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TO US – LET'S JOIN
FORCES INSTEAD
SHOW REPORT P16

AL BAKER ATTACK
Now it's the turn of Qatar Airways boss to rebuff unfair competition claims from a big US airline **13**

REMOTE THINKING
FAA finally issues rules for operators of small unmanned aircraft – but does it clear the air? **23**

FLIGHT

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24 FEBRUARY-2 MARCH 2015

CIVIL HELICOPTERS

OVER A BARREL

Why for the offshore sector, falling oil price is a problem

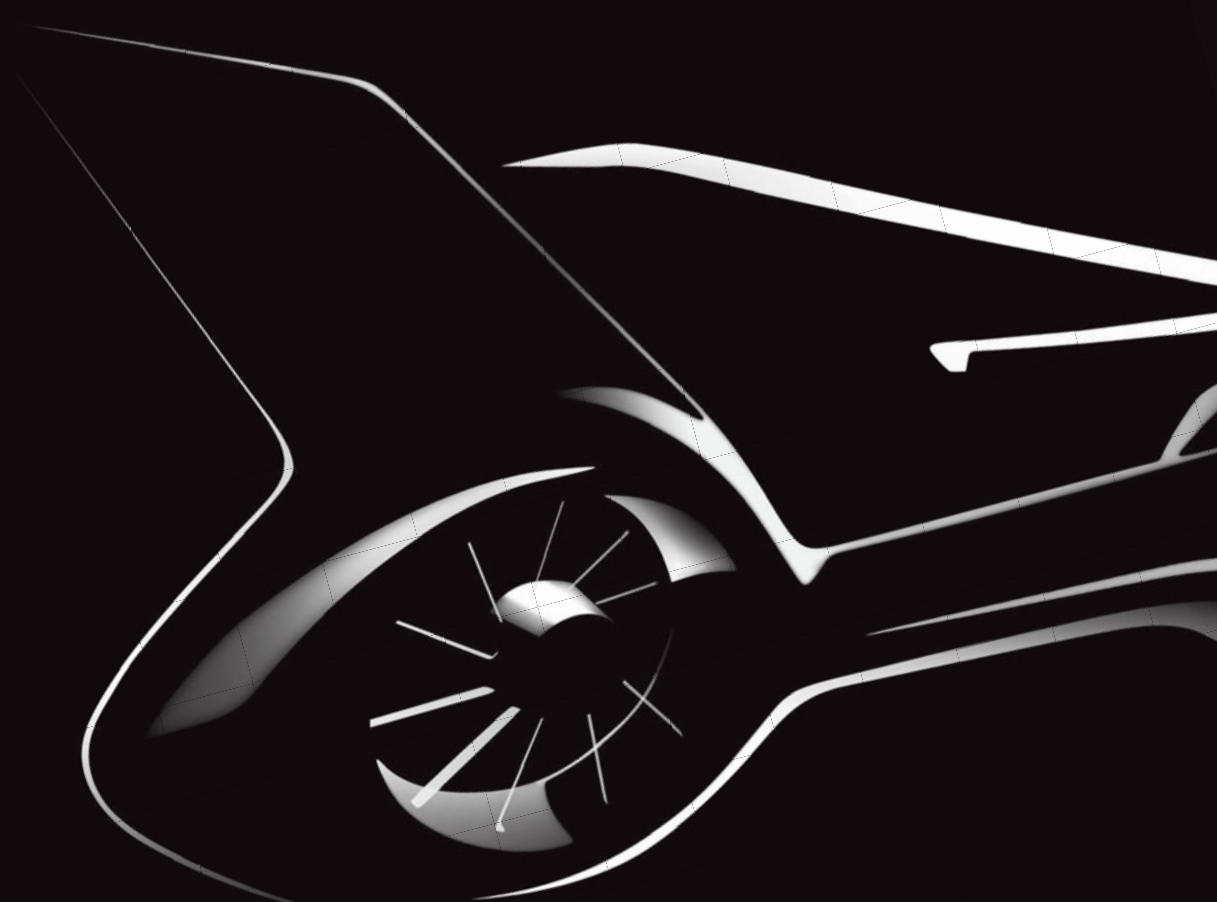


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AIRBUS
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COVER IMAGE

A Sikorsky S-76 hovers over the silhouette of the Southern Cross oil drilling platform in the Mediterranean at sunset **P30**



BEHIND THE HEADLINES

Greg Waldron (left) and Aaron Chong (right) travelled to Bengaluru, where they met up with our correspondent Atul Chandra to cover the Aero India show (P16-18). And Dan Parsons was at the US Air Force's Air Warfare Symposium in Orlando (P20)



NEXT WEEK ENGINES

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Lockheed reveals efforts to reduce cost of producing F-35A **P11**. Egypt orders 24 Dassault Rafale fighters **P8**



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IMAGE OF THE WEEK

François Le Vot makes a practice run in his Edge 540 on 12 February, ahead of participating in the Red Bull Air Race's Master Class category in Abu Dhabi. The former French air force Mirage 2000 pilot ranked only a lowly 11th place, with the top spot taken by the UK's Paul Bonhomme

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Rex Features

THE WEEK IN NUMBERS

17%

Flightglobal dashboard

The expected decrease in Air France-KLM's fuel bill for 2015, owing to a "quite efficient" hedging strategy

\$21bn

PwC US

The value of 53 \$50m-plus aerospace and defence M&A deals in 2014, up from just 41 – worth \$13bn – in 2013

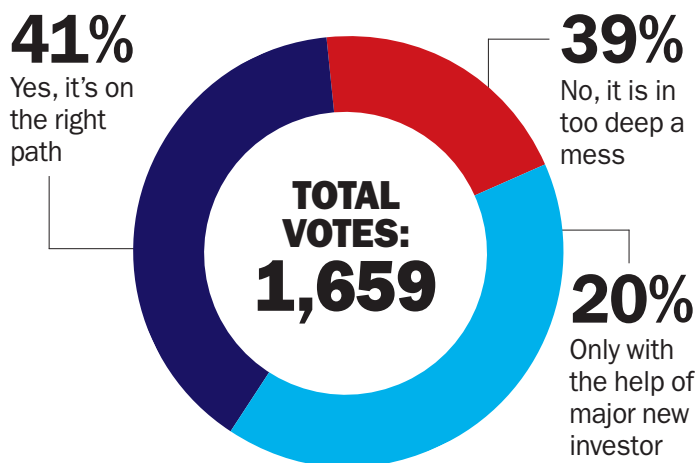
834

Flightglobal's Ascend Fleets

The number of airliners in India: 380 flying, 454 ordered; A320s rule, with 171 Ceo in service and 259 Neo on order

QUESTION OF THE WEEK

Last week, we asked: **Can Bombardier turn things around?**
You said:



This week, we ask: **Will success in Egypt help Dassault complete sale of Rafale to India?**

- ☐ Yes, just down to final paperwork
☐ It will stall for year or more ☐ It will never get signed off
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Clearing the air

The USA has lagged behind other countries when it comes to imposing rules on the rapidly expanding world of unmanned aviation. Two new sets of regulations will change that

It was a landmark week in the history of unmanned aviation. In an industry segment normally driven by technology advances, this time the push came from two separate and very different policy decisions by the US government. First, the Federal Aviation Administration released on 15 February a draft of proposed rules for integrating unmanned air systems weighing less than 25kg (55lb) in national airspace. Two days later, the State Department issued a new policy that for the first time allows the export of armed UAS to foreign militaries. Both have far-reaching – and often overlooked – consequences.

The State Department's move had long been anticipated and will, no doubt, be welcomed by big UAS and munitions suppliers with access to the government's multi-billion-dollar pipeline of foreign military sales.

The new export policy comes with loose strings, in the form of a blanket prohibition on the use of these exported systems for illegal surveillance and non-legitimate acts of violence. While such admonishments are



Present menace or future opportunity?

Regulators in other countries have in many ways outpaced their counterparts in the USA

helpful, it does highlight an even larger implication of the State Department's decision. While the government prohibited the export of armed UAS abroad, it had some moral authority to prevent similar transfers by countries with less commitment to even the loose strings that the new US policy attaches to such sales.

On the commercial side, the long wait for the FAA to release a notice of proposed rulemaking is over. It took the agency more than eight years to release the draft

regulations. While several years late, the proposals strike a reasonable balance between safety and access. UAS-based delivery services will have to wait a bit longer, but the proposed rules would allow a commercial industry to develop around aerial photography, precision agriculture and pipeline monitoring.

For the near future, the real menace to aviation safety will come not from commercial operators but from the still unregulated and largely unmonitored hordes flying cheap and unreliable "drones" for recreation.

Overall, the unmanned industry is making huge strides – but many want more progress. It is incredible to consider that only 20 years ago UAS operations were largely unknown outside of Israel and a small, unappreciated US Army project called the Predator.

Regulators in other countries have in many ways outpaced their counterparts in the USA. It is already legal in Australia and Canada and the UK to fly a UAS for commercial purposes. That day is still at least one year ahead in the USA, but it is closer now than ever. ■

See Defence P22 and News Focus P23

Now it's rotorcraft feeling the bumps

Helicopters have enjoyed a smooth ride in a turbulent general aviation marketplace – until now. As the fixed-wing light aircraft sector struggled with the financial crisis post-2008, demand for rotorcraft continued at a steady pace.

Even as the military market slackened, the oil and gas sector propelled backlogs for medium and large helicopters to new heights. Meanwhile, Robinson Helicopter proved demand for a cheap, single-engined turbine helicopter was as strong as ever, as long as the price was low enough. But then the helicopter market hit an unexpected bump. New figures show overall deliveries declined in 2014. Robinson experienced the steepest reduction in the light single category,

but demand for medium aircraft also stagnated.

Now, the industry faces fresh challenges in the form of a plunge in oil prices. If oil prices continue to trade around \$50 per barrel, oil exploration projects on floating rigs far from shore could be put on hold, reducing demand for large, long-range helicopters.

This comes just as manufacturers ramp up production of several new medium-sized helicopters developed to capture demand from the oil and gas sector.

Rotorcraft makers deserve credit for continuing to innovate with new products and technology during the recent boom, but it remains unclear how a newly-turbulent market will reward the industry. ■

See Cover Story P30



For all the latest news from the unmanned systems sector, visit our landing page: flightglobal.com/uav



BRIEFING

WOW TO LAUNCH TO USA WITH EX-UTAIR A321S

FLEET Icelandic low-fare carrier Wow Air appears set to take its first Airbus A321s from the fleet of Russian operator UTair. The two most recent additions to the Icelandic aircraft registry are a pair of A321s assigned to Wow Air and registered TF-MOM and TF-DAD. The aircraft were part of a batch ordered by UTair in 2012, but despite the recent acquisition, the Russian carrier is withdrawing the type from service. Wow Air intends to use the A321s to open new routes to Washington DC and Boston in the first half of this year.

FOREIGN RECRUITMENT AT RUSSIAN AIRLINES FALLS

EMPLOYMENT The weak rouble is stalling recruitment of foreigners to fill cockpit vacancies at Russian airlines. Following changes to the country's air code in July, nine carriers made use of an annual quota of 200 non-nationals among first officers. However, Olga Golodets, deputy prime minister for social and labour issues, admits: "To date, only 20 foreigners have been employed as first officers. Due to the rouble's sharp depreciation, recruiting flightcrew from abroad has become unprofitable for domestic airlines."

ATLAS SHOWS STRENGTH OF SPANISH UAV SECTOR

UNMANNED SYSTEMS A bid to make Spain's Andalusia region a leading aerospace technology power has reached a noteworthy milestone, with the flight of a 45kg (100lb) unmanned observation aircraft to 10.8nm (20km) beyond visual range, in segregated airspace around the year-old ATLAS dedicated UAV facility. The system tested in mid-January by Madrid-based UAV Navigation can cruise at 70kt (130km/h), with an 11,500ft ceiling and a range of 216nm.

US BUDGETS 'RELATIVELY STABLE' – BAE SYSTEMS

DEFENCE In a "challenging but stabilising" economic environment, BAE Systems expects rising sales in 2015, led in aviation by its role as UK lead for Eurofighter Typhoon and its position on the Lockheed Martin F-35. Delivering 2014 results, which saw sales dip by 8% to £16.6 billion (\$25.7 billion), partly reflecting a 2013 boost from a Saudi Arabia Typhoon contract price adjustment, chief executive Ian King says: "We believe US budgets are now relatively stable, with some early indications of a modest improvement in 2016."

WORK IS NO TAL ORDER FOR INDIAN COMPANY

PRODUCTION Tata subsidiary TAL Manufacturing Solutions aims to supply more than 120,000 parts and assemblies to major airline and engine programmes by 2018. The firm will deliver parts for Boeing 787- and Airbus A320-family aircraft – the latter under a partnership agreement with RUAG Aerostructures – as well as for Rolls-Royce's Trent 1000 and Trent XWB engines.

GENERAL ATOMICS TESTS SENSE AND AVOID

TECHNOLOGY General Atomics Aeronautical Systems has carried out flight tests with a pre-production variant of its sense and avoid air-to-air due regard radar using an MQ-9 Reaper unmanned air vehicle. The process involved a series of planned missions tracking small and medium-sized manned aircraft. Meanwhile, the company has announced the completion of a record 40h flight with its Predator XP UAV.

P-8 HARNESS PRODUCTION ON THE MOVE

TECHNOLOGY Bengaluru-based Fokker Sasmos – a joint venture between Fokker and Indian firm Sasmos – is set to build its first harnesses for the Boeing 737-based P-8 maritime patrol aircraft.



The agreement makes Cairo the Rafale's first international buyer

EXPORTS BETH STEVENSON LONDON

Paris clears Egypt order for Rafales

Bilateral arms agreement includes MBDA guided weapons and FREMM-class frigate in addition to 24 Dassault fighters

Egypt has ordered 24 Dassault Rafale multirole combat aircraft, as part of a bilateral arms agreement with Paris worth €5.2 billion (\$5.9 billion).

Dassault had announced the aircraft's selection on 12 February, prior to the deal being formalised, and did not disclose the number of aircraft to be acquired. Paris confirmed the contract early last week, during a visit to Cairo by defence minister Jean-Yves Le Drian. Also included in the deal are guided weapons produced by MBDA and a FREMM-class frigate from DCNS.

"This decision is a continuation of our co-operation that dates back to the 1970s," Dassault says. The Egyptian air force currently operates the company's Alpha Jet, Mirage 5 and Mirage 2000 models in strike roles.

Confirmation of the contract formalises Egypt as the first international buyer for the type.

"The Rafale meets the needs of countries that, like Egypt, demand a sovereign air force of the best level," says Dassault.

The company is still waiting to finalise its expected sale of the Rafale to India, having been selected four years ago to meet the nation's 126-unit medium multirole combat aircraft requirement.

"Negotiations surrounding the Rafale are currently under way with several governments," the company says.

The export success with Egypt comes at an important time in the Rafale programme, with Paris having placed increased emphasis on exports in order to safeguard production of the type. France's DGA defence procurement agency says Dassault delivered a combined 11 Rafales in 2014 to the nation's air force and navy.

In addition to Dassault, the sale is also good news for Thales, which provides the fighter's avionics equipment, active electronically scanned array radar, Spectra electronic warfare system and additional equipment totalling approximately 25% of the total value of the Rafale. Industry partner Snecma produces its two M88 turbofan engines.

