

Flight International

28 March-3 April 2017

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Divisive ban

Passengers to suffer as USA powers up new restrictions on electronics in the cabin **8**

Rough waters

Malaysia takes its fourth and final A400M, but maritime patrol planning is all at sea **18**

Sitting pretty

We review the current trends as Hamburg beckons for aircraft interior specialists **22**

COMPETITION

Level best for long-haul?

IAG takes fight to Norwegian with low-cost transatlantic operation



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COVER IMAGE

IAG provided this image with the name and livery for its new low-cost, long-haul unit Level. The transatlantic A330 user will be taking off for the first time in June **P11**



BEHIND THE HEADLINES

Greg Waldron (pictured) enjoyed a warm welcome at the LIMA show in sunny Langkawi (P6, P18). For our Aircraft Interiors preview, Murdo Morrison was in the hot seats in Crawley and Pembroke Dock (P22)



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We assess the future of US naval air power. Plus, our previews ahead of April's LAAD and ABACE shows

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Image of the week

Graham Dinsdale captured this stunning shot of a California Air National Guard Boeing F-15C flying through the Rainbow Canyon before crossing Death Valley along the "Jedi Transition". It is seen from Father Crowley Overlook – a popular spot for aviation photographers

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Graham Dinsdale

The week in numbers

↑ **4%**

Flight Dashboard

US airlines expect to carry 145m passengers this spring in a record high for the season, up from 140m in the 2016 period

\$3.26bn

Elbit Systems

2016 revenue for Israel's Elbit Systems gained 5%, as C4ISR surged 23% to \$1.22bn. Pre-tax profit jumped 12% to \$279m

21

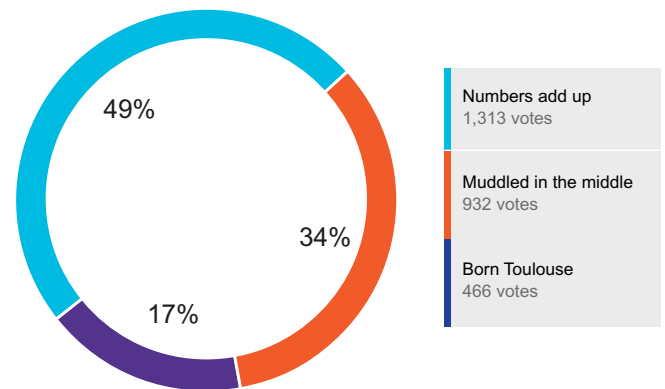
Flight Dashboard

Number of airlines which will be relocated at LAX in May to accommodate Delta Air Lines' move to terminals 2 and 3

Question of the week

Last week, we asked: **Boeing's potential '797'?**
You said:

Total votes: 2,711



This week, we ask: **Restrictions on laptops in the cabin?**

☐ Sensible precaution ☐ Dubious intelligence

☐ Will achieve nothing

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Illogical, captain

Although the concealment of explosives inside consumer electronics is a valid concern, new rules – rapidly introduced by the UK and US authorities – appear inconsistent and ineffective

Just two hours before the UK parliament became the scene of an armed assault and counter-terrorism operation, the transport secretary had been inside, fending off awkward questions about weaknesses in new enhanced security measures for airline passengers.

Contradictory logic is rife in the aviation security game. The passenger with a pocket-knife will have the instrument confiscated before being allowed to board. If the passenger is not considered a threat, there is no reason to remove the knife. If they are, then letting them board, with or without the knife, is a security risk.

Pilots endure X-ray screening and other invasive checks before being handed complete access to the aircraft's controls. And perfectly-safe aircraft divert after a phoned-in threat, not because its passengers are in danger but because the charade is necessary.

Public confidence in such measures is also essential, and gaps in the logic will do little to reinforce it

Unsurprising, then, that some of the reasoning behind the latest US and UK measures appears to border on the ludicrous.

Concealment of explosives inside consumer items is a legitimate concern, borne out by the laptop bomb detonated on an Airbus last year and the 2010 interception of devices fitted inside printer cartridges.

But the selective ban by the UK and US governments is, at best, inconsistent, and, at worst, ineffective.

From the outset there was an extraordinary mismatch over the types of device considered a threat, and the countries involved. The absence of Qatar and the



No holds barred

United Arab Emirates from the UK list also gives off a faint whiff of trade retribution from the USA.

Limited application to US- and UK-bound flights places the onus for application on gate security, rather than central screening, and the procedures for dealing with a prohibited laptop at the gate – bearing in mind that it must, by definition, be treated as a bomb – apparently involves loading it on the aircraft anyway.

Transferring electronic devices to the hold also contradicts the rationale that equipment powered by lithium batteries should stay in the cabin, to reduce the risk of fire – not to mention the complicating fact that such devices might have been purchased in airside outlets.

Undeniable requirements for discretion in matters relating to intelligence and security provide an all-covering carpet under which anything tricky to explain can be swept, using nothing more than vague references to secrecy as a broom. But public confidence in such measures is also essential, and gaps in the logic will do little to reinforce it. ■

See This Week P8

Roman ruins?

Just how many last chances for salvation can one airline have?

Alitalia, one of Europe's ailing legacy carriers, is facing yet another round of cost cutting as it attempts to make a long overdue return to profitability.

It has been here before, of course, as recently as 2014, when a transformation programme was launched in the wake of Etihad's investment in the airline.

Back then, a return to the black was scheduled for 2017 – but faced with deteriorating market conditions and intense competition from low-cost rivals, that target has been pushed back to 2019.

Under the latest plan, the beleaguered flag carrier will slash its narrowbody fleet by 20%, instead concen-

trating on its medium- and long-haul operations. This might have made sense three years ago, before Norwegian revived the low-cost, long-haul model.

If the likes of Air France and now IAG, with the launch of its Level operation, feel compelled to react, you can be sure they feel there is a significant threat.

Alitalia's move feels like a belated response – the change it should have made in 2014 when the danger from EasyJet and Ryanair was already obvious.

Besides, its plans may yet be scuppered by a veto from Italy's notoriously intransigent trade unions.

Still, this is Alitalia, and it will always have another opportunity to save itself. Won't it? ■

See Air Transport P11, P13



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BRIEFING

NEW ARRIVALS TO BOOST KOREAN AIR FLEET

DELIVERIES Korean Air (KAL) expects to receive its first seven Bombardier CSeries jets this year, with the CS300s scheduled to join its fleet from August. The SkyTeam carrier is also scheduled to accept its first five Boeing 787-9s, three 747-8Is and one 777-200LR Freighter during 2017. KAL had a 160-strong fleet at the end of last year, and Flight Fleets Analyzer shows its order backlog as also containing 30 examples each of the 737 Max 8 and Airbus A321neo.

RUSSIA TARGETS APRIL DEBUT FOR MC-21

PROGRAMME Irkut has scheduled the first flight of its MC-21 narrowbody for April, the Russian government has disclosed. Deputy prime minister Dmitry Rogozin, who oversees Russia's defence and aerospace industry, says the "current plan" is to complete the first sortie during the month, but an exact date will be set "as we deem the test aircraft and crew technically ready". The aircraft has so far passed all structural static tests.

HONEYWELL WINS A320 APU ACCOLADE

SUPPLY CHAIN Airbus has elevated Honeywell's auxiliary power unit (APU) to the status of standard fit for its A320 family. The company, which supplies the model 131-9A unit for the twinjet family, says it has been classed as "standard equipment" rather than a selectable option. The A320 family has also been available with competing APU designs, including the United Technologies APS3200.

LEONARDO TO OPEN AW609 ORDERBOOK

TILTROTORS Leonardo chief executive Mauro Moretti says the company will "open the orders" for its new AW609 civil tiltrotor in the second half of this year. The company is targeting service entry for the type "at the beginning of 2019", he adds.

MOSCOW PLANS UNMANNED FORPOST-M

DEVELOPMENT Moscow is to develop a new unmanned air vehicle based on the Israel Aerospace Industries (IAI) Searcher 2 previously built under licence for its military. United Instrument Manufacturing Corporation Rostek is expected to be lead contractor for the "Forpost-M", which will carry some Russian-developed payloads and datalinks. IAI states that it is "not commenting on contracts and customers".

TWO REMAIN FOR GREMLINS TRIAL

TECHNOLOGY Dynetics and General Atomics Aeronautical Systems are the remaining contenders for the US Defense Advanced Research Projects Agency's Gremlins retrievable swarming unmanned air vehicle programme. The pair are to complete a one-year second phase activity to develop critical technologies, before one is selected for a launch and recovery flight-test with multiple UAVs before the end of 2019.

QUICKER CUSTOMISATION FOR SUPERJET

PRODUCTION Sukhoi's civil aircraft division claims to have halved the time for customisation of the Superjet 100 over the past two years, thanks to optimising production and changes to its facilities. The airframer says it was averaging 66 days for work such as interior installations and livery painting on the type in 2014, but slashed this to 28 days last year.



Moscow sent its Russian Knights display team with new Su-30SMs

REQUIREMENT GREG WALDRON LANGKAWI

Malaysia drags out fighter acquisition

No decision on MiG-29 replacement likely until 2020, as Saab insists Gripen has not been excluded from shortlist

Kuala Lumpur appears to be sending mixed signals about the status of its multi-role combat aircraft (MRCA) acquisition, which will replace its RAC MiG-29s with 18 modern fighters.

The nation's biennial Langkawi International Maritime & Aerospace (LIMA) exhibition was attended by European manufacturers BAE Systems, Dassault and Saab, which delivered wildly differing views of the MRCA process.

BAE, which is leading the Eurofighter consortium's campaign, promoted the Typhoon and displayed a full-scale replica. French air force Rafales appeared in both the static and flying displays in support of Dassault's bid, while Saab's efforts were backed up by a pair of Gripen Cs from the Royal Thai Air Force, which also took part in the daily displays.

Speaking at the show, a BAE executive said the company had received indications that there has been a downselect to two twin-engined types: the Typhoon and Rafale.

But a Saab official swiftly dismissed this suggestion, stating: "No decisions have been made here, and no clarity has emerged on what is going to happen. We have seen the same statements, but no decisions will be taken until 2020."

The company also notes that senior Malaysian officials recent-

ly extolled the benefits of single-engined fighters.

Saab stresses the industrial partnership opportunities and technology transfer it is willing to offer, and in a nod to Kuala Lumpur's tight defence budget, says it could provide it with Gripens under a lease agreement.

Another potential contender for the requirement, Boeing Defence & Space, had no presence at this year's show, although the US Navy provided two F/A-18E/F Super Hornets to appear in the static display. Moscow sent its Russian Knights aerobatic display team, for the first time flying new Sukhoi Su-30SMs.

Meanwhile, Airod continues to push a project to upgrade the Royal Malaysian Air Force's 10 MiG-29s to an enhanced SM standard. The proposal would equip the fighters with new radars, other updated avionics and improved cockpit ergonomics. It would also stretch the type's airframe life from 4,000h to 6,000h.

Malaysia has not sent any of its MiG-29s to the LIMA show since 2013. Sources say that only six examples remain airworthy, and are operating at a reduced capacity.

Flight Fleets Analyzer shows that Kuala Lumpur operates a fleet of 49 combat aircraft, also including 18 Su-30MKMs, 13 BAE Hawk 208s and eight F/A-18Ds. ■

See Show Report P18



Baggage rules to hit almost 30,000 passengers daily
This Week P8

INQUIRY DAVID KAMINSKI-MORROW LONDON

'Wake effect' pilot shut down engine

Crew of Challenger 604 involved in loss-of-control incident deliberately switched off powerplant as aircraft lost altitude

Pilots of the Bombardier Challenger 604 involved in a high-altitude upset in January deliberately shut down one of the aircraft's engines, subsequently re-igniting it as they regained control.

The aircraft had been en route from the Maldives to Abu Dhabi when its crew temporarily lost control, during which time the executive jet experienced "abnormal" flight attitudes and a "significant" loss of altitude, Bombardier tells FlightGlobal.

Investigators have yet to determine the circumstances of the upset, but a wake-turbulence encounter with a heavy transport aircraft is one of the lines of inquiry.

The Challenger had been flying over the Arabian Sea at 34,000ft at the time.

Bombardier states, in an advisory wire to operators of its executive jet range, that the crew had reported an "oncoming large transport-category aircraft" passing with 1,000ft altitude clearance above the Challenger, and offset "slightly" to the left, shortly before the upset.

As the aircraft lost altitude, it experienced "accelerations beyond the certificated flight envelope", adds the advisory.

The crew shut down one of the aircraft's GE Aviation CF34 engines after receiving a high interstage turbine temperature indication – the differential between the levels in the high- and low-pressure turbines.

Bombardier says the Challenger's other engine remained operational, and that the crew managed to relight the shut-down powerplant once they had regained control of the aircraft.

"There were serious injuries to some passengers on board," says the airframer. The aircraft diverted to Muscat, Oman.

Bombardier is assisting the inquiry, which is being led by the German accident investigation authority BFU. It has not instructed operators to take any action, pointing out that the details of the upset are simply for information.

"Operations of the Challenger fleet and all other Bombardier business jets continue unaffected," it says. ■



Deliveries of F4-standard multirole fighters are expected from 2025

PROGRAMME DOMINIC PERRY LONDON

France starts to develop fourth iteration of Rafale

France's defence ministry has launched development work on the F4 production standard of the Dassault Rafale, designed to deliver aircraft from 2025.

In addition, Paris is considering placing a fresh order for the multirole type under an agreement for a fifth tranche of aircraft.

Although light on specifics, the defence ministry says the F4 upgrade will be driven by operational feedback and will include improvements to the Rafale's networking capabilities and sensors.

It will also take into account the "expected evolution" of missiles and engines, as well as the likely integration of new capabilities.

Defence minister Jean-Yves Le Drian says: "The launch of the F4 standard is essential to bring to our armed forces a system with

increased performance in response to ever-more-demanding commitments."

Some features will be available from 2023, the ministry says, but the first full F4-standard aircraft will arrive in 2025. It adds that a decision on the fifth tranche of production will be made in its next six-year procurement plan, due in 2019.

France has so far ordered 180 Rafales for its air force and navy, but with the progressive retirement of its Mirage 2000s, it will require more examples to maintain a combat fleet of 225 aircraft.

Dassault chief executive Éric Trappier says he is "delighted" that the defence ministry "underlines the need to continue with acquisition of the Rafale beyond the [current] fourth tranche". ■



PROGRAMME

Approach tests put the 'C' into LCY

Bombardier on 22 March began CSeries validation tests at London City airport and expects to receive certification to operate commercial flights to the site in as little as six to eight weeks. "The aircraft flew flawlessly," says Robert Dewar, Bombardier vice-president of the CSeries programme. Aircraft operating to London City need special certification due largely to its steep approach requirement. Tests have already been performed at other airports, flying approaches as steep as 7.5°, but the late March trials, using its second CS100 flight-test vehicle (C-GWYD), were the first site-specific evaluations. In all, Bombardier carried out eight validation tests over two days. "Performance is either on spec, or better," says Dewar. Depending on results, no further flights should be required. Launch customer Swiss is keen to operate its CS100s to London City.



SECURITY GRAHAM DUNN LONDON & JON HEMMERDINGER BOSTON

Baggage rules to hit almost 30,000 passengers daily

Analysis of schedules data suggests combined impact of US and UK cabin electronics bans will have a huge effect

The US government's latest air travel security measures, unveiled on 20 March, could affect nearly 18,000 passengers each day travelling on some 50 routes to the USA from 10 foreign airports, according to schedules data reviewed by FlightGlobal.

A similar analysis of schedules data for the UK, which on 21 March announced similar restrictions, suggests that an average of 10,000 passengers will be affected by its heightened security measures.

The restrictions announced by the US Department of Homeland Security (DHS), which took effect on 25 March, prohibit passengers travelling from 10 cities in Africa and the Middle East from carrying a range of electronic devices in aircraft passenger cabins.

Any device larger than a mobile phone – such as laptop and tablet computers, e-readers and cameras – must now be packed in checked luggage.

Although the DHS has not specified a duration for the rules, Dubai-based Emirates Airline, one of the carriers affected, says they will be in force until 14 October.

The 10 airports affected by the electronics ban are Abu Dhabi, Amman, Cairo, Casablanca, Doha, Dubai, Istanbul Ataturk, Jeddah, Kuwait and Riyadh.

Those airports were chosen “based on the current threat picture”, says the DHS, although it notes that the ban does not affect international flights originating in the USA.

The DHS made the security changes after receiving new intelligence indicating that “terrorist groups continue to target commercial aviation, to include smuggling explosive devices in various consumer items”, it says.

PROPAGANDA EFFORT

“Disseminated propaganda from various terrorist groups is encouraging attacks on aviation,” it adds. “Terrorist propaganda has highlighted the attacks against aircraft in Egypt with a soda can packed with explosives in October 2015, and in Somalia using an explosives-laden laptop in February 2016.”

