



REAPING REWARD
USAF CUTS MQ-9
LOSS RATE AFTER
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FLYDUBAI CRASH

Investigators probe first loss for low-cost carrier after 737 destroyed in Russian incident **10**

BOTTOM LINE

Designers ready to pitch radical seating concepts to industry – but which could be a success? **28**

FLIGHT INTERNATIONAL

From Flightglobal

29 MARCH-4 APRIL 2016

SUPPLEMENT

READY FOR THE FUTURE

EasyJet has evolved pilot training to match its rapid growth. Our guide explains how



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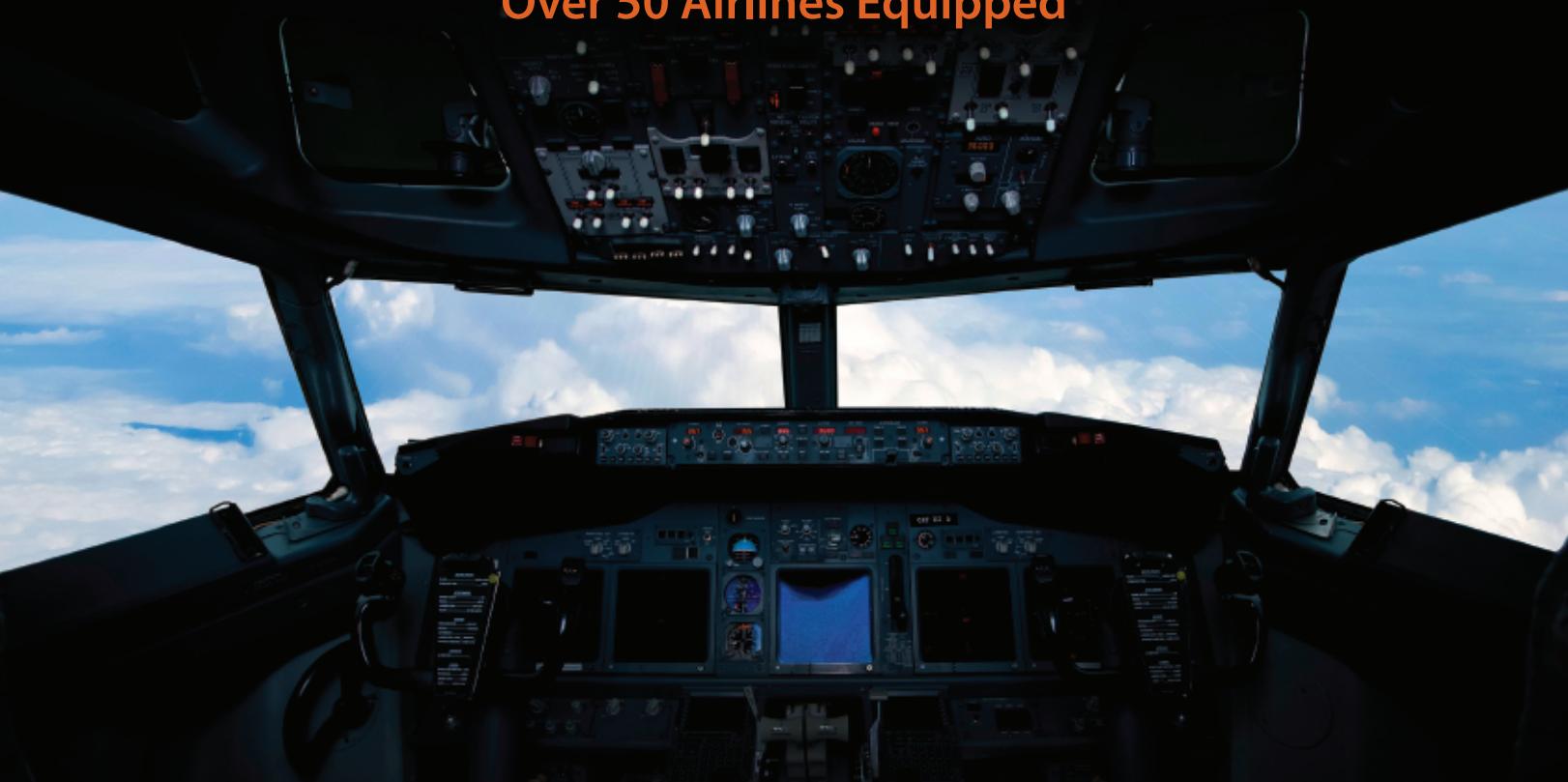
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**COVER IMAGE**

Twenty years after bringing the low-cost concept to market, EasyJet must train more than 300 pilots per year – and get ready for the A320neo **SUPPLEMENT**

**BEHIND THE HEADLINES**

Dan Thisdell flew to Milan to hear **Finmeccanica** boss **Mauro Moretti** outline the Italian aerospace champion's **2015 performance**, which marked a **turn in fortunes** (**P25**). And Beth Stevenson got an **MBDA** programmes update in **London** (**P23**)

**NEXT WEEK FIGHTERS**

Our full report from Nellis AFB looks at the Italian air force's first Red Flag detachment with the Eurofighter Typhoon

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GE Aviation powers towards Passport approval **P26**

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Air Canada, Craig Hoyle/MBDA

More class as airlines bring in premium-economy seats **P32**. UK MoD to trial Brimstone-equipped Apaches **P23**

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IMAGE OF THE WEEK

Aircraft from each of the US Marine Corps' Northrop Grumman EA-6B Prowler units fly in formation from NAS Cherry Point, North Carolina. Flightglobal's Fleets Analyzer database records 24 EA-6Bs as in service, with the Marine Tactical Electronic Warfare Training Squadron 1 to disband later this year

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US Marine Corps

THE WEEK IN NUMBERS

Flightglobal dashboard

China Aircraft Leasing's net profit jumped to HK\$380m (\$49m) as 2015 revenue surged 35% to HK\$1.5 billion



Airbus Group

Airbus Defence & Space is to sell its Ulm, Germany-based defence electronics business to investment firm KKR

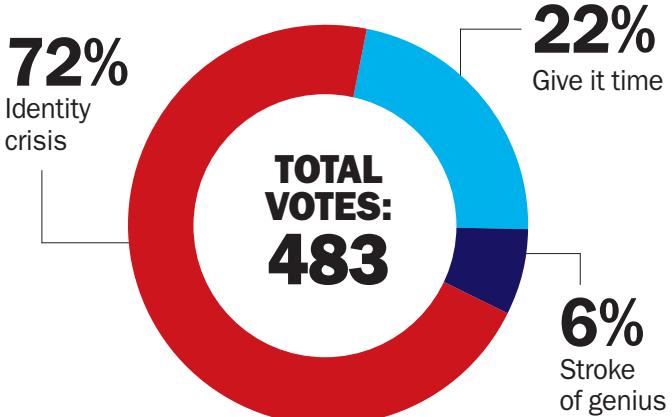


Orbital ATK

Last week's Cygnus resupply flight would have marked six trips to the ISS, had one not blown up on the launch pad

QUESTION OF THE WEEK

Last week, we asked: **Finmeccanica's rebranding as Leonardo:**
You said:



This week, we ask: **Should Brussels terror attacks lead to tighter airport security?**

- Yes, pre-check-in stage is needed
 No, process is strict enough already Improved intelligence the only answer

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A warning to all

Devastating terror attacks staged against passengers and staff at Brussels airport have led to questions about landside security. They also show how public spaces need public vigilance

Identifying a suspect before they commit an atrocity is harder than trying to find a needle in a haystack, since a needle, at least, looks different. The challenge facing airport security might accurately be compared with trying to find a particular needle in a needlestack.

That is difficult enough in any circumstances. But the proliferation of digital personal devices might in fact be sapping a vital part of defences: namely the "Mark One Eyeball".

That some affected by the devastating bombing of Brussels airport's departure hall were able to capture the aftermath so quickly – even as they cowered on the floor next to abandoned luggage – is testimony to the convenience and availability of handheld technology. But it is also a reminder that we move through a heads-down world.

While the mobile phone has, to an extent, ousted broadsheets and books as a source of entertainment on board aircraft and trains, its grip is more persistent. It holds people's attention, even as they walk, in a way that a magazine never could, aided and abetted by its integration into such routine tasks as orientation and paperwork handling.

There is no app to prompt the human instinct that something just does not seem right

Gazing at the phone's window into the virtual world sometimes reaches the level of parody, with spectators fixated on viewing live concerts or a fireworks display through its tiny screen. Heads-down pre-occupation can also divert attention from the simplest act of self-preservation, like avoiding walking into traffic.



Digital distractions can lower anyone's guard

The threat of terrorism brings an increasing emphasis on visual awareness – "if you see anything suspicious..." – but this conflicts with a slide into collective tunnel-vision. The pull of the phone is stronger, and the result can only be detrimental to security. There is no app that points out an unattended bag, much less prompt the human instinct of something that just does not seem right.

Introducing landside cordons to reduce the vulnerability of unsecured arrival and departure zones is more likely to shift the target than resolve the problem.

To suggest that the chaos at Brussels could have been stopped if only people had left their phones in their pockets is, of course, ludicrous. But technology designed to connect with the world out of our sight has also served to disconnect us from the world within it.

Social media has been a powerful tool for coping with the consequences, and pursuing the perpetrators, of events such as those in Brussels. But to what degree has it weakened the defences for preventing them? ■

See This Week P9

High-altitude stakes

Since the Space Shuttle's final mission in 2011, Americans have had to explain to their children that the only way to space now is via a Russian Soyuz spacecraft, blasting off from Kazakhstan. This storyline is only being corrected with the development of the Boeing CST-100 Starliner and SpaceX Dragon capsules.

But another sad situation is developing; one that started when the US Air Force retired the Lockheed SR-71 Blackbird in 1998, and which is metastasising through the introduction of unmanned aircraft.

As it stands today, when Clarence "Kelly" Johnson's famed U-2 is retired to the boneyard or converted into the proposed unmanned TR-X surveillance aircraft after 2019, the only cockpit from which US military

aviators will view the world from 70,000ft will be from inside a converted shipping container on the ground. That's because Lockheed Martin's Skunk Works design team has scrubbed its "optionally piloted" plans for TR-X, since its high-altitude mission is "ideally suited" for unmanned aircraft.

There is nothing comfortable, or even logical, about donning a pressurised spacesuit to fly at freezing and inhospitable heights in a single-engined spyplane, at a time when a UAV can transmit back the same images and signals. But there is something glamorous – almost romantic – about high-altitude flight that will be lost when the U-2, which first flew in 1955, is replaced. ■

See This Week P11



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BRIEFING

FIRST US-BUILT AIRBUS TAKES OFF

NARROWBODY The first Airbus A321 built in the USA needs a “few more weeks” in final production before delivery to customer JetBlue Airways, after completing its first flight on 21 March. The 3h 26min sortie from the new final assembly line at Brookley Aeroplex in Mobile, Alabama, comes nearly four years after Airbus announced plans to build airliners in the USA. The airframer intends to build as many as four A320-family aircraft per month in Mobile by 2018.

ITALY DOUBLES T-346A COMMITMENT

TRAINERS Italy has placed a follow-on order worth €300 million (\$336 million) for an additional nine Aermacchi M-346 advanced jet trainers. The deal doubles the number of Honeywell F124-powered aircraft ordered for the Italian air force, which uses the designation T-346A. Deliveries will begin this year and conclude by 2018. A total of 68 M-346s have now been ordered by four nations: Israel (30), Italy (18), Poland (eight) and Singapore (12).

See News Focus P25

AIRSPACE CABIN TO SET NEW STANDARD

INTERIORS Airbus has unveiled a new brand for its cabins, named Airspace, that will be introduced on the A330neo around the end of 2017. The concept incorporates many features available on the A350, including enhanced lighting, a quieter cabin and redesigned overhead compartments. Mid-cabin lavatories can also be moved to a lavatory/galley area at the rear, creating space for six more seats.

PEGASUS ADDS TO ORDERBOOK WITH 737 DEAL

AIRLINE Turkish carrier Pegasus has added five Boeing 737-800s to its orderbook of 75 Airbus A320neos and two current-generation A320s. Flightglobal's Fleets Analyzer database shows it has 47 737-800s and 10 A320s in service, while its joint ventures, Izair and Kyrgyzstan-based Air Manas, operate a further eight 737-800s.

IRAN EYES LUFTHANSA A340 FLEET

PACT Lufthansa could sell Airbus A340s to Iran Air, according to a newly-agreed memorandum of understanding between the carriers. Lufthansa chief executive Carsten Spohr says the tentative pact mainly covers support by the German carrier’s maintenance division as Iran Air introduces new aircraft, but that it also could acquire A340s being replaced by 25 A350-900s. Other options include their deployment at Eurowings, or with low-cost unit Jumia.

RUSSIA CREATES NEW CERTIFICATION AGENCY

REGULATION Russian authorities have established a new, autonomous aviation agency, which will take over the certification activities previously overseen by the Interstate Aviation Committee. Federal air transport regulator Rosaviatsia says it has ratified the Aviation Register of the Russian Federation – to be commonly known as Aviaregister Rossiya. Its activities will centre on the certification of civil aircraft and engines, as well as systems including avionics.

US AIR FORCE FACING PILOT SHORTAGE

STAFFING The US Air Combat Command is 511 fighter and attack aircraft pilots short of its total force requirement, according to its commander, Gen Herbert Carlisle. The US Air Force is also facing a current shortfall of 199 pilots versus its authorised strength of 1,180 needed to operate General Atomics Aeronautical Systems MQ-1 Predator and MQ-9 Reaper unmanned air vehicles.



Lockheed Martin

The company says a demonstrator would cost less than \$1 billion

TECHNOLOGY JAMES DREW WASHINGTON DC

Lockheed holding fast on SR-72 plan

Initially unmanned vehicle would be used to validate a new propulsion system designed to reach top speed of Mach 20

Lockheed Martin has renewed its strong promotion of the unmanned SR-72 aircraft concept, with company leadership now pushing a reusable, air-breathing hypersonic vehicle as an “affordable” way to validate a new propulsion system for achieving speeds between Mach 6.0 and M20.

