ASSEMBLY

## Tianjin and Mobile plants poised for A320neo production

Airbus is aiming to begin final assembly of A320neos at its Chinese plant in Tianjin around mid-year and production at its US Mobile line at year-end.

The two assembly lines complement its Toulouse and Hamburg single-aisle facilities, at which A320neo manufacture is already under way.

Airbus gave the schedule estimates for Tianjin and Mobile – without identifying specific months – having delivered a total of 70 A320neos by the end of January this year.

Forty had Pratt & Whitney PW1100G engines, and 30 were fitted with CFM International Leap-1As.

Single-aisle production remained relatively low in January, with 21 aircraft delivered, only two of which were Neo models.

Airbus has yet to deliver the first A321neo, stating only that it will be handed over "well before summer". The PW1100G-powered version has already been certificated. ■



FIM activity is part of a wider FAA assessment of air traffic control

TECHNOLOGY JON HEMMERDINGER BOSTON

## NASA space tests aim to bring airliners closer

Flight testing is being carried out by NASA of airborne technology designed to reduce the required space between aircraft during descent and landing.

The technology is called flight deck interval management (FIM) and is among systems that are included in the US Federal Aviation Administration's NextGen air traffic modernisation.

The FAA is also testing ground-based interval management systems that will help controllers manage spacing.

NASA has started flight testing FIM near Seattle using a United Airlines Boeing 737, a 757 provided by Honeywell and a third,

business aircraft, also provided by Honeywell.

The FIM system generates "cockpit displays that show pilots surrounding air traffic and provide speed guidance to maintain precise intervals from nearby aircraft", NASA says.

That information allows pilots to maintain a designated distance behind other aircraft, allowing aircraft to descend and land at shorter intervals, thereby increasing airspace flow, according to the agency.

NASA hopes to complete flight testing of FIM by mid-February and deliver the system to the FAA later this year. ■





Norwegian  
way holds sway  
for rivals  
News Focus P15

SAFETY DAVID KAMINSKI-MORROW LONDON

# Study finds pattern in landing incidents

Analysis by Russian regulator highlights series of runway excursions by large cargo aircraft, many during poor weather

Russian analysis has highlighted 56 landing incidents over 25 years involving large transport aircraft, with more than a third occurring in adverse weather.

The analysis accompanies preliminary information on January's crash of a Turkish Boeing 747-400F at Bishkek, Kyrgyzstan, as the freighter attempted to land at Manas airport in freezing fog.

Russian federal air transport regulator Rosaviatsia says 93% of the events charted between 1991 and 2016 resulted in the aircraft rolling beyond the runway, and 37.5% happened in poor weather.

Six of the 56 events examined were classified as accidents, two of which were catastrophic, and



Rosaviatsia says the 747-400F was too high on approach to Bishkek

the total included nine serious incidents. It states that such events typically involve high approach speeds, incorrect estimates of aircraft altitude and dy-

namics, and failure to carry out a go-around in adequate time.

Four events last year centred on landings and subsequent rolling off the runway, Rosaviatsia

says, involving 737s of Nordavia and Nordwind, an Azur Air 757, and a Pskovavia Antonov An-24.

Meanwhile, preliminary information indicates the 747-400F which crashed at Bishkek had been too high on the approach and overflew the runway at Manas airport before crashing into a village beyond its far end.

Rosaviatsia says the aircraft had been "far above" the expected height as it reached the threshold of runway 26. It "landed" 900m (2,950ft) beyond the threshold of the opposite-direction runway 08, continuing into the village 1km from the runway end. There were 39 fatalities, including four crew members. ■

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Camcopter rises to the challenge with Australian contract  
**Defence P16**

STRATEGY GRAHAM DUNN LONDON

# Norwegian way holds sway for rivals

Low-cost, long-haul model and imminent economic benefit of 737 Max are turning airline into a transatlantic trend-setter

Norwegian has defied sceptics about its branding, the scale of its aircraft orders and embracing the low-cost, long-haul model to become one of the most influential airlines operating today.

Plenty remains at stake for the carrier – not least with rising fuel prices – but it is at the heart of many of the industry's biggest themes and its progress will be watched closely during 2017 by rivals and copycats alike. This is already evident with SAS's announcement that it plans to obtain a new air operator's certificate in Ireland and establish bases in London and Spain.

Likewise, network carriers are already taking steps to respond as Norwegian has become the first European operator to establish itself in the low-cost, long-haul market across the Atlantic.

While Norwegian's transatlantic growth has so far been driven by its Boeing 787s, it will be the first to avail the economic performance offered by the re-engined 737 Max narrowbody on such routes when it launches services with its first example as early as June this year.

Norwegian had already revealed its intention to go long-haul by ordering 787s before the head-turning announcement in early 2012 that it planned to purchase 222 new aircraft – predominantly a mix of re-engined Airbus and Boeing narrowbodies.

While sceptics believed Norwegian would be stuck in a fight to the death with SAS for Nordic supremacy, it has steadily expanded its influence beyond its home markets. FlightGlobal schedules show that it is now the third-biggest airline – and largest overseas operator – at London Gatwick airport in terms of seat capacity, serving around 25 destinations, including eight across the Atlantic.

It is in the low-cost, long-haul sector – aided by benign oil prices – that the airline has so far defied the doubters. It now oper-



Carrier will take delivery of its first six Max 8s this year

ates more than 30 routes from five points in Europe to the USA and Puerto Rico – often from secondary airports.

And it is Norwegian, together with the likes of WestJet from the North American side, which is prompting a rethink from the transatlantic incumbents.

**"Norwegian's profits have been extremely seasonal since they started long-haul"**

Richard Evans  
Senior consultant, Flight Ascend Consultancy

British Airways, which says it has "been fascinated to see the consumer reaction" to Norwegian's transatlantic product, has come up with what it calls "competitive responses". Last year it relaunched flights from Gatwick to New York JFK, and during 2017 it intends to start serving Fort Lauderdale and Oakland. It is also introducing 10-abreast seating on 25 of its 777s, increasing the economy-class cabin from 216 to 252 seats. US carriers on transatlantic routes seem set to follow suit.

But Norwegian intends to create its own fresh options when it debuts the 737 Max on transat-

lantic routes. It is scheduled to take delivery of six Max 8s this year, and will base at least four in the Boston and New York areas.

Bjorn Kjos, the airline's chief executive, notes that the Max can be operated at a "really, really low cost: even lower cost than the [787] per seat". He points out Norwegian already operates relatively long flights with narrowbodies, such as its Oslo-Dubai route.

It is in line to be not only a pioneer of the new type, but to be at the forefront of single-aisle transatlantic operations. Aer Lingus and JetBlue have indicated interest in starting similar operations.

## INDUSTRY DISRUPTOR

Three years after Norwegian Air International's application for a foreign air carrier permit, US regulators approved it in the last days of the Obama administration in December 2016. But whether that is the end of the matter remains to be seen.

Emboldened by the "America first" rhetoric of President Donald Trump, US unions have called on the White House to overturn the decision, which became effective on 29 January.

And for all its influence as an industry disruptor, Norwegian has so far delivered relatively modest

profits, totalling just \$119 million over the seven years to 2015.

"Norwegian's profits have been extremely seasonal since they started long-haul operation – much more so than [BA parent] IAG," notes Flight Ascend Consultancy's senior consultant, Richard Evans. "Norwegian Air International has the lowest fuel burn per revenue passenger kilometre across the Atlantic, but appears to have structurally lower yields too, so could be vulnerable to higher fuel prices to some extent."

Indeed, investment in Norwegian's market positioning, its young fleet and early delivery slots for the 737 Max also make it regularly talked about as an attractive acquisition target.

The carrier could be a potential fit for EasyJet, which is in the market for a European air operator's certificate. Ryanair has shown limited interest in growth by acquisition since buying Buzz, but Norwegian could jump-start the long-haul operation that Michael O'Leary has long talked about, and the pair are already in the final stages of a much-talked-about interline agreement.

IAG too, which already has one low-cost operation in Vueling and a remit to grow, could also perhaps be tempted. ■



OPERATIONS JIM WINCHESTER LONDON

# Camcopter rises to the challenge with Australian contract

Canberra selects Schiebel UAV to assess reconnaissance capabilities alongside navy's manned rotorcraft inventory

Australia's navy will introduce a new vertical take-off and landing (VTOL) unmanned air vehicle capability on 29 April, after selecting the Schiebel S-100 Camcopter.

The service is to buy one system, with an option for another, to support test and evaluation activities ahead of a potential operational acquisition. Canberra's arrangement with the Austrian company also includes a three-year support package.

Current UAV operations by the Royal Australian Navy use the

Boeing/Insitu ScanEagle from a variety of ships. The service plans to add a hyperspectral sensor payload to the tactical air vehicle in 2017, and by year-end to be operating two unmanned flights at sea, wherever possible partnered with a manned capability.

The Camcopter deal follows a 2016 request for tenders, which also attracted interest from the UMS Skeldar joint venture.

Cdre Chris Smallhorn, commander of the service's Fleet Air Arm, says a maritime UAV can be used alongside an NH Industries



Service will receive one S-100 system to support testing from April

NH90 – locally designated as the MRH90 – or Sikorsky MH-60R under such a manned/unmanned teaming concept, but notes that the Sikorsky model already has its own intelligence, surveillance and reconnaissance capability.

Smallhorn told the IQ Defence International Military Helicopter conference in London on 31 January that the service expects to team the ScanEagle with the MH-60R and a future operational VTOL UAV with the MRH90.

Australia's navy will have 30 helicopter-capable ships by 2040,

but only eight flights of MH-60Rs and three such units with MRH90s. The latter type has reached initial operational capability at sea, with full capability expected in "a couple of years".