The attacks referenced are the 31 October 2015 downing of an Airbus A321 operated by Russian carrier Kogalymavia's MetroJet brand shortly after departure from the Egyptian resort of Sharm el-Sheikh, en route to St Petersburg, and a 2 February 2016 incident in which a Daallo Airlines A320 made an emergency landing at Mogadishu after an explosion blew a hole in the fuselage. Investigators believe that

terrorist activity was implicated in both events.

Though the new requirements impact only 10 cities, they encompass most flights from an entire region and include hubs operated by carriers – the Gulf's big three – that in recent years have expanded aggressively in the USA, as a result becoming embroiled in an embryonic trade dispute with US airlines.

In total, nine airlines operate routes affected by the restrictions, FlightGlobal schedules data shows: Egyptair, Etihad Airways, Emirates, Kuwait Airways, Qatar Airways, Royal Air Maroc, Royal Jordanian, Saudia, and Turkish Airlines.

Many of those airlines operate multiple daily flights to the USA. Etihad for instance, flies from Abu Dhabi to six US airports, carrying an average of 2,100 seats daily.

Likewise, the restrictions affect Qatar's 11 daily flights to 10 US cities, and Emirates' 17 daily flights to 11 US cities. Qatar carries more than 3,500 seats daily to the USA, while Emirates' daily US-bound seat count tops 7,000.

The restrictions also have outsized impact on Turkish Airlines, which serves nine US cities and carries some 3,100 seats daily to the USA.

Indeed, the same carrier is disproportionately affected by the UK's restriction. April schedules data from FlightGlobal shows that of the 75 airline services covered by the ban, around two-thirds of them are on Turkish routes. Aside from Turkey, the UK says the new regulations apply to flights from Egypt, Jordan, Lebanon, Saudi Arabia and Tunisia.

FlightGlobal schedules data for April shows more than 1,400

Turkish Airlines operates six routes to the UK



scheduled flights from the six countries into the UK. These account for almost 300,000 seats across the month, an average of around 10,000 seats a day.

Turkey to the UK is the biggest of the markets covered by the UK's new restrictions. There are 49 services operated by nine airlines scheduled for April, spread across 34 routes. Scheduled Turkish capacity is slightly higher in this year's peak summer months than in April.

RESTRICTED ROUTES

Turkish Airlines has the most capacity into the UK from Turkey. It has more than 80,000 seats scheduled into the UK market during April, across six different routes. The largest of these is Istanbul Ataturk-London Heathrow.

While the routes covered by the US restrictions are only operated by overseas carriers, the UK restrictions apply to several home operators.

British Airways serves five of the countries covered – its flights on the routes in question accounting for around 40,000 seats in April. Tunisia is the only one of the six countries that BA does not serve.

In imposing the restrictions, the UK said it faced a “constantly evolving threat” from terrorism and that the government “must respond accordingly” to ensure the protection of the public. But it stresses that it is “not currently advising against flying to and from those countries” affected by the measures.

The UK has not applied its measures to Kuwait, Morocco, Qatar and the UAE – the other countries with airports covered by the US restrictions. ■

April 2017 scheduled capacity from Turkey into the UK

Origin	Destination	Flights	Seats	ASKs
Istanbul Ataturk	Birmingham	52	8,129	21,415,819
Istanbul Ataturk	Edinburgh	30	4,548	13,013,709
Istanbul Ataturk	London Gatwick	60	10,233	25,493,110
Istanbul Ataturk	London Heathrow	164	44,641	112,433,866
Istanbul Ataturk	Manchester	60	10,756	29,029,045
Istanbul Sabiha Gokcen	London Gatwick	22	3,322	8,404,291
Totals		388	81,629	209,789,840

Source: FlightGlobal schedules data (March 2017)



Erie echo in loss of
Saab 340 propeller
Air transport P10

REQUIREMENT DOMINIC PERRY LONDON

T-100's maturity must Trump US politics, insists Leonardo

Italian airframer fears focus on domestic concerns will scupper bid for USAF's T-X contest

As the battle for the US Air Force's T-X trainer programme heats up, Italy's Leonardo fears its T-100 will be overlooked due to political considerations.

The T-100 – a derivative of the Aermacchi M-346 – faces opposition from a combined Boeing/Saab team, which is offering a clean-sheet design, and the Lockheed Martin/Korea Aerospace Industries T-50.

Although the T-100 is being offered through Leonardo's US subsidiary DRS – following the withdrawal of former partner Raytheon from the contest in late January – the company remains the only overseas participant in the competition without a big US airframer as a partner.

Mauro Moretti, Leonardo's chief executive, speaking on a full-year results call, noted that as the T-X competition was the last of the air force's big-ticket acquisitions, this provided an extra competitive edge. "It is quite reasonable to assume that whoever didn't have a result before wants to have a result today," he said.

However, he is concerned that political considerations will favour domestic suppliers, despite Italy's considerable military purchases from the USA, notably the Lockheed F-35.

"If you consider the balance of what Italy is buying in defence in the USA against what we can sell in the same market it is absolutely not comparable," he says.

"I hope and think that politically it will be considered to give the best system on the market at the moment the possibility that it needs."

Moretti defends the T-100, noting that it is the "most mature... the most developed with the most performance you can find on the market at the moment".

He stresses that the maturity of the platform and its broader training system should be an important consideration given the USAF's need to quickly replace its fleet of aged Northrop T-38 Talons from 2025.

Leonardo will submit its bid by the end of March, he says, which will include the location of a US final assembly line. ■

MANUFACTURING DOMINIC PERRY LONDON

New ATR could be carbonfibre aircraft: Moretti

Italy's Leonardo appears to be leaning towards the extensive use of composite material in its proposed 100-seat "multi-purpose" turboprop.

Chief executive Mauro Moretti on 15 March indicated that the airframer was ready to proceed with a new development with or without Airbus, its partner in the ATR turboprop joint venture.

Moretti says that manufacturing advances made by its aeronautics division could be leveraged for any new programme.

"In the last couple of years we have gained new capabilities in manufacturing of carbonfibre, and we are also developing new process technology for a higher level of productivity," he says.

This allows for improvements in quality and cost that give Leonardo the "opportunity to gradually abandon manufacturing of components in traditional materials", says Moretti.

Leonardo is in discussions with Airbus about keeping the larger turboprop within the ATR business, but may seek investment from elsewhere, Moretti indicates.

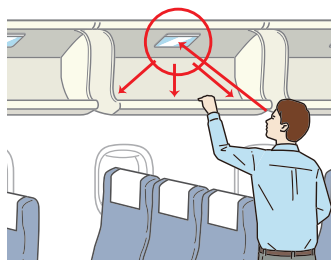
He believes that a signal to the market that it has begun work on a 100-seater would allow it to maintain its sector dominance. ■



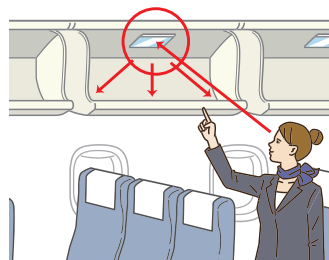
Aermacchi M-346-derived type faces competition from a Boeing/Saab design and Lockheed/KAI's T-50

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OPERATIONS DAVID KAMINSKI-MORROW LONDON

Crew issues make Miami route vanish into Finnair

Oneworld carrier Finnair is halting its Miami service for the summer season and cutting frequencies on its Chicago route, owing to crew rostering problems.

Finnair blames the adjustments on a “temporary shortage” of aircraft and crews.

While it has not given specific details, the airline has previously had to juggle training for the transition of Airbus A330 pilots to the carrier's new A350s.

The situation has been exacerbated by uncertainties over the A350 delivery schedule.

Finnair says it will suspend the Helsinki-Miami service from 4 May, and resume the route with a thrice-weekly frequency on 1 October. It adds that it will trim two of its weekly frequencies on the Chicago route during May.

Finnair had previously opted to suspend its route to the Chinese city of Chongqing as it tried to deal with the A350 training backlog.

The Helsinki-based airline has so far taken delivery of seven of an eventual 19 examples of the new Airbus widebody type. ■

Carrier has rostering problem due to pilots training for its A350s



INQUIRY DAVID KAMINSKI-MORROW LONDON

Erie echo in loss of Saab 340 propeller

Australian carrier Regional Express notes close similarities between 17 March incident and 1991 event near Toronto

While Australian investigators have yet to reach conclusions on the in-flight propeller separation involving a Regional Express Saab 340, the circumstances closely resemble a previous event over Lake Erie.

The US National Transportation Safety Board (NTSB) details a flight involving a Comair Saab 340A, registered N146CA, which lost its starboard propeller during descent to Toronto.

Investigators found that the pilots had detected vibration from the propeller at 21,000ft and, believing it to relate to icing, descended to 8,000ft where they decided to shut the engine down.

The propeller was being feathered to reduce drag when it separated from the engine, states the NTSB, and the Saab diverted to Buffalo, New York.

Examination of the GE Aviation CT7 engine showed that the propeller shaft had sheared near its forward end, just behind the flange to which the propeller hub was attached.

The propeller had not been recovered when the NTSB – six weeks after the November 1991 event – stated that metallurgical

examination of the engine revealed evidence of fatigue cracking which had “progressed most of the way around” the circumference of the shaft.

It stated that the engine's gearbox had accumulated 10,600h but that the shaft was not life-limited and that other shafts had reached more than 14,000h.

Investigators concluded that the cracking caused the vibration detected by the crew, and expressed concern that pilots might

not recognise that the vibration is an onset to a “potentially catastrophic” condition and so might allow the engine to continue operating rather than shutting it down as soon as practical.

Regional Express noted the Comair incident in the wake of the 17 March propeller-separation involving one of its Saab 340Bs.

The flightcrew had shut down and feathered the starboard propeller following abnormal indications, the airline says, adding that

The carrier has since replaced propeller gearboxes and shafts on five other aircraft

inspections revealed it subsequently sheared off at the shaft.

No detail of the service history of the Regional Express aircraft (VH-NRX) has been disclosed, but the airframe was manufactured in 1992, and had been in service for 25 years, while the Comair Saab had only been operating for two years before its propeller loss.

None of the 19 passengers and crew were injured in the incident, in which the aircraft landed safely at Sydney. The carrier has since replaced propeller gearboxes and shafts from the same series on five other Saab 340Bs in its 51-strong fleet of the type.

Following a search, the missing propeller was located on 21 March by a New South Wales Police helicopter in an area of bushland near Revesby to the southwest of Sydney. ■

Additional reporting by Ellis Taylor in Perth



Missing component was located in bushland southwest of Sydney



Fokker nose-gear jammed by maintenance error
Air transport P12

STRATEGY DAVID KAMINSKI-MORROW LONDON

IAG Levels its aim at Norwegian with low-cost operation

Long-haul budget airline is designed to counter challenge from Nordic rival on transatlantic routes out of Spanish hub

IAG has signalled that it is aiming to compete head-on with low-cost operator Norwegian with its newly unveiled budget carrier Level.

Its planned services from Barcelona to San Francisco – operating to Oakland airport – as well as Los Angeles will bring the two airlines face to face in the transatlantic low-fare market when both operations begin in June.

Level will operate 314-seat Airbus A330s on the routes. Norwegian's long-haul operations are conducted with Boeing 787-9s with 344 seats, and -8s with 291.

While Norwegian's 787s have about 10% of their seats in a premium class cabin, Level's A330s will have a smaller proportion, with about 6% in a premium-economy section.

Both airlines have disclosed plans to serve Los Angeles twice-weekly and Oakland thrice-weekly. Norwegian is also opening Barcelona links to Newark and Fort Lauderdale, while Level will operate to Buenos Aires and Punta Cana.

Level's thrice-weekly operation to Argentina – which begins on 17 June – might have pre-



Carrier's A330s will be configured with 314 seats in two-class layout

empted a Norwegian expansion into that country.

Norwegian has previously indicated that Buenos Aires is a favoured destination, and the company has embarked on establishing a corporate presence in the Argentinian capital.

Level's service offering will include complimentary catering, in-flight entertainment and checked luggage. The new carrier will also participate in IAG's Avios loyalty scheme.

IAG chief Willie Walsh says Level will "benefit" from the corporate strength of its parent, and will offer a "stylish and modern approach" to budget travel.

He confirms that IAG will use Vueling as a feeder service for Level, adding that the new long-haul operator will "complement" the IAG portfolio and "further diversify" its customer base.

"This is just the start," he says. "We're really excited about the opportunities for expansion."

Norwegian has established itself in the transatlantic budget market, having begun services in the sector in 2013. Since then it has transported some 4 million passengers between eight US cities and several European locations.

While IAG has not specifically disclosed the thinking behind the new carrier's branding, the name and the green-and-blue colour scheme hint at a levelling of the competitive playing field. ■

Services to take off with two jets and four routes

IAG's new long-haul, low-cost airline operation Level will have an initial route network comprising four destinations in North and Latin America.

Level will start services with two 314-seat Airbus A330s in June this year, IAG says.

It will operate from Barcelona to the US cities of Los Angeles and San Francisco, as well as the Argentinian capital Buenos Aires and Punta Cana in the Dominican Republic; IAG will later look to expand Level's operations to other European cities.

The carrier group says the A330s will be operated initially by Iberia pilots and cabin crew. The aircraft will have 21 premium-economy and 293 economy seats.

Havana, Santiago and Tokyo have previously been identified as potential routes for the operation.

FLEET GHIM-LAY YEO WASHINGTON DC

Max will be a Texas ranger on Southwest debut



Low-cost carrier plans to have 14 of re-engined type by end of 2017

Southwest Airlines has unveiled the all-Texas routes its first Boeing 737 Max aircraft will be flown on, ahead of receiving its initial examples of the re-engined narrowbody later this year.

The Dallas-based carrier will operate the 737 Max from 1 October, with the inaugural revenue flight departing Dallas Love Field at 07:00 for Houston Hobby. It will then continue to San Antonio before returning to Dallas.

The routing is reminiscent of Southwest's very first flight on 18 June 1971 – except that the airline then operated 737-200s and flew to Houston Intercontinental rather than Hobby.

Southwest says it will launch nine 737 Max 8s into operations on 1 October, followed by the tenth about a week later; it will end 2017 with 14 in its fleet.

The last of its 86 737-300s will be retired on 30 September. ■



INCIDENT DAVID KAMINSKI-MORROW LONDON

Fokker nose-gear jammed by maintenance error

Italian investigators have said that incorrect maintenance was conducted on an Air Vallee Fokker 50's nose-gear the day before the aircraft was forced to land with its nose-gear retracted.

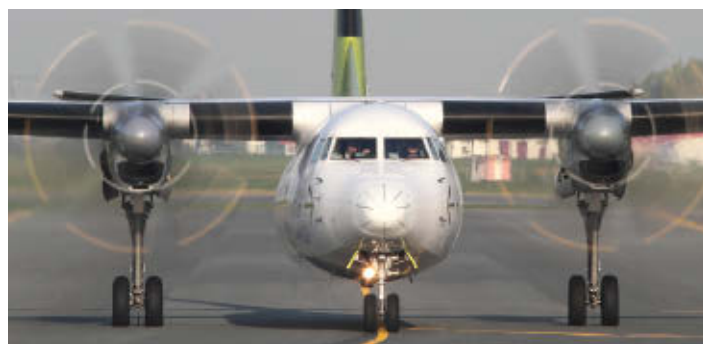
The crew of the aircraft (SE-LEZ) noticed an "unusual sound" during nose-gear retraction after it took off from Rimini on 30 April last year, says a technical analysis by Safran Landing Systems.

The main landing-gear lowered on approach to Catania, but there was an alert about the nose-gear, and the crew carried out a low pass over the airport for a visual check. Tower controllers confirmed the nose-gear doors were open but the wheels were not de-

ployed. The crew could not resolve this and the Fokker landed with its nose-gear retracted.

Safran has compiled the technical analysis to assist the inquiry by Italian investigation authority ANSV. Maintenance records, it says, show that the nose-gear assembly underwent seal-replacement work on the day before the event. However, during reassembly a valve housing was left improperly orientated.

When the nose-gear retracted, the shock-absorber over-extended, causing the tyre to strike a bulkhead – the noise heard on take-off – and jam in the well. "The contact between the tyre and the bulkhead meant that the



Safran believes its shock absorber overhaul instructions are "robust"

gear could not be extended," says the analysis.

Safran reviewed its technical publications but says its instructions are "robust" and "written specifically to prevent incidences

of incorrect assembly" of the valve housing and a resulting over-extension of the shock absorber.

It believes that no corrections are required to the published assembly directions. ■

PROGRAMME
FIRDAUS HASHIM SINGAPORE

IAe readies first N219 prototype for flight debut

The first flight of Indonesian Aerospace's (IAe) developmental N219 commuter aircraft is expected around mid-year.

