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HOW ROTORCRAFT
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787 CRISIS

GROUNDED... CONFOUNDED

Where does the Dreamliner go from here?



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COVER IMAGE

This PA photograph shows an All Nippon Airways Boeing 787 after a battery malfunction forced its emergency landing at Japan's Takamatsu airport. The ensuing groundings are analysed in this issue. See Cover Story P6-7

PIC OF THE WEEK YOUR PHOTOGRAPH HERE

Labelled "Smoke Spin", this shot – taken during September's Wings Over Gatineau-Ottawa air show – was posted by AirSpace user mikeybthepilot. Open a gallery in flightglobal.com's AirSpace community for a chance to feature here. More images from the galleries appear in our photo special (P32)



flightglobal.com/imageoftheday



Development milestones lift Cessna P20. Crash prompts debate over city helicopter use P10

Cassini, Rex Features

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NEXT WEEK INDIA SPECIAL

We probe the nation's air force renewal plans, airline sector, space programmes, aerospace manufacturing industry and airport projects, ahead of Aero India

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BEHIND THE HEADLINES

David Learmount (top) got to grips with an A380 simulator at Airbus's training centre in Toulouse (P12), and David Kaminski-Morrow attended the airframer's results briefing (P9). Dan Thisdell's notes from a visit to Dassault Systèmes in Paris (below) informed his story on 3D design (P23).



For a full list of reader services, editorial and advertising contacts see P37

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THE WEEK ON THE WEB

flightglobal.com

On defence blog **The DEW Line**, Dave Majumdar drew attention to Saab's new animated video showing what a hypothetical combat mission might look like in a JAS-39

Gripen NG fighter. "An unnamed, but presumably **Western**, country appears to have intervened in some sort of conflict in an **arid region** of the world, defending an 'unarmed

country, desired for its **strategic value**', explains Majumdar. "There is also a vast demilitarised zone to patrol and the unnamed enemy state flies some variant of the **Flanker**. The premise is somewhat **ridiculous**, but it's an interesting video." Visit flightglobal.com/gripenvideo to judge for yourself. And on his eponymous blog, operations and safety editor David **Learmount** blogged about Airbus's "golden rules for pilots", as enshrined in a wallet-sized **plastic card** (above).



Find all these items at flightglobal.com/wotw

QUESTION OF THE WEEK

Last week, we asked for your thoughts on **Eurobraer's plans to revamp its regional jet family**: You said:

Got it just right

53%

Leaving it too late

22%

Needs an all-new aircraft

25%

Total votes: 1,366

This week, we ask for your take on the **Boeing 787 crisis**

- Will be resolved quickly Will drag on, and lead to lost orders
 Back to drawing board for Boeing

Vote at flightglobal.com/poll

HIGH Fliers

The top five stories for the week just gone:

- 1 NTSB releases picture of charred 787 battery box
- 2 Boeing shows off completed horizontal stabiliser for 787-9
- 3 Singapore Airlines firms A380 and A350 orders
- 4 FAA to review 787 programme
- 5 American Airlines proposes new 787 and 737 Max terms

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Raised stakes

Boeing's 787 woes must be seen in the context of airframers pushing hard to make the gains in performance sought by airlines – a dynamic with implications for the certification process

The US Federal Aviation Administration acted correctly to ground the Boeing 787 because of fears over battery fires, but the decision raises questions about the integrity of a certification process that declared the 787 airworthy less than 18 months ago.

The grounding seems at once slightly unfair and yet appropriate. Why unfair? With all new aircraft there are problems in service that cannot be anticipated in the controlled environment of a certification trial. But the 787's unique high-power electrical system means that even the slightest glitch can raise concerns about onboard fires and containment measures.

The FAA's certification process has always missed small problems that can only be discovered after an aircraft encounters the random conditions of a diverse group of operators. Hans Weber, owner of aviation consultancy Tecom, recalls how airlines protested against the initial reliability of the Boeing 747-400, especially in

The 787's electrical system and turbofan operate at conditions not seen before, commercially

the galleys where a burner tended to melt the aluminium coffee pot. That glitch also posed a fire hazard, Weber says, but the FAA never felt the necessity to intervene.

On United's first long-distance 777 passenger flight, crews found a passenger door frozen shut upon landing. A small channel of moisture inside the doorframe had gone undetected during flight testing.

What makes the 787 different is the severity of a few of its "teething" issues. A contained engine explosion in July and a battery meltdown and associated fire in



Testing time

January are serious safety alarms no-one expects after airworthiness certification. Both incidents triggered probes by the US National Transportation Safety Board, which usually focuses on incidents involving injuries and fatalities. And now the 787 is grounded around the globe while the battery fire investigation continues.

Airlines are rightfully demanding fuel-efficiency gains, driving manufacturers to design ever-increasing levels of performance from the turbofan and electrical system. On the 787, both of these systems are operating at extreme conditions never before experienced in commercial operation. Hence, even small mistakes – such as, say, switching to a lead-free coating and inadvertently triggering a contained engine failure – can have unexpectedly severe consequences.

The airworthiness process is not designed to screen for the risk of every random fault. As airframers assume more performance-driven risks, the kind of regulatory interventions required for the 787 are likely to become more routine. ■

See Cover Story P6-7

Bravery required for fresh attack

Pentagon procurement chief Frank Kendall is directing the Defense Advanced Research Projects Agency (DARPA) to explore the possibility of developing a new prototype attack helicopter. Such an effort could present an opportunity for the USA to reassert its dominance in the rotary-wing industry after decades of malaise. Indeed, the last successful clean-sheet US military helicopter design was the Boeing AH-64 Apache.

Here is an opportunity for the Pentagon to invest in revolutionary new technologies such as high-speed compound helicopters, potentially offering big leaps in range, payload, speed and efficiency. Such progress has been sadly lacking in the rotary-wing world since the 1960s. But a higher degree of risk must be accepted if

engineers are to be free to pursue game-changing advances. With careful analysis and design, programme risk can be reduced; it is, however, inherent in programmes that push the technology's limits.

Even if they do not result in the originally intended platform, the advanced technological capabilities, enhanced skills and expanded knowledge base developed could provide a foundation for future programmes, reducing future risk. And there would almost certainly be fallout technologies with other applications.

The Pentagon could use this exploratory effort not only to revolutionise rotary-wing technology but also to invest in future national technological capability. ■

See Feature P30



Last year we subjected Boeing's Dreamliner to a flight test. Read our verdict, plus an in-service report on the type, at flightglobal.com/787test



SAFETY STEPHEN TRIMBLE WASHINGTON DC

FAA grounding order moves 787 into uncharted territory

Airframer may divert engineering resources from development work to solve battery issues

A grounding order by the US Federal Aviation Administration moves the Boeing 787 programme into territory uncharted for a modern airliner as long as a recently discovered “battery fire risk” remains unsolved.

The FAA order effectively grounds six United Airlines 787s, aligning the US regulator with All Nippon Airways and Japan Airlines, which ceased 787 operations on 16 January. Fellow regulators and the five remaining Dreamliner operators – LAN, Qatar Airways, Ethiopian Airlines, LOT Polish Airlines and Air India – have since followed suit.

Boeing must demonstrate it has eliminated any risk of battery-ignited fire before the grounding is lifted. Chief executive Jim McNerney says the airframer’s entire resources will be employed to discover the source of the battery fire risk and correct it. Engineering resources could be diverted from other 2013 strategic efforts such as doubling the 787’s monthly production rate, assembly and flight testing of the 290-seat 787-9 and launching a potential 320-seat 787-10.

The grounding may have no

immediate impact on valuations as no market exists for second-hand 787-8s, but safety concerns could make it harder for some airlines and lessors to get financing, says Les Weal, head of valuations for Flightglobal’s Ascend consultancy. “If you were asked to finance one today, you may have to pass on the opportunity,” says Weal, explaining that such financiers have no shortage of requests bearing less risk than the 787.

If you were asked to finance [a 787] today, you may have to pass on the opportunity

LES WEAL

Head of aircraft valuations, Ascend

On top financial concerns, Boeing may also need to restore confidence in the 787’s entire electrical architecture. It was designed as a technological leap forward, reducing fuel consumption by several percentage points and using electricity to replace parasitic bleed-air to power onboard systems and cabin pressurisation.

But the power system with almost 1.5MW (2,010hp) of capacity has been a source of constant headaches barely 15 months into service. A suspect batch of circuit boards are likely to have caused a series of glitches on power distribution panels of several aircraft in December, forcing United and Qatar Airways to briefly ground some aircraft to perform repairs.

But far more worrisome are the newly realised risks of fire posed by the two lithium-ion polymer batteries. Boeing selected a lithium-ion-based battery proposed by electrical power conversion system supplier Thales, which packaged an industrial-grade battery designed by Japanese company GS Yuasa and a battery charger unit made by Securaplane, based in Tucson, Arizona.

Industry and government regulators were aware of the risks of potential safety hazards posed by battery chemistries based on lithium-ion. In 2006, Securaplane’s administration building “burned to the ground” after a botched laboratory test involving a GS Yuasa battery designed for the 787. In 2007, the FAA imposed a



ANA’s emergency landing sparked the grounding

set of special conditions for Boeing to prove the safety of lithium-ion batteries before the agency would grant airworthiness certification for the new aircraft.

The certification tests appeared to show Boeing had passed the FAA’s test. The lithium-ion battery allowed Boeing to start the auxiliary power unit with a device half the size of comparable nickel-cadmium or lead acid batteries used in previous designs.

INCIDENTS MAVIS TOH SINGAPORE STEPHEN TRIMBLE WASHINGTON DC

Boeing faces multiple safety investigations as crisis intensifies

One by one the press releases trickled in, from Air India, from Qatar Airways, from EASA, confirming the inevitable grounding of the Boeing 787 fleet across the globe following the US Federal Aviation Administration’s lead.

Although the introduction of the 787 has not been incident-free, many issues could be passed off as teething troubles. However, the fire on board a Japan Airlines Dreamliner at Boston Logan airport on 7 January appears to have been a pivotal moment.

Unexpectedly, on 11 January, US

federal regulators launched a “holistic” review of the programme that will put the twinjet under an unprecedented level of scrutiny barely 15 months after entering service. The comprehensive review was announced jointly by federal regulators, including Transportation Secretary Ray LaHood, FAA chief Michael Huerta, and Boeing Commercial Airplanes chief executive Ray Conner. The review will seek to determine the root causes of the safety and technical incidents plaguing some 787 flights, with a focus on the aircraft’s 1.5MW-capacity electrical system.

Federal officials were at pains to paint the effort as a precautionary measure, lest the public start considering the 787 a safety hazard. “We believe the 787 is a safe aircraft,” said Huerta.

However, events in the following days appeared to show the FAA as oddly prescient. The incident that triggered the grounding order was the 16 January emergency landing at Takamatsu airport of an All Nippon Airways 787 (JA804A) after cockpit alerts showed a battery fault. Flightcrew also smelt fumes in the cockpit and cabin, says ANA.

Subsequent examination of the main battery, located in the aircraft’s forward electronic equipment bay, revealed it was “discoloured and the electrolysis solution had leaked”.

The carrier later admitted it had previously replaced the batteries on several of its 787s, including the aircraft involved in the incident, which received the new battery in October 2012.