Chief executive Marillyn Hewson, speaking to reporters in mid-March, confirmed that the company is building on “several breakthroughs” derived from its short-lived HTV-3X Blackswift hypersonic testbed, which ended at the turn of the last decade, to develop “a controllable, low-drag aerodynamic configuration capable of stable operation from take-off to subsonic, transonic, supersonic and hypersonic [speed] to Mach 6”.

Hewson, while displaying an artist’s rendering of the SR-72, says it would cost “less than \$1 billion” to develop and fly a demonstrator aircraft the size of an F-22 Raptor.

Devised by Lockheed’s Skunk Works division, the SR-72 employs a turbine-based combined cycle propulsion system to get above “Mach 1.5 to 2.0”. At this point it would begin converting to a supersonic combustion ramjet for speeds beyond M6.

Rob Weiss, head of Skunk Works, confirms the SR-72 would be an unmanned vehicle, at least at first – Hewson says the company’s long-term ambition is to “enable hypersonic passenger flights and easier access to space”.

The company’s militarised spin-offs could include an air-breathing, hypersonic reconnaissance aircraft, or perhaps even future fighters and bombers.

Weiss says there is government interest but currently no programme of record. He believes the Defense Advanced Research Projects Agency might want to pick up where Blackswift ended and launch a proof-of-concept demonstration.

Lockheed revealed the SR-72, the next-generation version of the famed SR-71 Blackbird, in 2013 and has said it hopes to introduce a reusable hypersonic aircraft in the mid-2020s.

The challenge is to transition through M3, as modern turbojet engines are only capable of powering an aircraft to M2.2, while typical ramjets do not work below M4.

Hewson and Weiss point to Lockheed’s investments in hypersonic propulsion technology and high-temperature materials, but give no further detail on the propulsion system. ■



**Answers sought
after Flydubai crash**
THIS WEEK P10

THIS WEEK

PROGRAMME STEPHEN TRIMBLE WASHINGTON DC

CS100 on the home stretch

Successful European route-proving trial ushers in software update to ensure smooth EIS

Bombardier is nearing the end of software development and route-proving flights for the CS100, but Swiss International Air Lines confirms that entry-into-service (EIS) is now expected in July – about a month late.

Now running over 2.5 years behind its original schedule, the debut of the first member of the CSeries family is being handled with exceptional caution.

Bombardier has promised the aircraft will achieve 99% dispatch reliability at entry into service (EIS) and 99.5% two years later. That level of reliability tracks above the industry standard.

But Bombardier has invested significantly to field an aircraft with few of the normal “teething” issues expected at EIS for commercial aircraft types, says Rob Dewar, its vice-president for the CSeries programme.

That will soon be tested, with the release of the next software update. The CSeries test fleet, including the first P1 production aircraft, is flying with Build 6 software. But the Build 7 standard is the EIS software load, adding



**PROPELLION
STEPHEN TRIMBLE
WASHINGTON DC**

GEnx-1B design modified due to ice damage risk

A new modification for the most advanced version of the GEnx-1B engine alters one of the fuel-saving features added to the Boeing 787 propulsion system.

Despite the design change – required to avert icing-derived fan damage – manufacturer GE Aviation says the closely-scrutinised fuel burn figure for the 787 fleet will not be affected: “No performance impact [is] expected,” it says.

GE engineers are shaving about one-tenth of an inch from a layer of abradable seal material surrounding the ring of fan blades.

The Cincinnati-based manufacturer issued a new service bulletin recommending the design change on 11 March. The US Federal Aviation Administration followed up a week later making the modification mandatory on all GEnx-powered 787s.

The FAA states that its move follows a “blade-rub event” at 20,000ft that resulted in fan imbalance, “substantial” engine damage and a “non-restartable” loss of power.

The problem is caused by ice build-up on the fan blades, which, when it is abruptly shed, causes an imbalance in the fan. As a result, the blades rub too hard against the abradable seal, causing so much damage inside the engine that it cannot be restarted in flight.

An investigation determined that the problem was unique to the most advanced version of the GEnx-1B engine – the performance improvement package (PIP)-2 – which allowed GE to meet Boeing’s fuel-burn targets on the 787.

One of the fuel-saving PIP-2 features includes tightening the space between the blades and the abradable seal material, reducing air flow leakages that make an engine less efficient – but that appears in turn to have made the chances of a damaging contact more likely. ■

SAFETY

Brussels blasts prompt security fears

With Belgian investigators sifting through the wreckage of the departure hall at Brussels Zaventem airport after twin suicide bombings on 22 March, renewed focus has been placed on the challenge of how to tighten security in such a space.

In the aftermath of the atrocity, which killed at least 11 people and left more than 90 injured, the airport operator was forced to defend security at the site. This had been at an enhanced level, due to a heightened threat on the Belgian capital since late last year. The operator pointed out the entrance hall was public, and it did not have the capacity to impose controls at the terminal entry.

Very few airports outside Israel subject passengers to screening at terminal entrances. Critics of that strategy contend it achieves little other than moving vulnerable queues elsewhere.

Belgian federal prosecutor

Frédéric van Leeuw confirms two devices were detonated at Zaventem, exploding within seconds of each other at 7.58am near the check-in desks of rows 11 and two in the departure hall, ahead of the security screening area. ■



Zaventem airport operator has been forced to defend its security



SAFETY DAVID KAMINSKI-MORROW LONDON

Answers sought after Flydubai crash

Boeing 737-800 was destroyed after high-speed impact at Rostov-on-Don in poor weather conditions after an extended hold

Russian investigators are analysing cockpit-voice and flight-data recorder information to understand the loss of control which led to a high-energy impact by a Flydubai Boeing 737-800 at Rostov-on-Don airport.

None of the 55 passengers – mostly Russian and Ukrainian – and seven crew members survived the loss of Flydubai flight FZ981, at 03:40 local time on 19 March. The aircraft had been attempting a second night-time approach to Rostov's runway 22, after an extended hold, although investigators have yet to confirm whether the crew had been trying to abort the second landing attempt at the time of the crash.

Unverified video images, apparently from surveillance cameras, purporting to show the accident sequence, appear to indicate the aircraft had entered low cloud and then descended steeply and rapidly. Investigators have not authenticated the footage.

WRECKAGE

The wreckage field was highly localised, focused 300m beyond the runway threshold, and the fragmentation of debris is consistent with a high-speed impact from a steep descent – similar in appearance to that left by the Tatarstan Airlines 737-500 after its near-vertical dive into Kazan airport during a go-around in November 2013.

FZ981 had been due to arrive at around 01:40 but airport meteorological data shows it was subject to rain, reduced visibility and strongly gusting winds at the time of the initial approach.

The weather did not improve and, at the time of the accident, the airport was experiencing wind gusts approaching 50kt (92km/h).

Rostov sensors recorded the wind direction as being mainly from the south-west and when assessed in relation to the runway direction, the gusts would have generated a crosswind component of around 25kt. The inquiry has yet to confirm whether this would



Debris field was highly localised, focused 300m beyond threshold

have been within the operating limit. Russia's Interstate Aviation Committee (MAK) – heading the inquiry – says it is gathering information on weather conditions.

"The airport was open and we were good to operate," said Flydubai chief executive Ghaith Al-Ghaith, in a briefing shortly after the crash. "How did [the weather] affect this unfortunate accident? It's too early to tell."

Russia's aeronautical information publication shows Rostov's navigation charts for runway 22 have a specific warning to pilots to expect "increased turbulence and windshear" during final approach.

Flydubai passed the IATA operational safety audit last year, compulsory for membership of the association, and disclosed it had joined as a member airline 10 days before the accident.

The MAK has extracted information on the accident sequence

up to the point of impact from the flight-data and cockpit-voice recorders, despite substantial damage. Rostov-on-Don has a Category I instrument landing system, but the inquiry has yet to confirm the type of approach being conducted at the time.

"I can confirm, as far as I can see, there was no distress call"

GHAITH AL-GHAITH
Chief executive, Flydubai

No emergency call was made, Al-Ghaith says: "I can confirm, as far as I can see, there was no [distress] call." The flight's Cypriot captain had 5,965h and the Spanish first officer 5,769h, he states: "That's quite experienced."

The aircraft (A6-FDN) was around six years old and had been among the initial jets delivered to

Flydubai, entering the fleet in January 2011. Al-Ghaith says it had undergone a routine maintenance C-check with Jordanian specialist Joramco on 21 January.

The MAK has expressed concerns at evidence of deteriorating piloting skills during approach and landing and on the go-around.

STANDARDS

It outlines unease in an analysis of civil aviation safety in 2015 for states under its watch.

Although safety statistics were relatively good, the authority highlights an event last November at Osh, Kyrgyzstan, in which an Avia Traffic 737-300 sustained engine and undercarriage damage in a hard touchdown in fog but then executed a go-around.

The crew started diverting to Bishkek but the aircraft was badly damaged, experiencing failures in two hydraulic systems and its starboard engine, and returned to Osh, where it suffered a landing-gear collapse. The MAK says investigations in recent years, including of the Osh accident, have found areas of concern.

These include loss of control skills on approaches under instrument conditions from Category I to Category IIIa, as well as lack of knowledge of go-around procedures.

Investigators last year attributed the crash at Kazan to the crew's attempt to pursue an unstable approach before aborting and losing control. ■



Six-year-old narrowbody entered service in 2011 was one of 50 ordered by low-cost carrier in 2008



CFM guides Leap toward next hurdles
NEWS FOCUS P13

THIS WEEK



First flight of the engine took place in Tucson, Arizona aboard company's 747-200 flying testbed

PROPELLION STEPHEN TRIMBLE WASHINGTON DC

Trent 1000-TEN faces delay

Manufacturer confirms one-year hiatus to service entry of more efficient 787 powerplant

Rolls-Royce confirms an upgraded version of the Trent 1000 engine for the Boeing 787 – to cut fuel burn to originally promised levels – will be delayed a year before entering service, even as it kicked off flight testing of the powerplant.

The UK manufacturer had planned to certificate the Trent 1000-TEN upgrade by the end of 2015, with deliveries beginning in 2016 for the 787-8 and 787-9.

Certification and service entry have been pushed to mid-2016 and 2017, respectively, R-R says. Its schedule allows “flexibility”, it adds, but it has not specified

reasons for the delay.

“Our customers are aware and understand this change,” R-R says. “This allows us to ensure we have an engine with even better maturity, robustness and durability.”

The Trent 1000-TEN, launched in mid-2012, is the third planned upgrade of the engine family that entered service with the 787-8 in late 2011. Though sometimes thought of as exclusive to the 787-10, the Trent 1000-TEN is available for the 787-8 and 787-9 first. It is expected to be introduced on the -10 in 2018.

First flight of the powerplant took place on 22 March, utilising

the company’s 747-200 testbed.

The new engine enhances fuel efficiency across all three variants by 2%, according to R-R, using technology developed for the Trent XWB and the Advance3 technology demonstrator.

For the 787-10, the Trent 1000-TEN raises power levels to 76,000lb-thrust (338kN) initially, with the capability to rise to 78,000lb-thrust if needed. Two previous upgrades have been introduced – Package B and C – but the Trent 1000-TEN is needed both to reach Boeing’s fuel burn target as well as to match the -10’s thrust requirement. ■

SURVEILLANCE

U-2 upgrade is missing link in unmanned age

Lockheed Martin will add a beyond-line-of-sight communication relay to the U-2S high-altitude surveillance platform – a capability not easily matched by its unmanned successor.

The Dragon Net upgrade will equip the U-2 with an L-3 Communications satellite modem, enabling ground forces to call up imagery from intelligence databases. The U-2S carries a Dragon Fly modem, allowing soldiers to relay full-motion video to each other over miles. That matches the capability of the Block 20 version of the Northrop Grumman RQ-4 Global Hawk’s battlefield airborne communications node.

The upgrade is within Lockheed’s strategy of proving the manned aircraft’s relevance against the US Air Force’s RQ-4s.

“It allows you to start merging weapon systems,” says senior business development director Scott Winstead. “That’s what the U-2 does, whereas the Global Hawk has three variants.”

While the RQ-4 is being adapted to carry the manned platform’s main optical sensor, this requires its radar to be removed, whereas the U-2 can fly with both. Lockheed aims to replace the U-2 and RQ-4 with its stealthy, unmanned TR-X development. ■

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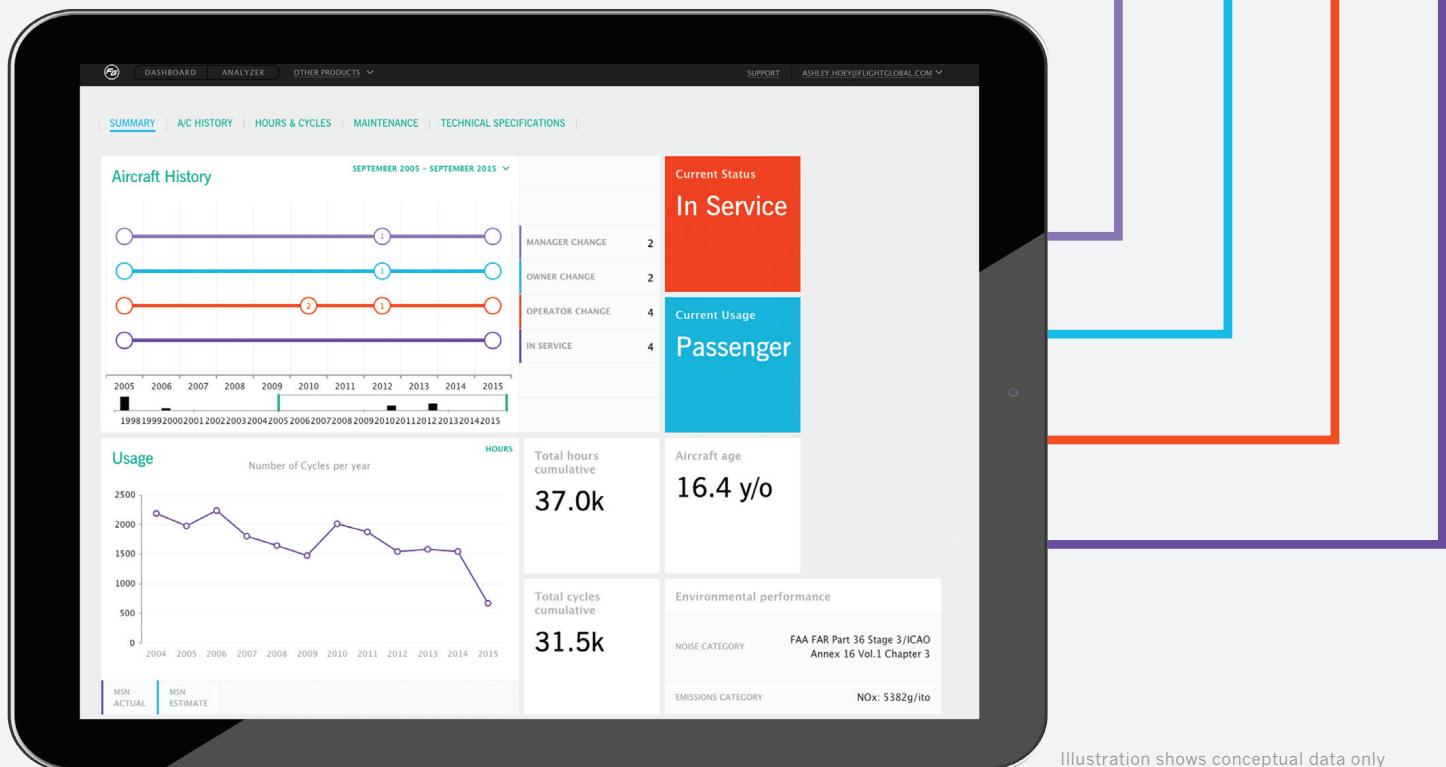


Illustration shows conceptual data only



PROPELLION DOMINIC PERRY CINCINNATI

CFM guides Leap toward next hurdles

Joint venture readies manufacturing system for dramatic production ramp up as service entry for new powerplant nears

Despite its relatively untroubled path toward service entry, the CFM International Leap engine series continues to be dogged by allegations – strenuously denied – that the narrow-body powerplant is not meeting performance specifications.