The contract signature coincided with the Egyptian air force launching air strikes against Islamic State militants in Libya in retaliation for the killing of 21 Christian Egyptians in the country. Performed using Lockheed Martin F-16s, the strikes were carried out against camps and assembly and training centres "completely and accurately", according to the Egyptian government. ■



F-35 cost saving efforts are laid bare
THIS WEEK P10

DEVELOPMENT GREG WALDRON BENGALURU

UAC chief details Russian-Chinese widebody project

General Electric, Rolls-Royce in frame for engines as Slusar reveals workshare arrangements for joint long-haul airliner

Russia and China's proposed joint long-haul aircraft will have a range of 5,400-6,500nm (10,000-12,000km) and would initially be powered by either a Rolls-Royce or General Electric engine.

Speaking to Flightglobal at the Aero India show in Bengaluru on 19 February, United Aircraft Corporation chief Yuri Slusar said that a preliminary analysis about the technical and marketing aspects of the new type was completed last September.

The proposal has been long discussed by Russian executives and their counterparts at Chinese airframer Comac. The aircraft will seat around 300 passengers, and also be aimed at markets beyond Russia and China.

Slusar kyboshed reports that the new airliner will have a range of just 2,700nm, which would be limited for an aircraft of such size, declaring this as a misquote.

"At the stage when we examined different variants of the programme, there was an assumption that maybe it would be worth making the aircraft shorter-range. But after a more careful analysis of the market potential, we decided

on a range of 10,000-12,000km," he says. "Now the range is fixed."

Slusar also touched on dialogue between the two sides regarding workshare on the programme which, he says, will be divided equally between both parties. Irkut has experience with composite wings, while China has worked with foreign airframers in areas such as building fuselages and other components, he notes. "The Chinese work a lot in collaboration with avionics, providing components to manufacturers, and integrating equipment aboard an aircraft," he says. "Russia has a lot of things to share and co-operate on."

Russia will build the wings and high-lift devices on the proposed widebody, while China will manufacture the fuselage.

Slusar says only R-R and GE make engines with sufficient thrust to lift the proposed airliner. Longer-term, however, there could be joint Chinese development of an engine with the required output.

Russia's last long-haul airliner programme was the Ilyushin Il-96, which was built at the VASO facility in Voronezh. ■

See Show Report P16



Aerodynamic improvements and winglets are being considered

ENHANCEMENTS GREG WALDRON BENGALURU

Superjet set to get range of upgrades

United Aircraft Corporation (UAC) head Yuri Slusar says the company is working to improve the competitiveness of the Sukhoi Superjet 100, having embarked on aerodynamic improvements and a weight-reduction campaign.

"We have a Superjet upgrade programme," he says.

"We are planning winglets on the airplane and improvements to the overall aerodynamics.

"We also have a weight-reduction programme. This will give additional advantages as the aircraft evolves."

Slusar stops short, however, of saying whether a re-engining of the type is under consideration. The Superjet 100 is powered by SaM146 engines developed by PowerJet, a joint venture between Snecma and NPO Saturn.

"Certainly we are looking very closely at competition around the

market," he says. "Embraer is our main competitor, not so much the [Mitsubishi] MRJ."

UAC is involved in active Superjet campaigns in India and south-east Asia, and Slusar also floats the possibility of involving India in the type's supply chain.

"We are ready to offer India opportunities – options for some production here," he says.

Sukhoi displayed a Superjet 100 equipped for the VIP role on the static display at Aero India.

Meanwhile, Nepalese start-up operator Bishwo Airways has signed a letter of intent for five Superjet 100s, for delivery from 2017.

Sukhoi's civil aircraft division says that the aircraft will be configured in a two-class layout, including 93 seats. ■

Additional reporting by David Kaminski-Morrow in London

PROGRAMME DOMINIC PERRY LONDON

Engine tests push Pilatus PC-24 closer to first flight



The prototype business jet has started engine ground runs

Swiss airframer Pilatus is progressing towards the maiden sortie of its first business jet, with a prototype PC-24 photographed undergoing engine ground runs at its Stans facility on 18 February.

First flight of the Williams International FJ44-4A-powered type is scheduled for May, ushering in a two-year-long certification campaign using three flight-test articles.

The aircraft spotted performing testing is likely to be the second flight-test example. The initial, fully liveried prototype was rolled out on 1 August 2014, when Pilatus indicated that its first sister ship would follow in February, with a third to appear six months later.

Certification and first delivery of the \$9 million PC-24 is scheduled for early 2017. ■

ACQUISITION DAN THISELL LONDON

Sierra Nevada snaps up Dornier 328

Electronic systems specialist acquires type certificate holder of turboprop commuter airliner and its jet-powered variant

A new chapter in the history of the Dornier 328Jet and turboprop opened last week, with the acquisition for an undisclosed sum by Sierra Nevada (SNC) of type certificate holder 328 Support Services.

328 Support, based in London and with main operations at Oberpfaffenhofen airport near Munich, supports many of the approximately 175 328s still available. It bought the type certificates in December 2005 from insolvent AvCraft, which had acquired them in turn from Fairchild Dornier when it foundered in the post-9/11 downturn.

SNC describes itself as a world leader in C4ISR innovation and integration, and already owns supplemental type certificates for Dornier 328 modernisation technologies. Aircraft modified by the company are used for multi-mission applications ranging



There are some 133 examples of the type currently in operation

from surveillance to transport, cargo and medical flights, and Flightglobal's Ascend Fleets database records the US Air Force as operating the largest fleet of the type, with 17 examples.

Management at SNC was unavailable to detail its plans for 328 Support, but the company says it

"anticipates a close working relationship" between it and Wichita-based 3S Engineering, a certification specialist it also bought in September 2012.

After buying the 328Jet production line from bankrupt Fairchild Dornier in February 2003, AvCraft's attempts to restart

production the following year proved financially overwhelming for the Leesburg, Virginia-based executive aircraft completion specialist, which had developed a programme for the 328 and 328Jet at its Tyler, Texas facility. It filed for insolvency in March 2005, with only four firm orders on its books.

Subsequent type certificate holder 328 Services also bought the rights to the Dornier 428 – a 328Jet-based attempt to develop a 44-seat regional aircraft that was cancelled by Fairchild Dornier in 2000.

According to Ascend, the remaining 328 fleet is split almost evenly between jets and turboprops, with 133 aircraft in service and another 42 in storage.

Passenger transport uses account for 47 turboprops and 26 jets, while another 27 jets are used as business aircraft. ■

PARTNERSHIP BETH STEVENSON LONDON

Dynamatic to develop small UAV systems in India

India is to begin manufacturing an indigenous derivative of AeroVironment's family of small unmanned air systems.

The "Cheel" will be co-developed by AeroVironment and Indian company Dynamatic Technologies, in a facility in Bengaluru that was inaugurated on 17 February.

"The governments of India and the USA have selected a next-generation unmanned aircraft system based on AeroVironment's market-leading family of small UAS as a collaborative project under the India-USA [Defence] Technology and Trade Initiative," a statement from Dynamatic says. "The project, named 'Cheel', will

be jointly developed and produced by Dynamatic Technologies and AeroVironment in India, subject to government approvals."

The Cheel – or Kite in English – production facility will house an advanced avionics and communications laboratory, as well as facilities for payload development, composites, and assembly and testing for the unmanned air vehicles.

"We will pool Dynamatic's advanced Indian manufacturing and engineering capabilities along with AeroVironment's unique UAV design skills, application expertise and global support services to co-develop and produce the world's best mini UAVs," says Udayant Malhoutra, the Indian company's chief executive.

"The next-generation Cheel will be a truly global system."

The announcement follows speculation that US President Barack Obama was to agree to a se-

ries of technology transfers for India following his visit to the country in January. This had already led to General Atomics Aeronautical Systems being granted a DSP-5 export licence, enabling it to offer its unarmed Predator XP to the nation.

It had been reported that an indigenous variant of AeroVironment's Raven UAV would be developed, but Dynamatic's statement does not cite a specific template. Rather, it says that technology from the US company's family of small UAVs – also including the Puma, Shrike and Wasp – will be incorporated.

A teaming agreement between the two companies was signed in 2013 to position them for a number of opportunities with potential Indian customers, including the defence and home affairs ministries, Dynamatic says. ■

See Defence P22



Technologies developed for types such as the Raven will be used



Orbital ATK steps up production of frames for 787-9
AIR TRANSPORT P12

THIS WEEK

ROTORCRAFT DOMINIC PERRY LONDON

Turbomeca overpowers P&WC in X4 engine duel

On the eve of the official unveiling of its new X4 medium-class rotorcraft, Airbus Helicopters has dramatically ditched one of the two engine suppliers on the programme, and hinted at a heavier design than had previously been expected.

The medium-twin X4 was initially proposed with a choice of either Pratt & Whitney Canada PW210E or Turbomeca Arrano powerplants, both in the 1,100shp (809kW) range. However, the former of these has been dropped.

Airbus Helicopters says that following a “comprehensive market assessment” it will move the positioning of the new aircraft, “necessitating a significant engine

power increase”. That is thought to mean the X4 will be larger than the 4.3t AS365 or 4.9t EC155 it is slated to replace, bringing it closer to the 6.4t AgustaWestland AW139, which uses 1,600shp-rated P&WC PT6 engines.

As a result, Airbus Helicopters says it will not work with P&WC to develop a “growth version” of the PW210E. Turbomeca has always given the power rating on its all-new Arrano turboshaft as between 1,100 and 1,300shp.

However, the debut sortie of the X4, which is due to be launched on 3 March at the HAI show in Orlando, Florida, may still be with the P&WC engine, given the Arrano’s schedule.



The type is expected to be larger than the EC155 it will replace

Patrick Perry/Airbus Helicopters

Arrano programme vice-president Patrick Moncoutié says discussions on sole sourcing have been taking place since last year. In return, the French manufacturer has given a commitment to Airbus Helicopters to accelerate the pace of work on the power-

plant, “to be ready for first flight as soon as possible”.

That milestone was envisaged for 2016, but Moncoutié says it may now come later this year. Certification of the engine is likely by the end of 2017, ahead of service entry of the X4 in 2018. ■

PRODUCTION DAN PARSONS WASHINGTON DC

F-35 cost saving efforts are laid bare

Lockheed Martin reveals efficiency investments it is making in attempt to reduce price of Lightning II to below \$80 million

Lockheed Martin on 18 February shared some of the efforts it is taking to reduce the cost of a conventional take-off and landing F-35A to a target of less than \$80 million by 2019.

The company has formally evaluated 131 potential cost-saving investments across its supply chain as part of a process dubbed the “blueprint for affordability”. Of those, 58 ideas have been approved for implementation, says F-35 director Lorraine Martin.

Lockheed and programme partners BAE Systems and Northrop Grumman have spent \$49 million to identify those projects, and have vowed to spend a combined \$170 million over two years on re-tooling and other investments to drive cost out of the programme.

The US government has promised \$300 million in similar investment when and if Lockheed can bring the price per F-35A to below \$80 million, with a Pratt & Whitney F135 engine, by 2019. The current cost for the combination is between \$110 million and \$115 million.



Lockheed Martin

Programme partners have spent \$49 million to boost efficiency

Some production changes have been derived from lessons learned through building the existing 120-plus F-35s. Instead of buying aluminium in 5,900kg (13,000lb) chunks and machining them into bulkheads, Lockheed now buys 3,760kg blocks, which require much less work. For an investment of \$652,000, the company expects to eliminate \$65,000 per aircraft.

In another example, the company has reworked the way it drills thousands of holes through F-35 components, and will replace an oil-based coolant with compressed liquid nitrogen that will cool metal-drilling bits to below freezing.

Simplifying the way that Lockheed creates the diverterless supersonic inlet bump inside the aircraft’s two engine intakes will

save \$6,000 per aircraft once implemented before year-end, equating to \$27 million over the life of the programme.

The blueprint does not officially begin until low-rate initial production (LRIP) lot nine, but Martin says Lockheed offered \$260,000 in savings per aircraft in the 43-aircraft LRIP 8 deal finalised late last year. Other projects approved prior to sealing a deal for LRIP 9 in the coming months will allow savings to increase to nearly \$1 million per jet.

“That’s no chump change,” Martin says, adding: “Every month, every week new projects get approved.”

By including the projected cost savings in production contracts, Lockheed assumes responsibility if the cost effectiveness of changes fall short. “Whatever I sign up to build it for, that’s all I’m going to get,” Martin says.

“That incentivises us to find the best projects and get them implemented as quickly as possible for both the US government and for the industry team.” ■



Parts were previously supplied by Boeing's fabrication unit

MANUFACTURING
STEPHEN TRIMBLE WASHINGTON DC

Orbital ATK steps up production of frames for 787-9

Orbital ATK has started building composite frames for the Boeing 787-9 aft and centre fuselage sections.

The Orbital ATK Freeport Composites Center in Clearfield, Utah, is planning to begin shipping the composite frames before 1 July. It will take three years for Orbital ATK to achieve full production rate, the company says. In 2018, Boeing plans to build at least 14 787s per month.

Boeing selected Orbital ATK last November to supply the composite frames for the 787-9 and the larger 787-10, which remains in development and is due to enter service in 2018.

Those components were previously supplied by Boeing's fabrication unit in Auburn, Washington and Alenia Aeromacchi in Naples, Italy.

Orbital ATK supplies similar structures for the Airbus A350.

Orbital ATK was formed on 9 February as a merger between ATK and Orbital Sciences. Its products range from space launch vehicles and related propulsion systems to satellites and tactical missiles. ■

It will take three years for Orbital ATK to achieve a full rate of production – in 2018, Boeing plans to build 14 787s per month

TECHNOLOGY MURDO MORRISON DERBY

Biggest 3D print part yet to fly this year on Trent XWB

Propulsion giant says test could open door for industrialised additive layer manufacturing

Rolls-Royce will flight test later this year a Trent XWB-97 engine with what it claims is the largest component ever built using additive layer manufacturing (ALM).

The titanium structure is a 1.5m-diameter and 0.5m-thick front bearing housing containing 48 aerofoils, manufactured using the ALM technique, also known as 3D printing.

VIABILITY

The UK propulsion giant has already ground tested several XWB-97s – the sole engine for the in-development Airbus A350-1000 – containing the tractor tyre-sized part, but no engine including such a large ATM component has ever powered an aircraft in flight, says R-R.

Although production XWB-97s will not contain the ALM component, the Derby-based company says the project is a key step towards proving the industrial via-

bility of the process, which it says could trim 30% from "like for like manufacturing lead time".

R-R will not commit to a time-scale for industrial manufacturing of ALM components of this scale. "We don't want to put a date on it," says Alan Newby, chief engineer, future programmes and technology. "We have a lot of work to do on scalability before making a commitment to production."

However, the benefits could be felt earlier in terms of the speed with which R-R could develop prototypes using ALM technology, and avoiding commissioning the tools to build a new component conventionally.

"It is ideal for prototyping. Shortening the manufacturing time by almost a third gives us more time to design," says Newby. "We are also able to produce designs that we wouldn't otherwise be able to do."

R-R is not new to ALM – a

technique through which metal powder is melted by an electron beam and then built up layer by ultra-thin layer to create complex shapes.