The US National Transportation Safety Board has sent staff to Japan to help lead investigators from the Japan Transport Safety Board with their probe. ■



France moves
to quell Mali
conflict
THIS WEEK P8



ANALYSIS MAVIS TOH SINGAPORE

Japanese carriers bear brunt of financial fallout

It has been a busy start to 2013 for Japanese carriers All Nippon Airways (ANA) and Japan Airlines (JAL), all thanks to the Boeing 787.

Between them the airlines operate a combined fleet of 24 of the type, about half of the total Dreamliners in service. After the airframe, the pair have been hardest hit by the grounding.

How badly the carriers are affected will be determined by how long the aircraft remain grounded, say analysts, adding that every day the jets stay on the tarmac spells losses in millions of dollars for the airlines.

"These two carriers, especially JAL, are just coming out of a nice patch, showing nice numbers in the last few quarters. This grounding will definitely put a dent on their bottom line," says Standard & Poor's analyst Shukor Yusof.

On 16 January alone, ANA cancelled 35 services, affecting a total of 5,900 passengers. JAL also had to cancel four services and redeploy aircraft on some other services. Further disruptions are expected now the transport ministry has ordered the 787s to be grounded indefinitely.

The airlines have older, less fuel-efficient aircraft such as Boe-

ing 777s and 767s, which are compatible to fly 787 routes. The key now is for ANA and JAL to work quickly to redeploy these aircraft and minimise cancellations, says Sagar Shahane, aerospace and defence consultant at Frost & Sullivan.

"This grounding will definitely put a dent on [Japan Airlines' and All Nippon Airways'] bottom line"

SHUKOR YUSOF
Analyst, Standard & Poor's

Last week, Michael Sinnett, 787 chief project engineer, said lithium-ion is not the only acceptable solution, but remains the best option for the 787. Any future design must show the battery is safe, even if something fails and heat builds to dangerous levels, says Hans Weber, head of the Tecnom aviation consultancy. Such a design must ensure fire is contained and is extinguished by being deprived of oxygen, he

says. Moreover, most, if not all, smoke generated by the flames must be vented outboard, rather than allowed to circulate inside the pressurised cabin, he adds.

Speaking hours before the FAA's grounding order, Weber said the response to the ANA and JAL battery incidents had been surprising but understandable: "The emotion generated by a fire on board is high. That's one of the scariest things to contemplate." ■

Financial damage to the airlines is expected to be "quite manageable", unless the 787s have to undergo complete structural redesigns. After all, ANA and JAL survived a three-year delay in the 787 programme, say analysts.

Both ANA and JAL have also made the 787s key to their growth strategies, and would rather avoid any delays to their incoming aircraft. ANA has 19 787-8s and 30 787-9s on order, while JAL expects to take a further 18 787-8s and 20 787-9s. ■

TIMELINE: THE DREAMLINER'S NIGHTMARES

- **November 2010:** Test aircraft ZA002 suffers in-flight electrical fire
 - **November 2011:** ANA experiences first significant fault on its 787s, when a malfunction prevents the main landing gear from extending at the first attempt
 - **July 2012:** ANA forced to ground five 787s after defect found in gearbox of the Rolls-Royce Trent 1000 engine
 - **February 2012:** Boeing is forced to inspect and repair numerous 787s after struc-
- tural stiffeners are found to have been improperly joined to the composite skin in the aft sections of the aircraft
- **July 2012:** A crack in a component connecting the fan booster to the low-pressure turbine leads to a contained failure of a General Electric GEnx-1B engine during a taxi test
 - **December 2012:** United Airlines 787 is forced to make an emergency landing at New Orleans International airport following an electrical incident
 - **December 2012:** Another electri-

- cal failure causes the grounding of a Qatar Airways 787, only hours after the airframe receives a public rebuke by airline chief executive Akbar Al Baker
- **January 2013:** Emergency crews extinguish electrical fire onboard a Japan Airlines 787 at Boston Logan International airport
 - **January 2013:** Japan Airlines flight JA824J experiences fuel leak while preparing for take-off at Boston Logan airport
 - **January 2013:** ANA 787 forced to make emergency landing at Japan's Takamatsu airport

- after flightcrew observes battery alert
- **January 2013:** Following the emergency landing, ANA and Japan Airlines temporarily ground their 787 fleets
 - **January 2013:** US Federal Aviation Administration grounds all US-registered 787s until Boeing demonstrates that the lithium-ion-polymer batteries onboard are safe
 - **January 2013:** Other regulators, including EASA, follow suit and order a grounding of Boeing 787's



BRIEFING

UNITED TO RETROFIT 737S WITH SPLIT-TIP WINGLETS

MODIFICATION United Airlines has ordered a new, scimitar-shaped split-winglet designed by Aviation Partners Boeing (APB) as a retrofit for the Boeing 737NG series. The first retrofitted 737-800 should be delivered after the new winglet achieves airworthiness certification from the US FAA in October, APB says. It will become the first of eight 737NG configurations targeted for the retrofit programme, APB adds, noting that FAA certification of split winglets for the 737-900ER is scheduled in March 2014.

LAT SWITCHES FROM BOMBARDIER WITH ATR DEAL

ORDER Antigua & Barbuda's LIAT has placed an order for three 48-seat ATR 42-600s to replace its Bombardier Dash 8 turboprops. The deal also includes options for two 68-seat ATR 72-600s. The Caribbean carrier will take delivery of its first ATR 42-600 in June. The inter-island carrier is also in discussions with operating lessors for additional -600s.

ORDERS BOOST FOR C295 TRANSPORT

SALES Airbus Military has received follow-on orders for its C295 medium transport from two current operators. Egypt has signed a contract for six aircraft, in a move to boost its eventual fleet of the type to 12, while Colombia has ordered one more to join five which are already in use. The company has also delivered its first two of a possible eight C295s to the Kazakhstan air force.

SAUDIS SIGN FOR TORNADO ENGINE SUPPORT

PROPELLION Rolls-Royce has been awarded a four-year contract to provide in-service support for the RB199 engines which power the Royal Saudi Air Force's fleet of more than 80 Panavia Tornado intercepto strike aircraft. Some module repair work will be undertaken at the Middle East Propulsion Company's Riyadh facilities, R-R says.

CHINA BUILDS TO EASE BEIJING AIRPORT JAMS

INFRASTRUCTURE The Chinese government has approved the construction of a new CNY70 billion (\$11.3 billion) airport in Beijing to help the capital city cope with congestion at its main hub. The Civil Aviation Administration of China says construction of the airport, to be located in Daxing, south of Beijing, is scheduled to start in 2014 and will be completed by 2018. The plan is for the airport to have six runways, and the capacity to handle 70 million passengers annually by 2025.

ISRAEL EXTENDS TRAINING DEALS WITH ELBIT

CONTRACTS Elbit Systems is to continue providing training services at the Israeli air force flight academy from 2014, under contract extensions signed with the nation's defence ministry. The company will maintain the air force's 20 Hawker Beechcraft T-6A trainers, guarantee "power by the hour" access to a fleet of Bell 206 helicopters and also maintain Bell AH-1A trainers under the arrangements.

TEAM FORMS FOR US AIR FORCE TRAINER CONTEST

PROCUREMENT General Dynamics and Alenia Aermacchi have signed a letter of intent to compete jointly for the US Air Force's T-X trainer programme to replace the service's venerable Northrop T-38 Talon. Under the agreement, General Dynamics C4 Systems will serve as the prime contractor for a comprehensive training system based around Alenia's T-100, a variant of the company's M-346 Master jet trainer.



REX Features

Mirage 2000Ds supported by C-135 tankers have been in action

DEFENCE CRAIG HOYLE LONDON

France moves to quell Mali conflict

Paris intervenes in African nation to target Islamist rebels with international community providing logistical support

Heightened instability in Mali led to France launching military action on 11 January against al-Qaeda and other Islamist militant groups holding the north of the African country.

International support for Operation Serval rapidly grew to include the commitment of air transport and other support assets from nations including Belgium, Canada, Denmark, Germany, Italy and the UK, with the USA also assessing its possible provision of logistical assistance.

France's intervention began when several Aerospatiale Gazelle attack helicopters from its army's 4th Special Forces Helicopter Regiment targeted vehicles being used by militants near the town of Konna.

Two air force Dassault Mirage F1CR armed reconnaissance aircraft and six Mirage 2000Ds, which were already based in N'Djamena in Chad, were also called into strike action, supported by three Boeing C-135 tankers. These were subsequently joined by four Dassault Rafale Bs and two more tankers, which arrived at the base following a long-range strike mission launched from Saint-Dizier air base in France.

The Mirage F1s were redeployed to Bamako airport near the Malian capital on 14 January,

and were later followed by several army Eurocopter SA330 Puma transport helicopters.

A combined total of five French Lockheed Martin C-130H and C160 Transall transports are also involved in the campaign, along with navy ATL-2 Atlantique surveillance aircraft.

Additional aircraft – including Boeing C-17s owned by Canada and the UK, C-130HJs from Belgium, and Denmark and German Transalls – were made available to deliver personnel, equipment and armoured vehicles to Bamako, with Belgium also having agreed to deploy two AgustaWestland AW109 helicopters to support medical evacuation tasks.

The French defence ministry says 1,700 of its troops were involved in the Serval campaign as of 15 January, including 800 personnel deployed into Mali from Chad. Paris launched its military action to support the Malian government under the auspices of UN resolutions 2056 and 2085.

"We will continue these activities as long as necessary," says French defence minister Jean-Yves Le Drian, adding: "Our commitment to the fight against terrorism is complete." ■



For commentary on the latest defence news, visit our blog at flightglobal.com/dewline

ORDERS DAVID KAMINSKI-MORROW TOULOUSE

Late A320 deal pushes Airbus past 900-mark

Unidentified customer boosts airframer's gross order total for 2012 to 914 jets, far above original target of 650 units

Sixty regular Airbus A320s for an unidentified customer have helped push the airframer's gross order total for 2012 to 914 jets. While still trailing Boeing's gross figure of 1,339, the Airbus total is far above its original target of 650. The airframer also delivered 588 aircraft, worth \$76 billion, exceeding its mid-year estimate of 580.

Chief operating officer for customers John Leahy says Airbus revised its order target in the summer to "try to get to 900". He adds that of 140 sales campaigns last year, "about half worked".

As well as the order for 60 A320-family jets signed on 31 December, the total includes three A330-300s, also for an undisclosed customer. Chief executive Fabrice Brégier says Airbus "overachieved" in 2012, noting increased production rates for the A320 and A330. Airbus's net order figure for the year was 833 against Boeing's 1,203, giving the European airframer a

41% share of the combined \$231 billion in revenues. The rivals' total order backlog reached more than 9,000 aircraft, of which Airbus accounted for 4,682. But Airbus's A320neo firmly leads the Boeing 737 Max in terms of firm backlog, with 62% of the 2,798 orders.

While the A320neo took 478 net orders last year, Airbus still managed to sell 261 of the baseline A320 variants. A320 deliveries rose to 455, a new record for the company. Twenty-seven A350s and 58 A330s and A340s featured in the net order total, although A380 sales dwindled to nine.

Airbus expected the popularity of the 737 Max to hand Boeing a strong year, but Brégier insists he is not disappointed: "We see we are still enjoying a leading position on the [A320neo] following a small catch-up from Boeing. We are still on the right track."