Meanwhile, the navy plans to retire its last Sikorsky S-70B-2 Seahawks at the end of 2017 after 27 years of service. "If we go through 2017 without crashing one, it will be the first combat aircraft type in Australian history to have entered service and have not lost one on the way through," Smallhorn says. ■

PROGRAMME JIM WINCHESTER LONDON

## V-22 tanker on track for marines

Initial operational capability for the US Marine Corps' Bell Boeing V-22 Aerial Refuelling System (VARS) should be declared in late 2019, with the milestone to represent the availability of an initial four mission-equipped aircraft.

VARS will be qualified with the USMC's Boeing AV-8B and F/A-18, Lockheed Martin F-35B and Sikorsky CH-53 fleets, but a testing timeline has yet to be worked out, says Lt Col Douglas Ogden, MV-22 military platform lead at the V-22 joint programme

office. The service had hoped to have the system ready to support initial operations with the F-35B, but a contract signature was delayed until October 2016.

Cobham Mission Systems will begin delivering production VARS sets during 2018.

Proximity trials performed with F/A-18s in 2013 and 2015 identified no issues with the fighters flying close behind the tiltrotor, Ogden told the IQ Defence International Military Helicopter conference in London. ■



VARS-equipped Osprey will provide ship-based refuelling capability

INDUSTRY STEPHEN TRIMBLE WASHINGTON DC

## Taiwan's next jet trainer to be developed locally

The Taiwanese government has committed to support local industry to design and fly a prototype advanced jet trainer by 2020 and deliver 66 production aircraft to replace the air force's ageing fleet made up of Aerospace Industrial Development Corporation (AIDC) AT-3 and Northrop F-5F trainers.

In a ceremony in Taichung on 7 February attended by President Tsai Ing-Wen, the government launched the \$1 billion development programme to revitalise an indigenous aerospace industry that 30 years ago co-developed the F-CK-1 twin-engined fighter with General Dynamics.

Taiwan has previously revealed concepts for an XT-5 trainer, which resembles a scaled-down variant of the F-CK-1. It had also flirted with acquiring a replacement advanced jet trainer

from a Western supplier, with one option being Leonardo's Aermacchi M-346, which is powered by Honeywell F124 engines assembled by AIDC in Taiwan.

After flying a prototype of the jet trainer in 2020, Taiwan plans to have a production version ready to enter service five years later. The new type will be developed without the assistance of a foreign partner.

In the announcement, Taiwanese officials lamented that the national aerospace industry had not made progress since the introduction of the F-CK-1 nearly 30 years ago, as "talented people have been hired away by foreign countries or retired".

Flight Fleets Analyzer records Taiwan's air force as operating 49 AT-3s and 26 F-5Fs, plus a combined 129 F-CK-1 fighters and trainers. ■





Battling the budget  
in a war against  
evolving challenges  
**Flight Interview P18**

**BUDGET** LEIGH GIANGRECO WASHINGTON DC

# USAF sharpens aim on A-10 extension

Air Combat Command chief suggests re-winged fleet could fight on in close air support role until at least "late 2020s"

Previously threatened with early retirement, the Fairchild Republic A-10 is to fly on for at least five more years – but potentially much longer, US Air Force officials suggest.

While the exact date for the specialised platform's removal from service will be decided following a discussion with defence secretary James Mattis, chief of staff Gen David Goldfein says the USAF will keep the type at least until 2021.

"As a mission, we're fully committed to close air support," he says. "We need to move the dialogue in a new direction that starts with how we do business today – because there's the reality that this will change significantly."

While the air force has previously outlined an official A-10 drawdown plan beginning in

2018, which concludes with the final aircraft moving to storage in 2021, senior leaders have hinted at a longer life.

Late last year, then-air force secretary Deborah Lee James announced the A-10's retirement would be delayed once again, and earlier in 2016, a decision was taken to allow Boeing to continue manufacturing replacement wings for the type. These could enable the A-10 to continue flying into the 2040s, Boeing says.

Air Combat Command (ACC) chief Gen Herbert Carlisle tells FlightGlobal that the new wings would make the strike aircraft viable for the foreseeable future.

"To some extent we're going to continue the A-10," Carlisle says. "We did buy some wings – we're going to keep those into the late 2020s, even into the 2030s."



US Air Force

Earlier plans had called for the type to be fully withdrawn by 2021

However, the ACC notes that the air force will not solidify its funding position until the Department of Defense's fiscal year 2018 budget is revealed, and that Goldfein's comments represent the service's current position.

An August 2016 report by the US Government Accountability Office said there was insufficient

information to support a full divestment by 2022. Air force documents had confirmed that the loss of eight A-10 squadrons would outpace the arrival of units equipped with the Lockheed Martin F-35 by two squadrons by the end of the DoD's five-year budget plan. ■

See Interview P18

**CONTRACT** LEIGH GIANGRECO WASHINGTON DC

# New production deal brings F-35A below \$100m

Following a year of tense negotiations, Lockheed Martin has agreed a price for the 10th lot of low-rate initial production of the F-35. Concluded with the F-35 Joint Programme Office (JPO), the \$8.9 billion contract is for the delivery of 90 aircraft and their Pratt & Whitney F135 engines.

According to the JPO, the agreement includes \$728 million in savings compared with its previously-mandated lot 9 deal with Lockheed. This figure bettered by \$128 million an estimate cited by President Donald Trump, and was



US Air Force

Price for conventional variant has dropped 7.3% from previous lot

in line with an earlier projection from F-35 programme executive officer Lt Gen Chris Bogdan of a 6-7% decrease.

"Unit prices, including jet, engine and fee for all three variants went down," the JPO says, noting that lot 10 is "the first time

the price for an F-35A is below \$100 million".

The JPO gives a \$94.6 million unit price for the A-model – a 7.3% decrease from lot 9; \$121.8 million for the F-35C (a 7.9% reduction) and \$122.8 million for the F-35B (down 6.7%).

Lot 10 of production will deliver 44 F-35As for the US Air Force, nine F-35Bs for the US Marine Corps and two F-35Cs for the US Navy, plus a combined 35 aircraft for Australia, Israel, Japan, Norway, South Korea, Turkey and the UK. ■

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CAPABILITY LEIGH GIANGRECO WASHINGTON DC

# Battling the budget in a war against evolving challenges

Departing Air Combat Command chief Gen Herbert "Hawk" Carlisle is still hitting targets

After nearly 40 years in the US Air Force, Gen Herbert "Hawk" Carlisle will hand over the reins of Air Combat Command (ACC) on 10 March to his successor, Lt Gen Mike Holmes.

For more than two years Carlisle has presided over the 1,300 aircraft within ACC that meet the USAF's strategic air defence needs. The diverse portfolio under his purview includes the Lockheed Martin F-22, General Atomics Aeronautical Systems MQ-9 Reaper, Northrop Grumman RQ-4 Global Hawk, and Northrop E-8C JSTARS ground surveillance fleet.

Then there is the Fairchild Republic A-10: the close air support jet that has emerged as a darling of aviation enthusiasts and a fiscal headache for the air force.

Yet Carlisle's legacy in his last post may be cemented by the Lockheed F-35A Lightning II, which reached limited combat capability last August – although at the announcement of that milestone, he acknowledged the aircraft still required significant work in the form of impending software and hardware upgrades.

## WORK IN PROGRESS

As Carlisle heads into retirement, he seems to see the F-35 not as an embattled programme, but a work in progress. That position does not jibe with the Pentagon's outgoing senior weapons tester, Michael Gilmore, who penned several caustic assessments of the fighter programme over his tenure.

In his last report, Gilmore warned that hundreds of deficiencies on the platform would push full combat tests to late 2018 or early 2019; more than a year after the planned date.

In an August report following the F-35A's initial operational capability announcement, Gilmore wrote that with the current Block

3i software, the aircraft might be less effective in a permissive environment than many "fourth-generation" platforms, including the A-10. With this software, the F-35A lacks an automated targeting capability for tracking and targeting moving vehicles: a feature that legacy platforms have.

**"[The F-35s] are incredibly complex machines and you improve the capability as you go"**

Gen Herbert "Hawk" Carlisle  
Commander, Air Combat Command

During a January exit interview with FlightGlobal, Carlisle acknowledged that individual capabilities on the F-35, such as its electro-optical targeting system (EOTS), needed work and would improve with Block 4 upgrades. But he also argues that taken as a whole, the new type will outperform legacy aircraft.

"In some cases, the [EOTS] we're fielding on the F-35 are not

as good as the current pods that are mounted externally on current aircraft," he says. "You can take things individually like that, but the airplane deploys as a package. In many environments, the A-10 can't get close enough to employ anything because it's threatened at a level that the F-35 is not."

The USAF knew about some of the gaps Gilmore pointed out and understood that those capabilities would not be available in the Block 3i variant, Carlisle adds.

"Some of the things he talked about, it was planned that way," he says. "The counter-argument I would make to Gilmore is, every developmental programme goes through this. These are incredibly complex machines and you improve the capability as you go."

With the F-35's technical issues aside, the fifth-generation aircraft will still fly with fourth-generation missiles. Lockheed designed it to accommodate Raytheon's AIM-120 AMRAAM, but Carlisle wants a combination air-to-air and air-to-ground missile that can offer greater range for the aircraft.

"Range is a big factor if you look at our potential adversaries



with things like the [Chinese] PL-15," he says. "I think it needs to be multiband, broad spectrum – which aids it in survivability and reaching the target."

Carlisle sees the missile fielded across a spectrum of platforms, from fourth-generation aircraft to a future penetrating counterair type and Northrop's B-21 bomber. He also believes technology will enable the USAF to achieve greater range within the current size and configuration for the F-35.

"I can't comment a lot on where we're going to go, but I will tell you that we worked hard," he says. "I think with the engine and motor technology for weapons we can get range, depending on what kind of profile and motor we use."