The manufacturer has been using the technology to repair components for at least five years. "We are using this knowledge now to build up to bigger components," says Newby.

Rolls-Royce has been working on ALM technology with materials specialists from the University of Sheffield and Manufacturing Technology Centre, near Coventry, in the UK, as well as Swedish-based Arcam, which makes additive manufacturing machines.

Rival engine maker GE is also investing heavily in the technology, and pioneered the manufacture of ALM components after buying Cincinnati-based Morris Technologies in 2012.

See next week's issue for more on ALM and Rolls-Royce

FORECAST DAVID KAMINSKI-MORROW LONDON

Launch pricing set to bring down Rolls-Royce profits in 2015

Rolls-Royce is forecasting lower pre-tax profits in its civil aerospace division for 2015, as volume growth is offset by adverse effects such as launch pricing.

The engine manufacturer expects pre-tax profits of £800-900 million (\$1.2-1.4 billion), compared with the

improvement to £942 million achieved last year.

It is predicting full-year revenues will rise from £6.8 billion to around £7-7.3 billion, assisted by Trent XWB and Trent 1000 sales and "good growth" in aftermarket revenues. The Trent XWB powers the Airbus

A350, the first delivery of which took place at the end of 2014. Rolls-Royce delivered 739 civil engines during 2014, down slightly on the year before. The value of its orderbook rose by 5% to £63.2 billion, with a net order intake of £11.7 billion.

Ramp-up of Trent 1000 engine production for the Boeing 787 contributed strongly to an 8% growth in original equipment revenues. The 12% improvement in civil aerospace underlying profit resulted from higher volume and better aftermarket margins. Improved retrospective support contracts under its TotalCare programme also helped profitability.

But this will not repeat "at similar levels" this year, says Rolls-Royce, which also expects to deliver fewer Trent 700 and Trent 900 engines for the A330 and A380 programmes. ■



The company's orderbook rose in value to £63.2 billion in 2014



PW1100G powers moves by MTU to double production
AIR TRANSPORT P14

PROGRAMME MAVIS TOH SINGAPORE

Most key structures in place as C919 takes shape

Comac has taken delivery of the tail cone and vertical stabiliser for its first C919 prototype, as the pace of final assembly of the Chinese narrowbody programme picks up.

The vertical stabiliser and rudder, manufactured by AVIC SAC Commercial Aircraft, are mostly made of composite material, it says.

The tail cone is manufactured by Aerospace HIWING (Zhenjiang) Special Materials. The section, also largely made of carbon-fibre, will house the aircraft's auxiliary power unit and con-

Comac has made extensive use of composite material on the twinjet



nect its horizontal stabilisers.

Comac has now taken delivery of most of the aircraft's main structures, including the nose, forward fuselage, mid fuselage, aft fuse-

lage, wings and centre wingbox.

The Chinese manufacturer commenced final assembly work last September, with the join of the aircraft's forward

and mid fuselage sections.

The airframer says the aircraft is rapidly taking shape at its final assembly facility located near Shanghai Pudong International airport.

Comac anticipates rolling out the CFM International Leap-1C-powered twinjet in the second half of the year.

The challenge, however, is to perform the first flight of the aircraft. Although this milestone is currently scheduled for end-2015, Comac says delays are likely due to the complexity of the system integration. ■

POLICY MAX KINGSLEY-JONES LONDON

Al Baker flies into row over hand-outs

Qatar Airways boss says accusations from big US airline chiefs show they do not understand the definition of subsidies

Qatar Airways group chief executive Akbar Al Baker has dismissed the latest round of accusations from US airlines about unfair competition from the Gulf carriers, saying they need to understand the difference between government subsidies and government equity.

Al Baker was speaking to Richard Quest of CNN in the wake of an interview the US network's business anchor conducted with Delta Air Lines chief executive Richard Anderson on 16 February. In that interview, Anderson restated that US airlines had "documented evidence that cannot be refuted" that the Gulf carriers have benefited from "tens of billions of dollars in direct government subsidies".

Controversially, Anderson also rebuffed the point that US airlines

had benefited from huge government subsidies after the 9/11 terrorist attacks, citing "the great irony" that the terrorists originated from the same region as the Gulf carriers.

Challenged about the alleged subsidies, Al Baker told Quest: "Quite frankly, I think Mr Richard Anderson needs to go and study in a university to find out what the difference is between equity and subsidy. We don't receive any subsidy. What the government has given us is equity into an airline which they own."

GUARANTEES

Al Baker also denied accusations that Qatar Airways benefits from unrealistically low fees at Doha's all-new Hamad International airport, pointing out that the charges are uniform for all carriers serving the hub.

While he did not respond directly to Anderson's comments about the origins of the 9/11 terrorists, Al Baker said the Delta boss had "forgotten that in 2001 the US government contributed nearly \$5 billion in aid to the airlines and an additional \$10 billion in loan guarantees. What is this



Al Baker says the US government subsidised airlines after 9/11

called? Is it called a donation or is it called a subsidy or is it called government help to them?"

Some observers are curious about Anderson's line of attack, given the links that Delta and its SkyTeam alliance partners have with airlines in the Gulf region. Saudi Arabian flag carrier Saudia is a major player in SkyTeam, while Delta's transatlantic partner Air France-KLM is building ties

with Abu Dhabi carrier Etihad Airways through codeshares and a revenue share agreement.

Meanwhile, American Airlines – Delta's ally in the US majors' campaign to force a US government rethink of its open-skies policy – operates a transatlantic partnership with IAG, of which Qatar Airways owns almost 10%, and all are members of the Oneworld alliance. ■

"Richard Anderson needs to find out what the difference is between equity and subsidy"

AKBAR AL BAKER

Group chief executive, Qatar Airways



PROPULSION MICHAEL GUBISCH MUNICH

PW1100G powers moves by MTU to double production

German subassembly manufacturer plans to deliver just under 4,000 modules and engines a year by end of decade

German engine specialist MTU plans to double its production output over the next five years.

The Munich-based subassembly manufacturer delivered around 1,860 engine modules and fully assembled powerplants last year, and the number is set to reach 3,950 by 2019, chief operating officer Rainer Martens said in Munich on 12 February.

MTU is supplying the first four stages of the high-pressure compressor and the complete low-pressure turbine for Pratt & Whitney's PW1000G geared turbofan, and will assemble about a third of these engines at its Munich plant.

For General Electric, the manufacturer is producing turbine centre frames for the GENx family, and will supply the equivalent

part for the GE9X series selected to power the in-development Boeing 777X widebody.

Production is set to be ramped up during the second half of this year – as the Airbus A320neo nears its planned service entry in the fourth quarter – and continue through 2016, says MTU. The production increase will largely be driven by the PW1100G, which competes with CFM International's Leap-1A on the re-engined A320 family, although the latter engine will not enter service before 2016.

A smaller proportion of the geared turbofan output will comprise versions for other aircraft types. Serial production of the PW1500G – which powers the Bombardier CSeries – has begun,



MTU provides compressor stages for the PW1000 geared turbofan

and several production engines have been delivered to the Canadian airframer, says MTU programme chief Michael Schreyogg. He reiterates that deliveries of the CSeries will begin by year-end.

Airbus plans to increase the monthly A320 production rate from 42 at present to 46 aircraft in 2016, but is studying options to boost output further.

MTU is shifting staff from its declining defence activities to the commercial engine business at its Munich plant. At its headquarters, the group wants focus on engine assembly and largely automated production of compressors

and turbine centre frames. A new blisk production facility with extensive milling machinery was opened at that site in 2013.

Meanwhile, labour-intensive processes, such as turbine assembly, are being transferred from Munich to MTU's Polish plant. The group will open a facility extension at the facility in Rzeszow by the end of this month, approximately doubling the footprint there. The facility's workforce is set to grow from the current 500 to 700 by 2017.

In Munich, staff numbers will be flat, but productivity is set to rise "considerably", says Martens. ■



Arkia's A330neo deal will help Airbus grow its presence in Israel

ORDER DAVID KAMINSKI-MORROW LONDON

Israel's Arkia gives Airbus twin-aisle first

Israeli carrier Arkia is to become the first carrier in the country to take Airbus long-haul aircraft, with a tentative agreement to acquire up to four A330-900neos. The airline has signed a memorandum of understanding for the four aircraft.

All A330neo jets will be powered by Rolls-Royce Trent 7000 engines. A delivery date for the Arkia

aircraft is yet to be disclosed.

Israel has proven a difficult market for Airbus, with flag-carrier El Al a traditional customer for Boeing.

But Israir agreed to acquire A320s in 2007 and the carrier also briefly used an A330 for long-haul operations.

Arkia became an Airbus cus-

tomiser three years ago when it ordered four A321neos.

Chief executive Nir Dagan says the A330neo will be a "key asset" to help the airline "grow efficiently on highly competitive international long-haul routes".

Airbus confirms that the commitment marks its first widebody aircraft deal in Israel. ■

REFLEETING

Embraer's big hopes for US regional sales

Embraer believes US carriers will order roughly 200 more large regional jets during the next few years. "There will be more replacement," says Paulo Cesar Silva, president of Embraer Commercial Aviation.

A drive to replace 50-seat regional jets and turboprops with 76-seat models – specifically the Bombardier CRJ900 and Embraer 175 – in the feeder fleets of American Airlines, Delta Air Lines and United Airlines, began in late 2012.

Embraer has landed 234 firm orders for the E175 since regional refleet began with Delta's deal for 40 CRJ900s in December 2012, analysis by Flightglobal shows. ■



HAL reveals Hawk
avionics upgrade
SHOW REPORT P16

REGULATIONS AARON CHONG BENGALURU

India puts safety first in big shake-up of aviation sector

New government also priorities regional connectivity, high fuel taxes and domestic MRO

The Indian aviation industry could experience a major shake-up following the election of the Narendra Modi government.

Speaking at a conference on the sidelines of the Aero India air show in Bengaluru, India's joint secretary of civil aviation, G Ashok Kumar, covered a wide range of issues the industry faces, from safety to the ease of doing business.

Kumar reiterated that a major priority is returning the country to the US Federal Aviation Administration Category 1 safety rating, and that this should take place within "two to three months".

In January 2014 the FAA cut India from Category 1 to Category 2, prohibiting Indian carriers from starting new services to the USA. At the time it said that India's civil aviation oversight regime failed to comply with ICAO standards.

Kumar says that regional connectivity within India needs to be improved, and new route dispersal guidelines for regional airports are being explored. The government could also permit codesharing between smaller provincial airlines that operate general aviation aircraft and commercial carriers. If this is allowed, small pro-



Indian carriers are prohibited from starting new services to the USA

vincial airlines will need to publish their flight schedules.

The government also hopes to address the issue of high fuel taxes charged by India's state governments, which have been a persistent source of irritation for Indian carriers.

India's federal government, he says, is talking to the states about this issue, but he is not offering a view as to when, or if, state tax regimes may change.

In regard to maintenance, repair and overhaul, Kumar says that 90% of India's commercial

MRO business gets channelled out of the country due to high tax rates on imported spare parts and other policies. India's regressive policies in regard to MRO have been a boon for MRO operators in the Middle East, Singapore and other countries, he says.

"The aviation industry in India should be seen as a growth engine for the country, and not just a business for the rich." He says more details will be announced in India's budget on 28 February, and that "a lot of hope is riding on it". ■

See Show Report P16

ORDERS

ATR 72s fly in to help modernise Air Madagascar

Air Madagascar has agreed to acquire two ATR 72-600s during the first half of this year as part of a modernisation programme.

The first aircraft will be delivered on 15 March and the second a month later, following a deal with the airframer during February.

They will join three ATRs already owned by the airline, which says it withdrew two Boeing 737-300s in December but is adding a 737-700 to the regional fleet. ■

MANUFACTURING

A330 flap win for Dynamatic

Indian manufacturer Dynamatic Technologies has secured flap-track work for the Airbus A330 programme, becoming a single-source supplier under the deal.

Airbus says the pact is its largest with a private-sector company in India. Dynamatic has previously produced flap-track beam assemblies for the A320 family.

Under the new deal, the company will assemble all flap-track beams at its facility in Bengaluru.

The company is also set to take responsibility for the entire supply chain for the component, which will include sourcing, manufacturing and assembly. ■

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AERO INDIA 2015

This year's Aero India in Bengaluru – the first following the emergence of the Narendra Modi government – was subdued, with a number of major contractors absent, and uncertainty lingering over several key procurement programmes, such as the planned acquisition of 126 Dassault Rafale fighters for the Indian air force. Modi created a stir by attending, reminding industry executives that India is not content with buying foreign equipment, but wants to build it at home. Show report by Atul Chandra, Aaron Chong and Greg Waldron



Flightglobal



BAE Systems

100 of the licence-built type have been delivered, of 123 on order

SYSTEMS

HAL reveals Hawk avionics upgrade

Improvements to jet trainer's cockpit display proposed as BAE agrees \$28.6m support package with Indian airframer

Hindustan Aeronautics (HAL) has presented a proposed display and avionics upgrade for India's licence-built BAE Systems Hawk 132 advanced jet trainers.

The avionics upgrade seeks to replace the two existing displays in each cockpit with two larger 8 x 6in multifunction displays. The proposed upgrade will make up for the current lack of a moving map display, and also replace existing electro-mechanical instruments such as the aircraft's vertical speed and altitude indicators.

The upgrade appears to be the result of a one-year effort by HAL's mission and combat system research and development centre, which will also handle the software aspects of the work. A BAE official says that in meetings with HAL, "both companies have agreed to work together on a

joint Hawk upgrade and fleet management tools".

The opening day of the show also saw the signing of a contract worth £18.5 million (\$28.6 million) between BAE and HAL for a support package for India's Hawk fleet. BAE says the five-year deal will support HAL's efforts to set up a dedicated repair and overhaul facility before major servicing of the aircraft, with the latter expected to begin in 2016.

India has ordered 123 Hawks for its air force and navy so far, with an estimated 100 of the type now delivered and in-service aircraft having accumulated nearly 70,000 flying hours.

Contract negotiations are currently under way for an additional order for 20 of the type to re-equip the air force's Surya Kiran aerobatic display team. ■

COMPETITION

Sikorsky lured by fresh VVIP transport contest

Sikorsky will pitch its S-92 for the eventual re-tendering of India's requirement for VVIP transport helicopters.

AJS Walia, Sikorsky's regional executive for India and south Asia, expects a request for information for the requirement some time later this year.

Walia believes the fact that the S-92's fuselage is produced by its Tata Sikorsky joint venture in Hyderabad will give the US heli-

copter an edge in the competition, likely to be for eight VVIP-equipped aircraft and four support helicopters.

The S-92 lost out to AgustaWestland's AW101 in a previous VVIP competition, but allegations of corruption derailed the acquisition in 2013.

Airbus Helicopters says it, too, will be interested in any re-tendering of the VVIP helicopter deal with its EC225. ■

ROTORCRAFT

Military interest in more Mi-17 V5s

Russian Helicopters expects additional orders for the Mil Mi-17 V5 transport from the Indian military. Speaking to Flightglobal, a company source says that it has "received initial interest for further orders".

India has taken delivery of 141 Mi-17 V5s, out of 151 that the nation ordered in two batches in 2008 and 2012. The final 10 examples

are scheduled to be transferred within the next few months.