Boeing delivered 601 jets in 2012, 13 more than Airbus. ■

JET AIRLINER DELIVERIES, ORDERS AND BACKLOG

	2012		2011	
	Deliveries	Net orders	Deliveries	Net orders
Airbus				
A320ceo*	455	261	1,895	421
A320neo	0	478	1,734	0
A330	101	58	306	87
A340	2	0	0	-2
A350	0	27	582	0
A380	30	9	165	26
TOTAL	588	833	4,682	534
Boeing				
737NG	415	210	2,010	372
737 Max	0	914	1,064	0
747-8	31	1	67	9
767	26	22	68	20
777	83	68	365	73
787	46	-12	799	3
TOTAL	601	1,203	4,373	477
GRAND TOTAL	1,189	2,036	9,055	1,011
■ NOTE: *A320 current engine option. Data includes corporate versions. SOURCE: Manufacturers				

NOTE: *A320 current engine option. Data includes corporate versions. SOURCE: Manufacturers

ANALYSIS MAX KINGSLEY-JONES LONDON

How Boeing won output and order races in 2012

Boeing has stolen Airbus's delivery crown after Toulouse's near-decade on top in a clean sweep that also saw it become top dog in the order stakes. Although Airbus's output rose by 10% in 2012 to a record 588 deliveries, its US rival surpassed the European airframer's tally by 13 aircraft.

Boeing's total of 601 deliveries is its second-highest airliner output ever, 14 units shy of the record 620 shipments in 1999. That high-water mark was set as Boeing integrated the production of MD-80/90 and MD-11 aircraft at the now defunct Long Beach plant in California.

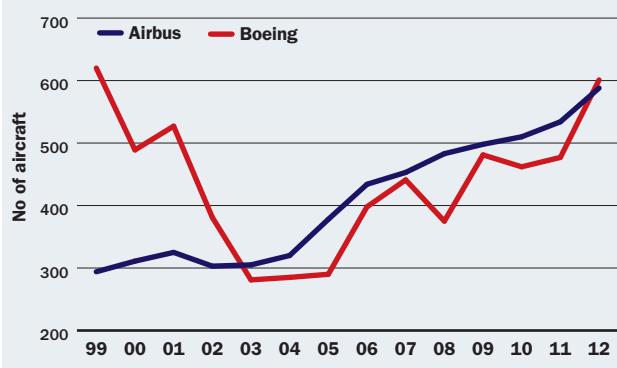
Overall, mainline airliner deliveries increased by 18% in 2012

to a record 1,189 aircraft, exceeding the 1,000-unit mark for a second successive year.

Airbus has also found itself in the unusual position of trailing Boeing in the order stakes. Airbus secured 833 net orders, against 1,203 for its rival, which was playing catch-up after being soundly beaten in 2011. The US airframer last headed Airbus in net orders in 2007.

Airbus retains bragging rights in the backlog stakes, however, with its 4,682 orders representing a 52% market share. The two protagonists' total backlog has now broken through the 9,000 mark, standing at 9,055 aircraft. ■

AIRBUS/BOEING DELIVERIES – 1999 TO 2012



SOURCE: Manufacturers

FORECAST DAVID KAMINSKI-MORROW TOULOUSE

Toulouse sets high delivery bar

Airbus aims to deliver more than 600 aircraft in 2013 and keep its book-to-bill ratio above unity. The airframer is looking to secure gross orders for 700 jets.

Chief operating officer for customers John Leahy says the airframer "has to have some reality in the orderbook" to avoid upsetting the delivery process. Airbus intends to hand over 25 A380s this year, an output dampened by the need to modify wing production to fix a bracket-cracking problem. It had previously admitted the figure would fall below the 30 achieved in 2012. But Airbus also

aims to secure an equal number of orders for the double-deck type.

Airbus chief executive Fabrice Brégier says the transition to the modified A380 wing – which will be standard on aircraft delivered from 2014 – means the airframer will "miss a month [of production], more or less".

Qatar Airways was scheduled to take A380s at the end of 2013 but Brégier says new customers do not want a mix of old and new wings. He says there will be a "shift" of aircraft from 2013 to 2014 but Airbus will still manage "close to" 60 A380 deliveries. ■



SAFETY MICHAEL GUBISCH & KATE SARSFIELD LONDON

Crash prompts debate over city helicopter use

A fatal crash in central London on 16 January, in which a helicopter struck a gantry crane, has sparked debate on rotorcraft use above built-up areas.

Kate Hoey, MP for Vauxhall, the area of London where the aircraft came down, has called for an inquiry into the "increasing numbers of helicopters flying around London" among so many new high-rise buildings: "Maybe we've come to take it almost for granted that people have the right to take their helicopter over London at any time, and I think we may have to look at that."

The accident occurred at about 08:00 local time when the Agusta-

Westland AW109, operated by Redhill, Surrey company Rotor-Motion, struck the crane on top of One St George Wharf and then crashed on to Wandsworth Road, south of the river Thames. Debris killed one person and injured 13 others on the ground. The pilot, Capt Peter Barnes, also died.

The AW109 had been on a commercial flight from Redhill to Elstree, Hertfordshire, when it requested to divert to London Heliport, which is near the crash site.

Conditions were poor at the time of the accident, with visibility down to about 600m (1,970ft) and a ceiling of 100ft in freezing fog, according to weather data. ■



Re Features

The AW109 hit a gantry crane atop One St George Wharf, London



Saab

Stockholm will purchase 60 of Saab's flagship fighter

COMBAT AIRCRAFT CRAIG HOYLE LONDON

Sweden approves Gripen E deal

Sweden's government has approved a proposal by the armed forces to acquire 60 Saab Gripen E combat aircraft, delivering a major boost for the developmental version of the manufacturer's flagship product.

Confirmed on 17 January, the decision to field the new aircraft from 2018 is also of significance to the Swiss government, which last year signed a framework agreement with its Swedish counterpart to jointly advance the E-model programme.

Switzerland has selected the type under a requirement to buy 22 new aircraft to replace its Northrop F-5 fighters, with first

deliveries sought from mid-2018. A Swiss evaluation team conducted its most recent flights using a two-seat development aircraft for the Gripen E from Saab's Linköping site last December. The activity involved verifying the successful integration of the multirole type's Selex Galileo Raven ES-05 active electronically scanned array radar, Saab says.

The Swedish government had included a proposal to buy between 40 and 60 new-generation Gripen as part of its Budget 2013 process, which was launched last year. Final deliveries of the type are expected to be made in 2027 under its approval for the deal. ■

PROCUREMENT GREG WALDRON SINGAPORE

Seoul weighs options in F-X III contest

Industry sources say South Korean decision expected by mid-year with focus on technology transfer for indigenous fighter

South Korea could make a decision in its F-X III fighter competition by mid-year, placing considerable emphasis on offsets and technology transfer.

Industry sources expected a choice to be made between the Boeing F-15 Silent Eagle, Eurofighter Typhoon and Lockheed Martin F-35 in late 2012, but one says the step was delayed by South Korea's presidential elections on 19 December. "The Defence Acquisition Programme Administration [DAPA] is still looking at costs involved with the various aircraft," says one source. "They have yet to

start really pushing for ways to push costs down. We're still some way from a conclusion, but have heard that a decision could come by mid-2013."

Boeing, Eurofighter and Lockheed submitted formal bids for the 60-aircraft requirement in June, with the winner to replace the South Korean air force's aged McDonnell Douglas F-4E Phantoms.

Seoul still appears insistent about using the F-X III deal to gain technological know-how for its K-FX indigenous fighter programme, which it sees as a possible replacement for its Lockheed

F-16s. One source involved in the contest says queries from the DAPA in recent months have been focused on technology transfer, while another says the issue of K-FX frequently comes up in meetings about the deal.

The stealth characteristics and payload capacities of the candidate airframes are among other critical considerations. Sources say the F-35 and F-15SE are seen as the front-runners for the requirement, with evaluation teams having visited the USA last year to evaluate the pair.

Boeing says the F-15SE will

offer a degree of stealth in the early days of a conflict via its use of conformal weapons bays, which can be removed after enemy air defences have been suppressed.

Lockheed permitted detailed examinations of production aircraft and viewings of both simulator and actual flights, the latter involved observing the type from a two-seat F-16.

Eurofighter evaluations took place in Spain in mid-2012 and totalled 15 flights. ■



For commentary on the latest defence news from Asia, visit
flightglobal.com/asianskies



**Future A350
pilots to 'learn
by doing'**
AIR TRANSPORT P12

THIS WEEK

LITIGATION DAN THISDELL LONDON

Airline sued over jet fuel tax dodge

Chicago transport authority claims it has been deprived of some \$300m through use of "sham" office in rural Illinois

Chicago's bus and train operator the Regional Transport Authority (RTA) has accused United Airlines and American Airlines of depriving taxpayers of some \$300 million in the past seven years by dodging sales tax on jet fuel bought for use at the city's O'Hare airport.

The RTA – which has filed a lawsuit against United but deferred formal action against American as that airline is in bankruptcy protection – says the two carriers should pay Chicago and Cook County taxes as they operate from headquarters in Chicago but have been “accepting” fuel from part-time-staffed “sham” offices in Sycamore, Illinois, a town of only 17,600 inhabitants in DeKalb County, more than an hour’s drive away.

The RTA alleges the offices are “rarely occupied and, in at least one case, don’t appear to even have a computer” but both multi-billion-dollar carriers claim they purchase their jet fuel via those offices. “The companies have entered into 25-year agreements with Sycamore, guaranteeing the city as much as a half-million dollars every year that the airlines are allowed to claim that they ‘accept’ jet fuel there,” says the RTA.

Most states collect sales tax based on where products are received. Illinois is one of only a few that collects sales tax based on where a company claims a purchase was accepted.

The RTA alleges the airlines should be paying tax at 9.5%, instead of the 8% levied by Sycamore.



ryan122_galley on flightglobal.com/AirSpace

United Airlines denies any wrongdoing from its arrangement

more. In a “tax fairness video” released with the lawsuit, the RTA details lost taxes since 2005 as \$133 million by the city of Chicago, \$60 million by Cook County, and \$96 million by the RTA. Joe Costello, RTA executive director, says: “Governments across the country have been forced to do more with less. [We] have had to work with constrained budgets and have needed

to raise fares and reduce service because the money’s just not there. Now we know why.”

The lawsuit comes about 18 months after the RTA filed similar lawsuits against Kankakee and Channahon, municipalities with similar tax-avoidance deals.

Neither airline would comment on specifics of the lawsuit but denied doing anything illegal. ■

REQUEST FOR PROPOSALS

Comprehensive project for the procurement of a service for supplying a new tool for the management of Aeronautical Materials and Maintenance for Aerolíneas Argentinas and Austral Líneas Aéreas.

Bidding terms and conditions shall be collected Free of Charge until February 27th, 2013 Opening of Bids February 28th, 2013 at 05:00 pm.

For further details contact us at:
gerenciadecompras@aerolineas.com.ar

**Aerolíneas
Argentinas**

REQUEST FOR PROPOSALS

Aerolíneas Argentinas (AR) is launching two RFP in order to support the engines and the components of B737NG fleet.