To raise the issue in interviews provokes visible irritation from CFM executives.

Allen Paxson, executive vice-president at the GE Aviation-Snecma joint venture, is no exception. He displays no anger, but there is a sense of exasperation when the subject arises, as though he cannot understand why he is being asked to repeat himself.

"We are running the engines now on the ground and they are right on specification – and I'm talking 10,000th of a percent. We are right there," he says.

PERFORMANCE

"We are very, very confident. Is it done? No, because we have not delivered [a production engine]. But the engines are drinking the amount of fuel to meet our specification level, so we are there."

And just in case the point was not grasped, he adds: "They have demonstrated specification level performance: they have demonstrated that on the flying testbed and on the ground. I'm 100% confident that we will deliver specification-level performance."

To some extent, CFM's focus is shifting from testing and certification – although the latter is still to come on the -1B for the Boeing 737 Max – to service entry.

Its first production engines for the A320neo will be handed over to Airbus in March or early April, says Paxson, ahead of first customer delivery in the second half of 2016.

Airbus has not named the airline due to receive the initial Leap-equipped Neo, but Paxson says CFM is working with six to eight customers "who are preparing for entry into service in the second half". And with the 737



Jeremy Dwyer-Lindgren

Flight tests of the -1B aboard the Boeing 737 Max began in January, despite no engine certification

Max to arrive in 2017, some 50 airlines will receive Leap engines over the next three years, he adds.

Paxson describes the Leap-1A as the most successful flight-test programme "in our history – either as GE or CFM", having accumulated over 1,340h on the engines to date. Airbus has been flying the Leap-equipped A320neo "without any interruptions", he says – a nod to the more troubled flight-test phase of the rival Pratt & Whitney PW1100G.

The CFM powerplant was also the first engine to fly on the larger A321neo, although its flight-test

yet to be made on the remaining 37% of orders, according to Flightglobal's Fleets Analyzer database.

Meanwhile, on the other side of the Atlantic, Boeing has begun flight tests of its 737 Max 8. As of 22 March, it had performed over 60 flights using the Leap-1B-powered aircraft, amassing 150h on the engines since its 29 January first flight.

APPROVAL PROCESS

However, engine certification has yet to be achieved, an unusual, albeit not unheard of situation.

Paxson says that joint approval from the US Federal Aviation Administration and European Aviation Safety Agency is "weeks away", with all tests complete and the paperwork submitted.

"The bottom line," he says, "is that Boeing has what [it needs] to go fly with full confidence and get the airplane ready."

Even as the flight testing progresses though, CFM is continuing its own trials to ensure the maturity of its production system when the Leap engine enters service.

Those stress tests – which mimic output 12-18 months in the future – are not only examining CFM's own manufacturing sites, but those of its major suppliers, and even from the tier below.

"Every sub-tier to our suppliers is critical to the process. It is part of the risk abatement in the build-up," says Paxson.

Output this year is 140 engines, split 50:50 between GE and Snecma's respective facilities in Durham, North Carolina and Villaroche, France. The figure doubles each year, with CFM intending to produce 400 Leap engines in 2017, 1,000 in 2018, and 2,000 in 2019 as it tackles the 10,400-plus backlog across three variants, which also includes the -1C for the Comac C919.

The ramp-up is rendered more complicated, however, by the fact orders for its CFM56 powerplant, which equips both the A320neo and 737NG, have stayed strong; backlog for the engine sits at over 3,200.

2015 saw 1,612 deliveries of the CFM56, a record, "and we will break that again this year", says Paxson, with output targeted at around 1,700 units. That will be "peak" production for that model, he says, with production progressively reduced through 2019 until it is making "a handful a month".

"We didn't originally plan for 2016 to be the peak, we thought it was 2015. But both airframers – Airbus and Boeing – are going up the rate curve," he says. ■

"We are running the engines now on the ground and they are on spec – 10,000th of a percent"

ALLEN PAXSON
EVP, CFM International

progress was temporarily curtailed after the aircraft suffered a tail-strike in early February.

The Leap-1A has also maintained its sales lead over the PW1100G, with a 34% share of the market, against 29% for the P&W powerplant; engine selection has



PROGRAMMES

First production 737 Max enters final assembly

Boeing has embarked on production of the first customer 737 Max, due to be delivered to Southwest Airlines next year.

Vice-president of marketing Randy Tinseth referred to the development during an investor conference in London on 16 March. "This week we started to roll down the production line the first airplane that will deliver to Southwest, next year," he said. "So it's an exciting time."

The CFM International Leap-1B-powered aircraft, in final assembly at the Renton facility, already has Southwest's colours painted on the Max 8's characteristic split wing-tips.

"We have now started to roll down the production line the first 737 Max that will deliver to Southwest"

RANDY TINSETH

Vice-president marketing, Boeing

Tinseth stresses that the programme was on track, noting the encouraging performance of the aircraft during the initial stages of the flight-test campaign.

Boeing has also begun work on a 777 with an enhanced-capacity interior, with the first example due to roll out in the third quarter. The airframer had previously disclosed that it was attempting to increase seating in the twinjet to prolong its appeal ahead of the arrival of the 777X in late 2019.

This would give customers the ability to add up to 14 more seats in a two-class layout through a re-configuration option that sees changes to the rear passenger lavatories, along with modifications to seat rails in the rear of the cabin.

In addition, an aerodynamic clean-up of the airframe and performance tweaks to its GE Aviation GE90 engines should deliver a 2% improvement in fuel burn per trip. ■

INQUIRY DAVID KAMINSKI-MORROW LONDON

Sinai A321 crash analysis points to 'criminal activity'

Investigators refer case of MetroJet flight that disintegrated over Egypt to attorney general

Egyptian investigators have referred the case of the crashed MetroJet Airbus A321 to the country's attorney general after receiving a Russian analysis pointing to sabotage.

Investigation committee chief Ayman El-Moqadem says the inquiry received the analysis on 14 March. He says it "suggests suspected criminal activity" in the destruction of the A321 over Sinai on 31 October last year, adding that the committee has "referred the matter" to the Egyptian attorney general.

The probe has yet to reach a conclusion, but several government officials have publicly said that the probability is an explosive device brought the aircraft down.

El-Moqadem says the airframe, at over 18 years, was relatively old and that the process of gathering its maintenance and technical records is "very time-consuming". The inquiry is "still awaiting a number of documents", he adds.

Wreckage and debris from the A321 have been transported to Cairo airport for analysis.



Debris patterns indicated that the aircraft had broken up in flight

"It is planned that the wreckage will be laid out so that experts will be able to determine the type of fuselage disintegration that occurred before the [aircraft] crashed," says El-Moqadem.

He says the technical investigation will continue, but the committee is prepared to assist the attorney general if required.

Meanwhile, Russian authorities have formally grounded Kogalymavia, which owned the MetroJet brand. Kogalymavia had been the subject of a federal audit days after the 31 October 2015 crash and air transport regulator Rosaviatsia says the airline has

been barred from operating domestic and international routes.

An inspection of the carrier in February found it had effectively stopped flights. Rosaviatsia says the arrears of the company have not been eliminated and its economic condition has been "very unsatisfactory" for two consecutive quarters. Russia's federal tax service has sought a declaration of bankruptcy against the company, adds the regulator.

Rosaviatsia says Kogalymavia is in a condition where it "cannot safely perform" commercial air transport, and grounded the carrier effective 15 March. ■

CONNECTIVITY JON HEMMERDINGER WASHINGTON DC

Gogo expands Air Canada 2Ku deal

Air Canada is to equip its long-haul widebody fleet with Gogo's 2Ku satellite-based connectivity system, expanding its relationship with the in-flight wi-fi provider.

Installations will begin in the

third quarter on the mainline carrier's Boeing 777s and will eventually encompass its entire twin-aisle inventory. However, the Montreal-based airline is still evaluating whether to install the system on the 767s operated by

its low-cost subsidiary Rouge.

The installation timeline has not yet been finalised, it says.

Air Canada's widebody fleet includes eight Airbus A330-300s, eight 787-8s, six -9s, 17 777-300ERs, six 777-200LRs and 17 767-300ERs, according to Flightglobal's Fleets Analyzer database. Rouge also operates 15 767-300ERs, it shows.

All Air Canada's narrowbody aircraft already have Gogo inflight connectivity. It promises 2Ku data transfer rates of up to 73Mbps, eventually rising to 100Mbps. ■

See Feature P30



Installations will begin on airline's 777s during the third quarter



Transport minister Robert Goodwill does not believe a fresh investigation is required and defers to studies being carried out by EASA



Jacob Rijin/REX/Shutterstock

SAFETY DAVID KAMINSKI-MORROW LONDON

Fresh scrutiny for aerotoxic syndrome

UK politicians call for independent inquiry into risk of contaminated cabin air and demand installation of monitoring systems

Members of the UK Parliament have pressed for an independent inquiry into the risk of contaminated cabin air and are seeking the installation of monitoring systems on aircraft with bleed-air systems.

The matter was debated by a backbench business committee on 17 March after being raised by an opposition Labour party member, Jonathan Reynolds, and put to transport minister Robert Goodwill. Reynolds said the Unite trade union was acting on behalf of 61 cases of "aerotoxic syndrome", in which contaminated cabin air is suspected to be linked to illness in crew and passengers.

Referring to two cases involving the separate deaths of two British Airways crew members, with questions over whether cabin air quality might have played a role, the matter "must be treated seri-

"We are obviously very keen to look at how we can work to get further information"

ROBERT GOODWILL

Transport minister, UK government

ously", he adds.

"No-one disputes that fume events, where toxins enter the cabin, occur," he says, adding that the frequency is estimated at once in every 2,000 flights. "It should be of great concern that no aircraft currently flying has any form of detection system fitted to warn crews when cabin air has become contaminated."

Reynolds, with the backing of other parliamentary members, has asked the minister to consider an

independent inquiry into the matter, and says the government could consider legislation to mandate monitoring equipment on aircraft or, at least, begin discussions with carriers.

Goodwill responds by pointing out that the inquests into the deaths are still open, but that evidence so far "does not support the view" of a connection to contaminated cabin air.

LONG DEBATE

He points out that cabin air safety has been a subject of debate, punctuated with in-depth studies, for over a decade.

The collective assessments commissioned by the government led to a committee on toxicity publishing a position paper which recognised that – although contamination from engine oil products occurs, and although

episodes of illness have occurred shortly after – the level of chemicals in bleed air would need to occur in far higher concentrations, than those found in the studies, to cause serious toxicity.

"But we are obviously very keen to look at how we can work to get further information," says Goodwill, pointing out that the European Aviation Safety Agency has conducted a cabin air measurement exercise, the results of which are due later this year. These will be used to prepare for a larger-scale project.

Goodwill adds that the issue is "complex", with "little evidence to show that a change is needed".

He says: "We need to be very careful about using the precautionary principle. We need to look at the actual evidence." He is pleased that additional research will be carried out, he adds. ■

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INFRASTRUCTURE

Norwegian backs Gatwick growth with 787 promise

Norwegian's chief executive Bjørn Kjos has pledged to base more than 50 Boeing 787s – almost double the number the airline has on order – at London Gatwick if the airport is allowed to build a second runway.

"A Gatwick second runway would allow us to be even more ambitious in our plans for long-

haul growth in the UK," Kjos told the Aviation Club in London on 17 March. With almost 8% of capacity, Norwegian is Gatwick's third-largest carrier, Innovata schedules show. The low-cost airline has nine Dreamliners in service and 26 787-9s on order, Flightglobal's Fleets Analyzer database indicates. ■



Norwegian

Carrier would station over 50 Dreamliners at expanded airport

INCIDENT

DAVID KAMINSKI-MORROW LONDON

Serious runway incursion spurs safety inquiry

French investigators are looking into a serious runway incursion during which a Dornier 328 departed over an Embraer 190 at Basel, Switzerland.

The SkyWork Airlines turboprop (HB-AEO) had lined up on runway 15 – having entered from taxiway G, 1,500m (4,920ft) along the 3,900m runway – for departure to the Swiss capital Berne.

French investigation authority BEA states the KLM Cityhopper 190 had "simultaneously" been travelling along taxiway D for an opposite-direction departure on runway 33.

Taxiway D is separated from taxiway G by 1,300m.

BEA says air traffic control instructed the Cityhopper jet (PH-EXB) to hold short of runway 33, but the pilot read back the phrase "line up and wait", and entered the active runway.

The 328 had started its take-off roll and the situation resulted in the turboprop becoming airborne and flying over the jet.