Even as the F-35 continues to face numerous hurdles, Carlisle is set on increasing the buy rate for the aircraft. Here he could find an unlikely ally in Congress: Senate Armed Services Committee chairman John McCain. The Republican senator has long been a critic of the programme, but his recent recommendations for the defence budget call for increased acquisition of F-35As.

Funding constraints have forced the USAF to procure 228 F-35As between fiscal years 2018 and 2022, at a rate of 48 aircraft per year. That means the service



Gen Carlisle has presided over 1,300 aircraft for more than two years





Global wings will continue to Triumph  
Business Aviation P21



F-22 and F-35 are just two elements of the Air Combat Command's portfolio

US Air Force

would not reach its goal of 1,763 F-35As until 2040, according to McCain's recent white paper. While the senator did not state a number, he argues that the USAF should buy as many F-35s as possible over the next five years.

"I aim to increase the buy rate as much as I can for as long as I can," Carlisle says. "I would love to get to 60. I'd love to get to 80 a year in the [conventional take-off and landing] version, which was the plan we had a while ago."

#### BUDGET PRIORITIES

The F-35 procurement is not the only casualty of a more austere Pentagon. Carlisle is leaving an air force that has pushed many of its budget priorities to the right. Since sequestration and the budget control act of 2011, the Department of Defense has tightened its belt. That has often forced the services to choose between pursuing ambitious modernisation programmes and maintaining their current fleets.

Despite characterising the ACC's JSTARS capability as a high-priority item, recapitalisation of the battle management, command and control platform has lagged for several years. The air force had mulled moving the effort to a rapid capability office, but decided against it. Instead,

the service will continue the programme on its current path – but may consider incorporating elements of rapid acquisition that could push the replacement along. Another E-model jet platform, the Boeing E-3 airborne warning and control system, will not see recapitalisation until the mid-2020s.

The USAF also has its eye on an MQ-9 Reaper follow-on, but there is no room in near-term budgets for MQ-X, Carlisle says. The service does not have a final answer on its MQ-X acquisition plan, but his recent meetings with USAF chief of staff Gen David Goldfein indicate the air force will continue buying MQ-9s longer than previously planned. Still, the current system is in need of a modernisation overhaul, he adds.

"I think the MQ-X is something we need to get after," he says. "We need open mission systems, we need a little bit of a different concept of operation, because the MQ-9 enterprise is very manpower intensive."

Meanwhile, discussions over which platform will succeed the Cold-War era Lockheed U-2 have all but fallen off the air force's radar. In 2015, Lockheed unveiled an optionally-piloted, next-generation U-2 at the annual Air Force Association conference. At the

time, the USAF shrugged off the company's advances, and months later recommended designing an unmanned platform. Although the USAF is exploring different avenues to fill that high-altitude intelligence, surveillance and reconnaissance void, a next-generation U-2 is not a top concern in the budget today, Carlisle says.

One potential budget item that has stirred discussion in Washington DC involves a low-cost fighter jet. The prospect of a low-end strike asset crops up every few years within the air force, but the concept is often quashed by a change of command, administration or budget priorities.

#### CLOSE AIR SUPPORT

The latest iteration of this concept is OA-X, a low-cost close air support platform that would be designed for use in permissive environments. That could prove a cheap and attractive option for the air force's counterinsurgency operations in Afghanistan, Iraq and even Syria. The USAF gave OA-X some credence in 2016 when it announced an experiment slated for early this year that would consider low-cost fighter options.

That experiment could also test whether lighter attack aircraft could handle major ordnance available on the A-10: the 30mm GAU-8/A seven-barrel Gatling gun. Carlisle names BAE Systems' 70mm Advanced Precision Kill Weapon System guided rocket as one contender for a light aircraft.

"Maybe there's ordnance out there that isn't the GAU-8, but can do a lot of that mission and can fulfil the capability," he says.

Carlisle sees OA-X moving forward this time, saying the aircraft

could bear budget and operational advantages. The service could procure such aircraft cheaply, and their operation and maintenance costs would come in lower than for current platforms, he says.

Foreign partners could also buy into the programme, although Carlisle notes that allies such as Australia, France and the UK have not expressed an interest in a light attack platform. Carlisle, who left the US Pacific Command in 2014, says OA-X could also be a tough sell for South Korea, which faces a more contested environment.

"I think we have to balance those positives with the threat environments that are increasing," he says. "If you look at what we're doing with Inherent Resolve [the operation in Iraq and Syria] today, those threats are getting more challenging, not less. The other thing is, if we spend the money on that, what aren't we spending the money on? There's other priorities that fit into the budget."

McCain and Carlisle could find common ground on OA-X as well. In his white paper, McCain recommended buying 300 light attack fighters with minimal development, and called on the USAF to buy the first 200 examples by FY2022. The high-low mix of additional F-35s plus OA-X aircraft could help Carlisle ameliorate his command's capacity issue.

"One of my biggest problems today is capacity. I just don't have enough fighter squadrons to do everything that is asked of me," he says. "As we look at 300 low-end fighters, that may be something that meets the combatant commander's need and may be one of the driving factors as we watch this test develop." ■



US Air Force

Service will buy MQ-9 Reapers for longer than previously planned



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Airshow debuts in view for Stratos 714  
General Aviation P23

DISPUTE STEPHEN TRIMBLE WASHINGTON DC

# Global wings will continue to Triumph

Supplier to remain working on Bombardier's ultra-long-range jet despite its legal action over alleged non-payments

Triumph Group will continue to supply wings for the Global 7000, despite the eruption of competing claims between the wing supplier and aircraft designer Bombardier, Triumph chief executive Dan Crowley said in an early February earnings call with analysts.

In December, Triumph filed a lawsuit in the Quebec courts against Bombardier, seeking to claim payments the supplier says it is owed. Bombardier has threatened to counter-sue based on alleged damages caused by delays to the Global 7000 programme due to a wing redesign.

Despite the legal trouble, Triumph will remain a loyal supplier as the ultra-large cabin, ultra-long-

range business jet moves closer to its scheduled entry-into-service in the second half of 2018.

"We continue to support the programme, although we continue to assert our belief that we're due payments for work completed over the last five years," Crowley told analysts on a fourth quarter and 2016 earnings call.

The Global 7000 represents one of Triumph's most ambitious development projects. The wing must be designed to achieve a maximum operating speed of Mach 0.925, second only to the Cessna Citation X+ for speed among business jets. At the same time, the wing must be shaped to allow pilots to approach runways at the lowest possible speed.



High-speed 7000 is due to enter service in the second half of 2018

By mid-2015, Bombardier had decided that the original wing design was inadequate for both purposes, so the manufacturer in July 2015 commissioned a redesign that pushed the programme two years behind schedule. As the wing supplier, Triumph bore

the brunt of the costs to modify or replace the tooling used to build the redesigned structure.

Both companies argue that the others' claims for payments are "without merit", but will continue working together despite their legal steps. ■

EXPANSION KATE SARSFIELD LONDON

# Luxaviation aiming high with launch of dedicated VIP helicopter division

Luxaviation, the world's second-largest business aircraft operator, has launched a helicopter division that it hopes will become the global name in VIP rotorcraft management and charter.

The company manages about 250 business aircraft and 20 helicopters across its network, which covers Africa, the Asia-Pacific, the Caribbean, Europe, the Americas and the Middle East. It also owns 24 fixed-base operations through its ExecuJet subsidiary.

Luxaviation Helicopters plans to expand the rotorcraft business organically, through joint ventures and by acquisitions. "Our aim is to bring the luxury service standards of business aircraft into the helicopter world," says Charlotte Pedersen, chief executive of the newly-formed company.

Pedersen – who was formerly Luxaviation's chief operating officer – stresses that the company is looking to work with local op-

erators to develop the market together. "We want to work with established, well-respected local companies across the world who can support our customers," she says. "This is a great opportunity for us to grow the business and to keep our clients within the Luxaviation network."

The company is looking to manage helicopters from the mid-size category upwards, "but we will consider smaller models", Pedersen says.

Luxembourg-headquartered Luxaviation began operations in 2009 with a single business jet. It started down the acquisition trail in 2011 with the purchase of German charter company FairJets.

Since 2013, it has added five more companies to its portfolio through debt-funded acquisitions, including London Executive Aviation in the UK and Swiss business aviation services provider ExecuJet. ■

DEBUT KATE SARSFIELD LONDON

# Argentina sees first operations of Phenom 100

A pair of Phenom 100s have begun operations in Argentina, marking a debut for Embraer's executive jet family in the Latin American country.

The Argentinian-registered, entry-level jets are being used for private and charter missions, says Embraer, which hopes their exposure will trigger more sales of its seven-strong business jet family in the nation. Embraer cites Argentina's ageing aircraft fleet as a reason for optimism. "There are 170 business jets in Argentina, and 80% of this inventory is more than 10 years old," it says.

Latin America is home to more than 100 Phenom 100s, from a global fleet of 340 – the bulk of which are based in Embraer's beleaguered home market of Brazil.

"[Brazil's] situation is creating few [sales] prospects for us," says the airframer, which is headquartered in São José dos Campos. ■



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DEVELOPMENT KATE SARSFIELD LONDON

# Airshow debuts in view for Stratos 714

Start-up plans to display the prototype of its very light personal jet at Oshkosh and NBAA, in effort to attract investment

**U**S start-up Stratos Aircraft says it will debut its 714 very light personal jet at two leading US business and general aviation trade shows this year, in an attempt to attract investment in the high-performance type.

"We plan to display the proof-of-concept aircraft at the AirVenture show in Oshkosh in July and at the NBAA business aviation convention in October," says chief technology officer Carsten Sundin. "This will maximise the aircraft's exposure and help bring new partners to the table."