In order to receive details of the RFP, please confirm before Jan 27, 2013 your interest in participating to the following e-mail address:

hflombau@aerolineas.com.ar

**Aerolíneas
Argentinas**



Aero IAS

Airbus estimates it will need to prepare about 9,000 pilots to cope with its backlog of 582 XWB-family aircraft

DEVELOPMENT DAVID LEAROUNT TOULOUSE

Future A350 pilots to 'learn by doing'

Airframer develops radical changes to training regime ahead of entry into service of its new long-haul twinjet in 2014

Airbus is using its preparations for the entry into service of its A350 in the second half of 2014 to radically change the way it trains pilots for today's aircraft.

With 582 A350-family aircraft on order, says Airbus, it will need to prepare 9,000 pilots to operate the fleet.

Having studied data as diverse as the techniques young people use to become adept on computers and the facts of pilot involve-

ment in accident causes during the last 15 years, Airbus has developed a programme for trainee A350 pilots to "learn by doing".

The principle echoes the way in which people – especially children – frequently ignore the quick-start guide when handling a new electronic device. Instead, they simply turn it on and start to find out how it works by experimenting, says Airbus.

As Christian Norden, Airbus's

head of flightcrew development points out, this not only leads to quick learning, but "it is also more fun".

Accident and incident data for the last 15 years unequivocally shows that, across the world's fleet, pilots' manual aircraft management skills are declining significantly. As a result, Airbus plans to use the hands-on learning process for pilots to familiarise themselves with the aircraft and

its manual handling characteristics once they begin the course, using a range of training devices including a full flight simulator.

As the trainees become more familiar with their environment, and more confident about handling the aircraft, they also gradually gain expertise at using the appropriate automated systems.

Airbus has made a science of studying the skills needed specifically to fly the world's highly automated aircraft, and came up with more than 300 essentials, says Captain David Owens, head of flightcrew training policy.

It has boiled these down to three "golden rules": "Fly, navigate and communicate [in this order and with appropriate task-sharing]; use the appropriate level of automation at all times; understand the flight mode annunciator at all times; take action if things do not go as expected]."

Owens says that pilots should be more ready to disengage automatic systems if they are not happy with what they see, and that the training regime should better prepare them to do this. ■

SUPPLIERS DAVID KAMINSKI-MORROW LONDON

Airbus may safeguard production with Alestis investment

Airbus is not ruling out a potential investment in Spanish supplier Alestis Aerospace in order to safeguard the production of vital components for its aircraft programmes.

Alestis builds important aero-structures for the A350 programme – including a crucial part of the section 19 tail cone – as well as fairings for the aircraft.

Alestis has been struggling to emerge from financial problems which, early last year, forced the company into administration and led it to draw up a restructuring strategy.

In September 2012, the company said the restructuring plan was es-

sential to obtaining funding, addressing a lack of liquidity, and preventing the "inevitable closure" of its 11 plants and the "disappearance by liquidation" of the company.

There is "no decision" on a possible investment in Alestis, says Airbus, but such a move is being considered. The airframer says it is "not discounting any solution" which will protect the production line.

"Despite the fact that the financial situation continues to be challenging, Alestis continues to deliver on its contractual obligations – on time and on quality – showing a stabilisation in its performance," says

Airbus. Among its recent achievements have been delivery of the tail cone for the flight-test A350 to the Toulouse final assembly line.

However, Airbus will not hand the company a contract for the same section on the -1000 variant in its current state. Fabrice Brégier, Airbus chief executive, insists that Airbus would be "crazy" to award a crucial section on a flagship programme to a "bankrupt company".

Airbus has previously stepped in to prevent suppliers' financial woes from affecting production, taking a shareholding in tubing and structures company PFW Aerospace. ■



David Learmount comments on operational and safety issues at flightglobal.com/learmount



Falko lifts
performance for
RJ85 operators
AIR TRANSPORT P14

AIR TRANSPORT

SAFETY DAVID KAMINSKI-MORROW LONDON

Transaero waits on Red Wings probe

Carrier keeps Tu-214 fleet grounded pending the results of investigation into rival's fatal overrun at Moscow Vnukovo

Russian carrier Transaero is keeping its Tupolev Tu-214 twinjets grounded pending the results of the investigation into the Red Wings Tu-204 crash at Moscow Vnukovo.

The airline says it has carried out a "comprehensive review" of its three Tu-214s, in the wake of the fatal Red Wings overrun on 29 December, in line with directives from the federal transport supervisor Rostransnadzor.

Rostransnadzor has been gathering data on incidents involving the Tu-204 and Tu-214 following the accident, which occurred little more than a week after another Tu-204 overran – without injuries – at Novosibirsk. "No defects were detected during the [Tu-214] review," says Transaero. "All the airline's Tu-214s were acknowledged to be in a normal state."

However, Transaero says its management has "kept in force" a decision to suspend Tu-214 operations. The carrier has deployed Boeing 737-800s and 767s to operate services in place of the Russian-built type. "The decision on resuming Transaero's Tu-214 air-



Transaero says inspections did not reveal any issues with its examples of the Tupolev type

craft flights will depend on the results of the official accident investigation," the airline adds.

Transaero originally ordered 10 Tu-214s but only took delivery of three. But the carrier agreed last year to lease a pair of Tu-204-100C freighters through a deal with lessor Ilyushin Finance.

It had also been considering the modernised version of the Tu-204, designated the Tu-204SM, which has failed to attract significant customer interest beyond a tentative

agreement with Red Wings to acquire the type.

Russian federal aviation regulator Rosaviatsia's latest aircraft registry, issued in early January 2013, lists 30 Tu-204s and Tu-214s associated with various carriers in the country.

Red Wings has nine Tu-204s, while the presidential air wing has two, along with seven Tu-214s. Other operators include Vladivostok Avia, with six, and Aviastar-Tu, with three.

Rosaviatsia has directed operators to make further inspections of thrust-reverser systems on Aviadvigatel PS-90 engines, which power the Tu-204 and Tu-214. Its latest advisory centres on checking locking mechanisms and verifying the results of moving the thrust-reverse control lever to various stops between minimum and maximum reverse. ■



Keep up to date with aviation safety at our dedicated channel: flightglobal.com/safety

CABINS DAVID KAMINSKI-MORROW TOULOUSE

Reconfigured A321neo to raise seating capacity

Airbus has formally launched a reconfiguration programme for the A321neo, which will enable the new twinjet to accommodate up to 236 passengers.

The programme, details of which were disclosed by Flightglobal in December, has been officially unveiled by the airframer.

Airbus is offering new cabin options on the type from the second half of 2017.

The first option involves installing an extra overwing exit to overcome exit restrictions which limit the A321neo – and the current A321 – to transporting a maximum of 220 passengers.

When this option is combined with Airbus's "Space-Flex" aft cabin, the type's seating can be increased by 16 to a total of 236.

Airbus says this will lead to a 5% reduction in seat-mile costs.

The second option involves de-activating a forward exit – door 2, immediately forward of

the wings – to create an undivided forward cabin.

The airframer has yet to disclose a potential launch customer for the reconfiguration options on the twinjet. ■



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SAFETY KRISTIN MAJCHER WASHINGTON DC

FAA to extend its ‘sterile cockpit’ rule for crews

Agency moves to restrict in-flight use of personal electronic equipment following cases where pilots were distracted

Crew members could soon be prohibited from using electronic devices or laptops for personal use during all phases of flight, under a proposal by the US Federal Aviation Administration.

A notice of proposed rulemaking published on 15 January would bring flightdeck rules regarding the use of personal electronic devices in line with the FAA Modernisation and Reform Act of 2012.

This law makes it illegal for flightcrew to use electronic devices for personal use while at their duty station.

The congressional act permits the crew to use these devices for operating the aircraft, as well as for “safety-related” and “employment-related” communications allowed under a carrier’s operating procedures.

In some parts of flight the use of these electronic devices is mandated by the 1981 “sterile cockpit” rule, the notice says.

This prohibits flightcrew from partaking in activities unrelated to safety that could cause distraction, but only during critical phases of flight. These include

taxiing, take-off, landing and flight below 10,000ft (3,050m).

Several past incidents prompted Congress to tighten the rules on personal electronics use, the FAA points out.

Two Northwest Airlines pilots on an Airbus A320 flight from San Diego to Minneapolis overflew their destination airport by

The FAA points to an instance when a pilot sent a text message on her personal phone while the aircraft was taxiing

150nm (280km) in October 2009. The pilots told National Transportation Safety Board investigators they were using personal laptops during the flight.

The FAA also points to an instance when a pilot sent a text message on her personal phone while the aircraft was taxiing.

Its proposed rulemaking will be open for comments until 60 days after publication. ■



Houridzane gallery on FlightGlobal.com/AirSpace

The lessor says the modification is exclusive to its aircraft

OPERATIONS DAVID KAMINSKI-MORROW LONDON

Falko lifts performance for Avro RJ85 operators

BAE Systems Avro RJ85 regional jets will be able to operate from high-elevation airports following approval of a modification for the four-engined type. The modification allows the disabling of a system which automatically deploys passenger oxygen masks above a certain altitude.

Aircraft lessor Falko – which emerged from the spin-off of BAE’s leasing arm – has developed the high-altitude modification in co-operation with the OEM. It will allow the RJ85 to operate at airfields with elevations up to 13,400ft (4,080m), far higher than the previously certificated limit of 8,000ft.

Falko says the change is exclusively available on its aircraft and was approved by the European Aviation Safety Agency towards the end of 2012.

It says the modification, which

is provided as a kit, allows the triggered release of oxygen masks to be overridden.

“We’re in the process of signing up [the first customers],” says executive vice-president of sales and marketing James Greenstreet, who adds that the company has two or three prospective clients with aircraft used in differing operations.

While BAE also produced the RJ100, the RJ85 has been identified as the more likely candidate for high-elevation airfield service – notably in South America where carriers operate British Aerospace 146s to remote airports.

“With the addition of the high-altitude modification our fleet of RJ85 aircraft are now able to operate to those airfields which until now have been out of reach to the type,” says Falko sales and marketing director Chris Sedgwick. ■

United Aircraft



LIVERY

Lao unveils its first Superjet

Lao Central Airlines’ first Sukhoi Superjet 100 has been fully painted in the Asian carrier’s livery at Russia’s Ulyanovsk finishing facility. The aircraft, number 95026, is the first of three 93-seat airframes due to be delivered to the airline. Lao Central will take the aircraft “early this year”, says Sukhoi, and the airline has options for six more. Authorities in Laos recently approved the twinjet through validation of its type certificate. The carrier will operate the Superjet on such routes as Bangkok, Ho Chi Minh City and Singapore.



Seoul picks AW159 for maritime deal
DEFENCE P16

SAFETY DAVID KAMINSKI-MORROW LONDON

A319 hard-landed during dual input on go-around

UK investigators have determined that the pilots of an EasyJet Airbus A319 made dual control inputs during a go-around, failing to prevent the aircraft from suffering a severe hard landing at Luton.

As the aircraft descended below 50ft (15m), its descent rate rose from 600ft/min (3m/s) to nearly 900ft/min, and both pilots initiated a go-around, having sensed that the aircraft was sinking too rapidly in the final stages.