The state-owned airframer disclosed the plan following a visit from Muhammad Nasir, Indonesia's minister of technology research and higher education.

IAe says it has already performed a number of trials on the first prototype, including wing static-load tests, along with several electrical checks, fuel-tank integrity and cleaning evaluations, as well as a landing-gear drop test.

The manufacturer aims to conduct a total of 300h of flight testing with two prototypes to achieve certification.

The N219 will be capable of operating in a number of commercial, military and parapublic roles. Powered by two Pratt & Whitney Canada PT6A-42 engines, it can operate up to 480nm (889km) with 19 passengers, while its maximum ferry range is 840nm. ■

INVESTIGATION DAVID KAMINSKI-MORROW LONDON

Autopilot was disconnected before A330's short landing

Hi Fly twinjet touched down 21m before threshold at Cologne, sustaining tyre damage

German investigators probing a short landing by a Hi Fly Airbus A330-200 at Cologne have said its descent rate increased after its autopilot was disengaged.

Investigation authority BFU, in an interim statement, says the jet (CS-TQW) touched down 21m (69ft) short of the runway threshold, damaging runway lighting.

The aircraft had been conducting a night arrival from Reykjavik to runway 32L – the much-longer parallel 32R having been closed – but was unable to accept a satellite-based approach and request-

ed a non-precision approach with radar vectors.

Three pilots were in the cockpit and the monitoring pilot confirmed visual contact with the approach lights, after which the tower gave landing clearance.

The flight-data recorder showed that the approach was automatic from 2,200ft, at an air-speed of 128kt (237km/h), with a rate of descent of 500-750ft/min. As the aircraft reached 690ft the autopilot was disconnected – after which, the inquiry says, the rate of descent increased to 895ft/min.

After an automated call-out at 30ft, one of the crew members stated: "We are getting slightly low." The third pilot, on the jumpseat, noted after the landing that the precision-approach path indicator (PAPI) lights had shown "four red" – suggesting a descent far below the glidepath – while the other two pilots had seen at least three red PAPI lights.

Weather conditions at the time of the landing, on 18 September last year, had been poor. BFU states that the captain told investigators the approach had been stable until around 200ft above ground, when vertical corrections were made to the flight path. He also said he was aware that the available runway was short.

BFU says the left-hand main landing-gear touched down 21m before the threshold, and the right-hand at 15m before. The right main-gear struck a lamp and sustained tyre damage. ■



Airbus twinjet had been carrying out a night arrival in poor weather



USAF reveals added review completed on B-21 bomber
Defence P14

STRATEGY OLIVER CLARK LONDON & GHIM-LAY YEO WASHINGTON DC

Alitalia to slash narrowbody fleet as it restructures again

Struggling flag carrier aims to return to profit in 2019 under latest cost-saving programme

The Alitalia board has approved a restructuring plan that aims to return it to profit by 2019 and under which the struggling Italian carrier will cut its narrowbody fleet by around a quarter and shed 2,000 staff.

It had originally been targeting a return to profit by the end of 2017 under a three-year plan instigated after Etihad Airways' 2014 acquisition of a 49% stake.

However, in the face of worsening operating conditions and poorer-than-expected financial performance, the airline has been forced to revise its strategy.

Alitalia says it plans to cut expenditure by €1 billion (\$1.07 billion) by 2019, through reductions in operating costs and manpower. The SkyTeam carrier is aiming to grow revenue by 30% in the same period to €3.7 billion.

Under the plan, Alitalia will reduce its narrowbody fleet by 20 aircraft by 2018. It operates 77 Airbus A320-family aircraft, Flight Fleets Analyzer shows.

Alitalia says shareholder support for the plan is subject to the airline's unions agreeing to a new collective works agreement and headcount-related measures.



Chief executive Cramer Ball says cuts are "painful, but necessary"

"With the approval today [15 March] by the board of directors of the second phase of our business plan we can now accelerate our actions towards turning around Alitalia," says chief executive Cramer Ball.

However, there is no guarantee that the plan will be accepted by unions, particularly the sweeping redundancies, which Ball describes as "painful, but necessary". The reduction of 2,000 positions from a global total of 12,500 includes both permanent and temporary roles.

A union source says Alitalia is also seeking a 22-28% reduction in pilot salaries. A 24h strike on 5 April is planned in response to the airline's proposals.

Once it is profitable, Alitalia will pursue growth and add six new long-haul aircraft to the fleet by the end of 2021, it indicates.

These would be additional to two aircraft joining the fleet in 2017-2018. The airline is also planning to launch 10 new long-haul routes between 2017 and 2021, and to recruit up to 500 new crew members by 2019. ■

REDUNDANCIES
OLIVER CLARK LONDON

Nigerian carrier says layoffs will ensure 'survival'

Aero Contractors is making some 60% of its workforce redundant in a move the Nigerian carrier's management argues is required to ensure its "survival".

The government has been running Aero Contractors since February 2016, via the Asset Management Company of Nigeria.

While the airline has not said how many will be affected by the proposed redundancies, it says "over a thousand people" are "basically not engaged due to lack of serviceable aircraft" and that this is not sustainable.

It asserts that its employee-to-aircraft ratio, at 500:1, is "perhaps the worst in the history of [the] global airline industry", suggesting that under "international best practices" a figure of 50 to 60 personnel per aircraft would be ideal.

The "bloated" salary bill will "eventually kill the airline", Aero Contractors contends.

It says staff in MRO and other "essential staff in critical departments" will not be affected.

Aero Contractors plans to use the cost savings to acquire more aircraft and pay for C-checks.

The "inevitability" of job cuts has been discussed with workers and unions, and affected staff have been notified. ■

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DEVELOPMENT

DOMINIC PERRY LONDON

Moretti targets rapid successor for Black Hawk

Leonardo could quickly bring to market a replacement for Sikorsky's UH-60 Black Hawk, in addition to "a sort of new Apache" attack helicopter, its chief executive says.

During a full-year results call on 15 March, Mauro Moretti said Leonardo's helicopter division has already been contracted by the Italian defence ministry to develop a successor to the AgustaWestland AW129 Mangusta attack helicopter. This will use the transmission and dynamic components from the AW189 as part of a cost-saving initiative, and Moretti says the same principle can be applied to other rotorcraft.

Such a strategy would allow it to create "an extension to the multirole defence helicopter; a new Black Hawk", he says.

That is likely to be a reference to the AW149 – the military version of the AW189 – for which the European company has long sought a launch customer. So far, only Thailand has emerged as a possible operator, but according to Moretti, Leonardo has "already seen interest [from] different countries".

Moretti says its strategy allows it to cut development time compared with others, adding that it will take "a few years" versus about "five years" for its rivals. ■

PROGRAMME LEIGH GIANGRECO WASHINGTON DC

USAF reveals added review completed on B-21 bomber

Secretive project advances as acquisition official pledges greater transparency to Congress

The US Air Force's Northrop Grumman B-21 bomber has passed an additional preliminary design review (PDR), the military deputy for the assistant secretary of the air force for acquisition says.

The service conducted an initial PDR during the programme's technology maturation and risk-reduction phase before it selected Northrop ahead of a Boeing/Lockheed Martin team. A protest followed its contract award, and the additional three-day review concluded a few weeks ago, Lt Gen Arnold Bunch said on 16 March.

"We're moving forward with detailed design at this point," Bunch says. "We did one [PDR] before, but we had to make sure we came back after the [appeal] downtime to clean up anything."

Normally, one PDR is conducted during the technology maturation and risk-reduction phase, to assure that a platform's hardware and software is operational. The programme then moves into the engineering, manufacturing and development phase, where a critical design review (CDR) is held.

The USAF has remained quiet on most aspects of the bomber contract. The service has even shrouded the price of the aircraft,



US Air Force

Service says it made mistakes with information release on the B-2

arguing that adversaries could gain information on its capabilities by working back from its cost.

Bunch says the programme is progressing toward detailed design and CDR, but declines to disclose the programme's timeline.

The air force is applying lessons from its Northrop B-2 bomber programme, including the way it releases information. Bunch says it has completely changed the activity's structure, with a focus on transparency and oversight from Congress. "We weren't as transparent as we needed to be," he says of the B-2 programme.

However, his philosophy ap-

pears at odds with other senior USAF leaders. "If you put a cost estimate out in the press, it's not only our adversaries that are looking at it, but the people that are going to build the system," Gen John Hyten, commander of the US Strategic Command, told a recent Congressional hearing.

Bunch says the air force is working with US intelligence, industry and the secretary of defence's office to determine what information can be released. "I don't see [us] releasing any more details for a period of time," he says, adding: "we've been very open so far." ■



ROTORCRAFT

Apache lifted by multi-year contract

Boeing has been awarded a five-year contract worth \$3.4 billion to remanufacture 244 of the US Army's AH-64D Apache attack helicopters to the E-model standard, and supply 24 new-build examples to an undisclosed international buyer. Apache project manager Col Joseph Hoecherl says the army's first multi-year procurement deal for the AH-64E Guardian will provide "much-needed capabilities... at a fair and affordable price that results in year-over-year savings to the [US] taxpayer." Boeing says it has so far secured seven international customers for the AH-64E. Flight Fleets Analyzer records these – India, Indonesia, Qatar, Saudi Arabia, South Korea, Taiwan and the UK – as having combined commitments for 205 examples.



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ROTORCRAFT MARK KWIATKOWSKI LONDON

Royal Navy makes Lynx extinct as last HMA8s step down

Final four examples of ship-based type complete farewell flight as service passes duties to new-generation Wildcat

A final flypast of four Royal Navy Westland Lynx HMA8 helicopters from 815 Naval Air Squadron took place from RNAS Yeovilton in Somerset on 17 March, before the type was officially decommissioned six days later on 23 March.

The Lynx entered Fleet Air Arm service in September 1976,

was used in conflicts including the Falklands and Gulf wars, and logged over 490,000 flying hours.

The HMA8 version has been replaced by AgustaWestland AW159 Wildcats.

Flight Fleets Analyzer records 111 legacy Lynx aircraft as being in operational use with 11 other nations following the RN retire-



Fleet Air Arm retired UK-built type after 41 years of operational use

ment, with this total also including nine Lynx AH9As which will end their service lives with the British Army in March 2018.

AgustaWestland's new-genera-

tion Lynx Wildcat is in RN and Army Air Corps service for the UK. The type is also operated by the South Korean navy and is on order for the Philippines. ■



Chengdu fighter currently uses version of Russian AL-31F turbofan

PROPULSION GREG WALDRON SINGAPORE

Power struggle endures for J-20

China is nearing the use of an indigenous powerplant with its Chengdu J-20 fighter, although mass production of key engine technologies remains a challenge.

"It will not take a long time for our fifth-generation combat plane to have China-made engines," the *China Daily* newspaper quotes Aero Engine Corporation of China official Chen Xiangbao as saying.

Chen says China has produced single-crystal turbine blades and powder metallurgy superalloy turbine disks required to allow fighter engines to operate at extreme temperatures, but that so far their "quality is not very satisfactory".

"The road to success is filled

with setbacks and failures," Chen says. "Each of the world's engine powers has walked this road."

Early examples of the J-20 – first flown in late 2010 – are believed to use a version of Russia's Saturn AL-31F. An indigenous replacement could be the 30,000lb-thrust (133kN) WS-15, which has been in development since the 1990s.

Chinese state media reports that the J-20 has entered air force service in small numbers. The type made its public debut last November at the Zhuhai air show.

Little is known about the twin-engined type's sensor suite, data-link capabilities and payload, or its intended roles. ■

WEAPONS CRAIG HOYLE LONDON

MBDA targets US prize with Brimstone offering

The US military could acquire MBDA's Brimstone air-to-surface missile to provide some of its fast jet platforms with an "off-the-shelf" precision strike capability for use against moving targets, the company says, despite the uncertainty raised by President Donald Trump's buy-American agenda.

"We know that the US military still aspires to have Brimstone on [the Boeing] F-15 and F-18," says Dave Armstrong, MBDA's executive group director for sales and business development. "It's a question of economics and programme management."

The European company has previously promoted Brimstone through its US subsidiary as a possible armament for the US Air Force's General Atomics Aeronautical Systems MQ-9 Reaper, and is strengthening its activities in North America. Armstrong notes that MBDA Inc is now "self-sufficient", with a roughly \$30 million contract backlog to manufacture Diamond Back wing kits for Boeing's small diameter bomb.

MBDA chief executive An-

toine Bouvier describes the new US administration as representing "a more uncertain partner, but no less important".

Meanwhile, BAE Systems is advancing its work to integrate Brimstone with the Eurofighter Typhoon for the UK Royal Air Force, with air data and flight envelope expansion continuing. The combination remains on course to be operationally available during 2018, to coincide with the retirement of the service's last Panavia Tornado GR4s.

"Firing trials are scheduled for later this year to test the effectiveness of the weapon in operational scenarios," BAE says.

Armstrong points to what will be a common stockpile of Brimstone weapons for the UK's Typhoons, Lockheed Martin F-35Bs and General Atomics Certifiable Predator Bs; to be acquired via the Protector programme. He also hopes it will be the "weapon of choice" for the British Army's incoming fleet of Boeing AH-64E attack helicopters, after a successful test firing last June. ■

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LIMA 2017

Staged from 21-25 March, the biennial Langkawi International Maritime & Aerospace exhibition again saw a major emphasis on maritime patrol aircraft, but budget constraints mean Kuala Lumpur appears as far as ever from confirming plans to upgrade its capabilities. Nonetheless, Malaysia has very real force gaps in several areas, and the cream of the world's aerospace sector showed up to describe their vision of the future. Show report by Greg Waldron



Airbus Defence & Space

ROTORCRAFT

Enhanced Nuri is proof positive for Airod

Maintenance and overhaul specialist hands over modernised S-61 for assessment and says type could fly on until 2025

Airod has officially handed over the first upgraded Sikorsky S-61A-4 Nuri transport helicopter for the Malaysian military, and sees the type remaining in service until 2025.

The update involves the rotorcraft's avionics, including an all-new glass cockpit with digital flight displays and a moving map.

The first upgraded Nuri, which serves as a proof of concept, took five months to complete, says Airod chief executive Ibrahim Bahari. The work was performed at Subang airport on the outskirts of Kuala Lumpur, where the company has the capability to modify two Nuris at the same time.

Bahari says that despite their age, the Nuris have only accumulated an average of 18,000-



Greg Waldron/FlightGlobal

Aged type has gained upgraded avionics and digital flight displays

20,000h of flight time. He estimates that the airframe's life could be pushed out to 40,000h.

Flight Fleets Analyzer shows that Malaysia operates 29 S-61s,

with an average age of 40 years.

While the fleet undergoes the avionics upgrade, airframes and components will also be inspected, Airod says.

Bahari also hopes to advance further projects involving the Lockheed Martin C-130. In particular, the company hopes to win an avionics and cockpit upgrade for the Royal Malaysian Air Force's examples, which it would then pitch to other Asia-Pacific operators.

Airod has already had several successes with the Hercules, including a \$25 million deal from the US Navy to service 13 KC-130Js between 2016 and 2020.

Meanwhile, commercial unit Airod Aerospace Technology (AET) is steadily building up its clientele in Asia. Abdul Majid, AET's head of sales and marketing, says its core client is Lion Group carrier Malindo Air, for which it conducts C-checks on its Boeing 737 fleet at Subang. ■



Greg Waldron/FlightGlobal

Nation has become the first Atlas user to complete its inventory

DELIVERY

Final A400M joins Malaysian fleet

The Royal Malaysian Air Force (RMAF) has taken delivery of its fourth and final Airbus A400M Atlas tactical transport.

During a ceremony at the show, Malaysian defence minister Hishamuddin Hussein received a plaque from Airbus Defence & Space's head of military aircraft, Fernando Alonso.

"The RMAF now has a fleet of four aircraft, and can start to fully benefit from the A400M's unique

capabilities," says Alonso. "I am convinced that they will be an example for the whole region."

Malaysia – the first customer to complete its A400M fleet – has amassed 2,000h with its first three examples, used by 22 Sqn.

Ioannis Papachristofilou, head of corporate marketing at Airbus Defence & Space, says regional requirements for maritime patrol aircraft are one area of significant interest for its A400M. ■



Cessna flies third Longitude prototype as approval nears
Business aviation P20

SURVEILLANCE

ATR 72MP debuts as Leonardo touts maritime potential

Recently-delivered platform appears in static display while European airframer detects opportunity with Kuala Lumpur

Leonardo's ATR 72MP maritime patrol aircraft (MPA) made its public debut in Langkawi, with an Italian air force example on static display receiving VIP visitors including Malaysian Prime Minister Najib Razak.

Italy has received its first two from an eventual four of the type, which it designates the P-72A, and is on the verge of declaring initial operational capability.