The 714 made its first flight on 21 November 2016, after a five-year development effort. It has since chalked up a further five sorties, each lasting around 30min. "We would have flown more if the conditions were favourable," Sundin says, in reference to sub-zero



Single-engined type has a projected range of 1,500nm and Mach 0.7 top speed with four passengers

temperatures at the company's Redmond, Oregon base. "We will step up testing when the weather improves, and will start to expand the flight envelope."

The aircraft has a projected top speed of Mach 0.7 with one engine and four passengers – its 714 designation denotes these characteristics. The design goal includes a range of 1,500nm (2,770km).

"There is nothing else like it on the market today," Sundin says. The 714's only competitor in the personal jet space is the in-production Cirrus SF50 Vision, which he says is about 100kt slower and has shorter range, at 1,200nm.

"Our aircraft has the performance characteristics of a much larger business jet," he says.

Privately-owned Stratos hopes that November's flight debut, coupled with the 714's unique appeal, will attract additional investors and allow it to accelerate development.

Stratos will not open the order book for the model until it is able to commit to a certification date. "We don't want to make promises we cannot keep," Sundin says. ■



Flag-carrier has 16 examples of the piston single in its training fleet

ACQUISITION KATE SARSFIELD LONDON

## DA40NG fuels Ethiopian's plans

**D**iamond Aircraft has sold five DA40NG piston-singles to Ethiopian Airlines, in support of the flag-carrier's "Vision 2025" strategic plan to become the leading aviation group in Africa.

The four-seat aircraft bring Ethiopian's fleet of DA-series models to 18 – made up of 16 DA40s and two twin-engined DA42s. The airline, headquartered in Addis Ababa, also owns a pair of Diamond aircraft simulators.

Both models use the AE300 turbocharged jet-fuel powerplant

manufactured by Diamond sister company Austro Engine, making them an ideal fit for the African airline training market, the Austrian airframer says.

"AvGas is hardly available in Africa," the company notes, adding that where it can be found "it is often sold at multiple the price of jet fuel".

Diamond says that of the 1,900 DA40s in service worldwide, 90% are used in a training role. About 60% of the 800-strong DA42 fleet is used for training. ■

UPGRADE KATE SARSFIELD LONDON

## Cirrus delivers with sixth generation of SR family

**C**irrus Aircraft has started deliveries of the sixth generation of its SR piston-single series, which it calls the "smartest, safest, most advanced models ever".

Launched in January, the G6 version of the high-performance SR20, SR22 and SR22T features the new Perspective+ flightdeck, based on Garmin's just-launched G1000NXi platform.

The new suite offers 10 times faster processing speed than the earlier Perspective system, says Cirrus, along with animated data-link weather, SurfaceWatch safety protection, payload management, visual approach capabilities and wireless database uploads. Other features of the G6 include new Spectra LED wingtip lights, and "courtesy lights" installed underneath each wingtip, on each step, and in the baggage compartment.

The G6 SR20 also features Lycoming's 250hp (186kW) IO-390 C3-B6 piston engine, which replaces the earlier models' 200hp IO-360 powerplant.

Cirrus launched the five-seat piston-single family in 1999 with the SR20. The all-composite type was the first certificated general aviation aircraft to be equipped with an emergency parachute – the Cirrus Airframe Parachute System (CAPS) – as standard. Cirrus says CAPS has helped save the lives of nearly 150 people since its introduction.

The SR20 was joined in 2001 by its upgraded and more powerful stablemate, the SR22, and the turbocharged SR22T completed the line-up in 2010. About 6,500 units have been delivered worldwide, with the SR22 accounting for the bulk of demand. ■





Super-selfie: before France's Thomas Pesquet went outside in January, Europe had committed to staying inside the ISS programme

# Space gets euro boost

European nations did not grant ESA all its wishes for the next few years, but member states have put their money down to back strategic priorities in access and navigation

DAN THISDELL PARIS

On 30 September last year, the European Space Agency's (ESA) comet-chasing "Rosetta" mission executed what director general Jan Woerner describes as a "planned suicide", spewing out one last blast of data as it crashed into the comet it had been tracking since May 2014.

Quite apart from its effect on 67P/Churyumov-Gerasimenko, Rosetta – named after the hieroglyphics-translating stone – was a real ground-breaker and no mean technical feat. It took 10 years from launch for the car-





leaving a crater big enough to be photographed from orbit.

So never let it be said that the ESA isn't making an impact. But as he wrapped up 2016 and previewed 2017 at ESA headquarters in Paris on 19 January, Woerner emphasised that Schiaparelli, which was designed to test technology for entry, descent and landing – very difficult in Mars's thin atmosphere – and then survive, on battery power, for just a few days to support a science payload, was by no means a total loss.

The crash occurred on 19 October and the event is still being analysed. The theory so far is that the onboard computer jettisoned the parachute and switched off the thrusters in response to a “negative” altitude value – that is, it believed itself to be below the surface. Gyros, not software, look to be the culprit. In any case, Trace Gas Orbiter did its job, transmitting lander data back to Earth “perfectly”.

In preparations for the 2020 half of the mission, which will put a rover with deep drilling gear on the surface, the lessons learned from Schiaparelli will be invaluable. Its loss, Woerner says, is a “sad situation”; a crash-landing in 2020, on the other hand, really would be a “disaster”.

## OTHER WORLDS

Meanwhile, he notes, ESA has solid experience with touching down on other worlds. Rosetta's Philae landing was hugely challenging and a more-than-partial success. The January 2005 landing of ESA's Huygens probe on Saturn's moon Titan – released from NASA's Cassini spacecraft, which is only now approaching the end of its mission to Saturn – was a genuine triumph and, still, the farthest-ever-from-Earth landing.

But while ExoMars promises to tell us a great deal about the Red Planet – and its literally ground-breaking ability to drill down 2m (6.5ft) should tap soil samples which, if any, will hold evidence of past or present life – it is already telling us quite a lot about life on Earth, or at least in Europe. First, European governments, however cash-strapped they

sized spacecraft to close on and intercept 67P, beyond Jupiter, and then stick by it for two-and-a-half years as it hurtled towards, around and away from the Sun. En route, it released a small lander, whose mini-mission was a qualified success despite an over-hard landing.

Also ground-breaking and spectacular, albeit less successful, was the first half of ESA's ExoMars mission. After a seven-month flight to Mars, the Trace Gas Orbiter satellite lined itself up for what should be years of atmospheric data sampling. But a stationary lander – named Schiaparelli, after the 19th Century Italian astronomer Giovanni, who mapped the planet's surface features – crashed hard,



NASA, ESA are teamed on deep-space Orion

may be, clearly value the science coming out of Mars and the European industrial ecosystem which makes it possible. When ministers from ESA member state governments met in Lucerne, Switzerland at the beginning of December to hash out ESA's budget and priorities for the next several years, their closing resolution urged ESA to “strive to reap the benefits expected from the significant investments made in the ExoMars programme” and stressed “the importance for the director general to implement thoroughly the ExoMars plan of action”.

## “[The launch of ExoMars shows] co-operation beyond Earthly crisis is working”

Jan Woerner

Director general, European Space Agency

And, the ministers went on, the ESA director general should “define future missions in the domain of robotic and human exploration, such as a Mars sample return mission as a possible project”.

Woerner – the former head of Germany's DLR aerospace agency, who joined ESA in 2015 on the retirement of France's Jean-Jacques Dordain – took the occasion of his January press briefing to underscore a more immediate highlight of ExoMars. Its March 2016 launch, by a Russian Proton rocket, showed “that co-operation beyond Earthly crisis is still working”.

The extent of Earthly crisis between Europe and Russia is well-enough known and nothing new, however heated of late. But Woerner is right to hold up ExoMars as an example of how things can be different.

The programme dates to early-2000s European concepts for Mars exploration, but was seriously derailed when, in 2011, a budget-constrained NASA had to drop out. With it went the launch – but Roscosmos soon stepped in with Proton rides for both segments and some scientific payloads.

Then, with the TGO-Schiaparelli mission already in deep space, the 2018 follow-up wobbled over cost worries and concerns that the hardware would not be ready in time. The 2018 launch was pushed back to 2020 – Mars and Earth are at their closest every two years.

For now, Woerner is confident that all will be ready for 2020, pointing to monthly engineering teleconferences with Russian colleagues. With a clear “go” and clear expectations from ESA member states, he can at least press forward with the confidence of a long-term budget and political support.

In as much as success breeds success, ExoMars is a measure of Europe-Russia collaboration in space. While Mars beckons, ESA ➤

» is supporting Russia's Luna 27 and 28 robotic missions to the Moon, which could lift off this decade.

Earthly worries, though, are many – or more typically, are money. Given the background of economic pressure and political upheaval, ESA's budget-setting ministerial council meeting in Lucerne in December offered an opportunity for member states to rein in the space agency.

## UNITED SPACE

Woerner summed this up well in his post-meeting blog post, headlined: "Success, tinged with a bit of disappointment". In it, he described discussions as "lively". Indeed, while he welcomed the council's backing of the "United Space in Europe" strategic vision that

he has advocated since taking office, he added: "It immediately became clear that the real focus of the discussions would be the subscriptions, the amounts committed to the different programmes." That is, money. "Exhausting meetings," he continued, "conducted both day and night [were dominated by] tactical manoeuvres... while issues of national affordability were never far from the surface.

"Subscriptions were announced and then withdrawn again [but] in the end, more than €10.3 billion [\$11 billion] was put on the table, constituting a major success overall."

That €10.3 billion for programmes, running in some cases to 2025, may represent only a nominal increase on the €10.1 billion pledged at the last full ministerial meeting in 2012. But ESA's total 2017 budget stands at €5.75

billion, including contributions from the EU and the Eumetsat weather service – nearly 10% up on 2016.