BEA says the incident involved SkyWork flight SX521 on 7 March.

Although the investigators have not given the time, the flight is scheduled as a daylight operation and meteorological data for Basel indicates weather and visibility were good. ■

SAFETY DAVID KAMINSKI-MORROW LONDON

United fights cowl key plan

Carrier lodges objection to European proposal aimed at addressing A320 safety concern

United Airlines has strongly objected to proposals aimed at reducing the risk of Airbus A320 cowl-door loss by mandating the installation of a key-and-lock mechanism. It insists the problem is "solely" attributable to human error, the result of ground personnel and flight crew failing to check cowl latches are secured before departure.

The US carrier "does not believe" the new latch design – involving a flagged key which cannot be removed until the cowl is locked – will resolve the issue.

It says the proposal still relies on a visual cue and that previous similar strategies, such as the use of high-visibility paint or door props, have been ineffective.

"If the mechanic [or] flight

crew is negligent and inattentive, the key [and] flag will just as likely be missed," it says in a formal response to the European Aviation Safety Agency consultation. United also points out the use of a key – to be stored in the cockpit – presents complications.

NEW PROBLEM

If the key is mislaid, or becomes damaged and stuck in the lock, this could mean the cowl cannot be opened or closed, preventing maintenance work and keeping the aircraft out of service.

United says it stands against "attempting to solve one problem by introducing a new one". The airline says it has previously implemented cowl improvements and preventative modifica-

tions, including door props and high-visibility latch paint.

But it adds it has taken additional procedural steps to reduce the risk of cowl-loss, notably introducing a dual sign-off requiring a second person to inspect and verify a closed cowl is properly latched.

United says these changes, particularly the dual sign-off, have proven "greatly effective" because they impose accountability on the maintenance team. The carrier says it has not suffered a cowl incident since 2006.

The European regulator says that an airline will be able to apply for an alternative means of compliance to the directive, as long as it provides sufficient data to support its request. ■



Max Kingsley-Jones/FlightGlobal

Airline argues that internal process changes, notably dual sign-off, have enabled it to resolve issue



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MAINTENANCE ELLIS TAYLOR BRISBANE

Fokker deal makes stronger Alliance

Agreement for charter carrier to buy surplus jets from Austrian counterpart brings multiple positives for both parties

Alliance Airlines' deal last year with Austrian Airlines for 21 Fokker 100s and Fokker 70s was good news: not only has the Australian charter carrier gained a major source of spares, but also new business areas and a new major shareholder.

The relationship between Alliance and Austrian started in 2014, when the former outsourced heavy checks on two F100s to the latter's Austrian Technik Bratislava (ATB) subsidiary. Last year Alliance stopped doing heavy structural checks at its Adelaide and Brisbane bases to outsource them to ATB.

TOUGH MARKET

"That was one of the big changes, we had to make the business sustainable, because it is a tough market," says Alliance's managing director, Scott McMillan.

Under the arrangement with ATB, Alliance ferries Fokker jets to Bratislava, Slovakia, over the European summer for heavy checks, although it maintains the capability to do major maintenance items in-house.

When Lufthansa announced last year Austrian's regional fleet would transition to Embraer 190s and E195s, McMillan approached the airline with the aim of acquiring its surplus assets.

"The aircraft are good quality; [Austrian] didn't anticipate [it]

would be phasing them out as early as this," he says.

Negotiations took a little over six months, and Austrian held talks with other parties. In the end, the simplicity of Alliance's proposal to take the whole fleet won and the deal was announced in November. The \$15 million sale involves \$9.5 million in cash with the remainder paid in Alliance shares. That arrangement made Austrian the largest single shareholder in the Australian carrier, with 12%.

While he admits the transaction is out of the ordinary, McMillan says Austrian is fully supportive of its investment.

"[Austrian recognises] we will earn good money out of these aircraft. [It is] a shareholder, so [it can see] that there is upside in our share price," he says.

Over the next year, the 21 aircraft will transition from Austrian to Alliance as they enter major maintenance events, such as engine changes or heavy checks. Transfer will occur at Bratislava before they enter maintenance with ATB.

McMillan says the agreement is flexible, with Austrian able to retain aircraft longer if needed, with a subsequent adjustment in the sale price.

Alliance is already the largest operator of Fokkers, but McMillan says the 21 jets will not be added

to its fleet. "We have no intention of bringing those aircraft to Australia," he explains. "We've got our fleet the right size – what we're doing is making our fleet more efficient, increasing utilisation." Instead, the business case for acquiring the aircraft was built on parting out the jets for its fleet, and allowing for the trading of parts.

"If we end up with four or five of these aircraft leased out, it's just good additional business"

SCOTT MCMILLAN

Managing director, Alliance Airlines

However, buoyant demand for Fokkers means some aircraft will be put to use elsewhere.

Despite the jets being out of production since the early 1990s, they have enjoyed a renaissance in Australia, with Virgin Australia Regional Airlines and Qantas's Network Aviation adding F100s to their fleets in 2015. Similarly, Papua New Guinea flag-carrier Air Niugini is acquiring ex-KLM Cityhopper F70s, and plans to take its fleet of the type to nine by 2017.

Alliance has moved to capitalise on demand for the aircraft. It recently signed an agreement to

sell three of the F100s to another operator, and is in talks to lease out another. It is also exploring further lease opportunities.

"If we end up with four or five of these aircraft leased out to other people, it's good additional business and that just leverages off the skill sets that we've got here," says McMillan.

The airline will use a large portion of the jets for spares for its operational fleet, and to trade to other carriers. It has already seen strong interest from other Fokker operators in the Rolls-Royce Tay engines, and McMillan says Alliance is working with R-R to place some of those powerplants.

LEASE OPTION

Alliance wants a European charter and wet-lease operation that could use some of the jets, and McMillan notes there is strong demand for narrowbody wet-leasing during the European summer. While it would like to do so on its Australian air operator's certificate (AOC), issues with the nation's Civil Aviation Safety Authority (CASA) mean it will likely seek another option.

"We would prefer to do that on an Alliance AOC, but because of the difficulty in CASA understanding good regulatory and commercial outcomes, it may mean us setting up a European AOC," says McMillan. ■

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CFM International

STRATEGY MURDO MORRISON LONDON

Single-minded Safran looks to power up in aerospace

Chief executive Philippe Petitcolin says the French group is keen to add to its assets

Safran is easily Europe's most diversified aerospace company, with a range of businesses covering airliner, helicopter and space rocket engines to security detection systems and landing gear to unmanned air vehicles.

A year into the top job, however, and chief executive Philippe Petitcolin is keen to slim down the partially state-owned group's sprawling portfolio, divesting non-core subsidiaries in security, and using the proceeds – as well as revenues from Safran's stake in the booming CFM International joint venture – to invest in enterprises in aerospace equipment that "fit our DNA".

At the same time – a decade after Safran came into existence with the merger of French household names Snecma and Sagem – he wants to create a group identity by rebranding its many operating companies. This will see some of the biggest names in aerospace, such as Snecma, Turbomeca, Labinal and Messier-Bugatti-Dowty, begin to disappear later this year.

"We are 10 years old as a company and it is time to act and think as one Safran," says Petitcolin, a 28-year veteran of the group, who previously ran engine maker Snecma and wiring specialist Labinal.

PROPELLION

Relentless demand for commercial aircraft means Safran's aerospace propulsion business continues to dominate its revenues. Safran and GE Aviation each own 50% of 40-year-old CFM International, whose CFM56 and Leap engines have a roughly three-quarter share of the narrowbody market, powering Boeing 737s and its 737 Max successor, and about half of all Airbus A320- and A320neo-family jets. The propulsion segment – which also includes its Aircelle nacelle and Turbomeca helicopter engine subsidiaries – made up 54% of Safran's €17.4 billion (\$19.6 billion) 2015 revenues.

With the Leap-1A engine certificated and a backlog stretching into the 2020s, a smooth transi-

sition from the CFM56 has been a priority for Petitcolin and his team. Both main versions of the engine – it will also power the Comac C919 – are in build, with the Leap-1A-powered A320neo entering service this year, and the 737 Max's Leap-1B in 2017.

Production is on track to increase from around 100 units this year to 500 in 2017, 1,200 the following year, 1,800 in 2019 and "2,000 plus" in 2020. "If we can deliver 500 next year, then we will be on track," says Petitcolin.

Under the partnership terms, Safran provides half the technology for CFM and assembles one in every two engines in Paris. The ramp-up to the Leap comes as production of the CFM56 holds steady, with expected output in 2016 of between 1,620 and 1,650 units, slightly up on last year's total of 1,612, says Petitcolin, who succeeded Jean-Paul Herteman in April 2015.

"We have done everything we can to secure the ramp-up and de-risk [the Leap programme] as much as possible," he says. The fact 80% of the supply chain is common to both programmes helps, he adds.

CONSOLIDATION

Despite speculation it would be followed by further consolidation, the creation of Safran in 2006 was the last big coming together in European aerospace. While GKN and General Electric have made modest purchases, the failure of the EADS marriage with BAE Systems in 2012 was the closest Europe has got to a major industrial restructuring after the turn of the century wave that created Thales, MBDA, Finmeccanica, BAE and EADS (now Airbus Group). But in retrospect, the merged company has become increasingly dominated by legacy Snecma group activities.

Safran quickly divested Sagem's communications products division and, while Petitcolin is "happy" with the "niche" Sagem defence business – it makes up about 7% of revenues – he has announced a review of the former Sagem's security activities, with the explosives detection



Airbus Helicopters

Turbomeca Arrano engines exclusively power the new H160



Lockheed plays air dominance hand
DEFENCE P22

PHILIPPE PETITCOLIN

business up for sale. Following a string of acquisitions, the security arm turns over around €1.8 billion. However, developing synergies with the remainder of the group's operations is not easy, admits Petitcolin. "We are looking at the rest of the security business for opportunities, and don't rule out any options," he says.

A divestment would leave aerospace even more at Safran's heart, where engines are the main driver. Aside from CFM, Safran also risk shares with GE on its GE9X, GEnx and GE90 programmes. It also builds the Sukhoi Superjet's PowerJet SaM146 with Russia's NPO Saturn, and, on the military side, makes the Dassault Rafale's M88, and is a partner in the Airbus A400M's Europrop International TP400. Airbus Helicopters is the main customer for its Turbomeca rotorcraft engines business, while Microturbo specialises in auxiliary power units and engines for target drones and missiles.

ELECTRICAL SYSTEMS

In the 2000s, Safran also entered the business jet market with Silvercrest. However, the engine, which will exclusively power the Dassault Falcon 5X, is two years behind schedule. Also part of its propulsion activities is the Aircelle nacelle business, which Petitcolin admits "has been a bit weak", although wins on the A320neo for the Leap engine and on the Rolls-Royce Trent 7000-powered A330neo have given it a boost. Meanwhile, its Labinal electrical systems and Messier-Bugatti-Dowty landing gear and brakes units are "number one in the world and self-sustaining", says Petitcolin.

Under the terms of its covenant with GE, Safran is restricted from developing an engine in the 18,000-50,000lb-thrust (80-222kN) segment outside CFM be-



Franck Juery/CAPA Pictures/Safran

Petitcolin is a 28-year veteran of the group, and was made chief executive of Safran in April 2015

fore 2040. But on either side of that range – either in regional or widebody engines – it is free to explore opportunities. "CFM will remain the core of our strategy for 25 years," says Petitcolin. "Outside CFM, we are open to co-operation that creates value for us." One option may be "working with the Russians" on a higher-thrust engine for a larger version of the Superjet. "It is under discussion. We will look at it," he says.

Following the example of Airbus, and latterly Finmeccanica, Safran is the latest European group to announce it plans to bring its legacy businesses under a single umbrella brand: from later this year, Snecma will become Safran Engine Systems, Messier-Bugatti-Dowty becomes Safran Landing Systems, and Turbomeca

changes to Safran Helicopter Engines, with other units following a similar nomenclature. Petitcolin says the move will encourage managers and employees to think, not as semi-autonomous, semi-competing businesses, but as one company.

ACQUISITIONS

With the security business looking odds-on to be divested, and the engines business going from strength to strength, acquisitions appear most likely on the aircraft equipment side.

Safran – which is 15% owned by the French government – has been repeatedly linked to a purchase of interiors specialist Zodiac. However, while Petitcolin does not rule anything out, he says there is "nothing on the

table" with the fellow French company, and, besides, with its strong cash position and lack of debt, Safran will not be forced into any move.

When it comes to talk of consolidation, Petitcolin differentiates between the commercial and defence elements of the business. In defence, where the market in Europe is dominated by a handful of companies supported by their domestic customer but facing shrinking military budgets, closer co-operation or even mergers are necessary, he says: "Everyone believes they [are the] exception."

The situation is different on the commercial side, "where we are all competing successfully as global companies", he says. "So I am not sure we need consolidation at all." ■

"CFM will remain the core of our strategy for 25 years. Outside CFM, we are open to co-operation"

PHILIPPE PETITCOLIN
Chief executive, Safran



DEVELOPMENT JAMES DREW WASHINGTON DC

Lockheed plays air dominance hand

Manufacturer of F-22 and F-35 cautions against rush to develop “sixth-generation” fighter, and looks to extend F-16 line

Lockheed Martin has warned against rushing into a “sixth-generation” fighter programme without first boosting F-35 Lightning II numbers and implementing a “robust” modernisation effort to keep the new type and the US Air Force’s F-22 capable against new counter-air threats.

The US Department of Defense has plans to buy 2,443 F-35s, but the programme has been delayed by six years – and almost doubled in cost compared with projections in 2001 – because of problems during development. However, Lockheed’s Skunk Works chief says that once fully fielded, the combination of F-22s and F-35s will achieve the air dominance that Washington desires for the next 30 to 40 years.

AIR DOMINANCE

“The quicker we can get a force structure that’s heavily populated by fifth-generation airplanes, the better,” says Rob Weiss, who has led Lockheed’s advanced development programmes office since 2013. “We should minimise the investment in fourth-generation airplanes – nothing beyond what is needed to maintain the force structure,” he adds.

His comments, made during a Lockheed media event in Washington DC in mid-March, come as the US Navy and USAF conduct an analysis of their future air dominance needs, specifically looking at what could replace the Boeing F/A-18E/F Super Hornet and perhaps also the F-15.