Eduardo Munhos, head of sales for Leonardo's aircraft division, says the company has spoken with several countries about the MP variant, including Malay-

sia and the Philippines.

Leonardo highlighted the ATR 72MP's flexibility, noting that it can perform multiple missions, also including search and rescue, exclusive economic zone monitoring, and acting as a communications node for other airborne assets.

The modified aircraft is configured with four onboard operator consoles, has a mission endurance of up to 10h, and could be armed with weapons for the anti-submarine warfare mission.

Located in a vast littoral region riven with competing territorial



Greg Waldron/FlightGlobal

Italian air force brought its modified twin-turboprop to Langkawi

claims, Malaysia has a clear need for a long-range MPA capability, as it currently operates just four Beechcraft King Air 200Ts.

Sources say Kuala Lumpur has two needs: the first for a long-range, militarised MPA mission to be conducted with a larger aircraft; and a shorter-range requirement closer to shore, operated by parapublic bodies.

Over the past few years, several companies have pitched poten-

tial MPA solutions to the country, including Airbus Defence & Space, with the C295; Boeing's Maritime Surveillance Aircraft, based on a Bombardier Challenger 604 business jet; an Indonesian Aerospace (IAe) development of the CN235; and Saab's Swordfish system.

Both IAe and Saab also had a major presence at this year's show, while the US Navy sent a Boeing 737-based P-8A. ■



Dornier 228NG could perform coastal patrols

RUAG

PROMOTION

RUAG sees potential for island hopping

Swiss aerospace company RUAG is working on opportunities to sell its Dornier 228NG in Malaysia, as it also increases its maintenance, repair and overhaul presence.

The company is in discussions with two local operators to sell up to three of the type

for chartered passenger services to island resorts, says David Jones, its general manager in Malaysia.

Another opportunity the company is hopeful for is a Malaysian requirement for an aircraft to perform coastal patrol and other parapublic missions. ■

COMMUNICATIONS

Honeywell scans for C-130 upgrade

By offering key systems upgrades Honeywell believes it can help extend the life of Malaysia's ageing military fleet.

Derek Lockett, the company's director of sales for the Asia-Pacific region, says it is in the process of expanding its regional presence, mainly through the addition of sales staff.

One area where it sees strong potential in the region is the ad-

dition of wi-fi aboard transport aircraft.

"Normally during a 12-hour [Lockheed Martin] C-130 flight, soldiers will be sleeping," he says. "If they can use their secure networks while airborne it will make for a more efficient mission."

He says that Honeywell will be able to leverage its experience in providing airliner connectivity.

Another product area he mentions with regard to Malaysia is aircraft health and usage monitoring systems, which Honeywell believes could benefit the nation's C-130 fleet.

The ability to update support personnel before a component or system suffers an issue aids with preventative maintenance, and can boost aircraft availability by 20%, he notes. ■

TRAINING

T-50 promotion takes to the sky

Korea Aerospace Industries is promoting its T-50 advanced jet trainer and light-attack FA-50 to Kuala Lumpur, with the company having a large stand at this year's show.

Its appearance was also in support of the South Korean air force's Black Eagles aerobatic team, which performed during the event's daily flying display with its eight T-50Bs. ■



DEVELOPMENT KATE SARSFIELD LONDON

Cessna flies third Longitude prototype as approval nears

Aircraft will focus on avionics and systems testing, with first production units in assembly

Cessna's Citation Longitude programme has taken another step forward, with the debut flight on 17 March of its third prototype.

The super-midsize twin – registration N702GL – completed a 1h 40min sortie from Wichita, Kansas flown by Cessna pilots Corey Eckhart and U J Pesonen, and flight-test engineer Mike Bradfield, with this evaluating the aircraft's systems.

The third prototype will be dedicated to avionics and systems development, says Cessna parent company Textron Aviation, and will also collect flight simulator data.

Cessna has, meanwhile, begun assembly of the first four production Longitudes at a dedicated manufacturing facility, called Plant IV, situated on the east side of its Wichita campus.

"The speed at which our team is achieving these milestones is an important indication to our customers of the maturity of the



Super-midsize twin performed 1h 40min sortie from Wichita facility

aircraft's systems, and the proficiency of our processes," says Brad Thress, Textron's senior vice-president of engineering.

The third Honeywell HTF7700L-powered prototype joined the test programme less than six months after the first Longitude commenced Cessna's certification effort. The second aircraft arrived last November,

and the pair have logged 250h across 125 flights.

US certification of the 12-passenger, 3,500nm (6,480km)-range twinjet is slated for the end of the fourth quarter, with service entry to occur in early 2018.

The \$24 million Longitude includes Cessna's first use of fly-by-wire technology, with electronically-actuated spoilers. ■

ORDER KATE SARSFIELD LONDON

G550 will come to the rescue for Beijing 999 unit

Chinese medical evacuation provider Beijing Red Cross Emergency Medical Center (Beijing 999) has acquired a Gulfstream G550 to support its disaster relief and medevac operation.

The large-cabin twinjet will be outfitted at the US manufacturer's facility in Appleton, Wisconsin. Features will include in-flight surgical operation capabilities, emergency resuscitation-enabled hospital beds, X-ray equipment and a medical bay, Gulfstream says.

A delivery date to Beijing 999 has yet to be determined, the airframer adds. Gulfstream records 25 G550s and smaller and shorter-range G450s in medical evacuation service worldwide.

"The aircraft's customisable cabin will serve as an example for future programmes," says Scott Neal, Gulfstream's senior vice-president for worldwide sales.

The G550 will be the second fixed-wing aircraft in Beijing 999's line-up, following the November 2015 delivery of a large-cabin Dassault Falcon 2000LX. ■

ACQUISITION FIRDAUS HASHIM SINGAPORE

Global Express deal back on the cards for AirAsia

AirAsia has revived plans to buy a used Bombardier Global Express from Caterham Jet Global, for use as an executive transport, after a previous deal fell through last year.

The low-cost carrier told the Malaysian stock exchange it plans to acquire the business jet – registration 9M-CJG – for \$10 million, including a \$1.5 million deposit from the earlier deal.

The long-range aircraft will be managed by a separate subsidiary, and could be made available for ad hoc charter under a dedicated air operator's certificate.

Caterham Jet is owned by AirAsia's executive chairman, Kam-

arudin Meranun, and group chief executive Tony Fernandes.

AirAsia describes the twinjet as an "efficient" means of transport for the two executives "when travelling for work". They would otherwise "have to rely on commercial flights, which may be infrequent or inconveniently timed", the airline adds. The deal is expected to be completed by 30 June.

Flight Fleets Analyzer shows that the 1997-built Global Express – the first iteration of Bombardier's flagship model – was used as a demonstrator by the Canadian airframer before being acquired in 2012 by Caterham Jet. ■



Bombardier type will be acquired from Caterham Jet for \$10 million



More seats
at the table
Aircraft interiors P22

LAUNCH DOMINIC PERRY LONDON

Russian Helicopters offers light single

Company targets increased sales with new 1.6t-class rotorcraft, with commercial and private operators intended users

Adapting to market demand, Russian Helicopters is to develop a new light single-engined helicopter for service entry early next decade.

It will feature co-axial rotors and have a maximum take-off weight (MTOW) of less than 2,000kg (4,410lb), the company says.

Russian Helicopters has previously focused on heavier weight classes, with its lightest programmes to date the 3,600kg

MTOW Kazan Ansats and Kamov Ka-226T twins. However, with volume sales in general aviation confined to lighter rotorcraft, the manufacturer has switched course.

It will develop a helicopter that is "attractive to both commercial and private customers", it says, which will also be certificated in Europe and the USA.

Russian Helicopters says MTOW will be 1,600kg, with a range of 410nm (760km). The

new model will be able to carry five people or 730kg of cargo and have a maximum cruise speed of 124kt (230km/h).

By comparison, the 1,720kg MTOW Airbus Helicopters H120 can carry five people or a 718kg load over 383nm, while the AgustaWestland AW009, with a MTOW of 1,800kg, can accommodate five people or transport 750kg with a 412nm range.

Engineers have already begun

working on the design, says Russian Helicopters, with an application for type certification to be submitted this year. Entry into service is scheduled for 2020-2021, the company says.

The company has given no details of which design bureau will be handling the work, although the use of co-axial rotors could indicate that Kamov will be involved, as such configurations are its speciality. ■

TESTING KATE SARSFIELD LONDON

Upgraded Akoya poised for take-off

Lisa Airplanes is readying its second and final Akoya prototype for flight testing in April, and plans to launch production of the light, amphibious piston-single in the fourth quarter.

The latest test aircraft features a new, retractable landing gear fitted with electronically adjustable skis, allowing the Akoya to operate from water, snow or land. "This feature is designed to make the aircraft as versatile as possible," Lisa Airplanes general manager Benoit Senellart says.

The upgrade is among the last design changes to the two-seat, Rotax 912 ULS-powered Akoya, which was launched in 2007 with a proof-of-concept aircraft. The first prototype made its debut flight in 2011, and had logged around 100 flying hours before the global financial crisis forced Lisa into receivership the following year.

Based in Le Bourget-du-Lac, southeast France, the company was rescued in 2013 by private investors and the programme remains fully funded and supported, says Senellart. "It's tough bringing a new aircraft to market [as a start-up]," he notes. "But we have never given up on our ambitious goals."

Despite the Akoya's slow pro-



Production of the two-seat amphibian will begin in fourth quarter

gress, he says there is still a gap in the small seaplane market for a model with very short take-off and landing capabilities.

"We are looking at a take-off performance of around 200m [656ft], as we want the Akoya to be able to land on as many lakes or other small water-based landing sites as possible," Senellart says.

He describes the Akoya's orderbook as "healthy" and is keen to start delivering aircraft shortly after certification, earmarked for the end of the year.

The Akoya is the first of a family of aircraft planned by Lisa. "We have a number of designs on the drawing board – all targeted at the

personal transportation market," says Senellart. "These include larger seaplanes, landplanes and flying cars. There is so much possibility within this sector, but first we have to assess the market to see what people are looking for."

Lisa's immediate priority, however, is to bring the Akoya to market and start delivering aircraft to customers, Senellart says.

Priced at about €300,000 (\$379,000), the Akoya is equipped with an emergency parachute, hydrofoils and foldable wings. It has a projected range of 865nm (1,600km), a maximum speed of 135kt (250km/h) and consumes 5.6 litres (1.5USgal) of fuel per 100km. ■

MILESTONE
KATE SARSFIELD LONDON

Tecnam's 200th P2006T heads to Bartolini Air

Italian airframer Tecnam's P2006T piston-twin reached a programme milestone on 10 March, with the handover of the 200th unit to Polish flight training academy and long-time customer Bartolini Air.

The four-seat, high-wing aircraft joins two other P2006Ts in Bartolini's fleet, along with six two-seat P2002JF piston-singles and a four-seat P2010.

The P2006T entered service eight years ago as Tecnam's only in-production piston-twin. The airframer says it is mostly used for private flying and training.

A P2006T with a high-aspect wing, supporting 14 electric motors, is being used by NASA as its X-57 Maxwell demonstrator looking at electrical propulsion for general aviation-class aircraft. ■

See Feature P32



Aircraft is school's third example

More seats at the table

A handful of major suppliers have struggled to meet surging demand for new aircraft cabins, fleet refits and upgrades, so new players are being drawn to the market

JON HEMMERDINGER BOSTON

Many of the world's airlines are making improvements to their on-board products in response to various economic and competitive pressures. But resulting demand for interior products such as seats is placing a growing strain on the relatively few manufacturers, resulting in new business opportunities for smaller, upstart providers, sources say.

At the same time, mergers have swept the upper end of the industry, with Zodiac Aerospace and B/E Aerospace both set to be acquired.

"At long last, it appears that we have found ourselves in the midst of an epic global battle to improve aircraft interior product quality and comfort," wrote Jonathan Berger, vice-president of aerospace and MRO at consultancy ICF International, in a blog post. "Should the major cabin interior suppliers fail to get their respective acts together – and soon – then we should logically expect to see a proliferation of new market entrants."

American Airlines' manager of onboard products Jay Mapston tells FlightGlobal: "It's a small supply chain." He notes that suppliers such as Zodiac and B/E dominate the interiors industry. "When the entire industry is relying on that small supply chain, everyone is eating from the same tree, and it runs out of apples," he says.

Fred Cleveland, managing director of PwC's transportation and logistics practice, says: "The supply side of this still remains stretched very thin. Over the last 12 months, suppliers have made gains in meeting delivery schedules, but it is not unusual to have a plane delivery delayed for interior components."

FLOOD OF ORDERS

Indeed, demand has surged in recent years amid a worldwide flood of new aircraft orders and booming demand for overhauls of existing aircraft cabins. Between the end of 2010 and March 2017, Boeing's outstanding commercial aircraft orders jumped 66% to more than 5,700, while Airbus's outstanding orders nearly doubled, to more than 6,700, according to

After 15 years, American's 777 fleet is getting a mid-life interior upgrade



the manufacturers and Flight Fleets Analyzer.

Top US carriers such as American, Delta Air Lines and United Airlines still have hundreds of orders outstanding, many for fuel-efficient types such as the Boeing 737 Max, 787, Airbus A320neo and A350. Boeing predicts in its 2016 market outlook that the number of aircraft in service will double to 45,240 by 2025, with nearly 40,000 of those being new.

Interior providers are busy equipping all those new aircraft, but at the same time several factors are leading carriers to update cabins of existing assets. Established airlines are seeking to compete with rapidly expanding Middle Eastern and Asian carriers, many of which provide an improved onboard product, Berger notes.

Combine that with a broader battle to attract lucrative business travellers, rapidly advancing technology and availability of cash thanks to low fuel prices, and carriers see good reason to make their cabins sparkle, he adds. "Historically, airlines refresh their cabin interiors once a decade during a major aircraft overhaul. Today, the situation has clearly changed. Similar to the constant need to upgrade your smartphone every few years, the fiercely competitive airline industry must



AirAsia boss Tony Fernandes liked Mirus's "Hawk" seat enough to order them for his A320s



keep up with the rapid pace of onboard product and technology innovation.”

Cleveland says the “merger mania” that swept the USA left consolidated companies with giant fleets and differing onboard products. For example, the 2008 merger creating the current Delta brought together roughly 450 Delta aircraft with 350 from Northwest Airlines, Fleets Analyzer shows. Likewise, the United-Continental Airlines and American-US Airways mergers brought hundreds of aircraft together.

The resulting carriers have since been standardising and upgrading their fleets, adding more seats to economy, outfitting aircraft with “slimline” and lie-flat seats, premium economy sections, new carpets and sidewalls, and upgraded in-flight entertainment systems, Cleveland notes.

At the same time, carriers have been ordering new aircraft.

“We are in the post-mega-buying phase,” Cleveland says. “We’re also in the post-mega-merger phase, where dissimilar fleets have been combined, promoting a homogenisation of interiors of old fleets, further exacerbating the demand on new interiors.”

American, for instance, is removing first

“The move into the two-class configurations – that’s become a big industry trend”

Jay Mapston

Manager of onboard products, American Airlines



A wholesale shift by airlines to aircraft such as the 737 Max has stimulated demand

class from its 777-200s, adding lie-flat seats in business class and international-style premium economy seats as part of a mid-life upgrade to the roughly 15-year-old aircraft, Mapston notes. The project should be completed in the third quarter of 2017. “The cabins we had were getting older and the market has changed,” he says. “The move into the two-class configurations – that’s become a big industry trend.”

Berger, however, says that in moving to “two-class” aircraft, airlines have, in effect, really just shifted their product and retained three classes: business, premium economy and economy.

STANDARDISED APPEARANCE

American is also fitting 24 of its 757s with lie-flat business-class seats and equipping 777-300ERs, 787s, A330s and A350s with international premium-economy sections. The carrier rolled out premium economy on newly delivered 787-9s this year, and expects to complete the installations by 2019. It is also standardising “trim and finish” inside its 737- and A320-family aircraft, a project that includes new seats, carpets, IFE and power ports.

Likewise, United’s more than 200 narrowbodies are being fitted with new first-class seats, and the carrier is equipping widebodies with a new business-class product dubbed “Polaris”. The aircraft will get new lie-flat business-class seats manufactured by Zodiac, 16in entertainment screens, privacy dividers, improved meals and new amenity kits, United has said.

The carrier began operating newly delivered 777-300ERs with the product in February, and expects to equip 767-300s, 777-200s, 787-10s and A350s.

In autumn Delta expects to receive its A350 with international-style premium economy seats and suite-style lie-flat business-class »

» seats with privacy doors. The carrier will install premium economy on other widebodies, and, working with Zodiac, is equipping 126 A319/A320s with new IFE systems, overhead bins, galleys and “pod-like” over-seat control units, it says.