At the show, Russian Helicopters made a presentation to the Indian defence ministry linked to the proposed establishment of a service centre for the repair and modernisation of its Mi-17 fleet. An estimated 300 Mi-8/17-series rotorcraft are operational in the country. ■



Russian Helicopters

Around 300 examples of the transport type are operated in India

PARTNERSHIP

HAL defends ability to produce Rafale

Company chairman rejects suggestions that Dassault is concerned by the quality of fighters manufactured under licence

Suggestions that an Indian deal to obtain 126 Dassault Rafale fighters is being held up by French concerns about Hindustan Aeronautics' (HAL) quality standards have been rejected by company chairman T Suvarnaraju.

Speaking to the media, Suvarnaraju stressed his faith in HAL's products, noting that it produces components and structures for a number of major aircraft types, such as the forward doors for the Airbus A320 and the gun bay doors and wire harnesses for the Boeing F/A-18 E/F Super Hornet.

The company has also worked on Boeing commercial programmes including the 737 and 777, and has a long record in licence-producing types such as the Sukhoi Su-30MKI, BAE Systems Hawk and Dornier 228.



18 of the type should be built in France, with 108 made in India

Nonetheless, Suvarnaraju declines to confirm or deny persistent reports that Dassault is dubious about guaranteeing fighters produced by HAL. Under the original terms of the air force's medium multi-role combat aircraft (MMRCA) requirement, the first 18 Rafales are to be produced

in France, and the subsequent 108 in India by HAL.

Dassault, which had the largest international presence at the show, also declines to comment on the status of its MMRCA negotiations, which have dragged on for four years following the Rafale team's selection for so-called

L1 bidder status in 2011. However, the manufacturer's signage around the event carried the "Make in India" message.

France sent three air force examples to the show, with the single-seat Rafale C and a pair of two-seat Bs having flown in from the United Arab Emirates, from where they had conducted air strikes against Islamic State militants.

At a separate press conference in the show, Indian air force Air Marshal Arup Raha said that obsolescence in the service's Mikoyan MiG-21 fleet means obtaining the Rafale is an urgent priority for the service. He declined to answer questions about what the air force will do if negotiations over the MMRCA programme between Dassault and India's defence ministry fall through. ■

MANUFACTURING

UTC workshare floats to India

UTC Aerospace Systems expects to conduct a greater scope of work in India, following the approval of its new four-person life raft by the US Federal Aviation Administration for domestic production and export.

Mainly fitted on business and GA aircraft, the system is also approved by the Indian Directorate General of Civil Aviation.

"UTC Aerospace Systems is among the first aerospace companies to manufacture aerospace products in India for direct shipment to the United States," says Daphne Falletti, president of the company's interiors business area. "There is great potential in the Indian aerospace market," adds Chris Rao, vice president in India.

UTC Aerospace Systems says it is also in talks with the Indian air force to potentially provide its DB-110 intelligence, surveillance and reconnaissance pod. It declines to reveal the type of aircraft on which it would be fitted. ■

WIDEBODIES

Boeing promotes the Dreamliner as Indian carriers consider 777X deals

Booming domestic air travel in India has led to fierce competition for single-aisle seats – but the widebody market has yet to fully pick up, Boeing says.

Speaking to Flightglobal, Dinesh Keskar, senior vice-president of sales in Asia-Pacific and India, says Boeing has done well to take a "commanding lead" in the country's widebody market. It currently counts Air India and Jet Airways as major customers in the subcontinent. Keskar says Boeing delivered Air India's 19th Boeing 787-8 in February and is in discus-

"Lessors in the Indian market appreciate widebodies, which have been a great hit with them"

DINESH KESKAR

VP sales Asia-Pacific & India, Boeing



Air India and Jet Airways are considering the new-generation 777X

sions with the flag carrier and also Jet Airways about the 777X.

"Our widebody strategy right now is to promote the 787-10, and we will eventually follow up with the 777X," says Keskar.

Low fuel prices and high demand for connectivity between cities like Mumbai and Delhi are factors in the surging demand for single-aisles. The 737 is currently operated by Jet Airways and SpiceJet, says Keskar, while the

airframer is in discussions with both carriers about the 737 Max.

Boeing is enjoying a "great partnership" with lessors to further penetrate the Indian market, he adds. "They appreciate the widebodies, which have been a great hit with them."

Flightglobal's Ascend Fleets database shows Air India operating 18 787-8s, 13 777s and five 747-400s, while Jet Airways uses 76 737s and five 777s. ■

NEGOTIATIONS

'Talks progress' as India ponders plunge for US-2

ShinMaywa says a high-level joint working group between the Indian and Japanese governments has met four times since being formed in 2013 following the confirmation of New Delhi's interest in potentially acquiring its US-2 amphibious aircraft. A subcommittee related to the acquisition has had more frequent interactions to discuss technical details, a company source says.

One key element involved in any offset campaign related to a sale of the type would be maintenance, repair and overhaul work.

ShinMaywa produces roughly one US-2 annually for Japan's navy, and so far seven examples have been delivered. The four-engined type serves in the long-range search and rescue role.

The Japanese manufacturer believes the US-2 could perform a number of roles for India, including long-range combat search and rescue, shore-to-ship and ship-to-ship transport, and humanitarian missions. The aircraft would also be an effective way to reach India's far-flung Andaman and Nicobar Islands, it adds.

"Indian fighters are always flying over the sea, but you can't always have a ship below them," says the company source. "The US-2 offers a unique capability, with its 10h endurance and ability to land and take off in high sea states."

The next step for any acquisition would be for India's Defence Acquisition Council to issue an "acceptance of necessity" document. This would set the stage for the working group to draw up details related to the procurement contract, plus offsets and transfer of technology.

If a deal moves forward, New Delhi could obtain 12-18 aircraft. This limited volume would make local production unviable, but ShinMaywa's extensive involvement in commercial aircraft systems would offer significant scope for offset work. ■

CONTEST

Airbus has field to itself in six-aircraft AEW&C contest

Rotodome-enhanced A330 model on display as European airframer submits sole proposal

Airbus Defence & Space appears to have emerged as the sole bidder for a global tender put out by New Delhi's Defence Research and Development Organisation (DRDO) for an "AWACS India" programme. The tender – for six airborne early warning and control (AEW&C) system aircraft – was issued in March 2014.

The European company submitted its proposal last October, an Airbus official confirms. Other sources indicate that it is the lone party to have responded to a request for proposals.

Commercial bids have yet to be opened for the requirement, which is for an initial batch of two aircraft, followed by four more. Options to increase this fleet size to 10 could be exercised at a later stage.

The DRDO stand featured a model of an Airbus A330 fitted with a rotodome, but officials did not provide any further information about the programme.

Airbus would have to integrate the mission systems on the air-



An adapted A330 could be the only choice for AWACS India deal

craft and gain certification that it is safe to fly. The company says it has been busy replying to Indian queries about technical aspects of the proposal. "It is not an easy programme, and we have to do it with fully civilian certification, as requested by DRDO," the Airbus source says.

Airbus Defence & Space has also been involved in jointly reviewing New Delhi's indigenously developed AEW&C system with India's

Centre for Airborne Systems, with the first Embraer EMB-145-based example likely to secure initial operational clearance later this year.

Meanwhile, Airbus is waiting for a decision on India's planned contract for six A330 multirole tanker transports, having agreed to further extend the validity of its bid until 1 July. It has been more than three years since the A330 was first chosen to meet the Indian air force's tanker requirements. ■

AIRLIFTER

New Delhi offered additional Hercules

Lockheed Martin says it is confident that New Delhi will replace the C-130J tactical transport lost in a 2013 crash, while it also is offering its "Sea Hercu-

les" variant to the nation for anti-submarine and anti-surface warfare missions.

Speaking to Flightglobal, Abhay Paranjape, Lockheed's di-

rector of business development for India, says that if the air force adds a replacement for the destroyed airlifter to an existing follow-on order for six to be delivered from 2017, this would allow it to base six of the aircraft on each of the nation's coasts. He believes the type has considerable room for growth in India, given that for the time being its fleet of five is primarily being used to support special forces operations.

Paranjape confirms that Lockheed has also had discussions with India about the potential use of the Sea Hercules by its military, but notes that there is no formal requirement. ■



India's air force has six C-130Js on order, to be delivered from 2017

YAK-130

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BUDGET DAN PARSONS ORLANDO

USAF could gun for successor to under-fire A-10

Service officials standing firm on retirement plan for current type, but hint at possible follow-on close air support project

Even as the US Air Force banks on saving \$4.2 billion by retiring the Fairchild Republic A-10 fleet, the service is considering building a brand-new aircraft to take over its close air support (CAS) role.

Speaking at the Air Force Association's annual conference in Orlando, Florida, Gen Herbert Carlisle, chief of Air Combat Command, said a follow-on weapon system for the A-10 is on the table.

"Another weapons system programme may be something we need to consider as we look at the gaps and seams for the future" of the CAS mission, Carlisle says. "What provides that close air support in the future is something we'll continue to look at. It could be a follow-on. It's a mission we have always been committed to and will stay committed to."

Carlisle says an upcoming week-long summit with the US Army, Navy and Marine Corps to

be held near Nellis AFB, Nevada, will solicit input from those services about the CAS mission in future conflicts.

The air force initially pitched the A-10's retirement in 2013 as a means of dealing with sequestration cuts, and has again suggested disposing of the type in its fiscal year 2016 budget request. The type was designed to fly low and slow

"What provides that close air support in the future is something we'll continue to look at"

GEN HERBERT CARLISLE
Chief, Air Combat Command

and provide covering fire for ground troops, and the service says it cannot afford to continue operating such single-mission aircraft, despite opposition from Congress.



The type is too vulnerable to operate in contested environments

Recent boosts for A-10 supporters include its involvement in airstrikes against Islamic State militants in Iraq and Syria, where Carlisle says it is proving effective. Twelve aircraft and 300 personnel have also recently arrived at Spangdahlem air base in Germany to support NATO's Atlantic Resolve security cooperation effort.

However, Carlisle notes: "Contested environments are going to go up, because our adversaries know what we can do when we own the airspace and will continue to try to deny that to us. The A-10 is significantly more vulnerable in a contested environment than other airplanes."

USAF chief of staff Gen Mark Welsh also stands behind the retirement plan, referring to CAS as "a mission, not a platform".

He adds: "The A-10 is going to go away eventually. Stretching it

as far as it can go is about 2027, 2028. If you go beyond that, you're talking about a huge investment trying to recapitalise that fleet.

"That makes no sense in today's environment," he says.

Welsh says the air force has flown 140,000 CAS sorties over the past 14 years with the A-10 and other platforms, and that the task will also be conducted using the Lockheed Martin F-35.

"Everyone's talking about how the F-35 is not going to do close air support – well that's all the Marine Corps is buying it for," he says.

"It will be a good CAS plane. It will take us a while to get it to what we want it to be, like we have with every airplane, including the A-10," he adds. "We are trying to reset the CAS mission for the future." ■

CONTEST STEPHEN TRIMBLE WASHINGTON DC

New team emerges for JSTARS replacement battle

Lockheed Martin has entered the competition to replace the US Air Force's Northrop Grumman E-8C JSTARS fleet, forming an alliance with radar and battle management and control specialist Raytheon.

The pair, along with L-3 Communications, unite the technology developed by Raytheon for the active array sensor programme with Lockheed's open systems expertise demonstrated a year ago under Project Missouri.

"We think this is really a differentiating capability for the Skunk Works versus our competition,"



A smaller platform than the current E-8C is likely to be required

says Rob Weiss, head of the Lockheed unit.

The companies have yet to decide on which aircraft platform to offer, preferring to wait until the

USAF mandates a converted airliner or a business jet to replace the Boeing 707-based E-8C fleet.

"We're positioned so we can go either direction," Weiss says.

A previous USAF attempt to advance a Northrop solution based on the 767-400ER was cancelled due to excessive costs. Performance requirements released by the service so far suggest that it wants to downsize the platform, radar and crew size. The E-8C's ground surveillance radar is 6.71m (18ft) long, for example, while the replacement system will be sized at between 3.96m and 6.1m.

Rivals for the USAF contract already include a Boeing offering based on the 737, a G650-based Gulfstream proposal and a Northrop bid premised on the G550. ■



Boeing wins extended deal to support RAF's Chinooks
DEFENCE P22

PROGRAMME DAN PARSONS ORLANDO

T-X requirements almost ready to fly

Bidders vying to deliver successor to T-38 Talon to receive information about programme under new cost-capability model

US Air Force officials have finalised the requirements for the T-X programme, which will replace the Northrop T-38 Talon, and plan to deliver them to industry by the end of February, service secretary Deborah Lee James said at the Air Force Association's annual conference in Orlando, Florida.

At that time, the USAF will consider the requirements as final, she adds.

A request for proposals is expected to be released late in fiscal year 2016, with the programme to be the first of four to undergo a cost-capability analysis (CCA) to find areas where the air force can reasonably sacrifice performance in exchange for acquisition cost reduction.

"This way we intend to make well-informed judgements about whether or not various incremental changes, increases in capability, are worth it from the cost perspective and the capability perspective," James says. "Industry will know when the time comes how much we value these capabilities."

Assistant secretary of the air force (acquisition) William LaPlante says the CCA approach will prioritise the relative value of capabilities based on their necessity to accomplish a particular mission and their price tag, whereas the current analysis of alternatives method simply compares the relative capabilities of various offerings. "It's not enough to say here's the threshold re-



Competitors include a take on Alenia Aermacchi's M-346

quirement and here's the objective requirement," LaPlante says. "We have to know more. We have to know which of those means more to the warfighter, which is of more value," he adds. "If we do this with industry on programmes

like T-X, there will be a much better understanding of what we're paying for and what we're willing to pay for."

A General Dynamics/Alenia Aermacchi team is offering a T-100 development of the latter's M-346 and Lockheed Martin/Korea Aerospace Industries the T-50, while Boeing/Saab and Northrop Grumman are each developing clean-sheet designs.

Three other programmes will serve as "pilots" for the CCA process, namely: a new long-range standoff weapon; a follow-on to the space-based infrared system; and the multi-domain adaptable processing system, which is envisioned as a pod to enable communications between stealth fighters. ■

SENSORS DAN PARSONS ORLANDO

Lockheed tracks potential for foreign Legion sales

An internally developed pod has been unveiled which Lockheed Martin says will bring fifth-generation infrared search and track (IRST) capabilities to legacy fighters such as the Boeing F-15 and Lockheed F-16.

The Legion pod's baseline configuration includes an advanced processor and datalink in addition to its IRST21 infrared sensor, the latter of which began limited operation aboard US Navy Boe-

ing F/A-18E/F Super Hornets earlier this year.

Capable of tracking and targeting enemy aircraft, the system would also support collaborative targeting between multiple aircraft in radar-denied environments. Lockheed is pitching it primarily for the US Air Force's legacy F-15Cs and the F-16, for which there is a healthy international upgrade market. It will also offer it as a contender for the USAF's multi-do-

main adaptable processing system, which will enable communications between stealth fighters.

Flight testing to achieve certification of an F-16 configured with the pod is scheduled for this year, and additional flights aboard other aircraft are scheduled to take place in 2016, the system's developer says.