Speaking in Paris of the programmes budget, Woerner says he reckons that ESA can

## "We are... ensuring the UK remains at the forefront of daring space exploration"

Jo Johnson

Minister, UK universities and science

meet all its commitments if inflation stays low; if inflation rises, he added, it will be necessary to talk about money.

Lucerne also saw ministers make a big vote of confidence in what is probably ESA's most visible programme: the International Space Station (ISS). There was little likelihood that Europe would have dropped out of the programme when its current commitment ends in 2020, but partners the USA, Russia, Canada and Japan had already committed to extend through to 2024, when the biggest artificial satellite will, finally, be de-orbited.

The disappointment at Lucerne came in the financial door being "slammed shut" on a proposed Asteroid Impact Mission, which would have been part of a joint NASA-ESA project to evaluate technologies for altering the flight path of a tiny asteroid. "It was an example of ESA at its absolute best: daring, innovative and ambitious all at once," wrote a



Proposed Moon village has no programme or budget, but concept attracts much interest

## LAUNCHERS

### Ariane 6 looking to development milestone – and first firm orders

The date 27 March should mark a critical moment in Europe's bid to ensure it retains competent, competitive and independent access to space. It is then that Airbus Safran Launchers (ASL) expects to cross "maturity gate 6", a set of specification details that will trigger the "go" order to begin production of Ariane 6 rocket prototype equipment, leading to ground tests in 2018 in anticipation of first flight in 2020.

In September, ASL will be in position to give the order to begin production of the first flight prototype. This momentum will characterise a year which ASL chief executive Alain Charneau describes as "absolutely key to us in terms of setting the scene for Ariane 6 marketing and sales". Indeed, he says 2017 will see ASL make the first "firm proposals" for

Ariane 6 launches.

The programme, to replace the hugely successful and reliable – but expensive – Ariane 5 heavy-lifter and the medium-sized Soyuz with a new modular system, is a response to US start-up SpaceX.

#### COMMERCIAL FREEDOM

Ariane-series rockets have orbited well over 500 satellites since 1980, including half the world's telecommunications units, and Ariane 5 has become a byword for reliable (ASL closed 2016 with the 76th in a string of successes).

But SpaceX has combined clean-sheet design with commercial freedom to build a streamlined industrial infrastructure that gives its Falcon 9 a compelling cost advantage. Falcon 9 is smaller than Ariane 5, so direct comparison is

difficult, but a flight can be bought for as little as \$70 million.

Ariane 5, by contrast, is the product of an industrial infrastructure designed to satisfy the European need to spread work to all the countries who contribute to the programme budget. With Ariane 6, the combination of new technology, a modular design and a rationalised industrial structure will have Ariane 6 flying for €70 million (\$75 million) per outing – half the cost of an Ariane 5 lift.

ASL is the agent for that crucial rationalisation – consolidation – of the Ariane programme. A 50:50 joint venture between Airbus and Safran, the Ariane 6 prime contractor was formally created in 2016, and closed the year by buying out France's CNES space agency to take control of

Arianespace, the European launch operator. ASL, then, is responsible for the design, manufacture and operation of Ariane 6 flights, along with sales of launches.

ASL also runs the commercial risk; institutions such as the European Space Agency, Eumetsat weather service and, by extension, the European Commission have some design oversight role and guide European space policy, but are in essence customers. The days of public subsidy are ending.

Hence Charneau says that when 2017 comes to an end he will count the year a success if these institutions have placed orders for Ariane 6 launches. "This is clearly where we need to have a step forward," he says. Indeed, so-called "institutional launches" are Europe's Achilles



Next stop, Mars: in space, nobody hears Earthly bickering



Stephane Cornejo/ESA

clearly disappointed Woerner, who added that the project – asteroid protection falls under the broad category of so-called “space situational awareness” or “planetary defence” – is a “necessity... [so] I will try to find a way back in through a window again. It is simply too important.”

A rising contribution was particularly welcome from one particular ESA member state: the UK. At Lucerne, Britain pledged €1.4 billion over the coming five years, up from the €1.2 billion it signed for at the 2012 ministerial in Naples. That translates into a yearly programmes contribution of €280 million, up from €240 million. As UK universities and science minister Jo Johnson put it at the time:

“We are committed to ensuring the UK remains at the forefront of new technologies, science and daring space exploration.” And, he added: “Our sustained investment... will ensure we build on the strengths of the UK’s growing space industry.”

#### BREXIT-BOUND

So far, then, no sign of a Brexit-bound UK matching its imminent withdrawal from the EU with a pull-back from ESA. In Paris, Woerner noted that ESA is an intergovernmental organisation with links to the EU, but it is not part of the EU (full members include Norway and Switzerland, and Canada is an associate) – and that the relationship with the

UK is a matter of “very big importance” and the focus of much hard work.

Across the Atlantic, president Barack Obama’s NASA administrator, Charles Bolden, resigned on 20 January as the Trump administration took charge. In Paris a few days before that, Woerner had simply observed that a new government means a new NASA administrator, but ESA had met with the Trump transition team to ensure the ESA-NASA partnership carries on.

In December, Woerner spoke in Washington DC to outline the results of the Lucerne ministerial meeting, and he says it is “clear” that the NASA transition people see ESA as a “reliable partner”. ESA, in any case, is supplying the »

Ever-reliable Ariane 5 is heading for retirement



Stephane Cornejo/ESA

heel; where US rivals SpaceX and United Launch Alliance can count on some €5 billion spent annually on launches by NASA, the military and the National Oceanic and Atmospheric Administration – and “buy American” legislation virtually eliminates foreign competition – ASL and Arianespace see only some €500-600 million.

Of 86 launches worldwide last year, 11 were European and barely a quarter institutional; the USA saw 22 launches, nearly two-thirds of which were institutional. ASL clearly relies on commercial sales, such as for telecommunications satellites.

For Ariane 6 and the smaller Vega C – whose solid fuel main engine will double as boosters for the larger rocket – the plan is for 16 or 17 flights yearly from the European space centre in Kourou,

French Guiana. The 2016 total of 11 flights was typical of recent years, but more flights would help reduce unit costs, as expenses like site maintenance would be spread out. Charmeau says he wants to see European governments and institutions order at least five Ariane 6 and two Vega-C flights per year. That, he says, is a “key factor in guaranteeing long-term, independent access to space”.

Asked if the launch cost reduction associated with Ariane 6 will boost European institutional demand for flights, Charmeau says he hopes so, but so far has no evidence. However, he says there is increasing interest within Europe in space programmes, so if the launch cost is slashed there should be, in national and institutional budgets, “more room for future missions”. ■

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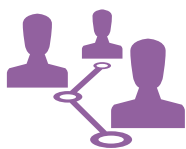
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» service modules for the first two flights of NASA's Orion deep-space-capable crew capsule from 2018, and hopes that supply relationship will continue beyond the first flights.

### NEXT ON THE AGENDA

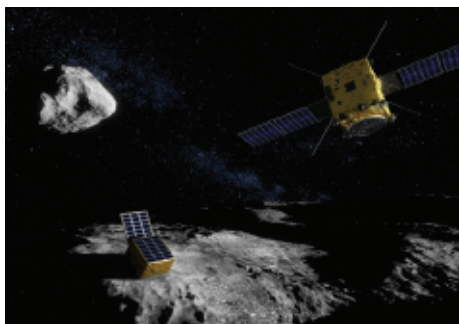
Ultimately, ESA's position looks sound enough to ride out the ups and downs of top-line budgets and adjustments of political priorities, both in Europe and internationally among its peers. In Europe, the longstanding position of large nations – Germany, France and Italy, and increasingly the UK, Spain and others – and the European Commission in Brussels is that space is of strategic importance, with major benefits for industry and economies, and quality of life.

In Paris, Woerner spoke of ESA's battery of Sentinel Earth observation satellites and their provision of better information to scientists and the public following the recent earthquakes in Italy: "A typical example of where space comes down to everyone on Earth."

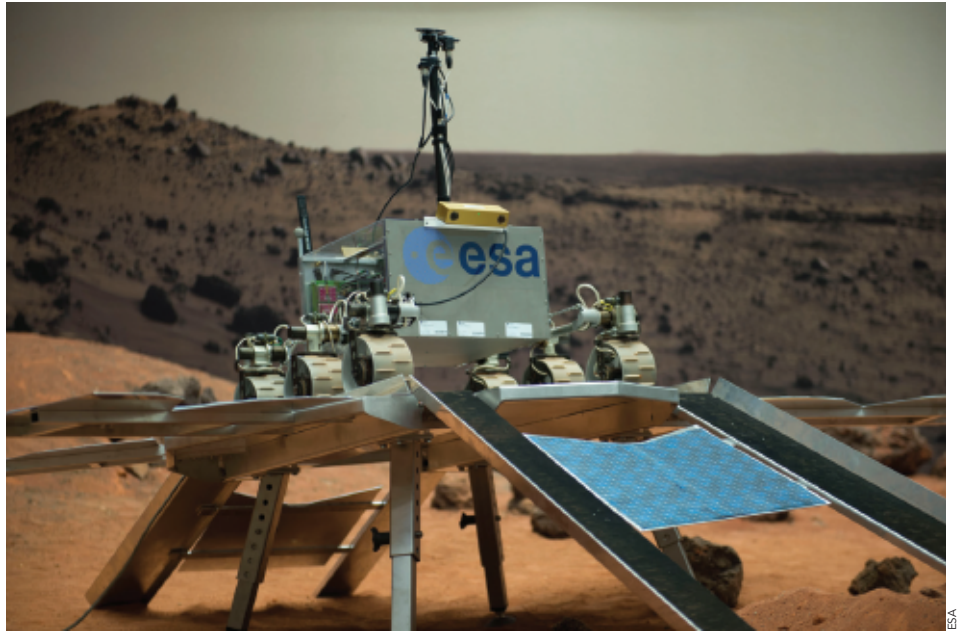
It is also a longstanding position that, for strategic economic and security reasons, Europe must maintain independent access to space and independent control of satellite navigation technology. So major programmes like the Ariane and Vega launcher development initiatives and Galileo satellite navigation constellation can be assumed to be secure.