Other carriers are also revamping cabins. For instance, Zodiac is helping Air France revamp its A330 cabins, and Iberia is adding premium economy to A330s and A340s.

Likewise, JetBlue Airways has been adding lie-flat seats on many aircraft, Alaska Airlines has been upgrading 737s with new seats, and Hawaiian Airlines is replacing traditional business-class seats on A330s with lie-flat seats.

All those orders have placed immense strain on the limited number of interior suppliers, and have put retrofit orders in competition with new aircraft interiors, Cleveland says. At the same time, suppliers are seeking certification of new, lighter-weight designs, adding complexity to an already tight production schedule, he adds.

“They are really, really going to be struggling to get all that done at the same time,” Cleveland says of suppliers. “The pipeline is flooded with new interiors.”

Berger writes: “The cabin suppliers are attempting to simultaneously manage both historic OEM demand to meet record aircraft production rates and surging airline demand for the latest cabin interior products.” He adds: “The supply chain is clearly overwhelmed and simply cannot keep up.”

BIGGER SHARE

That demand bodes well for the modification industry, which was worth \$5.1 billion in 2016, or 7% of the \$67.6 billion global MRO industry, according to an ICF report.

The company forecasts the modifications sector will grow an average of 5.2% per annum up to 2026, reaching \$8.5 billion, or about 9% of a then-\$101 billion MRO industry.

The size of the interior modifications industry, a subset of the larger modification sector, will grow 5.6% per annum for 10 years, ICF predicts.

No doubt modification providers will be busy, but surging demand has again led to bottlenecks. “Ask any airline or OEM who their lowest-performing suppliers are, and their answer is unanimous: ‘Our seat and cabin interior suppliers,’” Berger writes.

France-based Zodiac has faced among the most visible production problems. In 2015, American said it was replacing Zodiac as supplier of 777-200 and 787-9 business-class seats because of delivery delays. “Zodiac has not been able to deliver new seats in a timely fashion according to the terms of its contract,” American told FlightGlobal in 2015. “The seats are far behind schedule and continue to cause significant delays.”



Zodiac is producing the new Polarix business-class seat for United Airlines

United Airlines

Such troubles are not unique to American. “The issues we are having with suppliers – other carriers are facing them as well,” says Mapston.

Zodiac’s production problems, including a shortage of lavatories, also delayed A350 deliveries and weighed on Zodiac’s earnings.

The A350 problems resulted from “quality issues” at a plant in California and a slower-than-expected ramp-up at a Montreal facility, the company has said. The angled layout of business-class seats also caused more complex certification requirements, Zodiac tells FlightGlobal.

Zodiac insists the issues are being fixed, noting that it has opened a third production site in Germany, hired new staff and created processes with the goal of achieving normal operations by the end of 2017.

In January news broke that aerospace company Safran was seeking to acquire Zodiac, a deal that would create the second-largest aircraft equipment supplier – a company with about \$10 billion in revenue in the sector.

Safran chief executive Philippe Petitcolin said Safran could help Zodiac’s interiors busi-

ness recover, noting: “Our industrial expertise will also accelerate the return to their historical levels of profitability in the seats and cabin activities.”

Safran expects the deal to be completed by the end of 2017, and the merger to take place in early 2018. Zodiac, however, announced in mid-March that its aircraft interiors sales declined by 4.5% to €1.4 billion (\$1.5 billion) in the first half of its 2016-2017 financial year, from September 2016.

Nonetheless, Safran still has interest in Zodiac, and “confirms its confidence” in its ability to restore to operating profitability to Zodiac’s business units that are “currently in difficulty”.

MAKING PROGRESS

Aircraft manufacturers have also become involved. “The performance of cabin components remains challenging for Airbus, especially on the A350, and we are working closely with our cabin suppliers to resolve these issues and minimise potential delays,” Airbus says. “With regard to Zodiac, we have identified the main bottlenecks impacting on-time and on-quality delivery of seats and, in particular, lavatories, and have developed a way forward.”

The company has “been putting in place some extra resources in production planning as well as supplier management. We’ve made good progress on the issues, but we think full recovery still will take a few more months”, Airbus says.

Boeing says it has worked with seating suppliers for two years to address delays. “Boeing is also adding several new suppliers in order to expand the global supply of seats and provide new options and greater affordability to our customers,” it says. “Airplane deliveries have been proceeding as normal this year, but



The Space-Flex v2 rear galley and lavatory module for A320s, produced by Zodiac

Airbus

we continue to monitor this closely.”

Those production problems are creating inroads for a handful of smaller seat suppliers, some of which have recently landed new deals. “A lot of smaller start-up seating companies have emerged,” says Mapston. “I don’t know if it can solve the overall industry issue of lack of competition and supply, [but] there is a shifting there.”

German seat maker Recaro disclosed in April 2015 that it had signed a “supplier-furnished equipment” deal to provide Airbus with A320 seats. Recaro says it has invested “significantly” in its production sites, processes and products over the past decade. The supplier adds that it has not had delays that have kept customers from meeting agreed schedules.

Recaro delivered more than 100,000 aircraft seats in 2016, and by the end of 2017 it plans to open a new 6,000m² (64,600ft²) logistics site in Germany as part of an effort to meet

“The [seating] supply chain is clearly overwhelmed and simply cannot keep up”

Jonathan Berger

Vice-president of aerospace and MRO, ICF

higher demand.

In April 2016 news emerged that a relative new company, LIFT, a unit of US-based interiors supplier EnCore, will supply Boeing with 737 Max seats, with deliveries in 2017. LIFT, launched by executives who sold C&D Aerospace Group to Zodiac in 2005, announced in October orders from two unnamed airline customers.

Another German seat maker, Zim Flug-sitz, has landed recent deals, including contracts to supply seats for Lufthansa and Singapore Airlines.

UK-based Acro has supplied seats on Boe-

ing and Airbus aircraft operated by several carriers, including the UK’s Jet2, Iceland’s Wow Air and US carriers Allegiant Air, Hawaiian Airlines and Spirit Airlines.

The company has the infrastructure to meet demand, having moved into a new production facility in 2014 and opened customer centres in Miami and Kuala Lumpur, says Acro commercial director Andrew Bowen.

Hawaiian also chose a smaller player, Italy-based Optimares, to design new lie-flat premium seats for its A330s. The seats are light in colour and have few physical barriers, making them ideal for Hawaiian’s target customers, which tend to be families and couples travelling together, says the carrier’s senior vice-president of marketing, Avi Mannis.

Hawaiian chose Optimares because major suppliers’ seats tended to be dark in colour and boxy, designed for privacy so as to appeal to business travellers, Mannis notes.

In April 2016, UK-based Mirus Aircraft >>

CASE STUDY MURDO MORRISON CRAWLEY

Acro finds a low-cost niche, but design philosophy stresses comfort over price

Since entering the market a decade ago, Acro has made its reputation from supplying mostly no-frills airlines with “simple seats”. But do not make the mistake of calling the UK-based manufacturer a bargain-end upstart. “It may sound like we are a low-cost supplier, but we stand for comfort and an appropriate product fit,” insists chief executive and co-founder Chris Brady. “Our philosophy is comfort, robustness, maintainability, lightweight, price, in that order.”

Brady, a former Virgin Atlantic executive, founded Crawley-based Acro with two colleagues in 2005, inspired by an idea for an easy-to-maintain, sturdy, non-reclinable economy seat, based on the principle that passengers cherish personal space above the ability to tilt their seat by a few degrees. “The common perception is that a fixed-back seat is uncomfortable,” he says. “But what people want is not headrests or being able to recline, but comfort.”

SLOW TAKE-OFF

Their 2007 prototype was the first non-reclinable seat on the market, says Brady, and Acro won a customer in Jet2, the Leeds Bradford-based leisure carrier. The trouble was – despite the company having



Chris Brady remains convinced that non-reclinable has a future

delivered 90 shipsets to the Boeing 737 and 757 operator – the non-recline seat was slow to catch on in the wider market. By 2011, Brady and his partners decided that they had to have another offering.

They designed a reclining version of the seat in 2011 and over the next three years the orders flowed, with US carriers Allegiant and Spirit choosing Acro’s new product for retrofit programmes. “They wanted a seat which was as simple as possible, with just a tray that was able to take a soda and a sandwich,” says Brady. “It had to be robust – the tray has just one moving part – and have the lowest possible cost of operation.”

Between 2011 and 2014, Acro’s turnover doubled each year. In 2013 it won its first line-fit deal, when Spirit asked Airbus to approve the company’s product for its new A320s. Deliveries began in 2015, followed by another major retrofit win, this time with Frontier. Deals with Hawaiian, Thomas Cook and KLM followed. “Perversely,” says Brady, “for a company that so believed in non-reclinable seats, it was a reclining seat that set us free.”

With the Series 3 and its more complex Series 6 successor now approved as Airbus buyer-furnished equipment, Acro is producing between 2,000 and 3,000 seats a month – about three-quar-

ters for retrofit. So far, it has produced some 80,000 seats, mostly for the USA. At the Aircraft Interiors Exhibition (AIX) in Hamburg it will announce a third line-fit customer, joining Spirit and Allegiant, and Brady is targeting a catalogue agreement with Boeing within three years.

Acro – which employs a largely outsourced business model, with its 150 staff based in premises next to Gatwick airport mostly involved in engineering design and assembly – may have made its name through simplicity. But that does not stop it looking at more sophisticated products. It plans to deliver its first premium economy seat, the Series 7, in December, to an undisclosed customer. “Premium economy is a fast growing sector of the market,” notes Brady.

Following that will be the Series 8 – a long-haul version of Series 6 – targeted for delivery by the end of 2018 with a possible unveiling at AIX next year. Next on the product strategy map, around 2020, is the Series 9, “which takes us back to our roots with a pure fixed recline seat that will be incredibly light”. It will be pitched largely at Asian carriers. By that time, Brady hopes, the company will have taken the start-up’s revenues to six figures from £30 million (\$37 million) today. ■



Forecast Sessions Agenda

FightGlobal, in partnership with Reed Exhibitions, are returning to the CabinSpace LIVE seminar theatre, at Aircraft Interiors Expo.

Interiors Forecast sessions Tuesday 4th April

- ✚ **11.30 - 12.30:** Sizing up the cabin-retrofit opportunity: Will airlines upgrade their interiors more often while keeping older aircraft in service longer?
- ✚ **14.30 - 15.30:** The future of IFE – embedded, wireless, BYOD or immersive?
- ✚ **15.45 - 16.45:** Using connectivity to enhance the customer experience

MRO Forecast sessions Wednesday 5th April

- ✚ **10.00 - 11.00:** Predictive maintenance and the connected aircraft: how connectivity will be crucial in the 'big data' era
- ✚ **11.30 - 12.30:** Can the cabin-retrofit opportunity offset the declining maintenance requirements of latest-generation airframes?
- ✚ **14.30 - 15.30:** Environmental impact of end of life cabin equipment. Current process and regulation.

Find out more and register for the sessions at
www.flightglobal.com

CASE STUDY MURDO MORRISON PEMBROKE DOCK

Start-up Rebel Aero takes a different approach with cinema-style folding cushion

The aptly named Rebel Aero is one of a number of recent European start-ups out to prove that when it comes to the aircraft seating market there is still plenty of creative thinking to be done. Although the spin-off from an established composites specialist called United Aerospace has yet to win any orders, managing director and founder Gareth Burks believes that with more innovation coming down the line, it is just a matter of time. For too long, he believes, the market has not been daring enough, particularly in the economy cabin.

At just its second Aircraft Interiors Expo (AIX) in Hamburg last year, the Welsh company unveiled its S:two, an economy seat featuring a three-point harness and fold-up cushion that allows passengers to stand up in the space that would normally be occupied by half the seat – not unlike in a cinema – allowing faster loading and unloading. At the same time, the hinged design allows it to function as a booster seat for young children, much as in a car. Burks also maintains it is the only economy seat with a two-way shoulder belt as standard.

The mostly-aluminium S:two – a development of the S:one all-composite concept which marked Rebel's arrival on the seating scene at Hamburg in 2015 – won the

Pembrokeshire-based firm a Crystal Cabin award, the annual Oscars of the interiors industry. Since then, Airbus has been evaluating the product and Burks says airline interest in a retrofit version has been high. "Since winning the award we have had lots of approaches to JV [joint venture] it, licence it or even acquire the business," he adds.

RACING HERITAGE

Although Rebel is a new name in seating, Burks is no novice in the market. A product designer by training, he and three colleagues led a management buyout of United Aerospace in 2004. The company had its origins in Formula 1, but Burks and his colleagues moved into the seating market, as a supplier of composite structures to customers such as Zodiac.

It remains a second-tier supplier to the French company, making about 125 seats a week, although its portfolio of composite products ranges from target drones for defence company Qinetiq to medical equipment.

Burks says his inspiration for Rebel came from the fact that he used to visit AIX every year and come back frustrated. "My business partner at the time told me to put my money where my mouth was," he notes. As a small



Gareth Burks with the S:two seat, featuring a three-point harness

enterprise – United Aerospace employs just 49 people, mostly in assembly – the business cannot spend big on a certification programme until a customer is con-

firmed. But with a further concept promised for AIX this year – the third in three years – Burks is determined to show that he is a Rebel without a pause. ■

» Seating announced AirAsia as the launch customer for its "Hawk" economy seat. This will be installed on up to 312 of AirAsia's A320-family aircraft, said Mirus.

As start-ups seek market share, large existing interior providers are benefiting from strong demand while developing new products. For instance, in 2014 Zodiac announced that it had agreed with Airbus to develop the A320 "Space-Flex v2" rear lavatory and galley module, which provides more galley space and is marketed to carriers that provide full-service catering.

Zodiac is also marketing redesigned overhead bins, modern IFE products provided by its Zodiac Inflight Innovations subsidiary, and other upgrades, the company says.

Meanwhile, B/E continues to post strong financial results, earning a net profit of \$311 million in 2016. Those results were buoyed

by B/E's commercial aircraft division, which generated revenue of \$2.3 billion last year, up 12% from 2015.

B/E predicts orders for new aircraft, particularly widebodies, will continue driving up interior product sales.

The company's growth caught the attention of Rockwell Collins, which in October 2016 announced its intention to acquire B/E for \$6.4 billion.

Speaking to investors last year, Collins chief executive Kelly Ortberg said the deal would give it a foothold in the aircraft retrofit market. "I believe we are coming into a major cycle where a lot of widebodies are coming off lease and will be returned to the lessors. And with that we are going to see great opportunities for retrofit of the cabins."

He foresees the acquisition combining Collins' systems integration expertise with B/E's

interiors experience, enabling the group to develop high-tech cabin products that are linked into larger aircraft networks. Such a move would bring the interiors business into the broader big-data revolution sweeping aviation.

"All of the galley equipment is going to need to be a node on the network, to either provide a better passenger experience, to allow the crew to interact differently with the passengers or for improved maintenance actions," Ortberg says.

"Everything is going to become a smart device," he adds. "If you look five years, six years ahead, you'll see that this is a much different looking product line with... embedded sensors, controls, wi-fi interfaces, secured networks throughout the airplane."

B/E shareholders approved the merger in March, and the companies have predicted the deal will close this spring. ■

Extending the net

Armed with new-generation satellite-based internet technology, European airlines are set to expand dramatically their in-flight connectivity offerings on short- and long-haul services

KERRY REALS LONDON

European airlines have lagged behind their US counterparts when it comes to introducing in-flight wi-fi to their short-haul fleets. But recent contracts between IAG and Inmarsat, and ViaSat, Finnair and SAS, indicate that the European market is taking off.

Satellite-based in-flight connectivity providers say technology has moved on in leaps and bounds since the early adopters of wi-fi on flights within Europe launched their services, and the next wave of single-aisle aircraft to be equipped will offer a much more reliable service to passengers.

"Passengers will experience internet on board short-haul aircraft, which is kind of a novelty for Europe," says Inmarsat Aviation vice-president strategy and business development Frederik Van Essen. "The current systems flying are first-generation systems with a

very limited performance. Passengers will see a real step-up in performance, reliability, capacity and speed."

Van Essen adds that while first-generation systems "allow you to do some work", connections are not always available and "speeds can be haphazard".

"The US has been leading the world in [in-flight] connectivity but Europe is now rapidly following, and the rest of the world is following that," he says.

TRAILBLAZERS

Last October, Lufthansa Group launched Inmarsat's much-anticipated GX for Aviation Ka-band satellite-based connectivity solution, with plans in place to install the technology across the German airline group's entire Airbus A320 fleet by mid-2018.

The following month IAG announced that it would install high-speed in-flight wi-fi across the short-haul fleets of all four of its air-

lines, following a deal with Inmarsat to become the launch customer for its under-development European Aviation Network (EAN) air-to-ground connectivity service.