US Air Force

Company says updated Raptor and fully-capable Lightning II will meet US requirements for decades

The services are working together on common components, like propulsion systems and defensive suites, but are likely to proceed with separate platforms tailored to their different needs.

The USAF has suggested that some companies, like Lockheed, might push block upgrades of existing aircraft as an air dominance solution, instead of entirely new aircraft. However, Boeing needs a way back into the high-end combat jet market, as it has nothing to succeed production of the Super Hornet and F-15 at its plant in St Louis, Missouri, since its X-32 lost to the F-35 for the Joint Strike Fighter contract in 2001.

Lockheed is calling for a three-pronged approach to satisfy future fighter needs: procuring the total number of F-35s faster; implementing a more aggressive modernisation strategy for the

F-22 and F-35; and spending more time maturing sixth-generation capabilities before committing to a new aircraft programme.

“As we look at F-22s and F-35s, those airplanes have the capacity to maintain an advantage over the threat for the next 30 to 40 years, but it requires a modernisation roadmap to maintain their advantage,” says Weiss. “The pace is, in my view, too slow.”

DISTRIBUTED NETWORKS

Weiss also believes the US services could make better use of the capabilities they have through human-machine teaming, and by pairing assets through “distributed networks capable of surviving in contested environments”.

This could mean using a so-called arsenal plane that would serve as a standoff-range weapons carrier and launch volleys of missiles at targets designated by frontline fighters carrying targeting pods and other sensors. It could also mean using co-operative unmanned teammates, such as a Boeing QF-16 flying alongside manned fighters.

Meanwhile, Lockheed remains hopeful of extending production of the venerable F-16 at its Fort Worth site in Texas, beyond the “end of 2017”, by when it will have delivered the last seven aircraft from a 36-unit order for Iraq.

Susan Ouzts, the company’s F-16 programme chief, says several countries have expressed a strong preference for the type to the US government, with the nearest opportunity being a proposed \$700 million deal to supply Pakistan with eight more Block 52-standard examples.

“We’re anticipating that before the end of May we will have an indication back from Pakistan that they are buying some jets – we hope eight,” she says.

Lockheed has already begun procuring vital long-lead components in advance of securing a fresh order, but Ouzts confirms: “If we started a contract tomorrow, there would still be a few months of gap.” The company has not yet considered self-funding the production of a handful of aircraft, but she says: “There would always be a consideration of that, depending on the opportunity in the future for us.”

Last year, Lockheed delivered 11 F-16s: down from 17 in 2014, and it needs to find a buyer for its V-model variant, first flown last October. “We still believe the F-16 is incredibly relevant,” says Ouzts, adding that some nations either do not need, cannot afford or are not yet approved to acquire the F-35. “Quantities could be fairly significant; it just depends on getting the ball rolling.” ■



Xinhua/REX/Shutterstock

Last seven of 36 F-16IQs ordered by Iraq will arrive in 2017



**Back-up plan cuts
Reaper crash rate**
DEFENCE P24

ROTORCRAFT JAMES DREW WASHINGTON DC

Conversion deal saves Pave Hawk

US Air Force will start modifying 21 ex-army transports, to ease pressure on its aged combat search-and-rescue fleet

The US Air Force will begin converting 21 second-hand US Army Sikorsky UH-60L-model Black Hawks to the HH-60G Pave Hawk standard for combat rescue "this year".

Introduced during the Reagan administration, from 1982, the UH-60-based Pave Hawk fleet has been depleted from 112 to 97 helicopters. Fifty of the remaining platforms have sustained battle damage over the 15,000 rescue

missions flown since 2001, mostly in Iraq and Afghanistan.

The USAF has spent \$372 million developing and purchasing modification kits for the 21 ex-army Black Hawks, and \$71 million is earmarked in its fiscal year 2017 and 2018 budgets to complete the project and insert the aircraft into the pararescue force.

In written testimony to a congressional panel on rotorcraft modernisation on 16 March, the



US Air Force

HH-60Gs have recovered 5,400 injured US and allied personnel

air force says \$91.4 million has been requested for FY2017 to help fund modernisation of the HH-60G fleet, even as Sikorsky's new HH-60W combat rescue helicopter enters development for

use in 2020. Most of the sum will cover conversion of the UH-60L's analogue cockpit and adding a colour weather radar, forward-looking infrared sensor and refuelling probe.

Pave Hawk capacity has been a problem for the air force since the cancellation of its previous combat search-and-rescue (CSAR-X) deal, for 141 Boeing HH-47 Chinooks.

HH-60G crews have "repeatedly landed in contested areas to recover 5,400 injured American and coalition soldiers, sailors, airmen and marines" since 2001. Because of their age and high operational tempo, 37 aircraft underwent unscheduled depot maintenance last year – 38% of the fleet. ■

PROCUREMENT

Sikorsky nuclear site protection deal could value \$1.4bn

A sole-source deal to equip the US Air Force with 41 Sikorsky UH-60M helicopters to help guard nuclear-tipped intercontinental ballistic missiles at three air bases in America's far north could cost \$1.4 billion, the service says.

Testifying before Congress on 16 March, USAF military deputy for acquisition Lt Gen Arnold Bunch revealed 41 aircraft could be

acquired to replace the 25 Bell UH-1N Hueys dedicated to the role.

Bunch says the air force is weighing how desperately replacements are needed because a sole-source deal could be resisted by the "five potential industry sources" examining its requirement, or from lawmakers in states where alternative aircraft are built.

A congresswoman warned, at the

hearing on army and air force rotorcraft modernisation efforts, that it would need to make a strong argument for skipping a competition.

The USAF is likely to decide soon whether to divide a 72-aircraft requirement to replace 62 outdated UH-1Ns, with the nuclear security mission the priority. A competition for the remaining 31 or more utility aircraft could then follow. ■

ARMAMENTS BETH STEVENSON LONDON

UK set to trial precision-strike missile on Apache

MBDA is carrying out a feasibility study for the UK Ministry of Defence into the possibility of integrating its dual-mode Brimstone air-to-surface missile onto the Boeing AH-64E Guardian attack helicopter.

The one-year study contract – awarded to the missile manufacturer and Boeing last September and valued at less than £10 million (\$14.4 million) – will lead to a live firing test in the third quarter of 2016, MBDA UK managing director David Armstrong said at the company's annual results briefing in London on 17 March.

"We are under a study contract with Boeing to explore the fit of it

on the Apache," Armstrong says. The activity is likely to be carried out in the USA using an AH-64E test aircraft, but could use a US Army example, if required.

Armstrong describes the integration risk as low, and notes a large amount of the work concerns modifying fire control software.

A graphic of a UK Apache with



Craig Hoyle/MBDA

MBDA revealed Brimstone integration plan at DSEI last September

Brimstone weapons was displayed by MBDA at last September's DSEI exhibition in London.

The Army Air Corps flies a UK-specific Apache AH1 configuration, with these carrying Lockheed Martin AGM-114 Hellfire air-to-surface missiles. The service will either upgrade its existing aircraft to the E-model standard, or acquire new-build examples. US government approval for a potentially \$3 billion modernisation was granted last August.

Flightglobal's Fleets Analyzer database records the Army Air Corps as currently operating 49 Apache AH1s, with another 17 aircraft in storage. ■



RELIABILITY JAMES DREW WASHINGTON DC

Back-up plan cuts Reaper crash rate

Number of losses involving Block 1 version of unmanned MQ-9 is reduced thanks to addition of emergency electrical system

The US Air Force has avoided almost 20 crashes of General Atomics Aeronautical Systems MQ-9 Reapers since April 2015, thanks to a back-up electrical system installed as a safeguard against an undetermined problem with the starter-generator on the Block 1 version's Honeywell turboprop engine.

Speaking at a congressional hearing on army and air force unmanned aircraft programmes, US Air Combat Command chief Gen Herbert Carlisle said many Block 1 Reaper crashes have been directly linked to starter-generator failures. This resulted in an electrical safety improvement programme, which added a direct-drive, brushless alternator that can keep the aircraft flying for another 10h.

"Since last April, we have recovered 17 MQ-9s using this direct-drive, brushless alternator," says Carlisle.

According to Pentagon documents, the USAF has lost dozens of MQ-9s over the years, at a cost of



Undetermined problem with starter-generator for Honeywell engine has been linked to multiple losses

US Air Force

\$20-25 million per aircraft. Significantly more MQ-1 Predators have been lost in combat, with the latter type to be phased out by 2018. A *Washington Post* report quoted by one US lawmaker identified each of the types as involved in 10 crashes last year.

"It [the problem] has generally been centralised on the starter-generator on the MQ-9 community," says Carlisle. "The new Block 5 MQ-9 that we are producing now has a different electrical system, so it does not have the same problem."

Carlisle says the air force has

been working with the manufacturer to find the problem, and "quality control issues" have been uncovered. "We have not found the root cause," he adds.

General Atomics, which performed the first flight of a Block 5 aircraft in 2012, says the Predator B/MQ-9 Reaper "continues to maintain a 90% mission capable rate in the US Air Force inventory", with the platform amassing more than 2.2 million flight hours. The new version has a replacement high-capacity starter-generator and back-up generator. As of February, there were 134 MQ-1Bs and 176 MQ-9As in the air force inventory, says the service.

Carlisle says more than 77% of "cockpits" – referring to the types' ground control stations – are engaged in combat around the globe, with the remainder dedicated to training and testing. ■

ARMAMENTS BETH STEVENSON LONDON

Brimstone ambitions remain on target for hopeful MBDA

MBDA is hopeful its dual-mode Brimstone air-to-surface missile will be carried by General Atomics Aeronautical Systems' MQ-9 Reaper, but is waiting on requirements to prompt a new round of testing.

Nine live firings were made against moving ground vehicles at the US Navy's China Lake weapons range in California during a test campaign which concluded in January 2014; all resulting in direct hits.

"We've been in dialogue with General Atomics and have quoted prices to the customer, but the issue is finding a slot in the heavy duty workload that they have ongoing within the US and UK government Reaper programme," says MBDA UK managing director David Armstrong. It remains a priority of the UK Royal Air Force to integrate Brimstone on its current Reapers, or future MQ-9-derived Protector UAVs, he adds.

"I still hope one day it will be on US [Air Force] Reapers," says MBDA chief executive Antoine Bouvier, who is optimistic about the European company's prospects.

"Last year I was pessimistic. We'd spent a lot of time, resources and credibility focusing on the US, with limited success. However, in the past couple of months we've seen new opportunities that we are progressing with." ■

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STRATEGY DAN THISDELL MILAN

Finmeccanica heralds its new dawn

Italy's national aerospace champion is resurgent, restructured and back in profit as company emerges from a long dark ages

As Mauro Moretti puts it, 2015 marked "the end of an era" at Finmeccanica, and a new age begins with a new identity. That the resurgent national aerospace champion of Italy will adopt the name of perhaps its greatest son – Leonardo, as in Da Vinci – suggests a "renaissance". Hackneyed and even French the word may be, but for a company known all too well for financial turmoil, allegations of misconduct and the political machinations of state control, the achievements reflected in its 2015 financial performance do indeed say "rebirth".

THREE ACHIEVEMENTS

Moretti, detailing Finmeccanica's results in Milan, could boast of three achievements. One is the return to profit, for the first time since 2010, and reduction of a once-alarming net debt, on track to fall below €3 billion (\$3.3 billion) this year. A second is the completion of a restructuring strategy started by his predecessor-but-one, Giuseppe Orsi, after a disastrous 2011 that saw a net loss of more than €2.3 billion on heavy losses in power, road and rail, plus a €750 million write-down against defects in fuselage sections and horizontal stabilisers for the Boeing 787.

That strategy called for the group to be consolidated around aerospace (AgustaWestland helicopters, the Alenia and Aermacchi aircraft and aerostructures businesses, and space joint ventures including Telespazio and Thales Alenia Space), and defence and security electronics (the Selex companies in Europe



Action Press/REX/Shutterstock

Rescue team: AgustaWestland is a Finmeccanica "treasure"

and DRS in the USA). Another plank of Orsi's plan was to tighten up lines of management control and push responsibility for financial performance down to division and business level.

Orsi wanted consolidation around successful programmes, whether owned by Finmeccanica or joint ventures; such as regional turboprop maker ATR, a 50-50 joint venture with Airbus Group.

Moretti describes Finmeccanica as "much more selective" in taking orders; the eschewing of unprofitable business and cost reduction – including closing some Italian factories – has made a "more focused and stronger" group with a clear "perimeter" around core sectors.

Critically, Moretti can say that Finmeccanica today is focused in that perimeter of helicopters, aircraft, space and defence and security electronics. With the final divestments of bus, rail and energy generation companies, Finmeccanica is, finally, the company Orsi set out to make it.

But there is a third achieve-

ment, and Moretti deserves much credit for shaping the character of the group. Since January, Finmeccanica has been "one company"; what was a financial holding company is now a "great integrated industry" focused on four sectors.

This aspect of restructuring, he says, is "the turning point" and 2016 will see the transformation completed. Up to now, says Moretti: "Our customers don't know the range of our ability, just one small piece. But we can offer incredible solutions."

"Our customers don't know the range of our ability. But we can offer incredible solutions"

MAURO MORETTI
Chief executive, Finmeccanica

For 2016, a difficult market has Moretti and his team forecasting modest growth but ongoing consolidation, and improving operating efficiency.

The turnaround was no small feat. After 2011 cast a harsh light on the group's woes, things worsened with allegations that flagship unit AgustaWestland bribed its way to a lucrative VVIP helicopter sale to India. The allegations were laid to rest in 2014 but had put the group under strain and cost Orsi his job, though he was exonerated.

THE REBOUND

It might be argued that turmoil laid the foundation for the turnaround. Orsi, a former head of AgustaWestland who was chairman and chief executive, was replaced in the latter role by his finance director, Alessandro Pansa, and in the former by Gianni De Gennaro – a police chief with a distinguished career fighting organised crime – who remains chairman. It did no harm to have a former banker with a clear strategic vision and an anti-corruption champion in charge.

Moretti, then head of Italy's railways, was put in the hot seat in mid-2014, when newly-elected prime minister Matteo Renzi shook up management at state-controlled firms.