Internationally, ESA holds an unusual position among space agencies. It is Europe's habit to operate through multinational partnerships and collaborations, and that role as a facilitator helps projects like the ISS. If a human journey to Mars is ever to really happen, for example, it is widely assumed that for reasons of cost, technical competence and politics, it would have to be an international affair, even though NASA – with the biggest budget and the most inter-planetary experience – would lead. At the 2014 ILA air show in Berlin, Bolden made this point clearly. In a debate with peers including Dordain and Woerner, then head of DLR, he noted that while he might be the "boss", Dordain was the "dean".

Woerner is, perhaps, taking that role even further. He has long talked of the world entering a new phase of the industrial revolution,



ESA wants defences against asteroid threat



ExoMars rover will drill 2m beneath the Red Planet's surface in 2020 – if it arrives safely

in which people are moving beyond merely accepting technology that is chosen for them to expecting that they will have a say in choosing what technology is developed.

One of his early initiatives was an ambitious "citizens' debate on space for Europe", which on 10 September 2016 convened meetings of 50 or 100 people – aged 15 to 89 and representing a cross-section of their societies – in each ESA member state to discuss topics like sci-

### "[Earth observation satellites] are an example of where space comes down to everyone"

Jan Woerner

Director general, European Space Agency

ence, space exploration or space debris management. Woerner describes the discussions as "very intensive", turning up results showing a strong belief that space is good for humanity (91% agree). Around 80% agree that space should be a source of commerce, industry and economic development, should be protected from pollution and harmful human activity and should be exploited for natural resources.

The idea that an agency like ESA should make a conscious effort to make plans and set priorities with direct input from its ultimate stakeholders – citizens – is compelling in an age of revolution, as evidenced in Brexit, Trump and perhaps other surprises to come.

Woerner likes to emphasise what he calls a "new paradigm" in space. ESA was founded in 1975, he notes, to be a single European space organisation; this has been a source of continuity, but everything is achieved through programmes. Historically, those programmes are

decided by governments and executed by ESA. Europe has its own multinational character, but the government-driven top-down approach to space is familiar to Americans through NASA. Now, however, there are new pressures on budgets and new actors, new technologies and new motivations.

As a result, he says, space is changing; ESA today is not just a driver, it is a facilitator. Woerner made headlines early in his tenure at ESA by advocating what he calls a "Moon village": not necessarily a permanent base, but some physical or support infrastructure that could help realise ambitions – from public or private sector participants far beyond those who can be involved in the ISS – to do work on the Moon. The Moon village, he says, is not a programme and has no budget or plans – but it is a fact, because ESA has been approached about possible projects.

Back down on Earth, another reality is the public-private partnership as more than just a way to get private sector money to pay for public space projects. ESA, says Woerner, is often asked to support entrepreneurs not with money but with knowledge – a shifting of roles that fits the new space paradigm.

Even in the realm of science, there is scope for adaptation to this new world. Space situational awareness, or planetary defence – that realm which Woerner considers "too important" to ignore – could conceivably be one application. The ESA convention dictates that scientific priorities are defined by scientists, and that would include, say, a mission to survey space for potential-threat asteroids.

But ESA is looking at ways to adapt if private alternatives are offered. Indeed, he says, if a good idea came from outside, "the door would immediately open". ■

CRAIG HOYLE LONDON

For many people, flying is an experience to look forward to, thanks to the aircraft's ability to shrink the world for the purposes of business, pleasure or adventure. And more than 60 years since the dawn of the commercial jet age, making a flight is statistically proven to be safer than the journey to and from the airport by road or rail.

But despite the huge advances in technology, operating standards and safety over the past several decades, for some, the prospect of leaving the ground in a jet-propelled metal tube is a terror-inducing threat that can keep them from visiting friends and family, going on holiday or advancing their careers. For would-be travellers in this category, a very real fear can represent an insurmountable barrier, preventing them from taking advantage of one of the true wonders of the modern age.

So, how can those with an overwhelming dread of flying be helped to address their fears?

For the past 30 years, British Airways has sought to do just this, through a regular series of courses staged at locations in the UK and overseas open to people who want to beat their phobia and take to the skies. Named "Flying with Confidence", the initiative is run at London's Heathrow and Gatwick airports, and additional sites including Dublin, Edinburgh and Manchester, plus Dubai and Johannesburg.

FlightGlobal was invited to attend one such course at Gatwick late last year, where a group of more than 80 delegates met a dozen BA staff – including senior pilots and cabin crew – who volunteer their time to run the course.

The carrier divides its standard one-day session into two parts: an explanation of how an aircraft and its systems work, along with associated elements such as air traffic control; and an exploration of the psychological aspects that hold back those wishing to beat their fears. These are followed by a short flight experience in one of BA's jets – lasting about 45min – to put the theory into practice.

## RATIONAL THOUGHT

By looking at available statistics – which show that there are about 110,000 scheduled commercial flights every day – the rational mind can calculate the incredibly small likelihood of being involved in an airliner accident. FlightGlobal's figures for 2016 show that there were 11 fatal mishaps resulting in 239 deaths, excluding deliberate acts such as terrorism. A record-breaking 2015 saw these figures achieve a historic low of nine accidents and 176 fatalities. And as the industry drives further towards an accident-free utopia – which may never actually be realised as flight numbers increase – it is also focusing on improvements in security and crew selection/screening.



BA's Flying with Confidence scheme has helped 50,000 people tackle "aviophobia"

# Stress-free in seat 35B

For 30 years, British Airways has offered reluctant flyers the chance to confront their fears – explaining everything from 'that noise' to take-offs, training and dreaded turbulence

For the nervous flyer, however, no amount of statistics can remove the fear that something might happen to them. While many who are feeling such unease may get themselves through the flight experience somehow – perhaps by resorting to medication or alcohol – BA notes that one in four people has a fear of flying.

Capt Gordon Black – a Boeing 777 training captain with about 40 years' experience with the flag-carrier, says obstacles in the way of reluctant travellers can be built up as a result of a lack of knowledge, control or familiarity with aviation, or even over-familiarity. Perceived knowledge about the risks associated with flying can be misplaced, influenced by partial media reporting of rare fatal accidents, or simply grounded in myth, he suggests.

The course leader for the recent Gatwick event, Capt Andy Shaw, delivered the technical part of the presentation, which ranged from the fundamentals of flight and aerodynamics to wing design and strength, fuel reserves and diversion practices. A 787 captain with experience totalling more than 20,000 flight hours and over 20 years at BA, he also explained why jet engines make more noise during some phases of a flight, and how aircraft can continue to fly safely in the event of a failure.

"Many people don't like take-off, but they do like landing," Shaw says, pointing to one of the phases of flight that causes the greatest anxiety to many. Leaving the ground is optional, but returning is obligatory, he notes.

Lack of control is a major contributor to anx-





Simulators can prepare pilots for all events

iety around flying, as is the case for individuals who perhaps like to drive but do not enjoy being a passenger in a car. One of the recent Gatwick course attendees held a private pilot's licence and was nervous about flying with an airline for those very reasons.

Another attendee – who was planning a trip to New Zealand – had previously opted against a flight from London to Edinburgh because of his anxiety, instead taking a much longer and more expensive journey by train.

The technical part of the course also explains what causes turbulence – described by Black as “everyone’s favourite” phobia – and how different people perceive it. Many pilots with decades of experience in the cockpit have never encountered the sort of severe turbulence that many anxious flyers feel they have endured in the past, and the course suggests that alarming media reports of aircraft “plunging thousands of feet” during such incidents are often inaccurate and heighten ill-placed fears.



A team of volunteers from the airline help to ease any nerves during end-of-course flight

In a book produced to accompany the training programme, *Flying with Confidence* course director Capt Steve Allright notes: “Flightcrew around the world share a common classification of turbulence: light, moderate and severe. For the fearful flyer, even light turbulence can be upsetting [while] for pilots it is no different to a bumpy road: a small, but totally safe inconvenience and very much part of our daily lives.”

This section of the course also affords the chance for nervous passengers to ask questions of an airline captain: an opportunity they might never otherwise get.

Questions on the day related to turbulence, communicating with passengers – or not – when something goes wrong, executing go-arounds and pilots consuming alcohol, with Shaw explaining each in turn.

## NO SURPRISES

Speaking separately, Allright – who has been involved with the programme for 24 years and co-authored the BA-produced book with psychologist Patricia Furness-Smith – notes: “If your question starts with ‘what if’, we’ve practised it in the simulator.”

He lists simulator-based “what-ifs” as including “just about anything and everything you could possibly imagine. Engine failures, gear failure, flap failure, loss of electrics, hydraulics, volcanic ash encounter, decompression, fire, medical emergencies, pilot incapacitation, diversion.”

Already among the most highly trained ➤



» professionals in any career, commercial airline pilots undergo regular refresher courses and testing in the synthetic arena. For BA pilots, this means two 4h simulator details every six months including testing, plus an annual medical check. They also fly as part of a team, notes Black, increasing overall safety.

Flight Fleets Analyzer records BA as having an in-service fleet of 269 jets, comprising Airbus A320-family narrowbodies, A380s, 747s, 767s, 777s and 787s. Its current network serves 196 destinations in 85 countries, according to FlightMaps Analytics. It carries more than 40 million passengers a year, operating about 650 flights a day.