The system already has achieved limited qualification under a company-funded development programme, and can be "quickly procured and integrated to meet current and emerging requirements," says Ken Fuhr, director of fixed-wing programmes at Lockheed's Missiles and Fire Control division. ■



Host platforms could include the F-15C and F-16 fighters

TECHNOLOGY STEPHEN TRIMBLE WASHINGTON DC

Research lab goes on the defensive

The US Air Force is considering a Lockheed Martin proposal to adapt the active millimetre wave radar developed for the PAC-3 missile segment enhancement to protect fighters under attack in the air.

On 5 February, the Air Force Research Laboratory (AFRL) invited proposals for a miniature self-defence munition and related seeker study, in a bid to develop a concept for a weapon to be dispensed from a fighter, hone in on an incoming missile and destroy it with a direct hit. This would replace a current combi-

nation of chaff, flares and directional infrared countermeasures.

Lockheed's concept repackages the sensor from the ground-based missile defence system in a miniature munition powered by a small rocket motor.

Three of the interceptors could fit in the space needed for a one Raytheon AIM-120 AMRAAM air-to-air missile, says Frank St. John, vice-president of tactical missiles and combat manoeuvre systems at Lockheed's Missiles and Fire Control division. ■

CONTRACT CRAIG HOYLE LONDON

Boeing wins extended deal to support RAF's Chinooks

Five-year maintenance contract worth £450m continues arrangement established in 2006

Boeing has secured a £450 million (\$694 million) extension to its long-standing through-life customer support (TLCS) contract for the Royal Air Force's CH-47 transport helicopters.

Announced on 17 February, the new five-year agreement continues an availability-based maintenance and support arrangement for the Chinook that was established by the Ministry of Defence with Boeing in 2006.

"Boeing has delivered availability that is 10% above requirements"

DAVID PITCHFORTH

Managing director, Boeing Defence UK

Boeing Defence UK managing director David Pitchforth says that under the TLCS arrangement the company "has delivered aircraft availability that is 10% above the requirement, and driven serviceability to an all-time high".

In-service support for the RAF's Chinook force is provided at Odiham, the main operating base for the type in Hampshire, and at a "depth" level at Vector Aerospace's Fleetlands site in Gosport.

Flightglobal's Ascend Fleets database records the RAF as having 44 Chinooks in current active use, with seven more in storage or upgrade. Eight HC6/F-model examples have yet to be delivered, with the MoD expecting to have a combined fleet of 60 of the rotorcraft available by 2017. ■



The MoD expects to have 60 of the type in its fleet by 2017

REQUIREMENT

Indonesia revives its interest in CH-47F

Indonesian officials including defence minister Ryamizard Ryacudu have held discussions with Boeing related to the company's CH-47F Chinook transport helicopter, Jakarta confirms.

The nation's defence ministry says that Boeing is exploring "Chinook co-operation with Indonesia", but no further details have been provided.

Jakarta's efforts to potentially obtain the CH-47F follow its army order for eight Boeing AH-64E attack helicopters, confirmed last year. Indonesia in 2005 expressed interest in obtaining four Chinooks, to bolster disaster relief capabilities.

Flightglobal's Ascend Fleets database records the Indonesian army as operating 11 Mil Mi-17-1V transport helicopters, with six more on order. ■

REGULATION

STEPHEN TRIMBLE WASHINGTON DC

US export policy shift makes way for armed UAVs

The US government has opened the door to exporting armed unmanned air systems to foreign governments, in new policy announced by the State Department. This removes an outright ban on sales to international customers, and places new controls on how such systems can be used.

The US military has been using armed UAS in operations since 2002, carrying such weapons as the Lockheed Martin AGM-114 Hellfire air-to-surface missile and Raytheon Paveway II-series laser-guided bombs.

US export policy, however, has until now limited contractors to supplying unarmed versions of the same aircraft. While sales of armed UAS abroad are now possible, the US policy prohibits the end-user from using them for conducting illegal surveillance or carrying out attacks on their own populations.

The new policy continues the US government's commitment to the international Missile Technology Control Regime, which dictates a "presumption of denial" on transfers of all unmanned aircraft capable of flying more than 160nm (300km) and carrying a payload of at least 500kg (1,100lb). Exports will now be reviewed by the State Department. ■



More Predators could be sold to international operators

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Kodiak goes to Japan as Setouchi takes on Quest

BUSINESS AVIATION P24



Banning the use of systems beyond visual range, as suggested, would retain Amazon's delivery UAS ambitions inside the warehouse

UNMANNED SYSTEMS STEPHEN TRIMBLE WASHINGTON DC

US FAA keeps small UAVs within sight

Commercial flights closer to reality as long-awaited regulatory proposal rejects need for pilot's licence or certification process

A small unmanned air system could perform commercial flights in most US airspace at up to 500ft in daylight, as long as it remains within eyesight of an observer or an operator who has passed an aeronautical knowledge test. That is the long-awaited regulatory framework finally proposed by the US Federal Aviation Administration on 15 February, after more than eight years of deliberation and a failed legal challenge last year to its authority over such equipment.

Despite reports suggesting that the FAA would require a pilot's licence to operate a small UAS – defined as weighing up to 25kg (55lb), its notice of proposed rulemaking (NPRM) would require that an operator only pass an FAA-administered knowledge test. Small UAS also would not face an airworthiness certification process equivalent to a manned aircraft, although the air vehicle must be made available to the FAA for inspection if asked.

But the FAA's proposed rules stop short of satisfying a rapidly proliferating community of aspiring commercial operators. The proposal would ban the operation of systems beyond visual range of the operator and also over the heads of other people, negating attempts by companies

such as Amazon to launch UAS delivery services in big cities.

All sides of the small UAS debate, however, are glad to see the FAA publish the proposal after years of delays. The National Business Aviation Association calls the new rulemaking a "good first step". But the debate over how small UAS will be integrated in the national airspace has only just begun.

By publishing the rulemaking proposal, the FAA has unleashed a potentially overwhelming 60-day comment period. A similar opportunity two years ago over a minor rewrite of guidelines for operating unmanned aircraft as a hobby generated more than 100,000 submissions, and FAA officials expect the commercial rules to generate even more discussion.

SLOW PROCESS

The policy debate could drag on for months or years before a final rule is published. Congress gave the FAA a year-end deadline for approving the regulations. However, last May, an administration official noted that it takes an average of several years to process a controversial rulemaking – and the small UAS rules certainly fit the definition of controversial. More recently, the US Govern-

Operating unmanned air vehicles weighing more than 25kg, or at night for any size, remain distant goals

ment Accountability Office – the auditing arm of Congress – estimated that passage of a final rule could take two to three years.

For his part, FAA administrator Michael Huerta prefers to be optimistic about the timeline. The NPRM provides a "very comprehensive" framework that should make it easier for the FAA to analyse, he says, and "move this rulemaking as expeditiously as possible".

The FAA's proposal comes after several countries, including Australia, Canada and the UK, have already implemented regulations that allow small UAS to be operated commercially. Other countries, such as India, have banned such use of small UAS completely.

In the USA, there are still many questions about the details and the pace of opening up airspace to UAS for commercial purposes. The FAA rulemaking, for example, asks for feedback on whether the agency should establish a separate category for UAS

weighing less than 2.2kg, with fewer operating restrictions.

Operating unmanned air vehicles weighing more than 25kg, or at night for any size, remain distant goals, requiring years of further research. The FAA's UAS roadmap released a year ago envisions a very gradual transition for large UAVs, paced by the development of sense and avoid and command and control technology.

The first step involves establishing a ground-based sense-and-avoid system. Already in operation by the US Army, this technology solves the problem of deconflicting UAVs with manned aircraft traffic while on descent: a phase of flight for unmanned systems where current radars have trouble detecting potential collision threats against the clutter of the ground.

In the very far-term, an airborne-based sense and avoid system is still needed to integrate all sizes of UAS into the airspace on a routine basis.

The proposed rulemaking for small UAS marks "another step in a process that has a lot of components," Huerta says. "This is not the final word on the full scope of UAS operations." ■



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Quest Aircraft

Setouchi had previously been appointed as a Kodiak dealership

ACQUISITION KATE SANSFIELD LONDON

Japanese owner to fund Quest for expansion

Quest Aircraft, manufacturer of the Kodiak single-engine turboprop, has been snapped-up by Japanese company Setouchi Holdings for an undisclosed sum.

The acquisition will enable the privately owned airframer to begin investing in product development and enhancements, including a new addition to its one-aircraft family.

"We have made no secret of our strategy to expand our product line," says Quest. "Our new owner shares our vision and has the funding to make this happen."

Setouchi is part of the Tsuneshi Group, a global company engaged in shipbuilding, transportation and related industries. Last year, it was appointed as a dealership for the Kodiak in Japan, where it hopes to secure certification in the next quarter. "This

appointment opened the door to our acquisition," says Quest.

The sale comes at a positive time in the company's 14-year history. In 2014 it delivered 30 Kodiaks – the highest annual shipment tally since the 10-seat, high-wing aircraft entered service in 2007. This is partly a result of Quest's recent strategy to shift its sales and market effort onto an expanding global dealership network and away from its US headquarters.

The company now has 14 dealerships covering 17 countries, and is looking to expand this tally further. "We have an in-service fleet of 134 Kodiaks to date," says Quest. "Our current orders are evenly split between utility, passenger and VIP owners/operators." For the last of these, the company recently unveiled a new executive interior called the Summit. ■

REPORT KATE SANSFIELD LONDON

Industry's \$219bn boost for USA

The US business and general aviation industry contributed \$219 billion to the US economy in 2013 and supported 1.1 million jobs, according to a study commissioned by eight leading business and general aviation associations.

The research, conducted by PricewaterhouseCoopers, updates a study commissioned nine years ago that at the time recorded US industry making an annual economic contribution of \$150 billion, supporting 1.2 million jobs.

"This a great achievement," says Pete Bunce, president and

chief executive of the General Aviation Manufacturers Association.

"In 2006 the industry was approaching its peak; today it is emerging from a seven-year downturn. This study confirms our industry's strength and resilience and clearly shows that general aviation positively affects economies and communities across the USA." The data will be used to make a strong case for the industry "on all levels", says Bunce, including as a reauthorisation year approaches for the Federal Aviation Administration. ■

PROPULSION STEPHEN TRIMBLE WASHINGTON DC

PW800s all go for new Gulfstreams

Long-awaited certification of turbofan launched in 2008 for Columbus paves way for deployment on G500 and G600

Pratt & Whitney Canada has received engine certification for the engines that will power Gulfstream's two newest business jets, unveiled last October.

Transport Canada certificated the PW814GA and PW815GA engines for the 5,000nm (9,300km)-range G500 and 6,200nm-range G600, P&WC announced on 17 February.

Both type certificates "represent major achievements for P&WC", says John Saabas, president of the Mirabel, Canada-based engine manufacturer.

The PW800 engine is derived from the core of the PW1000G series of geared turbofans. The reduction gear is omitted, but the highly efficient high-pressure section is adapted for the 15,100lb-thrust and 15,700lb-thrust power requirements of the Gulfstream jets.

Although the G500 and G600 were unveiled in October, P&WC had launched a certification programme for the engines in secret years earlier, collecting more than

3,300h of evaluation, including 350 flight hours on P&W's Boeing 747SP flying testbed.

"We are thrilled with the engine's performance, fuel efficiency and environmental characteristics," says Walter Di Bartolomeo, vice-president for engineering at P&WC.

The low-pressure section of the engine features a single-piece, 127cm (50in)-diameter, titanium fan, P&WC says.

For P&WC, the certification marks a long-awaited achievement. The PW800 was originally launched in 2008 to power the Cessna Columbus super-midsize jet, but that programme was cancelled two years later. At some point in the last four years, P&WC won a contest to power the G500 and G600 aircraft. Gulfstream also selected P&WC to supply an integrated powerplant system, which includes the engines, nacelles and thrust reverser systems.

First flight of the PW814GA on the G500 is due early this year. ■



Jet Aviation

The latest contract included repainting the jet's exterior

INTERIORS KATE SANSFIELD LONDON

Jet Aviation completes 25th BBJ

Jet Aviation's completions and overhaul facility in Basel, Switzerland, has performed its 25th Boeing Business Jet completion since it took on its first project in 1999.

The latest contract, for an undisclosed private customer, involved repainting the exterior and a com-

plete cabin rebuild. The work took nine months to complete.

The General Dynamics-owned company says it "leveraged the technology from its extensive investment in the Boeing 787 platform", resulting in a much quieter and lighter cabin. ■



Return of the
Jet Ranger
FEATURE P26

REPORT

Helicopters' safest year yet

Ascend analysis shows a continuing gradual improvement in accident rates in the turbine-powered rotorcraft sector

Helicopter accident rates – at least in the turbine-powered sector – seem finally to be establishing a downward trend. Flight-global Ascend's Helicopter Safety and Losses 2014 analysis confirms this improvement, but also makes it clear that the movement is gradual, not dramatic.

The comparison of last year with 2013, however, is very favourable. In 2014, civil Western-built turbine helicopters suffered 170 known accidents, of which 38 resulted in fatalities, killing 96 passengers and crew. In 2013, there were 229 known accidents, including 61 fatal accidents causing 145 passenger and crew deaths. The more recent tally also shows a significant improvement over the annual average for the last five years, which is 205 accidents, 54 fatal accidents and 137 fatalities.

The Western-built turbine helicopter fatal accident rate in 2014, at about one per 550 helicopters in service, was some 40% better than in 2013, when the rate was one per 350 helicopters. On this basis, 2014 was probably the safest year ever for turbine-powered helicopters.

Going beyond simple numbers to accident rates, 2014 still looks good. Since the number of rotary-wing flights carried out is almost impossible to confirm, rates are calculated on accident numbers per aircraft for the entire active global fleet. The turbine helicopter fatal accident rate for the 1990s was one per 230 helicopters, while that for the decade starting in 2000 was one per 310 helicopters. The rate for the first five years of the present decade (2010-2014) was one per 385 helicopters.

On average, therefore, Western-built turbine helicopters are now about twice as safe as they were at the start of the 1990s.

A look at comparative figures for the single- and twin-engined fleets shows that the latter's safety performance is pulling ahead.



Four people died when a VIP-roled AgustaWestland AW139 came down in Norfolk, the UK last March

Over the last five years, the multi-engined helicopter fatal accident rate has been more than 30% better than that for the singles.

The fatal accident rate for multi-engined helicopters in 2014 was remarkable, at one per 910 helicopters. This achievement becomes clear by comparison with recent decades: in the 1990s, the rate was one fatal accident per 245 helicopters; while that for 2000-2009 was one per 350; and the rate for the first five years of the present decade was one per 500 aircraft.

SINGLES

The single-engined fleet is definitely improving its safety performance, albeit not as fast. The fatal accident rate for 2014 was one per 455 helicopters, markedly better than the annual average for the last five years, which was one per 320. The fatal accident rate for the 1990s was one per every 225 helicopters, and for 2000-2009 one per 295 aircraft.

Looking at the simple accident numbers instead of rates over the last 30 years the improvements look far more gradual, with a fa-

"The people who pay for the service have got to be willing to pay for good operators and best practice"

PAUL HAYES

Safety and insurance director, Flightglobal Ascend

vourable tweak in 2014, which is good by any standards. Last year single-engined helicopters suffered 29 fatal accidents: 16 fewer than in 2013, and the lowest number in any year since 2002, when there were 28. The number of single-engined fatal accidents in 2014 was also well below the long-term trend of about 39 per year.