To fully appreciate the revolution, it is worth recalling that the group – its name is a contraction of "Finanziaria Meccanica" – was formed in 1948 by a war-torn Italy to oversee the reconstruction of its engineering industries. Though the state still owns 30%, the transformation from a bloated hold-all for government assets to a sharp, modern business is profound.

Hence Moretti's decision to change the name. Leonardo, he says, is easy to remember and brings to mind Italian science and technology, an evocative "symbol of our legacy".

And, that legacy will not be swept away by any rebranding exercise. "Our huge brand heritage is a treasure," says Moretti. Brands like AgustaWestland – "worth more than its weight in gold" – and Aermacchi are firmly placed in Finmeccanica's new era. ■

FINMECCANICA AT-A-GLANCE: 2015 (CHANGE V 2014) €

	Revenue	Profit*	New orders	Order backlog
Helicopters	4.48bn (2.4%)	558m (2.8%)	3.91bn (-14.2%)	11.7bn (-4.3%)
Defence & Security Electronics	5.27bn (5.7%)	424m (106%)	6.7bn (32%)	10.3bn (17.4%)
Aeronautics	3.12bn (-0.8%)	312m (31.6%)	1.74bn (-44.1%)	6.17bn (-20.2%)
Space***	-	37m (-28.8%)	-	-
Defence Systems	459m (-7.3%)	88m (-1.1%)	686m (na)	1.23bn (22.7%)
Total**	13.0bn (1.8%)	1.21bn (23.3%)	12.4bn (-2.3%)	28.8bn (-2.0%)

NOTES: *EBITDA. **Including other activities and eliminations. ***Joint ventures consolidated on equity basis. SOURCE: Finmeccanica.



PROPELLION DOMINIC PERRY CINCINNATI

GE powers toward Passport approval

Manufacturer closes on certification for new powerplant to equip Bombardier's developmental ultra-long-range Globals

Engine maker GE Aviation is in the "final throes" of the certification effort for its new Passport engine to power the Bombardier Global 7000/8000 ultra-long-range business jets.

Brad Mottier, GE vice-president and general manager of business and general aviation and integrated systems, says the required tests on the 10,000-20,000lb-thrust (44-89kN) powerplant are complete.

The manufacturer will now file documentation with the US Federal Aviation Administration, says Mottier: "I am hopeful that by [mid-May] we will be able to announce we are all done."

Although Bombardier's in-development Global 7000 and 8000 – due to arrive 2018 and 2019, respectively – are the sole application for the Passport, GE continues to discuss its potential with other manufacturers, he says.

The Passport features a 52in (132cm)-diameter titanium fan bisk – the first application of the technology on an engine of this size – and a core scaled down from the Leap airliner engines made by its CFM International 50/50 joint venture with Snecma.

GE is also continuing early development work on the first of its

new Advanced Turboprop (ATP) family engines. Announced in November after selection by Textron Aviation for its next-generation turboprop, Mottier says it is six months into "full hardcore design development work". The initial engine will be designed to deliver 1,350shp (1,010kW) and work is under way at GE facilities in Europe. The company wants to start ground runs of the test engine in 2018.

ATP final assembly will take place at a turboprop centre of excellence to be built in the Czech Republic, probably near GE's Prague site.

The manufacturer wants the ATP range – spanning the 850-1,650shp power band – to challenge the Pratt & Whitney Canada PT6, and deliver a 10% improvement in specific fuel burn over its rival. Customer engagement has driven the conclusion that "there's no point us coming out with a clone of the PT6", says Mottier.

The ATP will have an integrated propulsion control system to regulate engine and propeller, as well as variable stator vanes in the compressor and advanced three-dimensional design of the aerofoils and blades in the compressor. ■



Textron Aviation

Enhanced turboprops have a new flightdeck and refreshed cabin

UPGRADE KATE SARSFIELD LONDON

Pro Line Fusion King Airs ready for Europe roll-out

Beechcraft is preparing to deliver the first Rockwell Collins Pro Line Fusion-equipped King Air 350i/ER and 250 twin-engined turboprops to Europe, after the region's safety regulator approved the modified seven-seat aircraft on 17 March.

The Textron Aviation subsidiary says the continent is a strong market for its King Air family. The region has a growing fleet of around 260 aircraft, shows Flightglobal's Fleets Analyzer database.

"We're looking forward to getting the upgraded King Air into the European marketplace, where owners and operators have responded enthusiastically," says Textron Aviation's Kriya Shortt.

Certified in the USA on the King Air 250 in July 2015, and the 350i/ER last November, the Pro Line Fusion-equipped turboprops include a full touchscreen display and a revamped interior.

Certification of Pro Line Fusion on the King Air C90GTx is due later this year. ■

INTRODUCTION KATE SARSFIELD LONDON

First Chinese G650ER delivered

Gulfstream has delivered the first G650-series business jet into the Chinese market, after the handover of an US N-registered ultra-long-range ER variant to Minsheng Financial Leasing (MSFL). Describing the move as "significant", Gulfstream president Mark Burns says: "It highlights the need for long-range business jet travel in China, the role MSFL has played expanding Gulfstream's presence and the performance of the G650ER."

With a two-year backlog for the 7,500nm (13,400km)-range ER and the 7,000nm-range G650, the twinjet-family is one of the few

types bucking the trend at the top end of the business jet sector, where falling demand has triggered a decline in new orders.

Gulfstream has delivered more than 160 G650ERs since it entered service in December 2012.

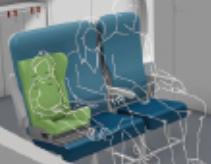
MSFL took delivery of its first Gulfstream, a G450, in June 2010. It has a fleet of 64 aircraft to support its leasing operation.

Chinese certification of the G650 series is expected "shortly", Gulfstream says, allowing deliveries of B-registered aircraft to begin. Flightglobal's Fleets Analyzer database records more than 100 Gulfstreams in China. ■



The engine will power the Global 7000 business jet

Bombardier



RESTRUCTURING KATE SARSFIELD LONDON

Flight Design stays positive

German company hopeful that potential investors will enable it to exit receivership by June

German light aircraft manufacturer Flight Design hopes to exit receivership in the second quarter, after "productive talks" with potential investors.

The Wildau-based developer of the high-wing, light sport CT-series aircraft and the C4 piston-single entered administration on 11 February, after unpaid bills "totalling over seven-digit euros" led to a "liquidity squeeze". A court-appointed lawyer is now running the venture, it says in a statement.

"Low level" aircraft manufacturing and parts production is continuing at Flight Design's factory in Ukraine, says Tom Peghiny, president of independent importer and distributor Flight Design USA.

Unrest has contributed to the company's financial woes, he says, "not because the factory is near the fighting between the Ukrainian forces and Russian-backed rebels, but because banks have been reluctant to extend or create new lines of credit in this



The C4 piston-single made its maiden sortie in 2015

RIDE-SHARING
KATE SARSFIELD LONDON

Skyüber ready to share success across Europe

European online ride-sharing platform Skyüber is gearing up to launch the second phase of its development plan, which will include expanding its reach throughout the continent.

The Portuguese firm launched its online and mobile platform in August, to connect pilots of non-complex aircraft, seating more than six occupants, with people looking to fly privately.

"The cost of the flight – which includes landing fees, fuel and insurance – is split between the riders which, depending on the number of occupants, can be very affordable indeed," says Skyüber co-founder Carlos Oliveira.

The platform has secured registrations from 2,000 pilots and 14,000 riders, who have shared around 500 seats.

NON-PROFIT

Oliveira stresses pilots cannot make money out of the flight. "It is purely a way to offset some of the costs of flying, which is very expensive in Europe," he says.

Skyüber's focus has been on training schools and aero clubs in Europe's largest markets of France, Germany and the UK. It is planning to extend its reach throughout the continent. "We have spent the last few months perfecting the platform and getting the funding to accelerate our growth to market," Oliveira says. "We now plan to widen our marketing effort to aero clubs around Europe, with a view to adding 50,000 pilots to the platform."

Skyüber has the blessing of the region's regulator, the European Aviation Safety Agency.

"We took our time to contact the regulator and make sure everything we are doing is fully compliant with the [agency's] cost-sharing principles," Oliveira says. "This isn't designed as a money-making venture [for pilots]; rather a match-making exercise," he adds. ■

CONTRACTS GREG WALDRON HYDERABAD

'Make in India' prompts C-NM5 move

India's National Aerospace Laboratories (NAL) has signed an agreement with Mahindra Aerospace to produce and certify its C-NM5 piston-single at a factory in the Indian city of Kolar.

One prototype of the NAL-designed type has been produced. The five-seat C-NM5 was built by Mahindra's Australian subsidiary

GippsAero near Melbourne, and had its maiden flight in 2011.

The aircraft will be transported to Kolar for the certification campaign. Mahindra will build two more prototypes at the facility, northeast of Bengaluru.

Speaking at the India Aviation show in Hyderabad in March, NAL director Shyam Chetty said:

"The government says 'Make in India' is a very crucial thing, and aviation and aeronautics will play a big role in this as a technology driver."

"We are hopeful about the [C-NM5] as well as Mahindra's eight- and 10-seater programmes."

Like the Airvan 8, the C-NM5 uses a Lycoming IO-540 piston engine. The Airvan 10 is powered by a Rolls-Royce 250 turboprop.

Apart from the emphasis on "Make in India" – a theme of this year's India Aviation show – another positive for the C-NM5 is the government's intention to develop 160 airstrips for general aviation. Most of the strips date from Second World War. "They are modelled as strips with minimum infrastructure so smaller aircraft can operate," Shetty says. ■



Mahindra says NAL-designed type will be built at Kolar factory

THE BOTTOM LINE

A new cadre of designers are turning their attention to comfort, convenience, safety and airline profitability in a bid to shake up the options in economy-class seating

KERRY REALS LONDON

Economy-class airline seats have not changed much in recent years. But some radical design ideas promise a shake-up as new entrants to the seat manufacturing industry are capturing the attention of judging panels and airlines alike.

Wales-based Rebel Aero, which managing director Gareth Burks describes as being “not only rebel by name but rebel by nature”, is one such upstart. The company has designed a seat it says will “rewrite the standards for space, comfort and safety” by enabling passengers to fold up the base and adopt a standing position during flight to stretch their legs.

The safety aspect comes in the form of a three-point harness, which Burks says was built in after the July 2013 crash landing of Asiana Flight 214 at San Francisco. While the majority of passengers survived, many were left with spinal injuries which some believe could have been minimised had the seats been fitted with something more substantial than a lap belt. By incorporating a pre-

certified AmSafe three-point restraint into its seats, Rebel Aero believes passengers will be “more protected laterally” and less likely to hit the seat in front in the event of an impact.

“Personally, I wouldn’t get in a car with just a lap belt and I don’t think anyone else would, either,” says Burks.

DESIGN BOOST

To enable the seat to transform into what the company calls its “booster” format, the base is divided into two parts. “The rear part is fixed and the front half pivots and folds back onto the rear half,” says Burks. This not only provides a ledge to enable passengers to adopt more of a standing position during flight – it also gives more space inside the rows for when passengers are entering and exiting the aircraft.

“Passengers can stand while taking their coats off, speeding up the boarding process,” says Burks.

Rebel Aero launched its concept for the seat, dubbed S:two, at the Aircraft Interiors Expo in Hamburg last year. This year it will

“Seat count is important, but airlines might give up a row to have a bar or social area”

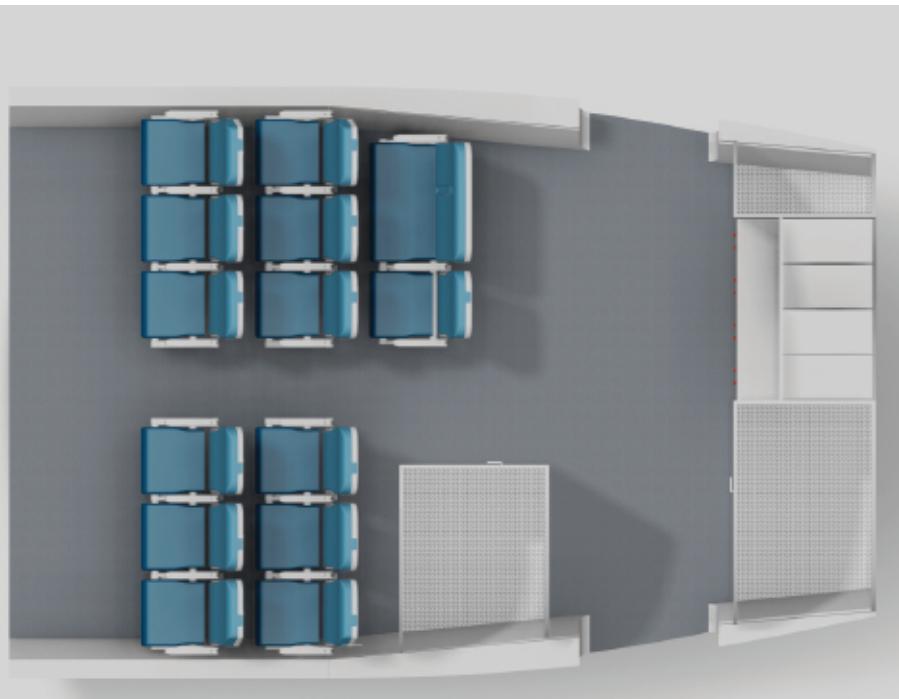
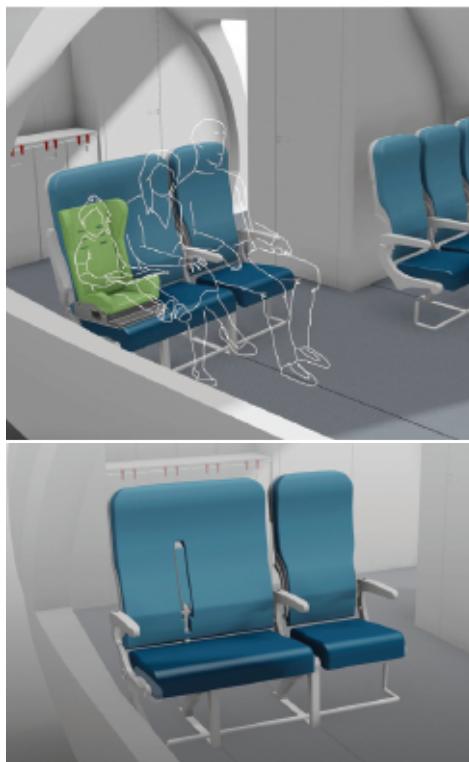
RICHARD BOWER

Managing director, AIM Aerospace

return with a fully- or almost fully-certified seat it hopes will enter service within 12 months. The company is also hoping the seat will win a Crystal Cabin award at this year’s event in Hamburg – the design has been selected as a finalist in the passenger comfort hardware category.