But the A319's captain did not use the sidestick takeover button, with the result that his pitch-up input was countered by a pitch-down input from the flying pilot – a captain under training.

Investigators suggest the captain under training suffered "momentary confusion" between the actions of his left and right hands, because he pushed forward on the sidestick and briefly pulled the

throttle back to idle. The captain pulled his own sidestick aft but failed to push the takeover button, with the result that the dual pitch inputs were summed and generated a net 7° nose-down input.

In its analysis of the incident, the UK Air Accidents Investigation Branch says this dual-input interval lasted around 4s. "The [captain] made a nose-up control input on the sidestick but did not use the takeover push-button to establish control," it states. "So the effect was limited to reducing the magnitude of the nose-down input made by the [flying pilot]."

This was not enough to avoid runway contact and the A319 touched down on all three landing-gears at the same time, with an impact of just under 3g. While there were no injuries among the 148 occupants, the three undercarriage struts exceeded their maximum loads and had to be replaced.



Ryan142 gallery on flightglobal.com/AirSpace

Investigators said use of the takeover switch was not instinctive

If the captain had used the takeover button, says the AAIB, the severe hard landing might have been prevented but it says the flying pilot's nose-down input, the opposite of that expected, probably took the captain by surprise. "The sidesticks move independently," says the AAIB. "So [the captain] would have had no knowledge of the inputs being made by the [flying pilot] until the

flightpath of the aircraft changed." It also cites previous Airbus incidents – involving Skyservice, Aer Lingus and Lufthansa – to illustrate that use of the takeover button is not "instinctive".

Despite the impact the A319 (G-EZVF), under the captain's control, completed the go-around and landed safely. It had been arriving from Faro on 14 February last year. ■

INVESTIGATION DAVID KAMINSKI-MORROW LONDON

Overrun pilots ignored flap fault drills

TAME Embraer 190 crew failed to follow correct procedures after notification of control-surface problem during Quito landing

Correct procedures for flap failure were not followed by the crew of a TAME Embraer 190 before landing at Quito and overrunning the runway, Ecuadorian investigators have determined. As the aircraft descended towards runway 35, after arriving from Loja, its centralised monitoring system alerted the crew to a flap and slat problem.

Ecuador's Junta Investigadora

de Accidentes (JIA) says the pilots tried five times to reset the flaps but the slats would not deploy and the flaps would only move to position 2. The crew, however, decided to continue the approach with the high-lift surfaces in these positions, "without carrying out" the appropriate Embraer procedure in the quick-reference handbook, says the JIA.

JIA analysis calculated the aircraft's reference speed for this configuration at 149kt (276km/h), and the actual landing distance at 1,950m (6,400ft). The 3,120m runway was wet with average braking action. But the aircraft was still travelling at 164kt while 50ft above the ground, and 80m before the threshold. Although the pilots intended to land close to the threshold to provide maximum distance for stopping, the aircraft floated and did not make runway contact until 880m beyond.

After touchdown, the aircraft travelled for 70m before the spoilers deployed, another 330m before thrust-reversers were activated and a further 380m before braking started. Full braking was not applied until 2,300m past the threshold. The aircraft, transporting 97 passengers and six crew, failed to stop in the available distance.

After overrunning the runway,

the 190 crashed through six instrument landing system antenna structures before striking a perimeter wall and coming to rest 300m from the end of the runway. It suffered severe damage, mainly to its undercarriage and the underside of its fuselage, as well as to the leading edges of its wings. Investigators discovered maintenance records showed 53 slat-flap failure messages in the two months preceding the 17 September 2011 accident.

The inquiry questioned whether corrective measures were being properly applied and has recommended the operator put more robust analytical processes in place. But the inquiry primarily attributes the accident to the crew's failure to follow correct procedures for dealing with the flap problem.

JIA investigators add that the pilots "did not respect" the need for a sterile cockpit, to the detriment of their concentration. ■



Several navigation masts and a wall were demolished in the crash



OPERATIONS CRAIG HOYLE LONDON

RAF reviews transport, tanker retirement plans

Faced with a looming shortfall in its ability to perform air-to-air refuelling and tactical transport duties, the UK Ministry of Defence has moved to extend the planned out-of-service deadlines for three of its aged types.

Due to have been retired in December, some of the Royal Air Force's eight Lockheed Martin C-130K transports will remain in use until October, although the service says "further extensions may be considered, dependent on operational requirements".

Dating to the mid-1960s, the K-model Hercules will be replaced by 22 Airbus Military A400Ms, with the RAF's first example due to be delivered next year. Extending use of the current type carries an associated cost of £16 million (\$26 million), according to the UK National Audit Office's (NAO) 10 January Major Projects Report.

Steps are also being taken to address any potential tanker shortfall created by a decision in the UK government's 2010 Strategic Defence and Security Review to accelerate the retirement of the RAF's Lockheed TriStar and Vickers VC10 fleets.

This called for the latter to leave use in March 2013, but the NAO says: "The Department is currently exploring an extension of a few months to that date to provide additional refuelling capability."

TriStar operations will continue beyond a planned July 2013 end date until March 2014, for an additional cost of £7 million, the NAO says. This would be only two months before the AirTanker consortium is scheduled to declare full capability with a new fleet of Airbus A330 Voyagers, three of which are already in use in the passenger transport role. ■



Airbus Military

PRODUCTION

First A400M flies French colours

The first series production example of the A400M Atlas has emerged from the paint hangar at Airbus Military's San Pablo final assembly site in Seville, Spain, carrying the markings of launch operator the French air force. Following an earlier five "Grizzly" development aircraft currently involved in a flight test programme, MSN7 is due to be delivered by the end of the second quarter of 2013, as France's first of 50 A400Ms. A total of 174 Atlas transports are on order for Belgium, France, Germany, Luxembourg, Malaysia, Spain, Turkey and the UK.

ROTORCRAFT CRAIG HOYLE LONDON

Seoul picks AW159 for maritime deal

South Korean selection marks first export success for AgustaWestland type, following eight-aircraft contest with MH-60R

AgustaWestland expects to close the first export sale of its AW159 Wildcat in weeks, after South Korea selected the type for a maritime helicopter requirement initially totalling eight aircraft.

South Korea's Defence Acquisition Programme Administration announced the development on 15 January, the decision following a competition between the

new-generation version of the Lynx and Sikorsky's MH-60R Seahawk. The evaluation was based on criteria including cost, performance and operational suitability with the Republic of Korea Navy's future frigates, it says.

AgustaWestland parent Finmeccanica says a contract will value around \$560 million, with its stake to be worth about €270

million (\$358 million). The airframer, meanwhile, says the win "will help sustain several hundred jobs" at its Yeovil production site in Somerset, the UK.

Roles to be undertaken by the AW159 for South Korea will include anti-submarine and anti-surface warfare tasks, maritime surveillance, and search and rescue duties, with AgustaWestland saying the type will carry anti-ship missiles, torpedoes and a door-mounted gun. Other mission equipment will include an active dipping sonar, nose-mounted electro-optical/infrared sensor, a 360° surface search radar and a rescue hoist, it adds.

Deliveries of the LHTEC CTS800-4N-powered aircraft will take place in 2015 and 2016.

The South Korean navy has an active inventory of 24 Lynx 99/99A maritime helicopters,

which Flightglobal's Ascend Online database records as delivered between 1989 and 2000.

Seoul's selection of the AW159 is an important development for AgustaWestland, after it lost out late last year in a nine-aircraft contest with the MH-60R in Denmark. The company is already manufacturing 62 Lynx Wildcats for the UK armed forces, with the type due to enter service with the British Army in August 2014 and the Royal Navy in January 2015, according to the UK National Audit Office. "We are confident that, thanks to this significant result achieved in South Korea, this model will be able to find further opportunities in other markets," says Finmeccanica chief executive Giuseppe Orsi. ■



AgustaWestland

The Wildcat is already in production for the UK Royal Navy



Keep track of news from the defence aviation sector at flightglobal.com/defence



**US Army fields first
AH-64E unit, more
upgrades to come**
DEFENCE P19

REPORT DAVE MAJUMDAR WASHINGTON DC

Pentagon drops F-35 performance bar

Transonic acceleration and sustained turn rate specifications reduced for all three variants following flight evaluation work

The US Department of Defense is lowering the performance bar for Lockheed Martin's F-35 Joint Strike Fighter, according to a new report by the Pentagon's director of operational test and evaluation (DOT&E), J Michael Gilmore.

Transonic acceleration and sustained turn rate specifications have been reduced for all three variants, with the US Navy's carrier-based F-35C the worst hit in terms of acceleration.

"The programme announced an intention to change performance specifications for the F-35C, reducing turn performance from 5.1 to 5.0 sustained g's and increasing the time for acceleration from Mach 0.8 to M1.2 by at least 43sec," says the report. "These changes were due to the results of air vehicle performance and flying qualities evaluations."

ACCELERATION SLIP

Comparable acceleration times for the US Air Force's conventional take-off and landing F-35A and the US Marine Corps' short take-off and vertical landing F-35B have also slipped, by 8sec and 16sec respectively.

However, their sustained turn rates have been impacted more severely than the USN variant, with the F-35A falling from 5.3g to 4.6g and the B-model from 5g to 4.5g.

All three variants are also suffering other problems.

"Horizontal tail surfaces are experiencing higher than expected temperatures during sustained high-speed/high-altitude flight, resulting in delamination and scorching of the surface coatings and structure," the report says.

"All variants were restricted from operations outside of a reduced envelope until the test team added instrumentation to the tailbooms to monitor temperatures on the tail surfaces."

The F-35B and C variants continue to have issues with transonic roll-off and buffeting, with new vehicle systems software having



Lockheed Martin

Wing spoilers could be added to fix roll-off issues with the F-35C

been introduced in a bid to reduce rudder and flaperon hinge movement in the transonic/supersonic region.

The issue is more severe on the F-35C, because of its larger wing, and could potentially be addressed by the addition of wing spoilers, the report says.

Comparable acceleration times for the USAF's F-35A and Marine Corps' F-35B have also slipped, by 8sec and 16sec respectively

The type's crucial helmet-mounted display still has problems with jittery images and is not meeting specifications for night vision acuity, with a so-called "green glow" problem having arisen, caused by light "leaking" from the cockpit avionics displays.

Image latency from the aircraft's distributed aperture system is now within tolerances,

the report states, but still "requires additional testing to verify adequacy".

Perhaps in worst shape is the F-35's software. According to the report, 20% of the initial Block 1 software package remains to be delivered and flight tested, while a first version of the more advanced, but still not combat capable Block 2A standard was delivered to flight test four months late.

"The programme made virtually no progress in the development, integration and laboratory testing of any software beyond [Block] 2B," the report says.

"Block 3i software, required for delivery of Lot 6 [production] aircraft and hosted on an upgraded processor, has lagged in integration and laboratory testing," it warns.

Structural durability testing of the F-35B was also halted in December 2012, "after multiple cracks were found in a bulkhead flange on the underside of the fuselage" during a 7,000h inspection, the report reveals.

Analysis of the issue was ongoing as the DOT&E report was being finalised.

Lockheed says it believes the F-35 programme is "demonstrating exceptional stability, certainly significantly greater than any legacy aircraft development programme.