Among the heavier machines, there were only nine fatal accidents involving multi-engined helicopters in 2014 – seven fewer than in 2013, and the lowest number in any year since 1992's eight. The 2014 result again falls well below the long-term trend of about 16 per year. But although there have been individual good and bad years, over the last 20

years the simple numbers of fatal accidents have hardly reduced.

Ascend's safety and insurance director Paul Hayes comments that the latest generation of helicopters may eventually bring lower accident rates, but says that may take some time.

"Technology will help eventually, but still today, as you go down the food chain, there are Vietnam-era [Bell UH-1] Hueys in operation," he says. "How many years will [the benefits of new technology] take to percolate down, and will the 'bottom-feeders' be willing to spend the time and money keeping all the technology working when they eventually get the machines that are new today?"

Hayes adds: "I think the industry needs a cultural shift by both operators and – very importantly – by the customers. The people who pay for the service have got to be willing to pay for good operators and best practice, and include a requirement for best safety practice in the contract." ■



To download a copy of Ascend's helicopter safety report, visit flightglobal.com/helisafety

RETURN OF THE JET RANGER



Bell Helicopter is setting its sights on recapturing the light, single-engined market with the 505, a modernised take on the manufacturer's highly successful 206 series

Bell Helicopter

Development of the Jet Ranger X follows Bell's release of the 429 medium twin as part of the manufacturer's focus on reviving its 400-series brands

STEPHEN TRIMBLE MIRABEL

It was the mid-1960s and thousands of US Army-trained helicopter pilots had already started returning from Vietnam. The commercial market for piston-powered helicopters was still in its infancy and non-military uses of turbine-powered rotorcraft were mostly yet to be invented. Then came the Bell Helicopter model 206, the original Jet Ranger, in 1967.

Adjusting for inflation, the 206A's original price of \$85,000 equals about \$550,000 today. That put the Jet Ranger within the financial grasp of the trained entrepreneur pilot looking to start a business, and the 206 became a phenomenon, spawning a 43-year-long franchise and an entire galaxy of commercial and military derivatives.

It was so successful for so long that its demise came as a shock – even, it appeared, to Bell. The manufacturer had nothing prepared to replace the roughly \$1.2 million model 206B3 when production finally ceased in 2010.

For the first time in nearly half a century, the light, single-engined market was available for the taking, and Robinson Helicopter quickly capitalised on Bell's absence. The Torrance, California-based manufacturer entered the turbine market in late 2010 by certifying the R66, then went on to deliver 500

copies of the roughly \$850,000, Rolls-Royce RR300-powered aircraft within four years.

Bell's management, meanwhile, was busy resuscitating its 400-series brands, releasing the Garmin 1000-equipped 407GX and the 429 medium twin. After launching the super-medium 525 Relentless in 2012, it was finally time to attempt to reclaim the light, single-engined market in June 2013 at the Paris air show. It was there that Bell launched the short light single model that was officially branded the 505 Jet Ranger X at last year's Heli-Expo.

Although featuring a new engine supplier, a new flightdeck and a Relentless-style nose and windshield, the 505 model's appropriation of the iconic Jet Ranger brand is not just a marketing ploy. In addition to borrowing the two-bladed rotor of a still-popular Jet Ranger derivative – the 206L4 Long Ranger – the 505 is designed to cater to the same entrepreneurial market that propelled the 206A into becoming an industry legend.

BUSINESSLIKE

"We make a lot of fancy products: those that cost \$5, \$10, \$15 million. Those don't appeal as much to someone who is coming out of the military, for example, has aviation experience, very good skills, can fly an aircraft," says David Smith, Bell's 505 programme manager. "If you want to start a business, you can finance \$1

"If you go beyond a certain [price] point you fall off rapidly in terms of who can afford it"

DAVID SMITH

505 programme manager, Bell Helicopter

million. That can be done. That's a sweet spot. So that's a big opportunity for this product."

Setting the right price point is a key challenge for Bell. Airbus Helicopters has struggled to sell more than a dozen EC120s a year at a price point of about \$2 million, while Robinson opened the floodgates with the only turbine helicopter on the market priced under \$1 million. Although customers have signed more than 300 firm orders with deposits, Bell is yet to release the list price of the 505. Its strategy, however, does not rely on setting the price point below seven digits.

"It's not really about the specific price point. We know that there's a price-sensitive market out there that if you go beyond a certain point – and we've felt that point out quite well – you fall off rapidly in terms of who can afford it," Smith says. "We are a differentiated product – heavily differentiated."

With more than 7,000 206-model Jet Rangers delivered, there may have been some temptation in Bell's boardroom in Fort Worth

LIGHT HELICOPTER SPECIFICATIONS

	Bell 206B3	Bell 505	Robinson R66	Airbus EC-120
Maximum speed (kt)	122	125	140	150
Maximum range (nm)	370	360	350	380
Useful load (kg)	670	680	640	720
Takeoff power (shp)	500	500	300	500
List price (US\$)	1.2m	n/a	855,000	2m

SOURCE: Flightglobal's Ascend Fleets database

to exploit that installed base. If Bell could somehow preserve that legacy with the Jet Ranger X, it would be re-entering the market with a well-oiled pipeline for spare parts and training. Aside from the 206L4-derived rotor blades, however, the 505 is almost entirely an original product.

RE-INVENTION

The decision to re-invent – rather than merely refresh – the product was bold, but Bell had no other choice. The design of the Model 206A/B proved extraordinarily long-lived in the helicopter market, but it could simply no longer support several of the features now demanded by customers, including an integrated glass cockpit and a modern, digitally controlled turbine engine.

Integrating electronic engine controls triggers what regulators call a major certification change, which requires the manufacturer to comply with a host of new design rules that would require even more changes, Smith says.

A customer advisory panel commissioned by Bell also demanded that the new aircraft should have a glass cockpit. Bell selected a version of the G1000 already applied on the 405GX, but any glass-based system quickly rules out preserving the original airframe of the 206 model. That cockpit was designed in the era of steam gauges. The instruments are close enough for pilots to monitor, but not so close to be regularly touched. The bezel keys on the Garmin panels “need to be reached”, Smith says.

“We found from our side it was a compelling value if the things you wanted were all-glass, digital engine control. You start down that path, very quickly that says a new clean-sheet design is the most effective way to provide that value,” he adds.

Having established that a clean-sheet design was necessary, Bell then made another bold decision. Since the Jet Ranger first appeared in the late-1960s, the light-single market had been virtually synonymous with Rolls-Royce (formerly Allison) engines. The Jet Ranger family featured the ubiquitous R-R Model 250, and even Robinson hewed closely to that tradition by selecting the RR300 for the R66.

“There’s obviously customers lining up for this. ... So we will move very, very quickly”

DAVID SMITH

505 programme manager, Bell Helicopter

Instead, Bell decided to power the 505 with a European engine for the first time – the Turbomeca Arrius 2R. That decision came shortly after Bell’s corporate sister, Textron subsidiary Cessna, launched the Latitude business jet with the Silvercrest engine made by Snecma, a corporate sister of Turbomeca. Despite the appearance of a new corporate alignment between Textron-made aircraft and Safran-made engines, Bell’s decision was actually made independently, Smith says. The real driver for

selecting the Arrius engine came from Turbomeca’s aggressive strategy to win the deal.

“They had exactly the mindset that we needed,” Smith says.

That mindset involved a certain aggressiveness. Smith’s team is required to deliver the 505 within three years of the launch announcement, but there is a sense within Bell that the programme should move even faster to reclaim its once-dominant position in the light turbine market. The first flight of the retooled Jet Ranger X was achieved on 11 November, several weeks before Bell’s official target of year-end 2014. Certification by Transport Canada and the US Federal Aviation Administration is scheduled for 2016, but Bell officials are keen to get there even sooner, if possible.

“We always have to try to do better than what our plan is,” Smith says. “There’s obviously customers lining up for this. Every day is wasted time for them making money and wasted time for us making money. So we will move very, very quickly.”

For Turbomeca, Bell’s emphasis on speed to market – while not sacrificing the 505’s intended price point – involves several technical challenges. The existing Arrius engine must be heavily modified to work on the new Bell product. The core of the engine remains largely unchanged, but two key components – the reduction gearbox and the hydromechanical controls that interface with a full authority digital engine control system – would have to be designed from scratch.

Despite the challenge, Turbomeca repackaged the Arrius gearbox and power controls in time to support the early first-flight milestone of the 505.

TIMELY

“They said they’d do it and they came in and did it,” Smith says. “From our side, that was an example of where you really needed the push to go to next-generation technology to start this first relationship with Turbomeca.”

The decision to integrate a dual-channel FADEC system on the 505 suggests Bell’s price-sensitive philosophy on the light helicopter market does not rule out integrating the most advanced technologies. By switching to electronic controls, fuel and thrust are managed automatically by computer, rather than relying on the skill and feel of the pilot.

“You have no hot-starts from an inexperienced pilot or a maintenance technician that might accidentally ‘over-temp’ the engine. You also have a lower workload,” says Smith, describing the benefits of a FADEC.

Similarly, integrating a glass cockpit on the 505 is another area where Bell is prioritising overall value rather than purely the lowest price point.

In the light helicopter segment, the baseline offering is usually an analogue-based



First flight of the Bell 505 took place on 11 November, ahead of Bell’s official year-end 2014 target

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Bell is designing the Jet Ranger X to cater for a wide range of applications, but strong interest has been shown from utility and private sectors

» flightdeck with conversion to an integrated glass cockpit system available on the after-market. In Bell's view, retrofitted systems are often poorly integrated solutions. Lighting systems, for example, are not integrated, requiring pilots to adjust lighting controls on separate boxes. An integrated system dims or brightens all the lights in the cockpit at the same time, he says.

Aside from the integration benefits, the 505 will also feature the standard G1000 functionality offered on Bell's more expensive projects. That includes an automatic speech recognition system that allows pilots to change radio channels using voice commands, Smith says.

TRANSMISSION

Although the rotor system is leveraged from the 206L4, the system that transmits the pilot's control inputs is another point of departure for the 505 design. Bell's light aircraft normally feature 3.7m (12ft)-long, push-pull control rods with no hydraulic boost. They are relatively simple to design and install, but complicate how they are integrated with the power system. So Bell has replaced the swaged control tubes for governing rotor pitch to a pulley-based, cable-driven system.

The goal of the redesign is to deliver the 505 with a control feel similar to that of a Long Ranger, Smith says. By keeping the same

11.3m-diameter rotor of the 206L4, the 505 should also benefit from the Bell family's "legendary" autorotation characteristics, which are of great importance to the training market.

Like the 206 family, the 505 design must be flexible enough to cater to a broad range of possible applications.

"The breakdown we've been seeing to date has been heavily skewed to private owners and utility missions," Smith says. "The utility segment covers a whole bunch of areas, including heavy lifting, training, and business needs. There's a little bit of tourism and a lot of private buyers, which are wealthy owners that want to get from Point A to Point B quickly."

Despite a couple of recent setbacks, Bell hopes the 505 will also restore the company's grip on the single-engined military market. The latest version of the first Model 206A derivative – the OH-58D Kiowa Warrior – will be retired by the US Army later this year as an armed scout with no direction replacement. Since the army terminated the contract for OH-58D's last official replacement – the Model 407-based ARH-70 Arapaho – Bell has struggled to regain its traction. It continues to deliver upgraded UH-1Y Yankees and AH-1Z Zulus to the US Marine Corps, but the army has indefinitely delayed the armed aerial scout programme.

While the army ponders its next move, Smith believes the 505 can serve the military

"The breakdown ... has been heavily skewed to private owners and utility missions"

DAVID SMITH

505 programme manager, Bell Helicopter

in other roles. Due to sequestration-imposed budget cuts, the army is retiring its fleet of Model 206-based TH-67 Creek trainers this year and replacing them with newly-acquired Airbus EC145-based UH-72A Lakotas. Although the army appears to have made its decision, Bell still insists "there's an active discussion" about the future of the next-generation trainer programme, Smith says.

"From a price point that they'd like to meet and the mission they would like to serve, there's no greater value than the Jet Ranger X," he says.

Smith also points to the evolution of the 407 airframe as an unmanned aircraft as another possible route for the 505. Northrop Grumman is modifying the 407 as the MQ-8C Fire Scout and delivering them to the US Navy.

"We believe there's lots of market opportunity for single-engined aircraft unmanned, and that's another example of an application future of the Jet Ranger X that might see the light of the day," he says. ■



The EC175 is one of three high-end midsize twins specifically designed for the offshore market

OIL CRISIS

Prices of \$100-plus a barrel led to new helicopters being developed to fly further offshore. But what will happen to these types now demand for new drilling is plummeting?

STEPHEN TRIMBLE WASHINGTON DC

At least three commercial helicopter programmes – the Airbus Helicopters EC175, AgustaWestland AW189 and Bell 525 Relentless – owe their existence to sustained oil prices over \$100 per barrel. All three were launched within the last decade to capture demand from oil and gas exploration companies as they pushed drilling sites further offshore, necessitating a new subgenre of “super” medium-sized helicopters weighing 7t-9t.

The same demand that created the super-medium category helped to propel the entire commercial helicopter industry to new heights over the last five years. As fixed-wing manufacturers catering to utility and general aviation requirements struggled to overcome a 2008 recession, oil and gas companies demanded ever-increasing services and capabilities from the helicopter industry, cultivating an energised leasing industry along the way.

UNCERTAINTY

Oil prices have fallen by over 50% in the last six months, creating an unwelcome sense of uncertainty as all three super-medium projects near critical milestones. To add to the awkwardness, there is no clear consensus on the cause of the fall in oil prices and when – or if – they will recover to prices over \$100 per barrel.

That scenario seemed most unlikely even a year ago, but is causing deep concerns among industry analysts now.

“You’ve got three primes developing new high-end midsize twins,” says Richard Aboulafia, a consultant for the Teal Group. “The overwhelming majority of those investments have already been made. I’m not so sure the market will be there for all three of them plus all the other helicopter models that are in proximate locations in the market.”

The EC175 and AW189 have recently entered service and are now in the midst of steep production ramp-ups. The Bell 525,

OIL AND GAS SECTOR HELICOPTERS		
Type	In-service	Percent
AgustaWestland	277	14%
Airbus Helicopters	551	29%
Bell Helicopter	603	31%
MD Helicopter	14	1%
Sikorsky	479	25%
Total	1,924	
Type	Firm order	Percent
AgustaWestland	87	38%
Airbus Helicopter	82	36%
Bell Helicopter	17	7%
Sikorsky	43	19%
Totals	229	
SOURCE: Flightglobal's Ascend Fleet database		



The AW189 is the flagship of AgustaWestland, which has the biggest orderbook in the sector

launched at Heli-Expo three years ago, is still preparing for a slightly delayed first flight as this article goes to press.

Although all three cater to other markets, their fortunes have always been tied to future demand from the oil and gas sector.

“Oil prices have been very dynamic, but demand [for leasing] hasn’t changed”

ED WASHECKA

Founder, Waypoint Leasing

The timing of the oil price plunge seems especially awkward for the super-medium class, but the oil and gas market affects the entire industry, with more than 1,900 helicopters assigned to supporting offshore drilling rigs as of 16 February, according to the Flightglobal Ascend database.