Another new entrant aiming to bring something out-of-the-ordinary to the aircraft seating market is Germany-based SII Deutschland, with its SANTO seat – last year’s Crystal Cabin Awards winner in the passenger comfort hardware category.

The acronym stands for special accommodation needs for toddlers and oversized passengers. The seat is designed to fit into the aft section of a widebody aircraft, where the fuse-



SII Deutschland

Designed to fit the narrowing, rear fuselage area, the SANTO seat caters to special accommodation needs for toddlers and oversized passengers

lage tapers and there is not enough space for a standard triple seat.

The SANTO seat comprises a standard seat and a seat-and-a-half with a fully retractable armrest. The latter can either be used as an extra wide seat for larger passengers, or as a standard seat with space for a child's booster.

"The idea is that passengers could be incentivised to be seated in such a location at a more moderate price, rather than pay for a whole seat for a child," says Erwin Ilias, inventor of the SANTO concept.

Airlines could market the seat at a premium to larger passengers unable to sit comfortably in a standard economy-class seat. "Airlines are cost-driven and this concept might bring extra revenue," adds Ilias, pointing out that in normal cabin configurations the area for which the seat is designed is often "lost space". "Our aim is to show that we're thinking outside the box," says Ilias.

SEEKING PARTNERS

At this stage the SANTO seat is purely conceptual, but SII Deutschland chief operating officer Peter Miehlke says the company is "seeking partners" to build it.

Airframers are clearly interested in the idea of adjustable seats that can be widened to accommodate larger passengers, as evidenced in February when Airbus filed a patent request with the US Patent and Trademark Office for a reconfigurable passenger bench.

In its filing document, Airbus included sketches to show the various ways in which such a seat could be configured. These include seating two larger passengers, three standard passengers, or two adults and two children.

A similar concept was unveiled at Aircraft Interiors two years ago by design company Seymourpowell. The "Morph" concept features a bench-style seat with movable dividers to alter the width of each berth.

Whether airlines will install such radically different seats on their aircraft is the big unknown. Aircraft interiors consultant Michael Planey is not so sure.

"I view quirky stuff sceptically. Airlines don't tend to buy into it," says Planey. "Airlines prefer simplicity – they're not look-



Virgin Atlantic

Virgin Atlantic's Upper Class bar is a passenger favourite – but more compact options work, too

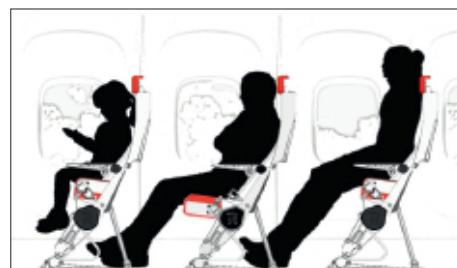
ing for bells and whistles."

While they might not be looking for bells and whistles when it comes to seating, airlines are still showing an appetite for individually-designed social areas such as on-board bars. However, demand appears to be shifting away from the ostentatious, space-consuming horseshoe bars installed by the likes of Emirates and Qatar Airways, towards an area that combines luxury with practicality, and does not eat too far into revenue-generating seat space.

"We're seeing a broadening of airline customers looking for bars and social areas and we're working with a couple we haven't done bars for in the past. But this is not necessarily at the expense of seats," says Richard Bower, managing director of UK-based AIM Aerospace, which counts Virgin Atlantic and Qatar among its in-flight bar customers.

"While they might give away a row, they want to retain seat count but still have a social area at door number two."

Airlines are increasingly looking to build



S:two offers greater comfort, easier entry and exit and a three-point belt for enhanced safety

more practical aspects into their on-board bars than in the past, adds Bower. "If possible, they like to combine [the bar] with practical stowage space, so we incorporate into the design of the bar somewhere to put the carts."

AIM Aerospace is being acquired by China's AVIC. The company is building a new factory in Bournemouth, on the UK's south coast, to manufacture premium monuments. The factory, scheduled to be completed by the end of the year, will expand AIM's capacity by a quarter and enable it to consolidate its aircraft interiors manufacturing activities.

"Our cabin interiors business in Bournemouth was spread around different hangars, so we needed to make that investment," says Bowers.

He describes the aircraft galley market as "fiercely conservative" and more about aesthetics than "revolutionary ideas". Despite this, the company plans to use this year's Aircraft Interiors to showcase concepts for the door two area of the aircraft.

"The main centrepiece will be a virtual reality display where we provide visitors with the opportunity to look at three ideas for the door two area," says Bowers. These include a classic design, a more practical design, and a more luxurious concept along the lines of the Emirates horseshoe bar.

Visitors will be invited to view these concepts through a pair of virtual reality goggles. Meanwhile, the new wave of seat designers will be hoping that airlines will not be wearing blinkers when they look at their ideas. ■

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Air Berlin's long-haul fleet is all connected, and its short-haul will gradually follow; so far, two A320s are Panasonic-equipped

PROMISE OF WI-FI FOR ALL IN EUROPE

With constant connectivity rapidly becoming an expectation in the air as well as on the ground, Europe's airlines are moving to fit their single-aisle fleets with onboard internet, mirroring moves on long-haul aircraft

GRAHAM DUNN LONDON

Recent developments suggest a tipping point is being reached in European airline interest in onboard connectivity for short-haul aircraft, though how and when this will filter through remains to be seen.

Wi-fi connectivity has become so standard onboard US carrier domestic operations that, mirroring what has happened on the ground, expectations are now about speed of connectivity rather than availability.

This was highlighted by American Airlines filing a lawsuit in February against the provider of wi-fi services for a portion of its fleet – around 200 older Boeing 737-800s, McDonnell Douglas MD-80s and Boeing 757-200s under a 2012 contract with Gogo – arguing the system is not competitive. American dropped the lawsuit and said it would consider Gogo's proposed improved 2Ku inflight service. Around 10% of Gogo's 11,000 connectivity solution equipped aircraft feature its broadband 2Ku solution.

If onboard connectivity is becoming the norm on North American domestic flights,

and is increasingly apparent on widebodies in Europe, it is far from common yet on short-haul flights in Europe.

"The tipping point was probably two years ago on long-range," says Panasonic vice-president for global communications services, David Bruner. "You still have lots of people to make decisions, but for every carrier, it is now more in their thought process."

That is underlined by a recent wave of connectivity announcements for European long-haul fleets, latterly including Air France's plan to start rolling out wi-fi on its long-haul fleet from 2017 and Air Europa's move to deploy Panasonic's connectivity solution on its Airbus A330s and 787s.

"For narrowbodies [in Europe] I think we are at the tipping point," adds Bruner, "But things are more fuzzy about business models."

The pioneer in the European short-haul market remains low-cost carrier Norwegian. The airline debuted its service, which uses Row 44's connectivity solution, just over five years ago and offers the service free onboard.

Over the last five years it says more than 19



Norwegian is a short-haul wi-fi pioneer...



...and offers its Row 44 service free onboard

million passengers logged in and 18,000 passengers access its onboard wi-fi daily. The biggest demand is on Spanish routes and flights to Malaga, Barcelona, Alicante and Madrid – with Tromsø – have most users. It says a third of passengers log onto social media within five minutes of the flight.

LIVE TELEVISION

It expanded the offering last November, by launching a 12-month trial to cover live television. It is providing free onboard access to Bloomberg TV and Norwegian channel TV 2 news on mobile devices under an agreement with Global Eagle Entertainment.

Several airlines in Europe have made tentative moves in the short-haul network. Air Berlin, Icelandair, SAS and, until its collapse, Transaero, all offered in-flight connectivity on narrowbodies in the region.

Interest continues to grow. Spanish low-cost carrier Vueling a year ago unveiled plans for onboard connectivity. It teamed with Spanish telecoms giant Telefonica to provide the new service, working with Live TV over the Eutelsat Ka-band satellite network. But having done the technical work, the carrier is yet to launch the service. "We're still waiting for all the civil aviation authorisations, but we're expecting to announce it soon," says the carrier.

Air France, alongside its widebodies connectivity plan, has teamed with mobile operator Orange to trial wi-fi onboard a pair of A320s. It launched the activity this year.

Alitalia, which is installing Panasonic's wi-fi service on its long-haul fleet, last autumn announced plans to roll-out connectivity across its whole fleet. Air Berlin has a pair of A320s equipped with the Panasonic connectivity service.

European budget carrier Ryanair, which had a brief dalliance with OnAir's onboard mobile phone service in 2009, continues to ponder connectivity. "We're looking at a near-fi product, where customers would log on to a near-fi network on board, and access content such as inflight movies or a digital inflight magazine," the carrier says. "We hope to trial it on board soon."

"The when to do it is out of the equation, it's a question of how to do it"

DAVID COILEY

Vice-president, aviation, Inmarsat

It sums up the variety of approaches – both in technology and business model – Europe's carriers are following. "Europe is one of the markets with the messiest battlegrounds," says Bruner. "We'll see what happens, but it's a very fragmented market. I'm sure we'll go through some sort of shake-out. Right now it's a bit of a frenzy in the market place."

One of the latest developments has come from Inmarsat and its planned European Aviation Network which, as the name sug-

gests, is focused on the short-haul European sector. Inmarsat has joined Deutsche Telekom on the initiative, unveiled last autumn, through a combination of satellite connectivity and ground-based mobile phone network.

Deutsche Telekom, in a recent update, says the roll-out for the European flight network will see the first LTE stations ready for the end of the year in southern England. Six test flights are planned, the first of which will take place this year. This will be followed next spring with the first commercial pilot for the network, also in England. Coverage over Germany and Western Europe's other most highly-populated areas is set for mid-2017.

FLIGHT TRIAL

Lufthansa has agreed to take part in a flight trial programme of the European Aviation Network next year and will this summer begin offering satellite broadband-based service on European flights using Inmarsat.

"This underlines again that we are pioneers when it comes to digital service onboard," said airline boss Carsten Spohr, announcing the move last year. The German carrier has been arguably Europe's most committed airline to onboard connectivity, having pioneered the Connexion by Boeing solution a decade ago, and its subsequent agreement on long-haul connectivity with Panasonic.

British Airways in the summer of 2014 said it was in talks with Inmarsat over using its satellite/air-to-ground network for broadband services, initially on domestic routes.

"Across the board with Global Express and in particular the new solution we've got for Europe, I think the timing is perfect. We are coming at a time when all airlines in Europe are interested in connectivity," says Inmarsat vice-president aviation David Coiley.

He notes this is coming at the same time that connectivity and entertainment are converging, through the use of mobile devices. "It is as much the convergence in this parallel track [driving demand]. We are all consuming more content on the move."

"The when to do it has gone out of the equation," he adds. "It's a question of how to do it – whether it's connectivity, content and IFE, what the retail model is. Some of the modelling may be different – it may be about ancillary revenues, operational improvements or service enhancement, but they all play into the same end result."

"I think there is demand. The model may need to evolve," he adds, noting that flexibility is one of the key requirements being called for. "They might be trying to find a way to initially package and price the service – but we do expect over a long-term project to repackaging and find new ways of working, potentially with other commercial partners. So the one key element is flexibility." ■

PUSH ON PREMIUM

Although US operators have proven reluctant to introduce a seat class between economy and business, carriers in other regions are embracing the concept

GRAHAM DUNN LONDON

The continued rise of premium economy among airlines was further underscored late last year when American Airlines detailed plans making it the first US carrier to introduce a formal offering in the sector on long-haul services. The carrier plans to debut the new cabin on its Boeing 787-9 aircraft this year, installing 21 premium economy seats in a two-three-two configuration.

"Our customers tell us they want a class of service between business class and main cabin [economy], and this feedback provided the genesis for our new premium economy service," explained chief marketing officer Andrew Nocella, announcing the move in December.

The airline will install a premium economy cabin on all of its 777-200 and 777-300ER and Airbus A330 aircraft by 2019, it says. New A350-900s will be delivered with the cabin from 2017.

US carriers have so far only dabbled in the premium economy market. American today offers an extra-legroom product – main cabin extra – for a fee as a step up from its standard economy seat, between economy and business class. Delta Air Lines and United Airlines both also offer similar extra-legroom products for a fee on their aircraft. Indeed, Delta will from May make its Delta Comfort+ product available for direct booking on US and Canadian flights.

CLASS SYSTEM

American will keep main cabin extra on its widebody aircraft, offering four classes of service on the 787-9: business class, premium economy, main cabin extra and economy. Its 777-300ERs will also have first class.

It was not the only US carrier to announce an upgrade to economy seating in December. Alaska Airlines detailed a plan to outfit its fleet with extra-legroom seats by the end of 2017, with 60 aircraft to have the product by

American Airlines will offer four classes of seat on its flights



the end of this year. This will cover the carrier's entire mainline fleet of Boeing narrowbodies – a combination of 737-800s and -900s, as well as its SkyWest Airlines-operated Embraer E175s.

Hawaiian Airlines already operates an enhanced economy product, Extra Comfort, and is adding another 28 seats in this class on its A330s as part of a wider cabin refurbishment. It will this spring complete the first of its A330 cabin overhauls, which will increase this seating on the type to 68.

Hawaiian chief executive Mark Dunkerley says it will take a break from the project over the summer. That hiatus will enable Hawaiian to keep all its A330s in service during the summer travel season. In addition, during summer Hawaiian will review the first aircraft's overhaul and seek efficiencies.

"Customers tell us they want a service between business and main cabin economy"

ANDREW NOCELLA

Chief marketing officer, American Airlines

Beginning in the fall, Hawaiian will resume the work at a "nose-to-tail" pace, with one aircraft being modified at a time and no break in between, Dunkerley says.

At that rate, Hawaiian will overhaul all its A330s by the middle of next year, Dunkerley says. The carrier has 22 of the type, plus one on order.