"From an operational test and evaluation perspective, we fully expect to deliver a qualified product to OT&E, as scheduled," it adds. "Further, similar and effective progress is being made across software development, structural test and equipment qualification, per the technical baseline review plan."

Meanwhile, the USAF and the Pentagon's Joint Program Office are working to bridge a gap between their and Lockheed's estimates of the F-35's cost per flight hour. "I think the folks in the programme office and the folks at Lockheed Martin are getting to a point where they understand exactly what the numbers are," says air force chief of staff Gen Mark Welsh. "What number we're going to use, I don't know yet."

SUSTAINMENT COSTS

Welsh says the USAF has started to gather real world data on F-35 sustainment costs from training operations at Eglin AFB in Florida. "That will get more and more definitive as we fly more and more aircraft," he notes.

Separately, Turkey's Undersecretary of Defence Industries (SSM) procurement agency has delayed the purchase of the nation's first F-35As by one year, saying that the aircraft's technical capabilities are "not at the desired level yet".

The government in Ankara had launched talks with Lockheed after giving its approval for an initial two-aircraft purchase in January 2012, but remains committed to eventually acquiring 100 F-35s under a roughly \$16 billion programme, the SSM says. ■

Additional reporting by Tolga Ozbek in Istanbul



For more commentary on the Pentagon's F-35 report, visit flightglobal.com/dewline

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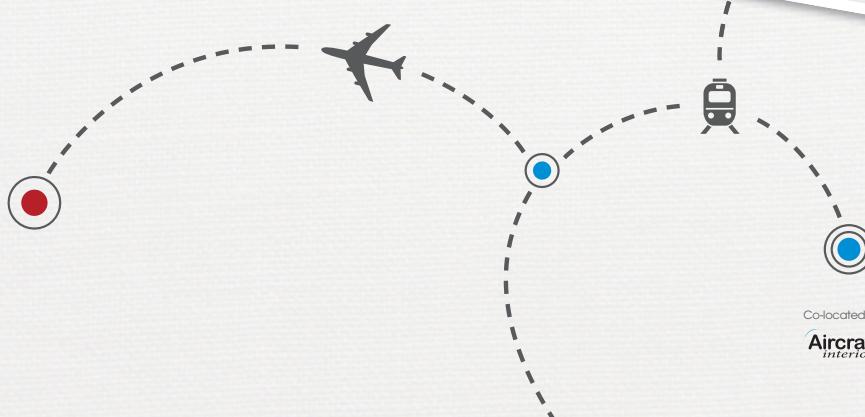
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Development milestones lift Cessna
BUSINESS AVIATION P20

ROTORCRAFT DAVE MAJUMDAR WASHINGTON DC

US Army fields first AH-64E unit, more upgrades to come

Future enhancements to extend range and targeting capability of Apache's Longbow radar

Even as the US Army moves forward with fielding its first unit of Boeing AH-64E Block III attack helicopters, the service is planning to add further improvements to the Apache gunships.

"We are currently fielding the 'first unit equipped' unit with Echo-models, and we're on track to meet that fielding schedule," says Col Jeff Hager, the army's Apache programme manager. Boeing has so far delivered 28 of 51 low-rate initial production examples, and in 2013 will start producing full-rate production aircraft for an eventual total of 634 helicopters, he adds.

But while the AH-64E transitions into full-rate production, some systems engineering work remains, Hager says. The changes, which will come in production Lots 4 to 6, include better embedded diagnostics for improved maintenance. The Apache will also gain a Link 16 datalink, plus



Boeing has delivered 28 of an eventual 634 Block III aircraft

improvements to its mast-mounted Northrop Grumman APG-78 Longbow fire control radar, which will improve the sensor's range and add an overwater capability.

Hager says the army has yet to decide how the overwater capability would be used, but the radar and Lockheed Martin AGM-114 Hellfire air-to-surface missiles could be deployed in concert to attack landing craft or small warships. An active electronically scanned array radar could also be added in the future.

Meanwhile, a new cognitive decision aiding system will help the pilot and crew with tasks "that tend to get a little cumbersome at times," Hager says.

The US Army also intends to support Boeing's efforts to sell additional Apaches to international customers, Hager says. Selections of the E-model aircraft have already been made by India, Indonesia, Saudi Arabia and Taiwan, according to Flightglobal's Ascend Online database. ■

See Feature P30

CONTRACT

ST Aerospace to overhaul Omani Hercules fleet

Singapore-based maintenance and overhaul company ST Aerospace has been awarded a contract to perform a major modernisation of Oman's three Lockheed Martin C-130H tactical transports.

Work on the first Hercules will commence in Singapore in the third quarter of 2013, with the transport to be returned to the Royal Air Force of Oman in the first quarter of 2014.

ST Aerospace will install a new glass cockpit with avionics compliant with global air traffic management systems, enabling the aged aircraft to be operated in civilian airspace, and overhaul other equipment, including the type's Rolls-Royce T56 engines.

Oman's air force operates three H-model Hercules, which Flightglobal's MiliCAS database lists as having been delivered between 1981 and 1983.

The service also took delivery of its first of three new-generation C-130Js during 2012. ■

UNMANNED SYSTEMS CRAIG HOYLE LONDON

Sensor-equipped Euro Hawk completes first flight

Germany's developmental Euro Hawk unmanned reconnaissance aircraft has completed its first flight carrying a Cassidian-developed suite of signals intelligence (SIGINT) sensors.

Achieved on 11 January using a derivative of the Northrop Grumman RQ-4 Global Hawk, the milestone came several months later

than scheduled, due to a longer-than-expected process to secure certification approvals from German airworthiness authorities.

After taking off from Manching near Munich, the unmanned air vehicle climbed to an altitude of 50,000ft (15,200m), and remained in military-controlled airspace throughout its 6h-plus sortie.

"With this first sensor flight, the Euro Hawk effectively demonstrated its system capability for safe operation within German airspace," says Nese Tukenmez, chief executive of the Northrop/EADS joint venture responsible for delivering the programme.

The aircraft's SIGINT payload also "showed excellent performance", adds Cassidian chief executive Bernhard Gerwert.

Getting the Euro Hawk back into the air has been a lengthy process since the development aircraft's arrival in Manching from the USA in July 2011.

Payload integration activities were completed by February 2012, with the modified platform having made its first taxi trials last June. Programme officials

speaking at September's ILA Berlin air show referred to a "painfully detailed approach" to securing airworthiness approvals, and outlined an ambition to fly the aircraft late last year.

A test campaign of about 15 flights is expected to be performed from Manching before the Euro Hawk will be delivered to the German air force's Schleswig-Holstein air base for user trials.

Berlin's Euro Hawk programme could eventually comprise the delivery of four series production aircraft and a second ground control station to join its initial equipment, under a deal worth a projected €1.2 billion (\$1.6 billion). ■



After taking off from Manching, the UAV climbed to 50,000ft

For more about unmanned air vehicle operations, visit flightglobal.com/uav



IN BRIEF

PREMIER WINGLETS

Premier Jet has ordered three shipsets of the Tamarack Aerospace active winglets to add to a retrofit kit in development for the Cessna CitationJet. Idaho-based Tamarack unveiled its active winglet technology last year. It is designed to reduce drag caused by a winglet-induced bending moment on the wing. The Tamarack winglet adds an outboard control surface that activates to dump excess aerodynamic loads.

STRATEGIC TIE-UP

UK-based aftermarket support company Euravia has signed a two-year agreement with Brisbane-based Sikorsky subsidiary Sikorsky Helitech Australia to provide Pratt & Whitney Canada PT6T engine maintenance, repair and overhaul services on Bell 212 and 412 helicopters throughout the Asia-Pacific and Australasia regions.

CEPA SETS THE DATE

Central Europe Private Aviation (CEPA) – an industry trade body established to support business aviation in central and eastern Europe – will host its third annual Expo on 27 and 28 November in Prague. CEPA says the 2013 Expo will build on a “successful 2012 event”, which attracted treble the number of delegates from its first year.

AW IN AZERBAIJAN

AgustaWestland has sold 10 helicopters to Azerbaijan Airlines – marking the first foray into the rotorcraft market for the Eurasian carrier. The €115 million (\$150 million) deal comprises an order for eight AW139 intermediate twins and a “preliminary sales contract” for two AW189 medium twins. The aircraft will be used for offshore and VIP transportation as well as emergency medical services and search and rescue missions. Deliveries are scheduled to begin in the second half of the year.

PRODUCTION KATE SARSFIELD LONDON

Development milestones lift Cessna

Cessna is celebrating two major milestones at the base of its business aircraft line. Production of the Citation M2 has begun at the airframer's Independence, Kansas facility, as the light jet advances towards certification in the second quarter of 2013.

The Williams International FJ44-powered twinjet, derived from the CJ1, is meant to be a step-up model between the entry-level Mustang and the light-cabin CJ2+. The M2's forward and aft cabins are built at Cessna's Wichita, Kansas plant and then transported to Independence for final assembly.

The first aircraft – “Unit 800” – is due to be used for demonstrator purposes, and is expected to roll off the assembly line this April, Cessna says. “We asked our customers what they wanted, and we worked their requests into the M2 design,” says Brian Rohloff, business leader for the M2.

The aircraft features the Garmin



Cessna

Cessna says the Caravan EX exceeds its 20% improvement target

G3000 avionics suite, a private lavatory, and seating for six passengers – “Features that many of our Mustang customers said they wanted in their next jet,” Rohloff adds.

Meanwhile, Cessna has clinched US Federal Aviation Administration approval for its Grand Caravan EX and says the single-engined turboprop has outperformed initial

targets. Powered by the new Pratt & Whitney Canada PT6A-140 engine, this latest version of the high-wing Caravan series boasts a 38% improvement in the rate of climb over its predecessor – exceeding its original improvement target of 20%, says Cessna. Deliveries of the 10-seat, aluminium aircraft are under way. ■

OPERATIONS KATE SARSFIELD LONDON

Turkish Eclipse saviour set to restart air taxi service

EA Aerospace founder says very light jet can realise his vision of affordable air transport

EA Aerospace – the Turkish founding partner of Eclipse Aerospace – is gearing up to launch an air taxi service in the second quarter of 2013 using Eclipse very light jets. The project is the first step in a process that EA Aerospace hopes will eventually spawn an air taxi network spanning Europe, the Middle East and Africa.

“I have held the view for many years now that the Eclipse is the perfect aircraft for the air taxi market,” says Ekim Alptekin, EA Aerospace president and Eclipse shareholder. Alptekin has harboured ambitions for a large air taxi network for several years.

In 2008 he was forced to abandon plans to launch his original air taxi offering, Myjet Aviation, following the collapse of Eclipse

Aviation. “We had orders for 120 Eclipse 500s but only one was delivered before the manufacturer went bankrupt,” says Alptekin.

“Although I lost a lot of money, I never lost faith in the product. I decided to become a shareholder and board member in the new company so I could help bring the product back to market and establish a global support network for the aircraft.”

The air taxi service – yet to be branded – is undergoing “concept” flights with the original Eclipse 500, owned by Alptekin, and a Total Eclipse. The first of three Eclipse 550s – featuring synthetic vision and auto throttles – is earmarked for delivery in the third quarter of this year – shortly after planned US certification.

“Two aircraft will be based in Ankara and three in Istanbul and will serve the markets in and around Turkey, where there is huge demand for affordable, flexible transportation – the Eclipse ticks all the boxes,” says Alptekin.