Up to 341 of IAG's A320-family aircraft will be equipped with satellite antennas on the top, which will communicate with Inmarsat's S-band satellite, and smaller, lighter antennas on the bottom that will pick up signals from the new 4G mobile terrestrial network to be operated by Inmarsat's partner, Deutsche Telekom. The idea is that avionics boxes on board the aircraft will "gauge which signal is best" and seamlessly transition between the strongest signals, says Van Essen.

Passengers will be able to access the internet on their own electronic devices, and IAG says connection speeds will be "similar to what they have at home". The airline group believes that opting for an integrated air-to-ground and satellite-based solution will enable it to provide its passengers with "the fast-



Finnair has opted to begin equipping its entire A320 fleet with the ViaSat Ka-band satellite-based connectivity system from May

est connectivity you can get on any aircraft”.

The first aircraft to be equipped under the contract – a British Airways A321 – is scheduled to be in service this summer, with Aer Lingus, Iberia and Vueling aircraft installations to begin later in 2017. The aim is to equip 90% of IAG’s single-aisle fleet with the technology by 2019.

The most obvious difference between EAN and GX is that the former is a regional solution, covering the 28 EU member states plus Norway and Switzerland, while GX provides global coverage. For airlines requiring coverage solely within Europe, Van Essen says EAN is an attractive solution because the equipment that needs to be installed on the aircraft is “a fraction of the weight” of that required for GX.

DELIVERING RESULTS

Testing of the new EAN system has “surpassed what we expected”, says Van Essen, and while there are “many things to tackle, test and work out”, the mid-year launch date looks achievable. Inmarsat suffered a setback last year when a SpaceX launch failure led to a delay in getting the S-band satellite that supports EAN into orbit. However, the company signed a contract with Arianespace to launch the satellite on an Ariane 5 rocket, allowing it to stick to its mid-2017 deadline.

Competitor ViaSat believes the fact that Inmarsat’s EAN service has yet to launch could prove a deterrent to European airlines. Don Buchman, vice-president and general manager of ViaSat’s commercial mobility business, says there are “quite a few regulatory hurdles to get over” for EAN. He also points to the “limited coverage” of air-to-ground services at a time when re-engined narrowbodies from Airbus and Boeing mean single-aisle aircraft are “no longer constrained to 2h flights”.

But Buchman agrees with Van Essen that European operators will “embrace connectivity” on their short-haul networks in much the same way as carriers in the USA have. “If you’re using a device on a train, why wouldn’t you on a plane?” he says.

“The US has been leading the world in [in-flight] connectivity but Europe is now rapidly following”

Frederik Van Essen

Vice-president strategy and business development, Inmarsat Aviation

ViaSat last year announced contracts with Finnair and SAS to install its Ka-band satellite-based connectivity solution across their short-haul fleets. In May Finnair will begin equipping its entire A320 family fleet with the solution, which ViaSat provides through its



Inmarsat’s GX solution will provide German flag carrier with global coverage by mid-2018



Eurowings has also followed the GX route

partnership with Eutelsat. Meanwhile, SAS is installing the service on its short- and medium-haul aircraft, the first of which is scheduled to enter service in the second half of 2017.

“SAS and Finnair announced the same rollout pattern across their narrowbody fleets, and El Al is already flying [the service] on narrowbody flights from Tel Aviv to European capitals,” says Buchman, adding that ViaSat’s solution is “selling really well” in Europe.

Finnair’s manager of in-flight e-commerce and IFEC (in-flight entertainment and connectivity), Harri Valkama, says the airline chose the ViaSat solution because it believed it was the “best available” for the carrier’s A320 fleet.

“It’s the best in the market now and there are a lot of scalability possibilities in the future,” says Valkama. Finnair “did consider” Inmarsat’s EAN solution but decided against it because of regulatory uncertainties.

“There are a lot of risks for us in the EAN: regulatory approvals pending for some European Union countries, and also the coverage is limited and not supporting all Finnair routes, and there were no possibilities to scale up the coverage in the future,” says Valkama.

None of the European airlines that have recently signed up to offer in-flight connectivity

on their short-haul networks have yet unveiled details about whether, and how much, passengers will be charged to access the service. Valkama says Finnair “will communicate the pricing model once the service is launched”, while IAG says it is a decision for its individual airlines and “more details will be provided closer to the launch date”.

PLAYING CATCH-UP

Europe’s low-cost carriers have been more reticent about installing in-flight wi-fi than the full-service airlines. With the exception of Norwegian, which provides passengers on its European short-haul network with free wi-fi through an agreement with Global Eagle Entertainment, and Eurowings, which announced in December that it would equip 69 of its A320-family aircraft with Inmarsat’s GX solution by the middle of this year, budget operators have yet to buy into the concept en masse.

EasyJet and Ryanair have in the past said they would like to offer wi-fi, but both have expressed concerns over the cost of installation. Buchman believes that “all the right ingredients are in place now”, and is “optimistic” that Europe’s low-cost carriers will get on board “this year, or it might be a little longer”.

He adds: “We’re seeing a lot of interest in wireless IFE,” particularly for narrowbodies, and this has been a factor behind ViaSat’s recent acquisition of Dublin-based Arconics.

Van Essen is also optimistic about the potential of Europe’s budget airline market. “I don’t think it’s that low-cost carriers are not interested in connectivity, but they’re looking at how to build the business case,” he says.

“It’s fair to say there is very much interest from the whole market, including low-cost carriers – I’d be surprised if they were not moving soon.” ■

Flexing muscles in the race for space

A revamped galley and lavatory allows airlines to pack more passengers into the A320. We use FlightGlobal data to assess how the higher capacity aircraft is being deployed

JAMES MELLON & PAUL RIGNALL LONDON

Airbus unveiled its Space-Flex lavatory and galley concept for the A320 at the Aircraft Interiors Expo in 2011. The design replaced a full-width rear galley with a smaller galley and toilet combination, freeing up room for extra legroom or an extra row of seats.

Space-Flex has gained traction since the European Aviation Safety Agency re-evaluated the narrowbody, allowing Airbus to increase the exit limit on the type from 180 to a potential 195 seats. According to Airbus, 70% of low-carriers and charter operators

have since chosen Space-Flex.

The initial Space-Flex version entered service in 2013 with LATAM Airlines Group. The idea has since evolved to its current form, which offers increased galley capacity – im-

Since the launch of the A320's increased exit limit, 70% of low-cost carriers or charter operators have selected Space-Flex

[Airbus](#)

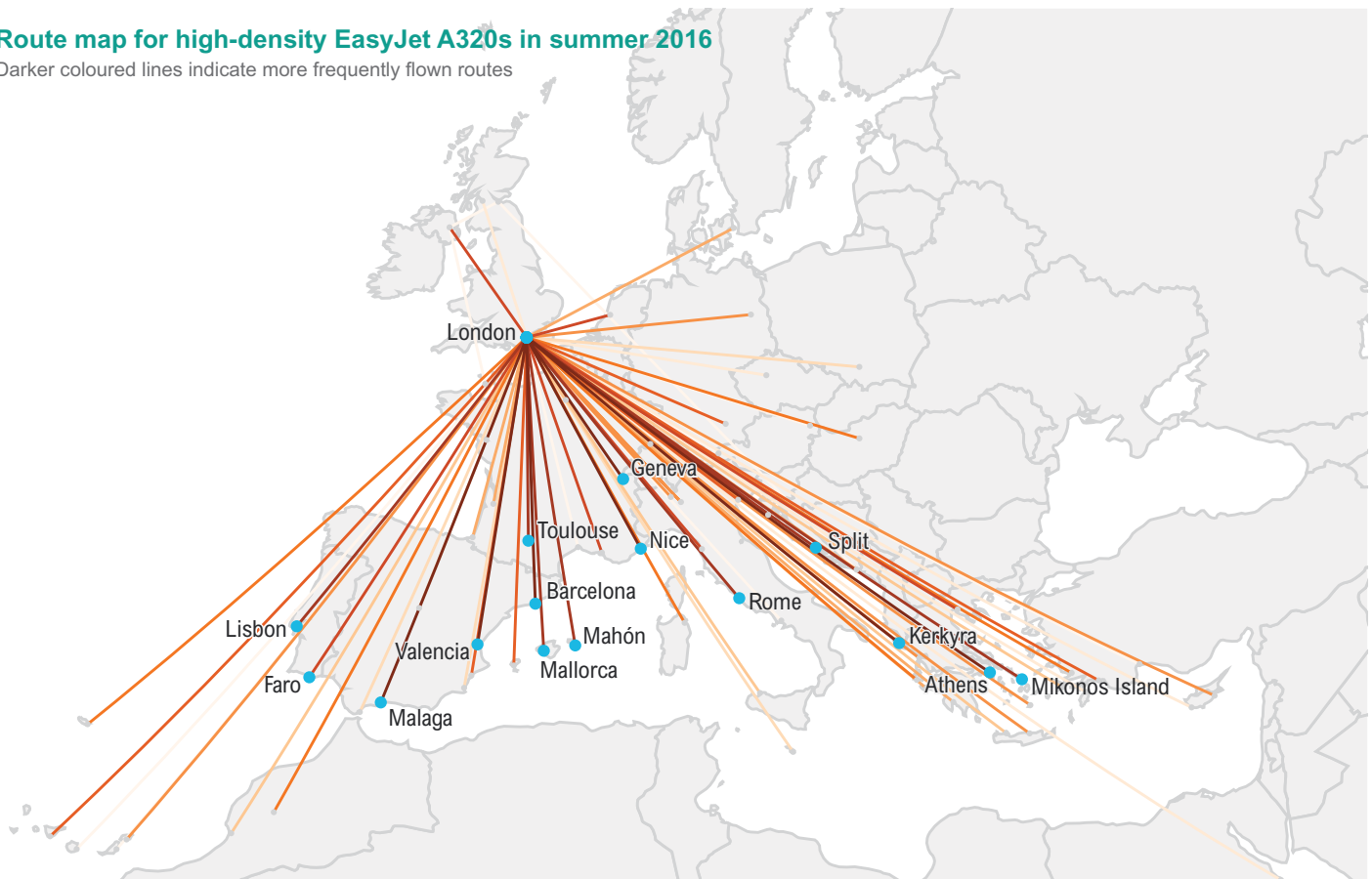
portant when dealing with higher-density configurations. This change was made by Airbus in collaboration with airline customers.

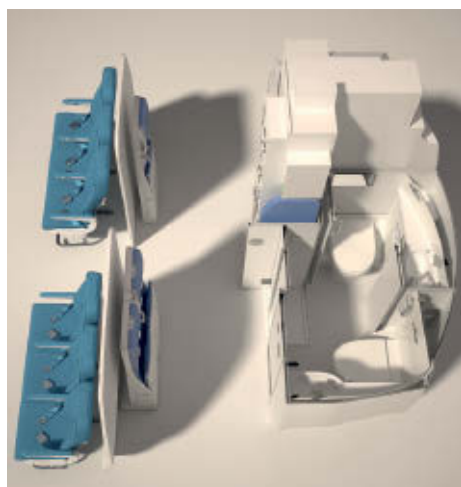
Airbus offers Space-Flex as a line fit option as well as supplying it as a kit which can be retrofitted on carriers' existing A320 fleets. The concept is part of an effort by Airbus to develop a cabin branding called AirSpace. It will feature across the A320 family as well as on widebodies like the A350 and A330neo.

According to Flight Fleets Analyzer there are currently 112 in-service A320s with more than 180 passenger seats, up to a maximum of 188. European low-cost carrier Vueling was the first carrier to take advantage of the A320's

Route map for high-density EasyJet A320s in summer 2016

Darker coloured lines indicate more frequently flown routes





Space-Flex frees up room in rear of cabin

increased exit limit when MSN6483 was delivered in March 2015, and has adding a further 15 186-seat A320s since.

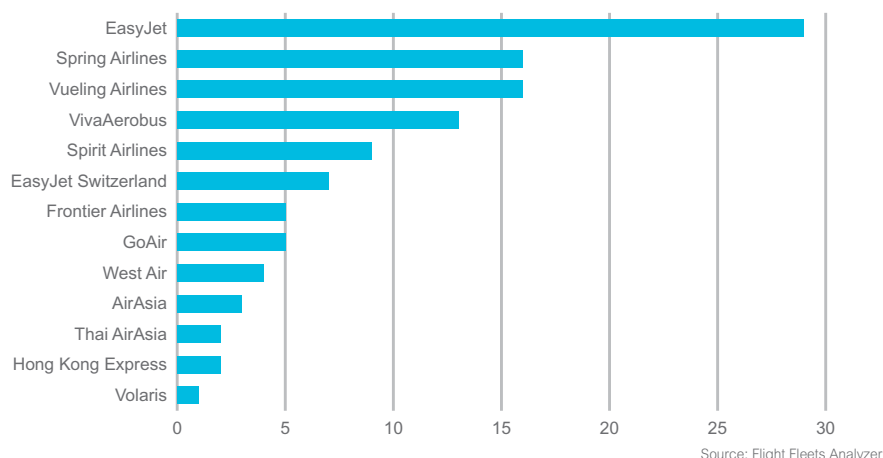
In North America, Spirit Airlines was the first carrier to feature the Space-Flex cabin option. Its A320s contain 182 seats, eight of which are marketed as business class with a 36in pitch and a width of 18.5in.

BOEING'S RESPONSE

Boeing's selection of upward- and outward-swinging overwing emergency doors

Carriers operating high-density A320s

112 aircraft in service are installed with more than 180 seats



on its narrowbodies has long meant its exit limit was greater than that found on comparable Airbus types: there are 1,373 in-service 737-800s with more than 180 seats, 79% of which can accommodate 189 passengers or more.

Boeing's 737 Max family – the more fuel-efficient next generation of its narrowbody – includes a 737 Max 200.

This high-density variant is based on the 737 Max 8 but features a reconfigured exit row arrangement, allowing it to accommodate

up to 200 passengers in a one-class configuration. Ryanair is set to be the launch customer for the Max 200, with first delivery expected in 2019. It has ordered 100 of the variant with another 100 options.

Vietnamese low-cost carrier VietJet Air is also on Boeing's books for the Max 200 with 100 orders, while the Chinese mainline Xiamen Airlines signed a memorandum of understanding for up to 30 examples for its low-cost operations at the Farnborough air show in July 2016. ■

CASE STUDY

Where EasyJet is focusing its high-density single-aisles

With more than 200 Airbus A320-family jets in service, EasyJet is one of the world's largest operators of the Toulouse-made narrowbody.

On top of receiving higher-density A320s direct from the manufacturer, EasyJet is putting 105 of its existing fleet through a retrofit programme over the next year, spreading the work between Slovenian MRO provider Adria Tehnika, Iberia Maintenance, SR Technics and Lufthansa Technik.

CABIN CONFIGURATION

The work will feature the reconfiguration of the aft cabin to the Space-Flex format, with the majority of each retrofit kit being supplied by Airbus, allowing an extra row of seats to be installed and bringing total passenger capacity to 186 in an all-economy configuration.

The additional space made available by reshuffling the galley and lavatory position means aver-

age and minimum seat pitch on board remains the same as on EasyJet's lower-capacity twinjets. Recaro's non-reclining SL 3510 seats have been chosen; they have a 17.1in width and are installed with a pitch of 29.9in.

SUMMER DEBUT

EasyJet received its first line-fitted Space-Flex A320 in May 2016 as part of a set of seven over the summer period.

Use of flight tracking data from FlightGlobal's FlightStats tracking data service allows routes flown by EasyJet's 186-seat aircraft to be discerned.

During the 2016 summer season – 27 March to 29 October – 4,159 EasyJet flights were flown by these seven aircraft on 74 distinct airport pairs.

The aircraft entered into service between May and July, in general each flying four or six segments a day.

Based at London Gatwick over

this period, the aircraft tended to fly to popular tourist destinations in southern Europe, with the top 15 routes shown here accounting for around 71% of flights seen.

Indicators suggest that higher-density cabins were not simply added to EasyJet's schedule and deployed randomly. This is borne out by the top routes flown by this sub-fleet not directly matching the top scheduled routes flown by the low-cost carrier over the period.

EasyJet's schedule contained on average fewer than 12 round-trips per week from Gatwick to Athens, Corfu, Lisbon, Split and Mahón during summer 2016 – compared with about 40 for the likes of Geneva and Barcelona.