While US carriers have been reluctant to



Air Canada has been offering premium economy seating on its 777 fleet since 2013



"More people will move from economy to premium than from business to premium"

LUIS GALLEG

Chief executive, Iberia

bers, you are going to have more people going from economy to premium economy, because the product we give in business is very good and people are ready to pay the fare for business in order to receive that service," he says.

European leisure operators are also active in the premium segment and Italian leisure carrier Neos has replaced the business-class section on its 767 long-haul fleet with premium-economy seats while management finalises interior plans for its on-order 787s, scheduled for delivery in 2018.

The airline abolished the business-class section on its 767s in favour of a higher number of Weber-built premium-class seats through an interior project completed last December.

The aircraft's total seat number remained unchanged at 284, but the Milan-based airline's technical director Marco Brusa says 21 premium-economy seats were installed in place of the 12-strong business-class section as a response to demand from tour operators.

Across Asia-Pacific, Fleets Analyzer shows 14 carriers offering premium economy or enhanced economy products.

Singapore Airlines is among the network carriers in the region to embrace premium economy and having begun the process of rolling it out across its 777-300ERs and A380s, it in March took delivery of its first A350-900 which also features a premium economy cabin. The carrier's A350 features 253 seats in a three-class configuration, including 42 business class and 24 premium economy seats.

SIA now expects to complete retrofit of its 19 A380s with premium economy during the second quarter. ■



Alaska is rolling out extra-legroom economy

economy section of any European operator, with the 66 seats onboard its 747-400s.

Spanish carrier Iberia will become one of the latest European carriers to bring in premium economy, joining fellow IAG airline British Airways in offering the product.

"We are going to implement premium economy in the A340-600s, the A350-900s will arrive with it, and the A330-300," explains Iberia chief executive Luis Gallego. He notes, though, it will not introduce the option on the A330-200s it deploys on denser routes. Iberia will begin retrofitting its A330-300s this year, replacing seven business class seats with 21 premium economy seats.

"We did an analysis, there will be a percentage of people that can go from business to premium economy, but when you do the num-

turn to premium economy, across the border Air Canada debuted premium economy on its 777s in 2013 and began taking 787s configured with 21 seats in premium economy the following year. WestJet, meanwhile, last year brought in a no-middle-seat premium economy product, on its Boeing narrowbodies and its first long-haul aircraft, 767-300ERs.

ESTABLISHED MARKET

Premium economy has been far more prominent in other regions and continues to be rolled out by new operators. Figures from Flightglobal's Fleets Analyzer database show almost 30 different European carriers – including several sister brands – offering the choice of either a dedicated premium economy section or an enhanced economy product on their widebodies.

The region's biggest network carriers, British Airways, Air France-KLM and Lufthansa all have premium economy offerings – the latter debuting it in 2014. Virgin Atlantic – one of the premium economy pioneers, and which has the product across its 39-strong fleet – has the largest premium



Virgin Atlantic boasts the biggest number of intermediate-class seats in Europe, with 66



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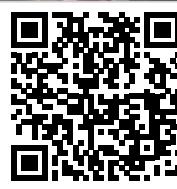
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Bjørn recalls Kjos encounters

Colourful Norwegian boss Bjørn Kjos had a long career, first as an F-104 fighter pilot for the Norwegian air force in the Cold War and later as a lawyer and judge, before rescuing a tiny, ailing regional airline and turning it into the low-cost powerhouse it is today.

Not everyone, of course, is delighted with that success. In a recent speech at the Aviation Club in London he noted that the carrier is banned from overflying Russia on its Oslo-Bangkok service. At the same time, it has faced lengthy hold-ups in its bids to obtain rights to fly into the USA.

"I spent years chasing the Russians every time they crossed the Norwegian border, so I can understand them getting their own back," he jokes. "But the Americans. Weren't they supposed to be our friends?"

Rear miss

A series of Facebook advertisements from Malaysian airline Firefly has come under fire from the country's gender rights groups for objectifying women by displaying price promotions on their derrières.

We might say that this one – showing a female who has apparently ended up with a "50% off" imprint on her bottom after sitting on a freshly-painted bench – is doubly wrong given that the same message is written exactly the same way, rather than mirrored, on the wood.

Three-point endorsement on that artistic licence.



A new kind of benchmarking



Airbus

**"Sell some more A380s, then I'll let you out, Mr Leahy".
[Airbus Group boss Tom Enders inspects the Perlan 2 stratospheric glider with chief test pilot Jim Payne]**

Pure genius

Italy's greatest polymath, Leonardo da Vinci, who did everything from imagining the rotorcraft to painting the Mona Lisa and the Last Supper, appears to be the inspiration behind the surprising rebrand of Italy's aerospace and defence champion Finmeccanica. As part of the move, all Finmeccanica's divisions will be retagged Leonardo, including the helicopter business which incorporates AgustaWestland.

However, it won't be the first Leonardo helicopter. As our illustration shows, this innovative design – piloted by the Teenage Mutant Ninja Turtle who shares a name with the Italian genius and the aerospace company – is already on the market, complete with what looks like a highly-effective weapons system.

Over a barrel

Does anyone have much faith these days in the Mystic Megs of Wall Street when it comes to oil price forecasting? Certainly not



Ooze idea was it first, then?

Jeff Knittel, chief of aircraft leasing giant CIT. One firm, he claims, has, "over the last 10 years, managed to predict a \$200 a barrel price and a \$20 a barrel price. So relying on those types in terms of what the fuel price is going to be, I think, is a fool's errand." Whoever can he mean? Surely not investment banking behemoth Goldman Sachs, which is forecasting that, in a worst case scenario, a barrel of the black stuff might soon sink as low as \$20?

Back in 2008, the same firm warned that with the world set to run out of oil due to rocketing demand, the \$200 barrel was heading our way.

So that's pretty much all conceivable eventualities covered, then?

Zeppelin lead

Many specialists have been called in to deal with the Zeppelin menace to England, and also with the Zeppelin

100 YEARS AGO

advantage to the German navy for scouting purposes. Every remedy has been tried save the most logical one of meeting Zeppelin with Zeppelin. As matters stand now, the Zeppelin fleet resembles the British [naval] fleet in that both are stronger and better than at any other period of the war.

'Budge up, mate'

In Southern Abyssinia... One [SAAF] fighter was forced to

75 YEARS AGO

land, whereupon one of its colleagues landed beside it under artillery fire and picked up the pilot of the first machine. He sat on the lap of his rescuer and flew the machine home.

Still waiting...

One of the more spectacular examples of fall-out from the

50 YEARS AGO

US space programme could be the application of "fuel cell"

power to the motor-car... It could be a practical motor-car engine within ten years.

Hijacks hit record

An unprecedented record of 32 attempts to hijack Soviet

25 YEARS AGO

aircraft was registered last year. The figure is viewed

domestically as an indicator of growing unrest under President Gorbachev's rule. There were only three such cases in 1989.

100-YEAR ARCHIVE

Every issue of Flight from 1909 onwards can be viewed online at flightglobal.com/archive

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Make better use of UK airports

In response to Michael Warr's letter (*Flight International*, 15-21 March). I don't think I have read anything so cumbersome in my life. As an international passenger, I don't want to be trying to

get from one airport to another to connect, I might have already spent some 20h in the air.

The whole idea of an airport is to provide interconnectivity and to do it with ease. Whether it's from cargo from a passenger aircraft to a freighter; passengers connecting to a regional flight; or domestic flight from a long-haul international flight, it all needs to be available on site. Airlines, passengers, or even airports do not want to see connectivity taking hours over land.

The overland transport in the UK is already overloaded, congested and doesn't connect often. This development would turn the whole journey into a nightmare, if isn't already.

Better use of airports as hubs and better air traffic control procedures and the use of aircraft types is a way forward, a total airport is the answer.

Peter Clark

Auckland, New Zealand

Test flight pioneer would have been a worthy recipient of a knighthood



RECOGNITION

Honouring noble 'Winkle' Brown

Whilst in no way wishing to detract from the breathtaking achievements of knighted pop stars, athletes and football club supremos, amongst others, is it not bewildering that 'Winkle' Brown was never awarded such accolade?

A memorial as already suggested is, of course, most laudable. But surely a knighthood would have been an appropriate way of recognising his bravery, skill and determination in the course of furthering the advancement of aviation in ways that no other had achieved before. And I bet his Fleet Air Arm stipend was far less rewarding than that of those I instanced earlier, too.

Mike Savage

via email

Stephen Simpson/REX/Shutterstock

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Subscription Rates

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Registered at the Post Office as a newspaper.
Published by Reed Business Information Ltd, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS, UK.
Tel: +44 20 8652 3500.

Newstand distributed by Marketforce (UK), 2nd Floor, 5 Churchill Place, Canary Wharf, London, E14 5HU, UK.
Tel: +44 20 3787 9001.

Classified advertising prepress by CCM.
Printed in Great Britain by William Gibbons and Sons Ltd.
Flight International published weekly 49 issues per year.
Periodicals postage paid at Rahway, NJ. Postmaster send changes to Reed Business Information, c/o Mercury International Ltd, 365 Blair Road, Avenel, NJ 07001.

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ISSN 0015-3710 (Print) ISSN 2059-3864 (Online)

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xponential.org

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24-26 May**EBACE**

Geneva, Switzerland

ebace.aero

16 June**Improving Return on MRO Investments**

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8-10 July**Royal International Air Tattoo**

RAF Fairford, Gloucestershire, UK

airtattoo.com

11-17 July**Farnborough air show**

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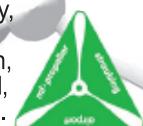
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Ref: DACCG/JV-01/2016

Date: 18 March 2016

Request for Proposal (RFP) for Joint Venture Partnership for Ground Handling Services with Biman Bangladesh Airlines Limited

1. Biman Bangladesh Airlines Limited invites proposal from the reputed organisations satisfying the criteria set out in the RFP schedule, for a Joint Venture in Ground Handling Services with Biman Bangladesh Airlines Limited, at all airports in Bangladesh.
2. The Joint Venture Partner will provide jointly with Biman Bangladesh Airlines Limited airport ground handling services to the valued customers, considering highest level of customer services and operational excellence for international and domestic.
3. Detailed terms and conditions have been given in the RFP schedule. RFP notice and schedule may be viewed in Biman's web-site: www.biman-airlines.com
4. The Offers/Proposals are to be submitted latest by **12:00 hours LT (0600 hrs UTC) on 18 April 2016** addressed to General Manager (Customer Services), Biman Bangladesh Airlines Ltd, Head Office, Balaka, Dhaka, Bangladesh through E-mail at jv01-2016@bdbiman.com Proposals/offers may also be submitted through courier service or dropped in the Tender Box placed in the office of General Manager (Customer Services), Administrative Building, Kurmitola, HSIA, Dhaka-1229.

Offers/Proposals will be opened immediately after the closing time and date in presence of the bidders, if any. However, no offer/proposal will be accepted after the closing time and date.

Biman Bangladesh Airlines Limited will not be held responsible for late receipt of any offer/proposal due to postal irregularities, if any.

5. For further clarification/information or query, General Manager (Customer Services) may be contacted at Telephone: +880-2-8901500/Extension-4308, +880-2-8901770 (direct), +88017-77715530 (cell), E-mail: gmcs@bdbiman.com during the office hours.
6. Biman Bangladesh Airlines Ltd. reserves the right to accept or reject any or all the offers/proposals partly or wholly without assigning any reason, whatsoever, and no claim shall be entertained in this regard.

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WORK EXPERIENCE GRAHAM COWNIE

Upgrading training to educating

After an 18-year career in the Royal Air Force, where a qualified flying instructor role gave a first taste in writing syllabi, Graham Cownie was disappointed by the standard of civilian courses – so decided to find a better way

Tell us about your aviation career to date

I gained my private pilot licence in 1974, at the tender age of 17½. I then joined the Royal Air Force in 1979. After training, I flew the McDonnell Douglas F-4 Phantom operationally at RAF Leuchars, intercepting Russians! In 1987 I became a qualified flying instructor teaching on, and then commanding, a number of basic flying training squadrons. I was also on the three-man team that brought the RAF's Shorts Tucano into service. It was my first taste of developing syllabi and courseware and I enjoyed it immensely. So much so that I 'freelanced', writing training manuals for export versions of the BAE Systems Hawk trainer. On leaving in 1997, I obtained my air transport pilot licence (ATPL) and took on various consultancy roles, shortly thereafter forming my first company to develop digital training systems for ATPL theory students.

Why did you decide to set up the Padpilot business?

I established Padpilot in 2009 because I was frustrated by the ATPL theory content being provided by all the major players at the time. To me it seemed to be out of date and unimaginative. I thought we could do better with our own team of experts. I wanted to produce a new type of training that promotes deep understanding and takes candidates well beyond a European Aviation Safety Agency (EASA)



Padpilot

Cownie's Padpilot business aims to bring pilot instruction up to date

exam pass into preparation for type rating. I also wanted to move the emphasis from mere 'training' to 'education'.

What are the major challenges for the training industry today?

There are too many accidents occurring through lack of elementary understanding that ought to have been drilled into the pilots from day one. Many ATPL candidates don't see the relevance and importance of theoretical knowledge. This is partly our industry's fault through not refreshing its material enough, or not explaining its relevance. But it's also because we are constrained by out-of-date and highly prescriptive

"We are constrained by out of date and highly prescriptive EASA learning objectives"

EASA learning objectives, and a rigid, inappropriate ATPL exam structure. How can we enthuse a student about North Atlantic organised tracks before he or she has ventured beyond the circuit?

Tell us about your typical day

Nowadays I fly a desk, but at least it's a desk with a Boeing 737 fixed-base trainer on it. A

typical day begins the evening before, when I browse through all our books to see what we need to do better. For most of the day we concentrate on adding more visual explanations, because pilots think in pictures. I also spend a lot of time keeping up to date with changes in airline operations and technology.

What do you enjoy most about your role?

I enjoy the raw creativity of what we do. We all believe we are making a big difference in the industry.

What are the least enjoyable aspects of your job?

I'm hugely frustrated by the slow pace of change and the way we are, at times, compelled to use the wrong teaching methods and to teach the wrong things by an out-of date examination system.

Where do you see yourself in five years?

I've started developing a new and radically-different learning platform, which exploits touch screen devices to their full effect. If it works, we'll open source it and then who knows what'll come next? ■



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