In Europe, the air taxi market is still in its infancy and the installed base of EA500s is only around 26 aircraft, says Flightglobal's Ascend Online database – a few of which are operated commercially.

“We are going to finally prove the air taxi concept with the Eclipse,” says Alptekin. “No other aircraft [in the entry-level sector] offers the same value proposition as this aircraft.” ■



To read our Total Eclipse flight test, go to flightglobal.com/eclipse



Chinese investors snap up Enstrom
GENERAL AVIATION P22

DEVELOPMENT KATE SARSFIELD LONDON

Nextant to treble offering with two new programmes

Hawker 400 re-engining specialist will unveil the new models in the second quarter

Nextant Aerospace is diversifying out of the Hawker brand by adding two more re-engined aircraft models, effectively trebling the size of its offering.

The yet-to-be-disclosed midsize and super-midsize types will sit at the top of the Nextant family of XT-suffixes jets – which so far consists of the light-cabin 400XT – and give the US airframer a much needed foothold in the move-up market.

"Having only one product in the Nextant family has its limitations," says Nextant chief executive Kenneth Ricci. "Customers who want to move up from a small to a larger aircraft have to go elsewhere as we have nothing to offer – until now."

As with the 400XT, the two new aircraft will be upgraded with the latest engines, avionics and interiors and will have "attractive acquisition and operating costs", Ricci adds. "We hope to build on our success with the 400XT programme [introduced in 2011 as a modernised version on the Hawker 400XP/400A], for which we have secured a sales backlog valued in excess of \$175 million and delivered 25 aircraft to date."

Nextant plans to add the latest business jets to the fleet of sister



Nextant Aerospace

Nextant has delivered 25 modernised 400XTs to date

company Flight Options, which already operates a dozen 400XTs from an order for 40 of the six-seat aircraft. Nextant will source the aircraft and perform the upgrade at its 125,000ft²(11,600m²) remanufacturing facility in Cleveland, Ohio, from where the company plans to deliver about 24 Williams FJ44-3AP-powered 400XTs this year. "We can ramp up to 30 400XTs if demand requires," says Ricci.

The USA is Nextant's largest market, but international sales are growing, Ricci says, and now "account for 40% of the order book". The \$4 million 400XT clinched European certification last month

and Nextant is hoping to secure approval this quarter for its new raked winglets. "Our priority this year is to build our global sales and customer support network," says Ricci.

To assist with this strategy, Nextant has hired former Hawker Beechcraft executive Sean McGeough as its president. Formerly the airframer's international operations chief in Europe, the Middle East, Africa and Asia-Pacific, McGeough "will concentrate on developing strategies that will allow Nextant to achieve even greater global market penetration and sustained growth for the Nextant 400XT", says Ricci. ■

SHIPMENTS STEPHEN TRIMBLE WASHINGTON DC

Late delivery rush boosts Embraer

A delivery frenzy in the fourth quarter helped Embraer beat expectations and ship 99 business jets in 2012, matching the previous year's total output.

Embraer's executive jet division says it delivered 99 aircraft overall in 2012, including 53 in the fourth quarter alone.

The unit's revenues will be released later this month, but the delivery rate reflects the company's guidance. Embraer anticipi-

pated bringing in between \$1.1 billion and \$1.3 billion from business jets in 2012. It had received \$580 million in the first three quarters, when the company had only completed about 46.5% of the year's deliveries.

Embraer delivered a total of 77 Phenom 100 and 300 light jets, meeting the company's guidance targets. It also slightly beat its own expectations for deliveries of Legacy 650 and Lineage 1000 jets,

which totalled 22, or two more than forecast.

But the deliveries also continued a downward trend for Phenom deliveries that Embraer hopes to reverse by 2014.

Embraer's light jet deliveries peaked in 2010 with shipments of 100 Phenom 100s and 26 Phenom 300s. By 2011, output had dropped to 99 deliveries, including 83 light jets, or six more than in 2012. ■

IN BRIEF

COMMON LANGUAGE

Qatar Airways' private jet division has launched its corporate website in Arabic and Russian. Qatar Executive says the move will help the division advertise in its Middle Eastern home market and growth regions such as Russia and the Commonwealth of Independent States, where luxury travel is "on the rise".

G650 APPROVAL

Jet Aviation Geneva has received European Part-145 approval, permitting the company to provide line and base maintenance on the Gulfstream G650. The Swiss service centre provides maintenance on a host of business jets, including the Gulfstream family, Bombardier Global 6000 and Boeing Business Jet.

GULFSTREAM RAMPS UP

Gulfstream plans to hire about 100 extra employees during the next 12 months at its Appleton, Wisconsin facility to support the growing volume in completions work for its large-cabin business jets, including the recently certificated G650. The site currently employs around 725.

CUTTER CERTIFIED

Cutter Aviation has received supplemental type certification for installation of Garmin G950 retrofit avionics in the Piper Meridian, with either the original Meggitt or Avidyne EFIS systems. The retrofit includes a new, custom-engineered panel and glareshield, providing a cleaner and more contemporary panel design, it says.

BONUS DEPRECIATION

The US government has signed a bill which extends the 50% accelerated depreciation for business aircraft to the end of 2013 – "as long as there is a written, binding contract in place to purchase the aircraft by 31 December", states the National Business Aviation Association.



IN BRIEF

JAPANESE DISTRIBUTOR

AgustaWestland has appointed Mitsubishi Bussan Aerospace (MBA) as distributor of the AW169 helicopter in Japan.

"The distributorship agreement, which includes a commitment for the sale of 20 AW169s, further strengthens the partnership between AgustaWestland and MBA, which has been the official distributor of the AW139 in Japan since 2005," says the Anglo-Italian airframer.

HIGH-FREQUENCY BELL

Bell Helicopter subsidiary Aeronautical Accessories has received US supplemental type certification for a high-frequency antenna for the single-engined Bell 407. "The HF antenna is designed to interface with many types of HF radios, thereby increasing reception in remote areas, improving safety and communications," says Bell.

NEW AUSTRALIAN ENGINE

Diamond Aircraft sister company Austro Engine has bench-tested a new FADEC-controlled rotary aircraft engine called the AE80R. The Austrian company says the engine's target weight is 27kg (60lb) with a power output of 80hp (60kW). Development of the AE80R began in 2010 and builds on Austro's experience with the larger AE50R 55hp rotary engine. The new design incorporates a "no-loss lubrication system", resulting in extremely low oil consumption, it says. Austro is aiming the AE80R at the "extremely weight sensitive" light sport and ultralight aircraft markets. The engine will also be targeted at the unmanned aerial vehicle sector, says Austro.

MAX-VIZ FOR CESSNA

Astronics' Max-Viz-600 enhanced vision system has received a Cessna Aircraft Service Bulletin for retrofit installation in recently delivered Cessna Skyhawk, Skylane and Stationair single-engined aircraft models.

SAFETY DOMINIC PERRY LONDON

Eurocopter admits it will miss own EC225 deadline

Airframer still no closer to finding solution to problem that has left 25 aircraft grounded

Eurocopter has finally admitted it cannot meet its self-imposed end-February deadline to return the global EC225 fleet to unrestricted service as it has been unable to identify the root cause of two North Sea ditchings in 2012.

The airframer's chief executive Lutz Bertling made the promise to an oil and gas industry forum last November. However, the manufacturer has now revealed its tests on the main gearbox bevel gear vertical shaft – the component that cracked in both incidents – have failed to produce any concrete answers.

Although it says it has been trying to identify a "most probable root cause" for the issue, it admits "this Eurocopter assumption has

not been proven by tests". A third test campaign will be launched at the end of January, it says, which will be "more sophisticated" than previous efforts.

"Bench test results are expected at the end of February," it adds. "In addition, evaluations will continue on three alternative scenarios for the failures' cause and all results will be shared with the UK [Air Accidents Investigation Branch]."

Eurocopter says it is working with USA-based engineering consultancy Shainin Engineering on the issue. Shainin was previously employed by sister company Airbus to solve the cracking of wing components on the A380. "The investigation remains the highest priority for the Eurocopter teams and

the group is fully committed to complete testing and agreeing on corrective measures with the authorities and the various industry stakeholders," the airframer says.

Once the cause is found, Eurocopter still needs to identify a solution, certificate it and roll it out to EC225s across the world.

Civil aviation regulators in Norway and the UK have banned overwater flights of the type, leading to the grounding of 25 airframes across the North Sea region, as revealed by Flightglobal's Ascend Online database. The remainder of the global fleet can perform overwater flights, but with restrictions in place. ■



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ROTORCRAFT STEPHEN TRIMBLE WASHINGTON DC

Chinese investors snap up Enstrom

Michigan-based Enstrom Helicopter has been acquired by a Chinese investment firm in a move aimed at helping the company grow in the rapidly developing Asian market.

Enstrom has delivered 168 light helicopters in the past decade and has revealed plans to increase production rates in Menominee, Michigan, with capital provided by new owners Chongqing Helicopter Investment (CQHIC).

"This is a major step in moving Enstrom to a new level," says president Jerry Mullins. The sale moves control from "one foreign owner to another", Enstrom says. The previous owner, who purchased Enstrom in 2000 from Segway inventor Dean Kamen, was never officially identified, but was reportedly a Swiss investor.

CQHIC acquires a manufacturer of two piston-powered aircraft – the F28F and the 280FX – and the 480B turbine-powered helicopter.



Enstrom Helicopters

Programmes include the 480B turbine-powered helicopter

Enstrom has boosted staffing levels by 50% in 18 months as demand has picked up, particularly in Asian markets. After delivering 17 helicopters in 2012, Enstrom has 25 helicopter orders on backlog, including four from China-based buyers, as recorded by Flightglobal's Ascend Online database.

Enstrom, founded in 1975 by

home-built helicopter designer Rudy Enstrom, becomes the latest US general aviation manufacturer to be bought by Chinese investors. It follows the acquisition of Cirrus and elements of Epic in 2011 by China's CAIGA. ■



For more news and information on the rotorcraft industry, go to flightglobal.com/rotorcraft



SOFTWARE DAN THISDELL BRUSSELS

'Big data' looks best in 3D

Vast quantities of information are easy to collect, but turning it all into something valuable poses a far greater challenge

The death earlier this month of one of the more colourful characters in information technology marks a good time to consider a critical challenge facing industry and government today, and one well known to aerospace decision-makers: too much data.

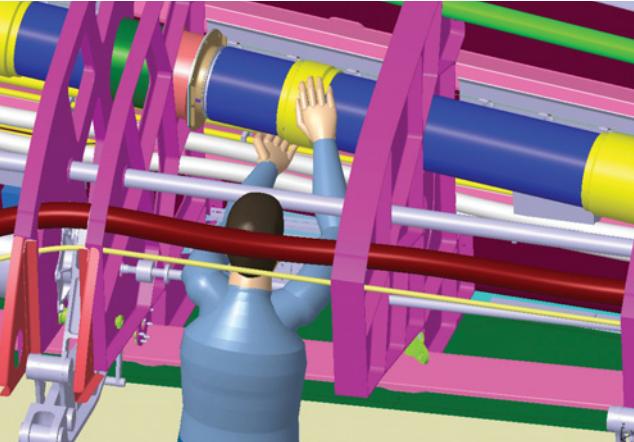
Hank Asher, who died aged 61, is credited by TLO, the Florida company he most recently founded, as the "father of data fusion", and inventor of online investigative systems that have helped law enforcement agencies sift vast quantities of data in often unconnected pools to find leads for otherwise-stymied detectives.