SWITCHING DESTINATIONS

EasyJet also appeared to move around the deployment of its high-density jets during the season. Around the middle of September, the sub-fleet stopped visiting Valencia and Pisa as often, while

destinations including Tenerife, Thessaloniki and Dalaman received more visits from the 186-seaters. ■

Top summer 2016 routes flown by high-density A320s

Route	Flights
1 LGW – ATH Athens	413
2 LGW – AGP Malaga	287
3 LGW – CFU Corfu	283
4 LGW – GVA Geneva	238
5 LGW – NCE Nice	210
6 LGW – VLC Valencia	203
7 LGW – BCN Barcelona	194
8 LGW – LIS Lisbon	186
9 LGW – SPU Split	179
10 LGW – MAH Mahón	155
11 LGW – JMK Mikonos Island	138
12 LGW – PMI Palma de Mallorca	137
13 LGW – TLS Toulouse	124
14 LGW – FCO Rome	109
15 LGW – FAO Faro	102
Total flights	2,958

Source: FlightStats, part of FlightGlobal

Aero stars, future flyers

High costs cutting pilot numbers is not new, but as visitors to this year's Aero Friedrichshafen exhibition will see, a long-embattled light aircraft industry remains optimistic

KATE SARSFIELD LONDON

Aero Friedrichshafen – to be held from 5-8 April – has come a long way since its humble beginnings in 1978 as a parochial event showcasing cars, motorbikes and gliders.

Its metamorphosis into Europe's largest general aviation show and the biggest event of its kind outside the USA began in 1993, when organisers severed the show's automotive ties in favour of becoming a dedicated GA event.

"Aero has successfully positioned itself as the shop front for the global GA market," says Aero Friedrichshafen project manager Roland Bosch.

He says the show's popularity is largely a result of the organisers' decision to stick rigorously to a trade show format, targeting what he calls "serious buyers".

The largest step in the development of the show was the relocation in 2003 to a new exhibition site adjacent to Friedrichshafen airport, Bosch says. This decision resulted in a year-on-year rise in exhibitor numbers of

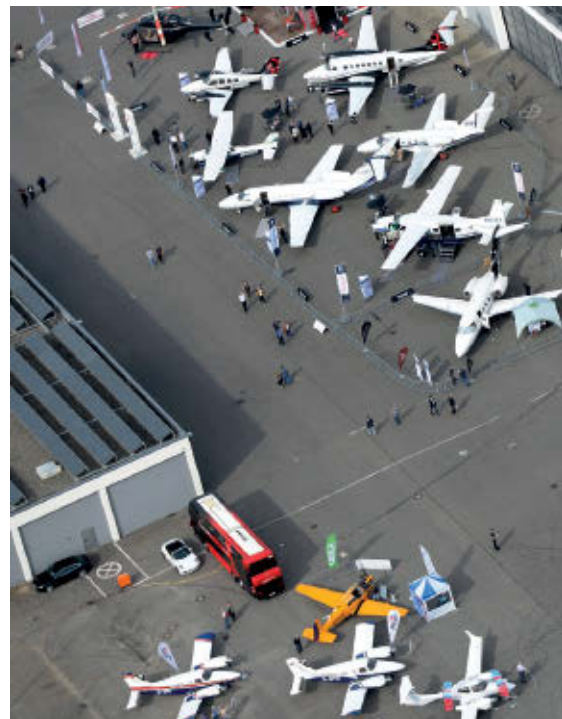
about 20%, reaching a peak of more than 600 companies in 2010 – when it became an annual event for the first time.

Bosch says that the decision to switch from a biennial to an annual cycle was met with some resistance, however. Many companies – leading GA airframers Diamond Aircraft and Tecnam among them – have chosen to exhibit every other year because of cost pressures and the volume of other international shows they attend.

NO GOING BACK

Would Aero consider returning to its biennial format? "No," says Bosch. "Even if our exhibitor numbers do dip in the intermittent years, we don't want to take the risk of another show coming along and filling that gap. There is still plenty of demand from the market for a large, annual European event."

Aero Friedrichshafen's organisers are continually striving to raise the show's appeal for its target audience: the owner-pilot community. That aircraft from across the aviation



spectrum are on display – from electric types to ultralights and piston-singles to small business jets – has helped to lure increasing numbers of potential buyers.

After a relatively static six years, the 2017 show – and the 25th to date – looks set to be the largest so far. About 660 exhibitors from 38 countries have signed up for the four-day event, which is expected to attract more than 35,000 visitors.

The show's location is a draw for its army of attendees. On the German shore of Lake Constance, which also borders Switzerland and Austria, Friedrichshafen is the birthplace of the Zeppelin, that company's Maybach engine subsidiary, and Dornier Flugzeugwerke. "We wouldn't consider moving it elsewhere," says Bosch.

COMMUNITY SERVICE

It also serves as a mouthpiece for Europe's embattled GA community. Leading figures from across the industry and trade associations use the show as a platform to discuss hot topics affecting the sector, such as the implementation of new European CS-23 aircraft certification regulations, the introduction of environment-led technologies such as electric-powered aircraft, more efficient engines and alternative fuels.

At the top of the agenda is how to reinvigorate the owner-flyer market. This sector is a vital income stream for the GA industry, but pilot numbers are falling at a rapid pace.

"There simply aren't enough people flying today," says Martin Robinson, chief executive of the UK Aircraft Owners and Pilots Association, which will have a strong presence at the show.



Diamond is expected to unveil a new aircraft, joining a family which includes the DA40 NG



About 250 aircraft will be on display in the main exhibition halls and static area

"The knock-on effect of this inactivity is reverberating across the industry, from aircraft manufacturers and flight training schools to flying clubs and aerodromes," he says.

Robinson uses the UK market to illustrate his point. While the country is home to one of the largest populations of aircraft and pilots in Europe, the number of private pilot licences issued for light aircraft in all categories has fallen from about 3,300 a year in 2005-2006 to less than 2,000 in 2016.

Similarly, data from the French Aeronautical Federation shows a 35% fall in the num-

ber of hours flown by private pilots at the country's aero clubs – from 835,000h in 1990 to around 550,000h in 2015.

This decline has had an impact on sales of GA aircraft across Europe. The latest figures from the General Aviation Manufacturers Association show that the continent's installed base of fixed-wing single- and twin-engined aircraft weighing less than 5,700kg (12,600lb) has been falling for years. Germany, for example, saw its fleet drop from 7,532 in 2008 to 7,314 last year. Sweden's inventory fell from 2,283 to 1,900 in the same period; Switzerland's from 1,610 in 2010 to 1,566 aircraft five years later, and the UK's installed base slid from 9,000 to 8,880 during the same period.

Christian Dries, chief executive of Diamond – manufacturer of the DA family of piston singles and twins – says private flying no longer has the appeal it once had. "The industry is dominated by pilots in the 50- to 70-year-old age range, and cash-strapped aero clubs are typically offering aircraft built between 1955 and 1970," he says. "The dot-com generation doesn't want to fly models with steam gauges, and new-generation aircraft are far too expensive."

A typical four-seat CS-23-certificated piston-single such as a Diamond DA40, for example, costs more than €400,000 (\$420,000), while a Cirrus SR22 – one of the best-selling aircraft in this class – is about €700,000.

FINDING ANSWERS

Robinson says the introduction of very light types, such as light-sport aircraft and homebuilts, has helped slash the costs of ownership and flying, but this has not been enough to attract new entrants.

The industry does not have a definitive answer, but says a collective effort is needed by manufacturers, flight schools and associations

to stimulate the market and attract what Robinson calls "fresh blood" into the sector.

The rewrite of CS-23 regulations, set to be published by the European Aviation Safety Agency within weeks, should help to lower the cost of designing and manufacturing aircraft under 8,620kg, but the impact on the end-user is unlikely to be felt for some time.

The nascent ride-sharing market is also playing its part. By giving owners and operators of non-complex aircraft with fewer than six seats a platform to share the costs of their flight with fellow passengers, the appeal and demand for private flying has started to grow.

"The shared economy is... helping to drive down the cost of aircraft ownership"

Emeric de Waziers
Founder, Wingly

French-start-up Wingly – which is returning to Aero Friedrichshafen for its second year – launched its ride-sharing platform in July 2015. It has since expanded into Germany and the UK, and, according to founder Emeric de Waziers, has facilitated over 1,500 flights carrying more than 2,500 passengers. "The shared economy is not only bringing new people into the market, it is also helping to drive down the cost of aircraft ownership for many pilots who would otherwise be forced to cut their flying hours," says de Waziers.

The frail market has not dampened the industry's enthusiasm or its flair. Manufacturers from across the GA spectrum will be represented at Aero Friedrichshafen with about 250 aircraft on display in the exhibition halls and the static area.

Sector stalwarts Beechcraft, Cessna, Cirrus, Daher, Diamond, Pilatus, Piper and Tecnam will be out in force to woo customers and bolster their dwindling orderbooks.

Diamond is expected to unveil a new light aircraft design to complement its popular piston-engined family. Tecnam's new P2012 Traveller piston-twin will take a break from flight testing to make its international debut. The 11-seat commuter, which is scheduled to enter service in 2019, was launched at Aero 2011.

This year's event will also mark the European premiere of Piper's flagship M600 single-engined turboprop and the start of its regional demonstration tour. Meanwhile, Cirrus will be hoping to secure maximum publicity for its recently certificated Vision SF50 personal jet ahead of its European validation, which is scheduled for this year.

"Aero is a celebration of GA," Bosch says. "The market is tough right now and we must use this... gathering as a way of building up and promoting the industry." ■



Tecnam's P2012 Traveller, still undergoing flight testing, will make its debut at the show

DAVE GRAHAM DUBLIN

Viewed from the perspective of an air show visitor, the so-called light-sport aircraft sector is flourishing. Go to international general aviation shows such as Aero Friedrichshafen, in Germany, AirVenture in Oshkosh, the USA, or even regional trade events such as Australia's Avalon, and there will be new models on display – and new makers – of these aircraft. Indeed, when the category was conceived by the US Federal Aviation Administration as a way to bring ultralights under its influence, and as a response to a hodgepodge of European regulations (where each country has its own standards), the then-FAA administrator, Marion Blakey, forecast there would be 9,000 US-registered LSA by 2015. For a GA industry suffering long-term decline, with owner-pilots being priced out of the market by increasingly complex and expensive machines, this concept was a breath of fresh air.

In the event, that 2015 total turned out to be closer to 3,000.

However, while there are no global statistics and regulations vary country by country, the light-sport segment – simple single- or two-seat aircraft, with a fixed-gear and piston engine, weighing no more than 600kg (1,310lb) or 650kg in the case of a seaplane or amphibian – is clearly a dynamic market. The category accounts for about a fifth of piston singles on an annual basis: figures which reflect its formal status in the US market.

But considering that the combined ultralight market in Germany and the Czech Republic in an average year is some 10% larger than the total US LSA market, total shipments in the sub-600kg LSA class may well eclipse total shipments of certificated piston-singles worldwide. Manufacturers surveyed for this article allocate between 10% and 30% of their production to the US market.

"EASA lost a historical opportunity to create a better LSA framework than the USA"

Jan Fridrich

Chairman, Light Aircraft Manufacturers Association, Europe

This dynamism is driven by astute entrepreneurs, aircraft designers and business people – often small businesses – who navigate the regulations in each market they serve. But the original intention of keeping costs down is at least partly undermined by the fact that the regulations are far from uniform. For example, the US weight limit is 600kg, while the German standard is 450kg – or 22.5kg more if equipped with a whole aircraft parachute. The

Crunch time for light sport

The LSA concept was created as a bid to consolidate standards, but harmonisation remains elusive and small aircraft remain expensive toys for wealthy enthusiasts

US standard is fixed-gear and fixed-pitch propeller, but most European standards allow for constant-speed propellers and retractable gear.

The FAA has a maximum clean aircraft (no flap) stall speed of 45kt (83km/h). Australian standards specify a maximum stall speed of 45kt in the landing configuration (with flaps). The FAA has a maximum horizontal calibrated airspeed of 120kt, while most other standards have no limiting top speed. The UK's

British civil aviation requirement, Section S, specifies greater factor of safety on structural components than all other standards.

Not surprisingly, of companies surveyed, on average they are building 16 minor variants of the same aircraft to comply with the various standards. "Each plane is an original, no two are the same," according to Milan Brstela, chief executive of Czech light aircraft designer BRM Aero.



And, as the standards evolve and change over time, aircraft designs must evolve, too. For example, Cirrus Aircraft certificated its roughly 1,000kg SR20 piston single in 1998. For such a category, the certification standards in force in 1998 remain the basis of all subsequent aircraft updates. Not so with LSA. As the standards change, so must the aircraft.

CERTIFICATION PATHS

Those opting for the “certificated” – as opposed to “self declared” – route to market have three main avenues: CS-LSA and CS-VLA in Europe and Primary Category in the USA. The seven aircraft certificated under CS-LSA since it was introduced in 2013 were all aircraft that had hundreds of copies flying under the “self-declaration” system prior to applying for their restricted type certificate. That each European Aviation Safety Agency application took approximately two years is hardly a great endorsement of the process. Germany’s Auto-Gyro received the only FAA Primary Category award of the 21st Century for its Calidus gyrocopter, itself a product of the self-declaration system.

Jan Fridrich, chairman of the Light Aircraft Manufacturers Association, Europe, puts it



Pipistrel is working on the Panthera, which has electric and hybrid versions



Tecnam’s P92, available for multiple certification standards, stands out among its peers

bluntly. “The EASA system is not what we wanted. It is too complicated. The only substantive difference between CS-LSA and CS-VLA is 150kg maximum take-off mass.

“Was VLA a success? No. So why does EASA think that CS-LSA with restricted type certificates would be a success? EASA lost a historical opportunity to create a better LSA framework than the USA.”

The same could be argued for the FAA’s Primary Category, as less than a handful of aircraft in total have been awarded it since its introduction in the early 1990s.

Another factor affecting private flying – and sales of LSA – is private pilot medical qualification. Reform has taken place in both the UK and the USA. While the USA’s new regime for non-LSA flying is not as permissive as for LSA, it is seen as a substantial step in the right direction. Ultimately, the larger opportunity for manufacturers is to offer scaled kits of their current aircraft in the experimental (home built) category that are heavier, faster models.

SECTOR STARS

While there are many great aircraft in the sub-600kg category, there are only a few standout businesses, which have outstanding marketing, sales, production, delivery and after-sales systems, along with global distribution.

One of these is Tecnam, based in Italy and making aircraft since 1948. Tecnam has leveraged knowhow from microlight/ultralight aircraft into certificated aircraft. Its starter aircraft – the P92 – is available for multiple certification standards and even has a CS-VLA type certificate.

With seven core models and 23 variants, Tecnam produces 19 different LSA-type (sub-600kg) aircraft. It has also fully certificated a



Each BRM Bristell-built aircraft is “unique”

four-seat single, three variations of its four-seat twin and is developing an 11-seat piston twin called the P2012 Traveller.

Another is CubCrafters, founded by Jim Richmond in the 1980s. The company has leveraged its Supercub restoration business into manufacturing certificated aircraft. Arriving late to the LSA party in 2007 with the Sport Cub, the Carbon Cub has dominated the US LSA category ever since its 2009 introduction.

In 2016 the company launched the X-Cub, a Part 23-certificated aircraft, building on Carbon Cub experience. CubCrafters has shown how to exploit and dominate a niche and leverage that ability into larger, faster and more capable aircraft and has a small but growing international footprint.

Flight Design has a global footprint with more than 1,800 CT-series aircraft delivered to date. Its latest C4 piston-single shows promise as an excellent high-wing, four-seat utility aircraft. If Flight Design emerges intact from current German court creditor protection, the C4 has huge potential.

Slovenia’s Pipistrel is relentless; as well as selling a range of light aircraft such as the Sinus and Virus, it is working on the Panthera: a four-seat, high-speed cruiser. Multiple

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» powerplant options include an all-electric version, a hybrid option and a traditional Lycoming engine. Pipistrel's considerable expertise with all-electric power spans its Alpha trainer and several EU-sponsored electric aircraft projects. If Pipistrel can commercialise one of these projects, it could have a long run.

Established in the early 1990s and merged with Aero-Technik, Evektor started license-building the P220 Koala ultralight, which morphed into the Eurostar, Sportstar and Harmony line of piston singles. Evektor has been involved in the Ae270 Ibis, Raven, Seabird and Cobra projects, but none of these has been commercialised. The Czech company's current focus is the EV-55 Outback, a 12-passenger, unpressurised turboprop twin. Evektor has evolved cautiously while producing quality aircraft. Whether it can bring a much larger model to market remains to be seen.

"The game is really going to change with the impact of manned VTOL craft"

Randy Schlitter

Chief executive, Rans Aircraft

Though not fixed-wing, Auto-Gyro's rotary wing autogyro is certainly part of the LSA-type market. That the German maker recently secured an FAA Primary Category type certificate for its tandem Calidus auto-gyro demonstrates considerable technical ability. It has been developing the auto-gyro concept for the last decade, starting with an open cockpit version, then a fully enclosed tandem and the latest is a side-by-side, fully enclosed craft. Rotax's new 135hp (101kW) 915iS piston engine will provide a major power increase for these draggy, but unique, aircraft. Auto-Gyro has yet to develop a substantial market outside Europe, but a new engine and a fresh type cer-



The Cubcrafters Carbon Cub has dominated the US LSA category since its 2009 debut

tificate may be all the impetus it needs.