Bell is the largest fleet supplier to offshore oil and gas companies with 31% of the in-service fleet, followed by Airbus Helicopters at 29%. Another 229 helicopters are on firm order, according to Flightglobal Ascend data, with AgustaWestland’s share of 38% the largest, and Airbus Helicopters following with 36%.

BALANCED

Despite the uncertain outlook, however, top helicopter industry officials with deep interests in the offshore oil and gas markets feel the outlook is not as worrisome as the economic trends appear.

Ed Washecka founded Waypoint Leasing in 2011 largely to cater to offshore oil and gas companies. Taking a page from fixed-wing lessors such as NetJets and ILFC, Waypoint is offering offshore operators vertical lift as a service, re-

lieving the companies of the need to acquire and maintain their own dedicated fleets.

“Oil prices have been very dynamic, but demand for helicopter leases that we’ve seen hasn’t changed,” Washecka says in an interview. “If anything the oil price demand causes people to think about what kind of commitments they want to make. On the one hand, oil companies may not be sure if they’re going to do this project or that project. On the other hand, it makes our operator base look at leasing as giving them a lot more flexibility.”

But clouding the picture is the uncertainty over any potential recovery to \$100 per barrel.

In a 6 February earnings call, Jonathan Baliff, chief executive of Bristow Group – one of Waypoint’s key customers – recalls an abrupt crash in oil prices in 2009 amid a global financial crisis, when the price of a barrel of crude dropped

below \$40. As abruptly as prices in 2009 fell, they rose again just as steeply, creating a V-shaped recovery curve that helped companies such as Bristow, which provides fleet services to drilling rigs. Six years on, Bristow is preparing for a longer recovery cycle this time.

“We don’t have the luxury in many ways of hoping that it is V-shaped,” Baliff says. “We have to plan for something that is U-shaped that has some cost structure adjustments.”

SNAPBACK

In a U-shaped recovery, the prices stabilise at the lowest level for a sustained period before a very rapid recovery. That represents the model that Bristow is using to manage its long-term fleet plans during this downward cycle in oil prices.

“We believe the snapback will be as particularly dramatic upwards as it was downwards, and we are managing that eventual renewal because it takes about three years to actually build a helicopter,” Baliff says.

For helicopter manufacturers, the impact of falling oil prices is more nuanced. In customer segments distinct from the oil and gas industry, lower oil prices can help generate cash to buy more or newer helicopters by reducing operation costs. So far, the manufacturers have not made any bold moves, such as publicly delaying a programme or cutting production.

United Technologies subsidiary Sikorsky, for example, still believes the impact of oil and gas prices is marginal on programmes such as the S-76D and S-92. “Some of the exploration companies are scaling back,” says United Technologies chief executive Greg Hayes. “More than 80% of the use of the helicopters for offshore oil is for current production – it’s not for exploration. So, ... on the margin: yes, there may be a few aircraft that will be little bit more difficult to sell.” ■



Bell’s 525 Relentless was designed to reach fields further out at sea

PLAYING CATCH-UP

Airbus Helicopters has scaled back its ambitions for the next-generation X4 medium-class rotorcraft as it rushes to recover ground lost to its rivals

DOMINIC PERRY LONDON

On 3 March, in Orlando, Airbus Helicopters will finally reveal the future of its medium-class rotorcraft. Work on the new model, known so far by its experimental designation of X4, has been under way since at least 2010, but there is still little clarity on what the helicopter looks like or what specifications it will boast.

There is no doubt that the X4 is badly needed, however. It is destined to replace the AS365 and EC155 Dauphin family of medium twin-engined helicopters, which have been selling modestly in recent years.

Flightglobal's Ascend Fleets database records deliveries of both types as having slumped over the last 10 years. It is an issue partly of age – the original AS365 made its first flight some 40 years ago and the EC155 dates from 1999 – and partly of intense competition.

Ascend data shows how quickly sales of the rival AgustaWestland AW139 have outstripped those of the Airbus Helicopters mod-

els. It may not be a direct competitor – the AW139 is bigger and heavier, boasting a maximum take-off weight of 6.4-6.8t against 4.5t for the AS365 and 4.9t for the EC155 – but has nonetheless taken market share away from Airbus Helicopters. Last year, for example, the AS365 and EC155 racked up just 28 orders, including 11 for Indonesia's navy; although better than the 17 sold in the prior year, it is some way short of the AW139's 2014 sales total of 69, according to Ascend.

NICHE

Analysts are quick to identify where the two Airbus Helicopters types are falling short.

"The AS365 and EC155 are old designs compared with a lot of the players in the market," says Ben Chapman, aviation analyst at Ascend's consultancy arm.

"Faced with newer and more capable technology, the demand simply isn't there from its major markets. [The Dauphin] still has a niche, but aircraft such as the AW139 have taken significant demand away. They are going to need

"We don't need fly-by-wire.

It increases complexity ...

development costs and risks"

GUILLAUME FAURY

Chief executive, Airbus Helicopters

a new design if they intend to continue competing in the segment," he says.

The airframer is, of course, well aware of the requirement to replace the models and rejuvenate its moribund sales in the weight class. In interviews, Guillaume Faury, Airbus Helicopters' chief executive, has frequently alluded to the fact that it is being out-competed by its Anglo-Italian rival. At an Airbus Group investor briefing in 2014, for example, Faury was driven to admit that the company was not capitalising on growth in the civil market for medium-weight helicopters and had "significantly lost ground" against its rivals.

"The Dauphin and EC155 are not competing appropriately – against the AgustaWestland AW139 mainly, but not only," he said.

That message has been repeated several times over the past 12 months, reinforcing the impression that the airframer has, if not lost its way, then at least lost ground in a segment it previously dominated.

It views the successful introduction of the X4 as vital to its ambitions in the medium-weight class. Speaking late last year at another investor briefing, Faury said the new model would help complete its line-up in the segment. Development of the X4, alongside the first delivery of the new EC175 in December 2014, will mean that the airframer will "reinvest completely the segment of medium and light heavies with brand new products", said Faury.

AMBITIOUS

It is perhaps because of this urgency, coupled with the more no-nonsense style that Faury has introduced since he succeeded predecessor Lutz Bertling in May 2013, that the shape of the X4 remains so shrouded in mystery.



The X4 is designed to replace Airbus Helicopters' modestly-selling AS365 Dauphin rotorcraft

Early proposals for the X4 circulating around 2012 proposed a highly ambitious helicopter featuring an all-new Thales cockpit, advanced rotor blade technology and Sagem-designed fly-by-wire controls.

In fact, at that stage the then Eurocopter was planning to launch two helicopters: initial models would feature more traditional avionics, while a later variant, intended to be introduced around five years later, would feature synthetic vision and any number of other high-tech advances. Images of the aircraft also showed a dramatically sculpted fuselage featuring canard-like stabilisers at the front of the helicopter, an enclosed Fenestron tail rotor and a horizontal stabiliser swept out from the top of the vertical fin.

The scope of the programme has since been dramatically reined in. Around six months into Faury's tenure there were already signs of a more cautious approach. At the manufacturer's annual briefing in January 2014 Faury indicated that the development was still a priority, but suggested that a less complex product was envisaged. But by the middle of last year, the scale of change had become apparent.

Gone was the phased approach to introducing an advanced cockpit. In fact, gone was pretty much the entire advanced cockpit. Fly-by-wire controls, explained Faury, would add too much time and complexity – and presumably cost – to a programme that was required to deliver in the relatively short term. Those advances, he argued, would not offer the end-user sufficient benefits to justify the hefty potential downsides.

"Why delay the X4 to wait for fly-by-wire?" Faury said. "Customers are expecting a competitive helicopter – that we can provide with the existing autopilot. We don't need fly-by-wire. It increases complexity, non-recurring development costs and risks, and the value added for the customers – that's not very clear," he explained.

And as for planning two clear iterations of the helicopter from the very beginning, Faury was equally dismissive. "We will make one product that is good enough from day one."

Not all the advances have been jettisoned,

**Initial
concept
sketches
were striking**

however. The X4 still appears, at least at this stage, to be very much a next-generation helicopter. The majority of the fuselage will be carbonfibre, with sections of early prototypes having been fabricated at the company's composite engineering centre of excellence at Donauwörth in Germany during the summer.

NEXT-GENERATION

Rotor blades are also composite, featuring the distinctive "hockey stick" shape of Airbus Helicopters' Blue Edge design. Testing of blade manufacturing techniques has been conducted at the airframer's Systemhaus research centre, also in Donauwörth.

Flight testing of some dynamic components has been carried out on an EC155 flying testbed and additional technologies have been taken from the manufacturer's X3 high-speed compound helicopter technology demonstrator. Avionics will be the new Helionix suite that Airbus Helicopters first introduced on the EC175.

One piece of the jigsaw that appeared to have remained in place, however, was the engines. Ever since 2012 it has been a straight fight between Pratt & Whitney Canada's PW210E and the new Arrano turboshaft being developed by France's Turbomeca, both listed as units in the 1,100shp (820kW) range. However, on 18 February the airframer announced that it was ditching the P&WC engine, with the 1,100-1,300shp Arrano remaining.

Airbus Helicopters says that following a "comprehensive market assessment" it will move the positioning of the X4 "consequently necessitating a significant engine power in-

crease" not available without additional work on the PW210E.

However, the maiden sortie of the X4 may still be with the P&WC engine, given the development timeline of the Arrano.

Patrick Montcoulié, Arrano programme vice-president at the French engine manufacturer, says that it has given a commitment to Airbus Helicopters to accelerate the pace of the new powerplant by around six months.

Certification of the engine is likely to be achieved by the end of 2017, ahead of service entry of the X4 in 2018.

Overall, Ascend's Chapman believes the apparent change of direction to be a positive one. "It's less about having new technology on board; it's about bringing to market a new helicopter that's more efficient and more reliable with longer range and better payload-range capability, with the right-size cabin."

Work is clearly at a relatively advanced stage on the X4. In his December 2014 address to investors Faury noted that the first prototype had just undergone "power on". First flight is rumoured to be early this year.

It may seem a relatively short timeline, but given the work that has already been undertaken, the airframer should be in a strong position to deliver on schedule.

That said, it cannot afford any slippages. Further entrenchment of the AW139's position can only serve to highlight Airbus Helicopters' lost dominance in the sector. In addition, with the AW169 – billed by some as a "Dauphin killer" – waiting in the wings, time may be running out for the airframer's former cash cow. ■

MEDIUM-CLASS HELICOPTER MARKET – DELIVERIES

Aircraft Type	Delivery year															
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Grand Total
AS365	4	9	14	10	20	22	25	22	30	21	10	5	8	8	5	213
AW139					4	15	32	36	76	63	80	66	70	105	76	623
Bell 412	33	21	17	25	21	27	27	33	50	22	11	19	33	30	23	392
EC155	9	10	14	13	7	11	8	9	9	19	10	17	7	9	10	162
S-76	7	7	9	13	32	35	31	56	40	39	29	16	2	21	15	352
Grand Total	53	47	54	61	84	110	123	156	205	164	140	123	120	173	129	1,742

SOURCE: Flightglobal's Ascend Fleets database



The engine manufacturer is concentrating on the 2,000shp-plus segment after acquiring Rolls-Royce's interest in the RTM322 programme

FRENCH CONNECTION

Fresh from its success partnering with Bell Helicopter on the Jet Ranger X, Turbomeca is eyeing opportunities to build on its long-standing ties with Airbus Helicopters

DOMINIC PERRY LONDON

Visit rotorcraft forums on the internet often enough and you would be forced to come to the conclusion that while French helicopter engine manufacturer Turbomeca may make decent enough products, its aftersales operation is lacking.

Olivier Andries, chief executive at the Safran-owned company, puts the problems firmly in the past. However, he feels that despite the progress the company has made, the market's perception is lagging behind reality.

"This reputation was deserved six or seven years ago and this is the problem with reputation – you are always trailing that despite improvements.

"I'm happy to say that we have made big

steps over the last five years in terms of support performance and we have driven up customer satisfaction quite significantly."

Its internal surveys suggest that in terms of customer satisfaction it now sits at a similar level to that of its rivals, Pratt & Whitney Canada and GE Aviation, says Andries.

VALIDATION

Of course, the old adage that there are lies, damned lies and statistics still holds true and a customer satisfaction survey means little in isolation. So, for Andries, a better validation of its performance is the 2013 selection by Bell Helicopter of Turbomeca's Arrius 2R powerplant for the airframer's 505 Jet Ranger X.

Remarkably, this is the first time the two rotorcraft stalwarts have worked together and

Andries thinks that was again due to its poor performance post-delivery.

"They decided on the 505 to partner with us based on the feedback they had got from customers that we had improved our support performance." Remedial actions, says Andries, included placing technicians closer to customers and increasing the headcount in Turbomeca's aftersales department.

"We knew we had to improve turnaround times. That's why we launched a transformation plan three years ago to do that."

The average turnaround on an Arrius or Arriel engine is now about 50 days – in Andries's view a figure in line with market expectations.

For Turbomeca, 2014 was a year of highs and lows, however. On the plus side is the progress it has made with its engine development programmes – in terms of iterative steps and brand-new powerplants. But in contrast, deliveries saw a double-digit decline reflecting the weaker volumes at the helicopter manufacturers. This was particularly the case with light single- and twin-engined classes – where it sells the Arriel and Arrius engines – whereas deliveries of larger helicopters stayed steady.

On the development side, quite apart from securing approvals for the Arrius 2B2+, Arriel 2E and Arriel 2M – all of which power various Airbus Helicopters types – Turbomeca has progressed a number of other programmes.

Already flying is the Arrius 2R for the single-engined Jet Ranger X, which made its maiden sortie in November having been handed to the

helicopter manufacturer around two weeks ahead of schedule. Certification is still on track for the end of the year, says Andries, with service entry expected in early 2016.

"As we speak we are preparing the ramp-up of the engine in 2015," he says. That ramp-up is crucial, given that full-rate production will be around 200 engines per year.

Assembly of the powerplants will take place at its facility in Grand Prairie, Texas, which has two advantages. Firstly the proximity to Bell's 505 assembly line in Lafayette, Louisiana, and secondly, made-in-America credentials. "It is a strong message that we send to Bell and its customers that this engine is going to be assembled in the US," says Andries.

The next engines likely to fly are two new variants of the Arden 3 – the 3G for the Kamov Ka-62 and the 3C for the Avicopter AC352, China's version of the Airbus Helicopters EC175. Maiden sorties for both types were due in 2014, but neither took place. Andries confirms that Turbomeca delivered both powerplants to the respective airframers on time, but dismisses suggestions that engine issues are to blame for the delay. The new helicopters should now take to the skies around mid-year, he says.

OPPORTUNITY

Successful operation on the AC352 could usher in another opportunity for the Arden 3C, however. At the moment, Pratt & Whitney Canada has the engine position on the EC175 with its PT6, while Turbomeca is frozen out of one of the flagship programmes of its biggest customer.

But shortly before the turn of the year, Airbus Helicopters indicated that it could be willing to consider the Arden 3 as a possible future alternative for the EC175 if it performs well on the helicopter's Chinese twin.