## PROTECTIVE BUBBLE

Also delivering the flight element of the course at Gatwick was Capt Alistair Black, who would be one of the pilots to fly delegates on an A319 later in the day – with the promise of a safe landing.

His task during the classroom phase was to explain the “protective bubble” that safeguards an aircraft in flight, detailing its horizontal and vertical minimum separation distances and also explaining the liaison between pilots and air traffic controllers, plus the workings of modern terrain and collision avoidance system technology. He also notes how this protective space is expanded in areas without radar coverage.

Some of the psychological aspects of a fear of flying were covered by Furness-Smith, a former 747 stewardess who had her own such encounter during a long-haul flight while still working for an airline.

**“Fear is harmless – it is when it is operationalised that it becomes nasty”**

Patricia Furness-Smith

Psychologist and former stewardess



Not everyone will love flying, but can now try

For Furness-Smith, phrases like “fight or flight” and “territorial imperative” are key to explaining the anxieties that travellers may experience. Leaving the ground is not a natural event for humans, she notes, and it is easy for a fear of something unknown to overtake rational thought. “If you’ve perceived it as a threat, then that’s enough,” she says.

Because of its combination of factors including height and an enclosed space, Furness-Smith describes “aviophobia” as “the Rolls-Royce of phobias”. Sufferers can be those who have never flown before, who have experienced a previous trauma, or even those who “have devoured other people’s experiences and become vicariously traumatised”, she says.

Important elements of the pre-flight preparations include relaxation and breathing techniques, to avoid or control what she refers to as “anticipatory anxiety” which can become part of an individual’s “behavioural DNA”. “Fear is harmless – it is when it is operationalised that it becomes nasty,” she adds.

An aversion to flight cannot be overcome unless the sufferer wants to address the issue, but is less debilitating a problem than for an individual with, for example, a fear of people, which cannot be so easily avoided during day-to-day life, she notes.

According to the book accompanying the course, “the key to overcoming your fear is to be proactive, have self-belief, instil a positive attitude, and apply your knowledge and tools”.

At the end of the classroom phase, attendees pass through airport security to board the aircraft that will test their new-found determination. Once onboard the A319, Shaw provided a running commentary from the flightdeck, so that passengers were not left to wonder what that sound was – from the narrowbody’s auxiliary power unit switching off and the lights blinking during engine start-up, right through to the type’s distinctive “barking dog” sound after landing.

Of those who attended, only a couple opted against taking the brief experience flight at the end of the course, which was just long enough to allow passengers the chance to get out of their seats and move around the cabin – for some, only after they released their tight grips on the armrests for the first time.

The experience at the recent Gatwick event underscored the proven success of the Flying with Confidence scheme: BA says more than 50,000 people have now attended, and it cites a success rate of 98%. While by no means everyone attending the day will go away relishing the prospect of flying in the future, many will at least be able to do so without encountering the debilitating stress of the past.

Just under 1,300 people attended BA’s courses in 2016, and for the airline’s volunteers, it is a great opportunity to make a difference. While as every pre-flight announcement highlights, the cabin crew are there primarily to ensure the comfort and safety of their passengers, getting the chance to work directly with a group of nervous flyers can bring immediate rewards.

For one attendee speaking after the Gatwick course – who had not flown for some time after encountering turbulence on an earlier trip – this was exactly the case. “I’m off to book a holiday,” she said.

The scheme delivered its first course of 2017 on 4 February, welcoming 130 people at Heathrow. Now in its fourth decade of helping passengers to overcome their fears, BA looks forward to welcoming many more aboard, this year and beyond. ■



Capt Steve Allright and his colleagues answer questions during a recent Heathrow course



From yuckspeak to tales of yore, send your offcuts to [murdo.morrison@flightglobal.com](mailto:murdo.morrison@flightglobal.com)

## Back soon? The original Typhoon

A charity aiming to return to flight one of the last Hawker Typhoons has made a breakthrough. The Hawker Typhoon Preservation Group (HTPG) has secured and plans to restore a Napier Sabre engine, to power what would be the only airworthy version of the renowned wartime fighter bomber in time for the 80th anniversary of D-Day in 2024.

HTPG says the Sabre IIa, serial number 2484, is one of only a few in the world still capable of powering an aircraft.

The organisation intends to transport the powerplant, based in Derby, to the project's base in Goodwood, before installing the horizontally opposed, 24-cylinder, sleeve valve engine on the Mk1b Typhoon, RB396.

RB396 is basically a fuselage, which survived a forced landing in the Netherlands in April 1945. HTPG aims to find enough authentic parts, as well as original drawings, to rebuild the aircraft and fly it again.

Typhoon fighter bombers were used for aerial assaults and air cover during the Normandy landings and flew numerous sorties in support of the allied advance. More than 150 Typhoon pilots lost their lives in the campaign alone. Supreme Allied commander Dwight



"When you said we were flying on a Falcon jet, this is not quite what I had in mind." This photo by an unnamed airline captain went viral after appearing on Reddit. The 80 birds of prey are en route to Jeddah on an A330.

Eisenhower credited RAF Typhoon squadrons for halting a German counter-attack in summer 1944 – "a threat turned into a great victory".

Details of the project can be found at [hawkertyphoon.com](http://hawkertyphoon.com)

## Next MiG thing

A translated tweet from a Russian news site states: "The newest MiG-35 is interested in a number of European countries." Ah, but are any European countries interested in it?

## Extra leg room

You've heard of snakes on a plane, but how about the latest menace: centipedes on planes?

We're not leg pulling. A male passenger on an Oman Air flight from Muscat to Heathrow was taken for treatment after one of the beasts bit him. It had been hiding in his jacket pocket. The multi-limbed arthropods are, says Wikipedia, "known to be highly venomous, and often inject paralysing venom". Ouch!

## May Force One

Reader Tim Byatt suggests the Airbus A330 that flew Theresa May to see President Trump should have been named *Mayflower* – after all, he says, the Prime Minister was heading to a brave new world.

## GI's jet set

A story on an Abu Dhabi news site – "GI Aviation launches affordable private jets" – will have delighted the local air taxi start-up. We hope passengers will be equally happy when they board the company's new Pilatus PC-12NG turboprops.

## Aircraft in action

Warrant Officer Maden brought down yesterday

**100 YEARS AGO**

his fifth German machine. Last night one of our air

squadrons bombarded the railway stations and enemy depots of Curchy and Voyennes and the bivouacs east of Nesle.

## Rave review

It is seldom that a film inspires a case-hardened

**75 YEARS AGO**

critic... to see it through again, but *Captain of the Clouds* falls

into this rare category. What will appeal most to readers... is the fact that it is entirely free from those tiresome, irritating inaccuracies that have marred some of its forerunners.

## Fond farewell

Mr Frank Smith is leaving the Royal Aeronautical Society,

**50 YEARS AGO**

where he has been librarian for many years. All I can say is that we

shall miss him. Not just for his unailing helpfulness, but for all the laughs, not a few of which have found their way into this column.

## Tilting at targets

The most detailed study yet of the tilt-rotor's civil

**25 YEARS AGO**

potential, updated by Boeing in February 1991,

concluded that a pressurised, 39-passenger derivative of the Bell Boeing V-22 Osprey military tilt-rotor transport had "significant market potential".

**100-YEAR ARCHIVE**

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Normandy hero: a Typhoon ready to go into action in France

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### No answers to missing MH370

In his letter: "Don't give up on MH370 theory" (*Flight International*, 17-23 January), Richard Lloyd says: "Hopefully, the end of the search for flight MH370 will lead to the acceptance the loss was due to a catastrophic event, rather than a criminal act".

This statement is rather annoying and helps nobody. He bases it on his theories, and modelling, but no proof. This remains an unsolved event, and is heading to be one of aviation's biggest unsolved mysteries.

There are no answers at all – and as an aviation commentator here in New Zealand, I say the two best devices that help to solve most accidents are the flight data and voice recorders.

Also, where there is possibly a maintenance watch via the aircraft crew address and reporting system (ACARS), these can go a long way to help solve an event.

None of these has been identified. I still think the accident was due to a criminal act, and I have not been proved wrong yet. All we have are a few aircraft pieces that possibly show a catastrophic

#### EXPENDITURE

### Boeing has questions to answer

On reading in a recent issue (*Flight International*, 31 January-6 February) that Boeing has now written off more than \$2 billion against the development costs of its KC-46A tanker, two thoughts occurred to me.

One: Boeing's quote to the US government was way below what it should have been; and two: does this not in effect amount to an illegal subsidy to the US Air Force?

Is there more to be written off?

Did Boeing deliberately under-quote, just to stop Airbus getting the contract they had in fact already won?

Does Airbus have a case for compensation?

**J McDermott**

Almeley, Hereford, UK



KC-46A development has now incurred a \$2 billion overspend

break-up after a possible fuel starvation, some limited radar tracks, and a few pings that possibly show a destination of varying degrees of position in the Southern Ocean. But no proof.

We have nothing – and that is very sad, as we do need answers and positive proof for the aviation industry. As someone once said: "It's like trying to find a stapler in the North Island of New Zealand". To me, it's like searching for that stapler when you are blind.

We can accept nothing until we have a positive conclusion.

That seems near impossible.

**Peter Clark**

Auckland, New Zealand

### Go large and cut movements

The debate on the subject of London Heathrow airport's need to accept more aircraft continues.

However, although the cost of a third runway has yet to be determined exactly, surely an equivalent sum could be better spent on helping to reduce the need for more aircraft movements at Heathrow by fostering the use of larger capacity aircraft?

Ways could be found to use this money to discount the price of the Airbus A380 and thus persuade more airlines to purchase the aircraft. Alternatively the money could be used to reduce

or remove landing fees for A380 movements at Heathrow.

Advantages: this would ease the noise and pollution for Heathrow's neighbours, remove the disturbance that would be caused by the building of a third runway, and foster the future of the A380 and its derivatives.