Founded in 2005, Icon Aircraft has shown with its A5 amphibian that it can design and market a beautiful aircraft – but whether it can manufacture the type profitably has yet to be seen. Icon is an outlier in its marketing approach and design philosophy. Appealing to the non-pilot, it has created several iterations, but failed to deliver a single customer aircraft due to manufacturing process problems. The first units are due to roll off its production line in Vacaville, California later this year.

THE FUTURE

Buyers expect the latest in glass panel technologies, multiple system redundancy and sophisticated autopilots. BRM's Bristela says: "Today's customers are looking for the highest-quality, fully equipped LSA with IFR [instrument flight rules] equipment, full-featured

autopilots, custom interiors and paint schemes." The average ready-to-fly LSA sales price is \$185,000, despite a base price average closer to \$130,000. The trend is towards infinite customisation.

Randy Schlitter, founder and chief executive of Rans Aircraft, says: "The most active market is current aircraft owners seeking replacement aircraft that have lower operating costs. We still sell most of our production into the retirement market, but are seeing a definite increase in younger clients in their 30s and 40s." While some flight schools operate LSA, their adoption is not widespread.

In order to meet customer demands, LSA manufacturers want harmonised worldwide standards that include higher weights, no speed limits, inclusion of complex configurations and sensible stall speeds. They would like a global embrace of the "self declaration" system, but this is likely to be resisted by manufacturers of traditional certificated types.

Perhaps there is even a future for LSA through the development of technologies like manned drones. "It literally can put a flying machine in every garage," says Schlitter. "The game is really going to change with the impact of manned vertical take-off and landing [VTOL] craft. Many people are addressing this concept. The critical battery and control reliability solutions are being developed by the auto industry. No doubt Google, Apple, and Tesla are researching this, if not already making prototypes.

"Sport aviation will benefit in the long run, if the use of personal VTOLs becomes commonplace. There could be a new group of young aviators seeking the thrill of fixed-wing flight. If truly practical VTOLs are out there, then you will see a creative explosion of super cool aircraft in all forms." ■



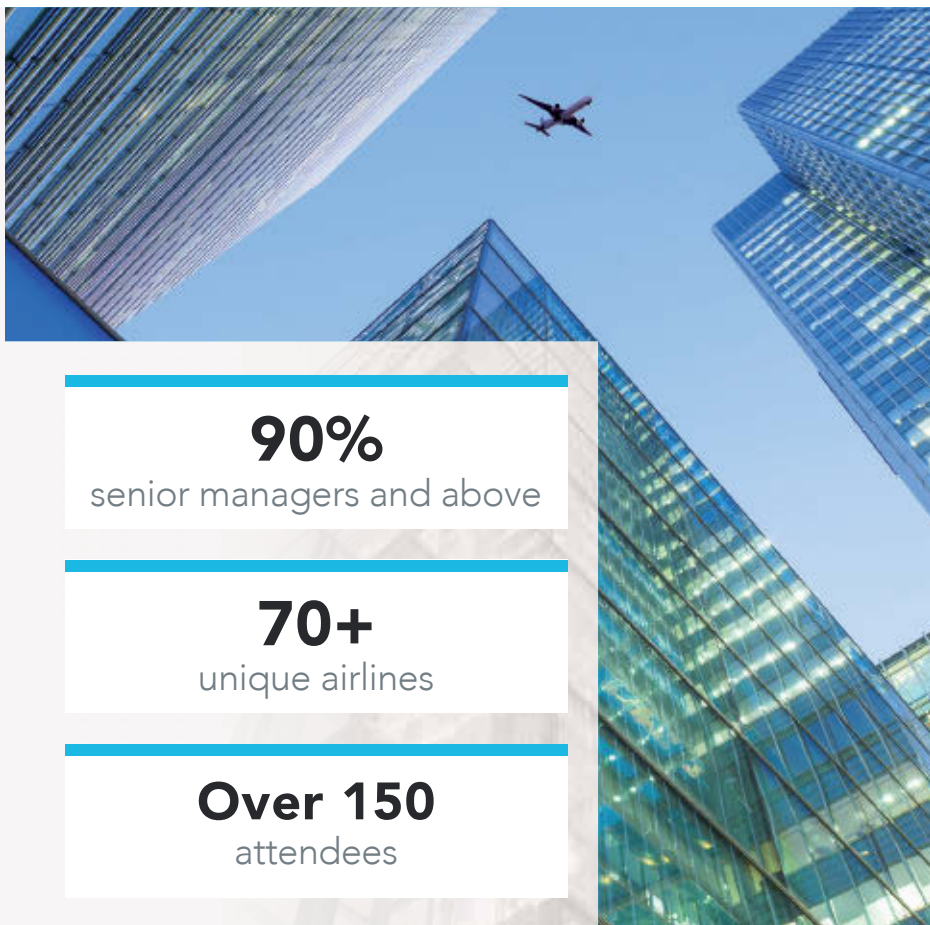
Rans Aircraft, which manufactures the S20, sees active sales in the replacement market

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Last Vulcan out of hibernation

Great news for fans of Vulcan XH558. The campaign to build a permanent home for the last surviving airworthy Avro bomber – which retired from the air show circuit in October 2015 – has raised the £200,000 (\$250,000) needed to return the restored aircraft from a hibernation imposed when the Vulcan to the Sky Trust was prevented from displaying XH558 to the public.

Now the trust can press ahead with plans to show the delta-wing aircraft at a new museum at Doncaster Sheffield airport, as well as take her on (albeit non-flying) visits throughout the country.

Trust head Robert Fleming says: “Everyone donating to this campaign can be proud that they are helping not only to protect a unique and important part of the UK’s rich aviation heritage, but also giving us the breathing-space needed to give Vulcan XH558 a secure home as the centrepiece of a new visitor centre to help inspire our future engineers.”

Marks & sparks

Birdseed’s ditching of its complimentary short-haul meal service is not going down well with many social media users, who are furious not just about the principle of paying for the Marks & Spencer sandwiches and other snacks, but about food running out “almost instantly” on flights of up to four hours.



Paying the fare, paying for fare



We have always wondered why the Machmeter on the Vulcan – ostensibly a subsonic aircraft – winds up to M1.3. Is it like the amp dial in the rock mockumentary *Spinal Tap* that goes to 11? We think we should be told. (Our snap was taken in the preserved cockpit of XM602)

“Might as well have flown EasyJet,” is a familiar comment.

Pictured on Twitter with a bag of crisps, Ian Ashton grumbles: “Sofia LHR BA0891 starving, no sandwiches hot or cold, other passengers and crew report this is now common.”

Level best

On the subject of cost-cutting initiatives, the branding of IAG’s new transatlantic budget carrier as Level (or LEVEL, as the case-obsessed marketers insist) has sparked much merriment on social media.

“I do hope they don’t use a stupid and confusing ATC callsign... like ‘LEVEL,’” notes Peter Evans.

Others have speculated about a future merger with a certain US low-cost airline to create... Spirit Level.

But has Willie Walsh’s airline group simply been more modest about its ambitions to vault into a new market segment than its two European rivals? When Lufthansa launched a separate long-haul leisure business, it decided to Jump, while Air France opted for a gentle Boost.

Rather self-effacingly, IAG has opted to keep it Level. It might be best not to speculate about what Alitalia could go for.



How’s that for returning serve?

Game to miss-ile Williams

We loved this juxtaposition of headlines on the CNN website. Who needs a strategy to deal with Kim Jong-un when you have the world’s greatest female tennis star on your side?

Betsy’s back

Cathay Pacific is naming a beer after Betsy, a Douglas DC-3 that was the Hong Kong airline’s first aircraft in the 1940s and 1950s.

“The world’s first hand-crafted bottled beer specially brewed to be enjoyed at 35,000ft” will be available to premium passengers on flights between Hong Kong and the UK until the end of April.

We’re not sure about the science behind a beer that improves with altitude, but it has to do with a combination of dragon eye fruit, Fuggle hops from the UK, and New Territories honey... it says here.

Due process

A French deputy, M. Ignace, has initiated a motion in the French Chamber of Deputies requesting the Government to constitute a high court of justice of the Allies, whose mission it will be to try the responsible authors of the crimes of all kinds committed by the enemy during the war.

Grand victory

The United States Navy has struck a smashing blow against the Japanese forces off New Guinea. The loss of heavy and light cruisers and destroyers will seriously handicap her command of the seas in the south-western Pacific.

U-2 at Bedford

A USAF Lockheed U-2 will begin operating from RAE Bedford this week. It will make high-altitude meteorological and gust surveys over the British Isles and North Atlantic.

Airbus rethink

The Sultan of Brunei plans to cancel an order for a VIP-configured Airbus A340, and has refused the gift of an A320 from King Hussein of Jordan. Industry officials say that the Sultan was offered the A320 in recognition of the financial assistance given to Jordan by fellow Islamic state Brunei during the Gulf War.

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Published by Reed Business Information Ltd,
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Newstrade distributed by Marketforce (UK), 2nd
Floor, 5 Churchill Place, Canary Wharf, London, E14
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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
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8-11 May
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Dallas, Texas, USA
xponential.org

17-18 May
Technology and Innovation in Airline Distribution
Bangkok, Thailand
flightglobalevents.com/TIAD2017

22-24 May
European Business Aviation Convention & Exhibition
Geneva, Switzerland
ebace.aero

4-6 June
IATA Annual General Meeting
Cancun, Mexico
iata.org

19-25 June
Paris air show
Le Bourget, Paris, France
siae.fr

14-16 July
Royal International Air Tattoo
RAF Fairford, Gloucestershire, UK
airtattoo.com

18-23 July
MAKS
Moscow, Russia
aviasaloon.com/en

24-30 July
EAA AirVenture Oshkosh
Oshkosh, Wisconsin, USA
eaa.org/en/airventure

12-15 September
DSEI
London, UK
dsei.co.uk

23-26 September
World Routes
Barcelona, Spain
routesonline.com/events/189/world-routes-2017/

24-27 September
RAA Annual Convention
Palm Beach, Florida, USA
raa.org/page/2017ACMain

25-28 September
Airline Passenger Experience Association
Long Beach, California, USA
apex.aero

3-5 October
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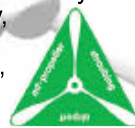


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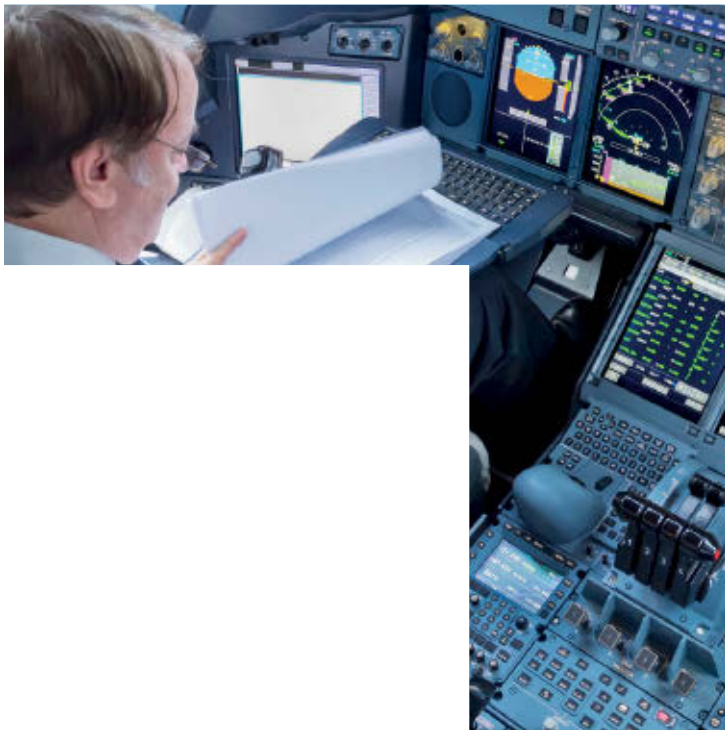
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5 years or longer in the industry
Held or holding a Goods-In Inspection stamp
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Preferably trained on Dangerous Goods and human factors
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Virtual Pilots' Jobs Fair

18-20 April 2017 | Online event



Pilots: looking for a new job?

Our virtual pilots' jobs fair will bring together commercial pilots and airline recruiters. It will help speed up and breathe new life into your job hunt. The event will take place online over three days. Event times vary to suit different time zones.

Why attend?

- Meet leading recruiters
- Get advice from other pilots
- See a live jobs feed
- Be inspired by our webinars

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Defense Sales Manager

Should have Military flight training background, with

- Valid ICAO Instructor license single engine turbine (desired)
- English Proficiency
- Communications skills
- Academic degree and or more than 5 years working experience in defense sales
- Defense industry experience
- Leadership level squadron commander

Surveillance and Mission System Sales Manager

- Technical understanding of surveillance systems
- English Proficiency
- Government procurement experience
- Ability to work independent
- Should have military background experience, or IC Background

Product Support Manager

- Managing a team of 14 after sales team member and growing
- Establishing service center concept
- Technical affinity
- Background in aviation business mandatory
- More than 5 years working experience in sales organizations and leadership/teamlead
- Perfect English proficiency

Pilot/Trainer

- Military pilot background mandatory
- EASA or FAA CPL/IR licensed or equivalent
- Flight Instructor (FI EASA) or Certified Flight Instructor (CFA FAA) or equivalent
- Total flight hours minimum 1500 h, including minimum 400 h as military instructor (primary or basic instructor role)
- Graduate of a Royal Air Force Qualified Flight Instructor Course or USAF Pilot Instructor Training course or equivalent preferred



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WORK EXPERIENCE JO ANNE TORAL

The view's better from the cockpit

Jo Anne Toral has followed in both her parents' footsteps: first as cabin crew and later at the front of the aircraft as a first officer with Cebu Pacific. Next stop, she says, is the captain's seat in a widebody

Have you always been interested in aviation?

I was fortunate to grow up in a family involved with aviation. My father is a retired airline pilot, my mother is a former flight attendant and my older brother is also a pilot. This meant I was inspired to become an aviator from a young age – it's always been in my blood.

Tell us about your career to date

I worked as cabin crew for Philippine Airlines for three years. This really helped me ascertain that I wanted to pursue a career as an airline pilot. I started at flying school in January 2015. I completed my ab initio and Airbus rating course at Alpha Aviation, one of Asia's leading pilot training providers, which took approximately 17 months. After going through a stringent hiring process, I secured a position with Cebu Pacific, starting off as a training first officer. After a few months of supervised line flying, I got released to the line as a regular first officer in January 2016, where I am now. I owe a huge part of this to the Alpha Aviation academy, as I don't believe my progression would have been possible without their facilities and instructors.

Why did you decide to pursue a career as an airline pilot?

Mainly because I loved working in this industry and sought professional growth. I also wanted to rekindle a desire I'd always had to get a job that would allow me to travel to different places and cities. But most of all, this career



Toral says gender was not a significant factor during her training

will always have a special place in my heart because of my parents – and I too wanted to make my mark in this industry.

Did you face many hurdles breaking into a male-dominated industry?

Piloting isn't about gender, so I faced exactly the same hurdles that my male colleagues faced, but maybe with a different intensity. The only downside of being a woman was that I was always more critical of myself and I always felt the need to do my best. It never crossed my mind that being a woman diminished my capability.

What do you enjoy most about your job?

For my parents' generation, air travel was exclusive to those who were in the upper class –

and in the Philippines not many had the luxury to afford travelling by air. While travelling by sea was cheaper, it would take them days to get to their destination. Working for a low-cost carrier such as Cebu Pacific is great because it provides affordable, safe and reliable air travel which is readily accessible to almost everyone, no matter what their financial capability or social status may be. This makes my job worthwhile. And of course, the view from the flightdeck is breathtaking!

What are the challenges?

The first challenge is conditioning yourself. Being a pilot is a tough profession to get into, and is very demanding mentally, physically and emotionally – even spiritually. It is very de-

manding of your time as well, and you have to sacrifice a lot to be successful in this line of work. But when you learn how to orient yourself with all of this in mind, studying long hours, taking numerous examinations, undergoing gruelling flight and simulator sessions, learning the standard procedures and how to multitask, these no longer feel like challenges but rather essentials in the whole process of becoming a pilot.

What can the industry do to increase female representation in the cockpit?

Ultimately the industry needs to keep chipping away at the gender gap. Career talks in schools, campaigns and inspirational women pilots portrayed in media would help children (especially young girls) to be presented with the idea that they can be anything they want to be.

Where do you see yourself 10 years from now?

I would hope to be a captain by then of a widebody aircraft, or perhaps have a place in the management of the airline I'd be working for. I'd also like to start to build my own flying-related business on the side. ■



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