Those comments, from programme chief Marc Allongue, seem to have caught Turbomeca on the hop. "We were pleasantly surprised," admits Andries. Although there are no active discussions at present, integrating the powerplant onto the airframe would be "a simple job" with clear benefits. "I can say this because it is now proven, but the Arden 3 could bring a double-digit [specific fuel consumption] improvement over the existing [PT6] engine," he says.



"We should be ready for any high-power engine development for entry into service by 2016"

OLIVIER ANDRIES
Chief executive, Turbomeca

On the Arrano, the manufacturer's all-new turboshaft to power the Airbus Helicopters X4, however, Andries is more reticent. The rotorcraft itself will be officially launched on 3 March at the Heli-Expo show in Orlando. Previously the engine choice was between the 1,100-1,300shp (820-970kW) Arrano and the 1,100shp-rated P&WC PW210. However, on 18 February the airframer ditched the P&WC powerplant, citing a need for more power.

First runs of the Arrano were conducted in 2014 and development is on track for 2017 certification, says Andries, to be achieved using 10 prototype assets.

The Arrano will feature the latest engine technology, much of which has been derived from Turbomeca's Tech 800 research programme. In addition, it will be the first turboshaft in the firm's arsenal to utilise additive layer manufacturing for the production of a number of its com-

ponents. The so-called 3D printing technique – in this instance it is actually selective laser melting – will be used to fabricate fuel injector nozzles and combustor swirlers.

Its first use of the 3D additive manufacturing focuses on what Andries calls "small complex parts". The new process vastly reduces the number of separate production operations required to make each component. "Because we had to perform 12 separate operations we had a certain level of non-conforming. Now that's reduced to zero," he says, noting that the business case "is very clear for us" but "what is even more significant is the schedule reduction".

Meanwhile, following its 2013 acquisition of Rolls-Royce's interest in the joint RTM322 programme, Turbomeca is continuing to focus on high-power engines in the 2,000shp-plus segment. It has largely absorbed the functions and competencies previously held by R-R, says Andries, giving it additional programme know-how.

DEVELOPMENT

Work on its Tech 3000 demonstrator is continuing. Testing of different elements will get under way this year and continue into 2016. The ultimate aim is to deliver a 3,000shp-class powerplant for a future rotorcraft. Although there remain no new helicopter programmes where an engine selection has yet to be made, Turbomeca is eyeing the requirement for platforms of 10t and above to be able to fly further and carry more as oil and gas exploration moves ever further offshore.

Indeed, most observers view Turbomeca's move as a logical step towards providing the engines on any eventual replacement for the Airbus Helicopters EC225 – which uses its Makila powerplants – although Andries declines to talk about any potential customer discussions.

"With the combination of capabilities and competences we gain on the RTM322 on one side and the Tech 3000 on the other, we think we should be ready for any high-power engine development for entry into service by 2016. We are preparing ourselves should any new opportunity arise," he says.

And the key to securing that position is to have the bulk of engine development completed. "When an aircraft OEM decides to launch a new platform, they look to rely on an engine manufacturer that has already proven the technology," he says. "They don't want to take a risk on a white-paper engine on top of [developing] a new platform."

That strategy paid dividends on the Arrano, which leans heavily on research conducted on the Tech 800 demonstrator, and Andries is convinced it will work again.

Time will tell whether it ends up on an Airbus Helicopters product, but given the depth of the relationship, you wouldn't bet against it. ■



The Arrius 2B2+ is one option on the latest variant of the light-twin EC135

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

Final flight for long-legged 747

Qantas's first 747-400 will make its last flight on 8 March, to its new home at Australia's Historical Aircraft Restoration Society museum at Albion Park.

VH-OJA flew nonstop from London to Sydney in 1989, at 20h, 9min the longest commercial service ever.

This time, its journey will be shorter: 10min, in fact, from Sydney to Illawarra Regional airport down the New South Wales coast, where neighbours will include a Qantas Lockheed Super Constellation, a Catalina, a Douglas DC-3 and DC-4 and a Desert Storm US Army Cobra.

The local council has given the museum a five-year licence to park the aircraft. As one wag on social media commented: "What happens if the licence isn't extended?"

Others regret a home has not been found for the 747 in Queensland, original home state of Queensland and Northern Territory Aerial Services.

Air Force Un

His father was famously so frightened of flying, he made state visits to China and Russia on a private train.

No such qualms for current North Korean dictator Kim Jong-un, who, judging by photos released by the country's news agency, looks very at home on board his version of Air Force One, a VIP-configured Ilyushin Il-62. Kim junior was doing



"This is your captain speaking: ladies and gentlemen, we are experiencing some unusually heavy traffic..."

[The nose section of a Boeing 747 is transported towards the UK's M4 motorway on 14 February]



"So, we get to eat first?"

some airborne inspections of new apartments in Pyongyang, built for scientists.

Note the ashtray. Pity the cabin crew member who has to tell him there's no smoking.



Goodbye jumbo: Qantas's first 747-400

Mind the drones

Would we attend a demonstration of thought-controlled drones?

That was the oddest invitation we received last week. The event, due to be held in Lisbon on 23 February, is the result of a study into "Brain controlled aircraft flight using multiple feedback mechanisms", which "uses a multi-disciplinary approach of combining aeronautical systems engineering with neuro-science research".

Let's just say we are thinking about it.

Yuckspeak #191

Cabin efficiency enablers = more seats.

Faithful servant

And finally for this week, headlines like this never fail to raise a smile: "Virgin Australia's loyalty chief to step down".

Surprise arrival

It is a somewhat dramatic entrance that HMS *Ark Royal* makes into the arena of naval operations, for practically nothing has been heard of this vessel since it was announced that the name had been selected for the seaplane-carrying ship.

100 YEARS AGO

Radio requirement

With the rapidly increasing production of aircraft and the frontline strength of the RAF attaining greater proportions, it is becoming necessary to expand the radio communication system which welds that tremendous number of aircraft and crews into one unit for the prosecution of the war.

75 YEARS AGO

Volcano crash

Seven crew members and 80 passengers were killed in the accident to the LAN Chile DC-6B on February 6. The aircraft hit the 19,130ft San Jose volcano in the Andes at a height of about 12,000ft. The captain had obtained ATC permission to re-route because of cloud in the El Volcan Pass.

50 YEARS AGO

Limited relief

On the surface, the general aviation business has just received its biggest ever boost – the selection of an airframe for the \$1 billion-plus USAF tanker/transport training system. Do not, however, expect dancing in the streets, because there is not enough good news even in a deal of this magnitude to counter the gloom elsewhere.

25 YEARS AGO

100-YEAR ARCHIVE

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

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Keep your seat when it's critical

I find it unbelievable that a captain of an airliner is not in his seat during a critical period of a flight as happened during the Air France mid-Atlantic and recent AirAsia tragedies.

If forecasts or weather radar indicate severe weather ahead it should be imperative that the captain be in his seat for that period. Rest periods aboard an aircraft on long flights should be determined accordingly.

I am sure that in the future, insurance companies may withhold payouts if they determine that the accident was the result of this neglect of a fundamental requirement.

Capt David Clemow
Auckland, New Zealand

Captain's call

Nigel Champness expresses his disappointment (*Flight International*, 10-16 February) regarding a BA 787 crew's decision to return to London Heathrow post engine shutdown.

"Land at the nearest suitable airport" leaves the crew to take

TRAINING

The fundamental flying skills

I refer to the recent discussions about training standards in your letters page and feature on airline safety (*Flight International*, 13-19 January).

Especially with protection systems that mask the natural ways an airplane behaves at the edge of the envelope, the basic – I am talking

Cessna-like basic – skills and knowledge must be readily present for a pilot to react properly to a situation that might have been last seen a long, long time ago in basic training.

My firm belief is that even in the most modern, automated airplanes the pilots have to be able to maintain basic flying skills, and be allowed to do so. An effective instrument scan is the next most important thing. These are cornerstones of being a pilot, and do not come from simulator training alone.

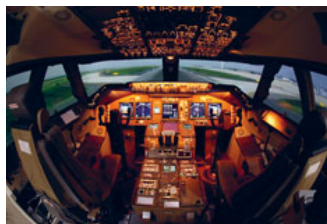
Simulators are great procedural training machines – don't get me wrong. But to complement them, hand-flying the real airplane for more than the first and last 1,000ft gives additional competence and confidence.

Whenever something goes terribly wrong, a confident pilot, be he or she a captain or a first officer, might be a bit quicker to recognise the situation for what it is, revert to adequate manual flight and correct it, then use automation again.

Despite all the bells and whistles in the cockpit we should not forget where we come from.

As well as a long-term reader, I am a type rating instructor and widebody captain with a major German carrier.

Michael Scheiba
By email



Ree Features

You can't just rely on simulators

into account all relevant operational factors. If the crew returned to "London" solely on the basis of commercial expediency then the regulator will have taken an active interest. Nor would the CAA ban single-engine approaches over central London or any other city centre unless absolutely required to do so by a very high-scoring risk assessment; that would be to restrict the options of a crew's decision-making construct.

Happily, the aircraft commander retains the absolute authority to take whatever deci-

sions necessary to secure his/her aircraft, and it seems that the BA captain and crew were confident that the safest option was a landing at Heathrow; the operating crew and the cockpit voice recorder were the only ones on that flightdeck that day to hear the decision-making going on.

"Nigels" other than Mr Champness were in the seats with decision-making protocols to hand; let's trust a (well-trained) crew of any airline to exercise the safest option – that's what they're paid and facilitated to do.

Name and address withheld

How far north?

Nigel Champness makes a good point about the nearest suitable airport. But the event occurred over "the northern UK".

That might suggest the nearest suitable airports would not have been Manchester or East Midlands but Glasgow, Edinburgh or, even better for a single-engined widebody, Prestwick.

Bob Owen
By email

Basics of safety

I refer to the statement in the article "Safety ratings for Indonesia" (*Flight International*, 3-9 February), which states that "the transport ministry also moved to increase domestic ticket prices in a bid to boost flight safety".

The mind boggles! It is exceedingly worrying that the ministry does not understand the basics of safety which apply to all industries and occupations – management commitment and accountability, safe procedures which are monitored, audits, reviews and feedback to management.

Peter Gray MRAsS
Helicopter and tiltrotor test pilot for *Flight International*
Redhill, UK

Not an acronym

Like most people today, you seem to be confused between acronyms and abbreviations.

An acronym is a word created from the initial letters of other words. FADEC is arguably an acronym. NGV (nozzle guide vane) and most other 3-letter "acronyms" are not. All acronyms are abbreviations. Not all abbreviations are acronyms.

Colin Devereux
By email



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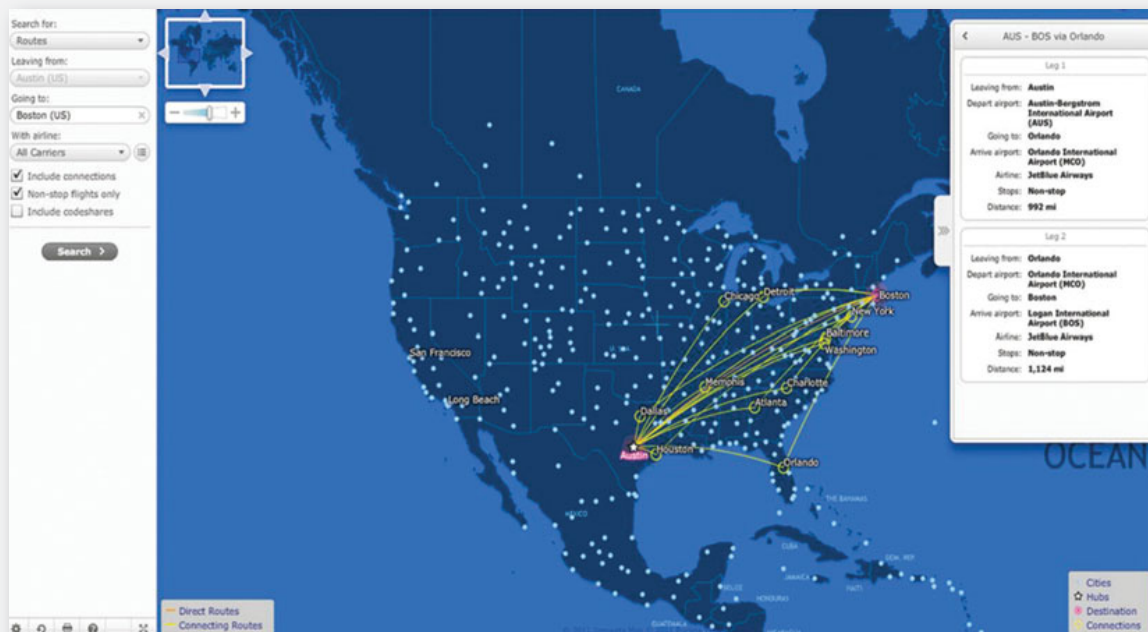
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24 April

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4-7 May

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auvshow.org

10-11 May

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17-20 May

ALTA CCMA
Punta Cana, Dominican Republic
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19-21 May

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26-28 May

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WORK EXPERIENCE OWEN CHENG

Bridging the cultures at Hartzell

Headhunted by the propeller manufacturer's president while working as a temporary interpreter for the company, Owen Cheng soon had a permanent job, where he makes use of both his language skills and engineering training

Tell us about your career to date

I started to work for Hartzell Propeller as an interpreter for a training class on 4 March 2013. My first contract with Hartzell was for three weeks. That turned out to be my only temporary contract with the company, as the following month Hartzell president Joe Brown decided to hire me on a full-time basis.

What are your qualifications?

I was born in China and underwent most of my education there: from middle school to high school, and then college. After I graduated in China I came to Ohio for graduate school at Wright State University, where I majored in industrial engineering. My bachelor's degree was in mechanical engineering.

Have you always been interested in aviation?

Yes – that's why I went to Wright State. Dayton is the birthplace of aviation. My first flight with a small aircraft took place in the summer of 2013. My friend Scott Meyer, the son of a Hartzell employee, let me fly a Beech Sundowner [piston single] for 40min over midwest Ohio. That was very cool!

What does your job entail?

I provide liaison for both technical support and OEM sales de-

It is my job to smooth things over and help both sides learn a little more about each other's culture



Cheng says his experience of growing up in different cultures helps him recognise when clients are struggling

partments, taking care of Hartzell's Chinese customers and repair workshops. I am also responsible for translating Hartzell's owner manuals, overhaul record sheets, service letters, air show brochures, press releases and web pages into Mandarin Chinese. I assist with on-site propeller validation by the Chinese civil aviation authority (CAAC) and with training classes for students from China.

What are the most challenging aspects of your job?

Bridging the gap between Chinese and Western cultures. I have travelled in more than 10 states in the USA and in each one there are different traditions. Growing

up in China and attending a US university has enabled me to recognise when co-workers or Chinese guests are struggling to understand the cultural differences and social conventions. It is my job to smooth things over, strengthen the relationship between the parties and help both sides learn a little more about each other's culture. I find this very rewarding.

What are Hartzell's expectations for the Chinese market?

Our expectation is to fully support our Chinese OEMs – such as AVIC and Harbin Aircraft – as well as the fleet operators and repair workshops. Three years from now, we hope to have at

least three maintenance and repair stations in China.

What are your career plans?

Learn more about Hartzell, win every customer in China, put our propellers on every Chinese-made general aviation aircraft and become a licensed pilot. I hope I can work for Hartzell for the rest of my life. ■



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