**Roland Harries**

Keswick, Cumbria, UK

### A colourful force

With the UK prime minister becoming an ever-more frequent voyager around the world, is there not a case for "May Force One" switching its "Grey Force One" paint scheme for something more akin to the stand-out liveries that adorn aircraft used by other world leaders?

**Bob Millichap**

via email

### Floating an idea

While the official search for MH370 has been suspended indefinitely, interest will continue unabated. Emerging new technologies may well provide additional information that can at least narrow the area of interest with high probabilities and eliminate others.

One such technology in place today is the very extensive Argo buoy network, which is available to all. Literally hundreds of Argo buoys are floating with the current in all oceans of the world, transmitting their location every few days.

One of the few certainties of MH370 is debris found ashore at known locations. Tracking the path of selected Argo buoys from various start and end points in similar seasons may well provide additional information.

**John Blundell**

Auckland, New Zealand



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## EVENTS

### 22-23 February

**Aviation Africa**  
Kigali, Rwanda  
[aviationafrica.aero](http://aviationafrica.aero)

### 28 Feb-5 March

**Avalon 2017**  
Geelong, Victoria, Australia  
[airshow.com.au](http://airshow.com.au)

### 4-11 March

**IEEE Aerospace Conference**  
Big Sky, Montana, USA  
[aeroconf.org](http://aeroconf.org)

### 6-9 March

**HAI Heli-Expo**  
Dallas, Texas, USA  
[heliexpo.rotor.org](http://heliexpo.rotor.org)

### 14-16 March

**IATA World Cargo Symposium**  
Abu Dhabi, UAE  
[iata.org/events](http://iata.org/events)

### 19-21 March

**Routes Asia**  
Okinawa, Japan  
[routesonline.com](http://routesonline.com)

### 21-25 March

**Langkawi International Maritime  
& Aerospace Exhibition**  
Langkawi, Malaysia  
[limaexhibition.com](http://limaexhibition.com)

### 4-6 April

**Aircraft Interiors Expo**  
Hamburg, Germany  
[aircraftinteriorsexpo.com](http://aircraftinteriorsexpo.com)

### 4-7 April

**LAAD Defence & Security**  
Rio de Janeiro, Brazil  
[laadexpo.com.br/2017/en.html](http://laadexpo.com.br/2017/en.html)

### 8-11 May

**Xponential unmanned systems  
and robotics**  
Dallas, Texas, USA  
[xponential.org](http://xponential.org)

### 22-24 May

**European Business Aviation  
Convention & Exhibition  
(EBACE)**  
Geneva, Switzerland  
[ebace.aero](http://ebace.aero)

### 4-6 June

**IATA Annual General Meeting**  
Cancun, Mexico  
[iata.org](http://iata.org)

### 19-25 June

**Paris air show**  
Le Bourget, Paris, France  
[siae.fr](http://siae.fr)

### 14-16 July

**Royal International Air Tattoo**  
RAF Fairford, Gloucestershire, UK  
[airtattoo.com](http://airtattoo.com)

### 18-23 July

**MAKS**  
Moscow, Russia  
[aviasalon.com/en](http://aviasalon.com/en)

### 24-30 July

**EAA AirVenture Oshkosh**  
Oshkosh, Wisconsin, USA  
[eaa.org/en/airventure](http://eaa.org/en/airventure)



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### CRMT Refresher Course

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## Tenders



Ref: DACPM/169/2017/46

Date: 29 January 2017

### Request for Proposal (RFP)

1. Biman Bangladesh Airlines Ltd. Invites Proposal/Offer for taking ACMI lease of One (01) Wide-Bodied Aircraft with capacity minimum 300 seats for a period of three months for Hajj Operation in 2017. Airlines, Operators, Owners of Aircraft and/or Leasing Companies may submit their proposals as per terms and conditions given in the RFP Schedule. Basic information are mentioned below:

a.	Number and Type of Aircraft	One (01) Wide-Bodied Aircraft.
b.	Age of the Aircraft	Aircraft must not be more than 20 years in age as on 08th October 2017.
c.	Seat Capacity	Minimum 300 Passenger Seats.
d.	Air Operators Certificate	The operator must have valid Air Operator Certificate (AOC) for ACMI Operation.
e.	Guaranteed Hours	Minimum 700 Block Hours.
f.	Nature of Lease	Aircraft, Crew, Maintenance & Insurance (ACMI) Lease.

2. Detailed information is available in the RFP Schedule. RFP Notice and Schedule may be viewed at official web-site of Biman: [www.biman-airlines.com](http://www.biman-airlines.com)
3. Proposals/Offer are to be submitted to General Manager (Corporate Planning), Biman Bangladesh Airlines Limited, Head Office, Balaka, Kurmitola, Dhaka-1229, Bangladesh latest by 1000 hours BST (0400 hours UTC) on 22 February 2017 through Courier Service or dedicated e-mail to [dacpm169@bdbiman.com](mailto:dacpm169@bdbiman.com). The Proposal(s)/Offer(s) will be opened on the same day immediately after the closing time and date in presence of the Bidder(s), if any. No Proposal/ Offer will be accepted after the closing time.
4. Bidders are requested to comply with the stipulated terms and conditions of the RFP Schedule, failing which the Proposals/Offer may be rejected at the option of Biman. Interested Bidders/Lessors may contact General Manager (Corporate Planning) at Telephone: +880-2-8901600/Ext. 2413, +8802-8901588 (Direct), e-mail: [gmp@bdbiman.com](mailto:gmp@bdbiman.com) during the Office Hour for any clarification regarding the RFP Schedule, if required.
5. Biman Bangladesh Airlines Ltd. reserves the right to accept or reject any or all Proposal(s)/Offer(s) partly or wholly at any time and/or stage without assigning any reason, whatsoever, and no claim will be entertained in this regard.

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**Alternatively you can contact Mike Sparrow, Airport Manager, London Oxford Airport, on 01865 290685 or email [msparrow@londonoxfordairport.com](mailto:msparrow@londonoxfordairport.com).**

**Closing date: 28th February 2017.**



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WORK EXPERIENCE PAUL SYKES

# Part matchmaker, part dealmaker

During his career in aviation finance, Paul Sykes realised that a common stumbling block was bringing buyers and financiers together. That prompted the idea for FlyFunder, which he likens to a dating app

## What ignited your interest in aviation?

I was introduced to aviation through the 2006 Mountbatten internship I did with RBS Aviation Capital in New York. John Slattery, who is now chief executive of Embraer's commercial aircraft division, took me under his wing to help support his sales team, and I got exposure to commercial aviation and finance for the first time. I enjoyed the scale and relevance of the industry, and met some great characters, who I still count as friends today.

## Tell us about your career to date

I have had a varied career over the past decade in commercial, corporate and rotary-wing aviation. I experienced commercial and corporate jet financing with sales roles at RBS in Dublin and London, managed a fleet of leased aircraft at CHC Helicopter and looked after a distressed UK and Nordic portfolio at GE Capital before moving into my current role at AirFinance. We work as a qualified adviser to the US Ex-Im Bank, sourcing deals and conducting due diligence.

## Why did you launch FlyFunder?

I have always fancied myself as a bit of an entrepreneur. My role involves going out and trying to find deals in a global niche market and I noticed very quickly that the process of finding finance as a buyer or financing opportunities as a funder was highly inefficient. Given the success of similar platforms in other markets – comparison and dating websites for example – it seemed



It became clear to Sykes that funding processes were inefficient

a no-brainer that a simple, secure platform would help industry participants engage with each other to do business more efficiently. FlyFunder allows those seeking funding to announce non-sensitive details – aircraft type required, deal size and borrower country, for example – and securely matches them to financiers who set high-level lending criteria. Financiers are notified when deals that meet their criteria are announced and are directed to the site to connect with buyers. I pitched the idea to AirFinance, who shared my enthusiasm, and we set about refining the business model.

## What impact will this have on the business and general aviation aircraft finance market?

Manufacturers, brokers, financi-

ers and buyers will all benefit from the increased connectivity, with buyers finding their best funding solution by seeing a range of options. Manufacturers and brokers source financing quickly and efficiently for customers looking to buy, and financiers can find opportunities without leaving their desk. In the same way that we have seen disruptive technologies change the way some markets operate (Uber for taxis, Airbnb for accommodation and Expedia or Skyscanner for flights), we believe FlyFunder will make financing more accessible for new industry participants.

## Tell us about your job

In addition to heading the FlyFunder project, I cover helicopters globally and jets/turboprops in Asia Pacific for AirFinance,

and additionally support the businesses' credit function.

## What do you enjoy most?

In the office, getting FlyFunder off the ground (excuse the pun) has been a very fulfilling experience, but I still love the thrill of closing a deal. Out of the office, I can be found on a golf course or watching my favourite English football team, Huddersfield Town.

## The least?

Covering a large territory and working for a US company can mean conference calls at some strange hours.

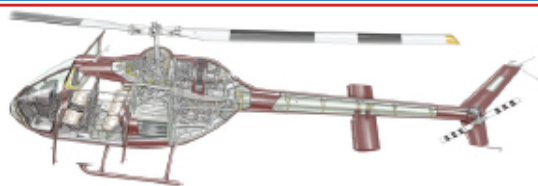
## What is the biggest challenge facing aircraft finance?

Availability of financing options for buyers with smaller aircraft and in non-standard jurisdictions. Getting financing for a Gulfstream G650 in the USA with a decent credit record is straightforward. Try getting an appropriately priced solution for an operator buying a Cessna Caravan in Indonesia. Sometimes these aircraft can provide essential services for communities but a lack of financing options means they are out of reach. It would be nice to see the oil price go up a bit too, to help my old friends in the helicopter industry. ■



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