JOINING THE DOTS

Twenty years before 9/11 Asher had been smuggling cocaine in his private aircraft in South America, before going on to work with the US Drug Enforcement Agency to convince Americans to get out of the trade. A long liaison with law enforcement ensued, with Asher the software entrepreneur providing the computing power behind some major investigations, including the identification of additional terrorists involved in the 2001 attacks. As he has said: "You could accidentally live next door to [9/11 mastermind] Mohammed Atta. You couldn't accidentally live next door to Mohammed Atta twice."

Sifting names, addresses, flight-plans and so on to make connections between people is only one aspect of the challenge typically referred to as "big data". Indeed, TLO describes itself as a provider of tools for due diligence, threat assessment, identity authentication, fraud detection, legislative compliance and debt recovery.

Airframers face many extra challenges. Historically, they have embraced the advent of computer-aided design for the obvious reasons of speed, accuracy and the fact that, especially in the internet age, it allows engineers who are not in the same location to work on the same set of plans.



If I get stuck in here, how much will it cost to design me out?

The addition of three-dimensional visualisation improved the process – for example by letting designers see whether or not a technician would actually be able to access key components through a maintenance hatch.

By the mid-1990s 3D had advanced far enough to allow Boeing, with long-standing design systems partner Dassault Systèmes, to make a dramatic breakthrough by producing the 777 from a digital mock-up, doing away with the costly and time-consuming physical model.

As the 787 went into production in late 2011, Dassault Systèmes chief executive Bernard Charles remarked that 3D software has transformed our concept of reality, musing that if Chinese counterfeiters were to buy a 787 and attempt to copy it, they would never succeed – unless they got hold of the digital plans.

One Boeing programme executive later told *Flight International* that remark missed the point, as while it would be miles better to try to counterfeit a 787 working from digital plans rather than measuring all the parts with a pair of callipers, the machine's dimensions are only one aspect of its essence, which resides in its 18 million lines of computer code as much as its shape and size.

Both points are valid, but

Charles and Dassault Systèmes are thinking far, far beyond mere 3D design. By 1999 the 3D toolbox had introduced the concept of product life-cycle management, so designers could consider their creations' eventual scrap-page. But in late 2012 these design tools were brought firmly into the big data era, with Dassault's launch of what it calls the 3D experience.

"Airlines are not looking for cool stuff – they are looking for efficiency"

PIERRE MARCHADIER
Vice-president, Dassault Systèmes

Now, 3D software can also help managers visualise complicated relationships between costs, pricing, customer preference, employee attitudes, supplier demands and the like – and, critically, understand the impact of changing any of these parameters.

RISK REDUCTION

In aerospace, the goal is to reduce the time, cost and risk associated with innovation. As Dassault vice-president Pierre Marchadier puts it, airlines are not looking for "cool stuff – they are looking for efficiency". And, with 3D, an air-

framer can show its airline customer the difference in time, cost and risk between design options. Customer confidence in choices made early in a programme's life can be enhanced – and customer knowledge and preferences built into the programme.

But perhaps most critically, says Marchadier, 3D experience tools give engineers and product managers a way to visualise the impact, over the entire programme life, of choices they make early on. Engineers must always nail down some parameters early for design to progress, and leave others to be finalised later; the newest 3D tools, he claims, let engineers see the result in time, cost and programme risk of fixing any particular part of the design – to choose the ones that aren't hugely expensive to adjust later.

In software terms, the system extends tools needed to analyse non-linear events – such as the failure of a carbon composite structure – to such problems as risk assessment or shifting customer preferences. That architecture, says Marchadier, "embarks all the key players", ranging from engineers and salespeople to airline passengers.

That's a lot of data, and it would be ambitious to imagine that managers and engineers will have the power to harness it completely any time soon. As Microsoft futurologist Dave Coplin recently told a *Financial Times* panel discussion on the challenge of big data, a lot of the data we have is of poor quality – but as we work with that data it will improve, as will our skills in using it. And, he added: "All of a sudden it's going to come together."

Or, as the European Commission's director general for communication networks Robert Madelin told a gathering of Dassault Systèmes customers in Brussels: "We can do things we can't imagine and because we can't imagine them we're not doing them yet." ■



Good week

PPG The chemicals major posted record fourth-quarter earnings and a solid full-year, with sales up 2% to \$15.2 billion, in part owing to "continued strength" in aerospace demand, which helped its performance coatings business segment lift sales by 1% to \$1.2 billion. In addition to civil and military aircraft coatings, cleaners, sealants and transparencies, PPG is the sole supplier of the Boeing 787 flightdeck windows and electrochromic cabin window shades.



Boeing



Qantas

BIRMINGHAM Business in the UK's second city is being hampered by lack of direct, long-haul connections, local chamber of commerce leader Jerry Blackett told Parliament, blaming a national aviation policy that is "dictated by the airlines". Blackett might have added "in cahoots with government", but that is life outside the big city in a hub-obsessed world, even though Birmingham is a big city whose people should not have to travel to London to catch a flight.

Bad week

MRO MURDO MORRISON SLINFOLD

Building on part success

Christopher Whiteside is turning a family spares business into a \$1 billion global concern

Christopher Whiteside says image matters in his business. AJ Walter Aviation's striking new headquarters in the Sussex countryside, not far from Gatwick airport, may look more like the home of a trendy software design house than a stockist of aircraft spare parts.

But for Whiteside – president of the 80-year-old company – investing \$24 million to build the warehouse and office complex was about being seen to be competing on a level playing field with the big boys: the OEMs and major airlines that want to control the aftermarket in components.

"Look, no one gets fired for buying from Lufthansa Technik and I can't compete with United Technologies, so all I've got is my level of service, and my brand. Presentation is everything. You get business because of your brand," says Whiteside, who took over the running of the business from his father in 2004.

Since then, AJ Walter has undergone considerable expansion, moving into fields such as consumables management, engines and, now, component repair, with the acquisition last year of part of the former Aveos maintenance, repair and overhaul business in Montreal, which has been renamed AJW Technique.

REMANUFACTURING

The Canadian business, which will become operational this quarter and employ about 300 people, will allow AJW to offer an in-house component remanufacturing service for the first time – until now work has been sent to third-party contractors.

But the rationale goes further than that. What Whiteside describes as a "judicious purchasing opportunity" will give the UK company an industrial footprint – and market foothold – in North America, helping towards Whiteside's ambition to create a \$1 billion turnover global business by 2017. "The concept of service-



AJ Walter Aviation

AJW's new headquarters: about creating the right image

level agreements and power by the hour is only just catching on there," he says.

With a current turnover of around half that figure, AJ Walter, which has distribution hubs in Singapore, Dubai, London, Montreal and Miami, has built its reputation by focusing on start-up airlines, generally those that cannot afford to invest in spare parts inventory, and on the Airbus A320 and Boeing 737 families.

It supplies, loans, manages and services mainly rotatable components under a variety of financial packages, with stock held at its own depots or at customer premises. The company carries out about 40,000 transactions a month and claims to have 17% of the worldwide Airbus and Boeing narrowbody spares business.

In the past 18 months, AJW has moved into consumables management, focusing on the 500 fastest moving items, as well as engine repair. Although it does no maintenance work itself, the company offers an exchange service for fan blade sets on the CFM International CFM56 engines that power the 737 and A320.

It acquires engines with "green time" remaining on aircraft being parted out, and leases them to airlines. Eventually, the engines will be broken down for parts. Another venture launched last year sees it partnering with British Airways' engineering arm to provide spares support to Boeing 787 op-

erators. AJW hopes to secure its first customers this year.

Whiteside is not modest about having made a personal fortune from trading spares. His ample office would be the envy of many corporate chief executives. It is straight out of James Bond, with balcony terrace, sofas and a large bookshelf lined with art hardbacks and a concealed door. His other office is a Bombardier Global Express, a photograph of which adorns the shelf.

His 350 staff do not do badly either. The building, which he helped design, contains a gym and dance studio, while solar panels and a rainwater recycling system help reinforce AJW's green credentials.

Whiteside makes no excuse for the comforts: "I've worked in dumps all my life and don't want to do it again. I wanted to create an environment for my staff that they don't want to leave."

Another picture frame behind his desk contains a letter from his former headmaster, predicting that Whiteside would achieve little in life; he was expelled from school at 15.

Three decades later, he says, he is often asked what his proudest achievement has been: "Quite simple – attracting all these talented people to come and work for this business." ■



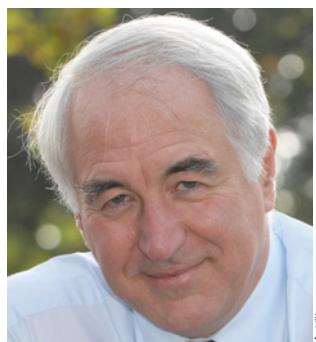
Exclusive news and data for
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flightglobal.com/mro



NH90 proves
‘flawless’ in
Afghanistan
FEATURE P26

PEOPLE MOVES

Bombardier, GKN Aerospace, Learjet, Meggitt



Twigger: leaving Meggitt

One of the aerospace industry's most highly regarded leaders will bow out in May when **Meggitt** chief executive Terry Twigger retires after more than 12 years at the helm of the UK-based maker of systems ranging from aircraft braking to ice protection, flexible fuel tanks, valves and controls. He will be replaced by Stephen Young, finance director since 2004. During Twigger's 20 years with Meggitt the company has grown from a turnover of £345 million (\$554 million) to some £1.6 billion and now employs more than 10,500 people as one of the UK's largest listed engineering groups. Mike

McCann is now chief executive of **GKN Aerospace Engine Systems**, formed on GKN's 2012 acquisition of Volvo Aero. He is replaced as senior VP business development by Charles Paterson, who joined from Airbus in 2009 when GKN bought its Filton wing parts plant. **Bombardier**'s Rick Rowe, demonstration pilot and standdown programmes safety manager, has retired after nearly 25 years at **Learjet**. Rowe, who has also served as chief pilot, pioneered Bombardier's safety standdown seminars, which by June 2012 had attracted 5,600 business aviation professionals.



Rowe: Learjet safety master

QUOTE OF THE WEEK

“The superiority of French forces in Mali is also a result of the outstanding quality of our equipment”

During a visit to Snecma's Gennevilliers engine parts plant, near Paris, defence minister **JEAN-YVES LE DRIAN** praised French soldiers – and its arms industry



Rex Features

BUSINESS BRIEFS

ROLLS-ROYCE GOES FOR GOLD-STANDARD ETHICS

INVESTIGATION Rolls-Royce has appointed senior UK lawyer David Gold to lead a review of its compliance procedures following the December 2012 initiation of a UK Serious Fraud Office investigation into possible bribery and corruption in its dealings in China and Indonesia, which could end in prosecution of individuals and of the company. In 2010, Lord Gold was appointed by the US justice department to monitor BAE Systems' compliance with the terms of its \$400 million settlement of US claims it had made false statements related to arms deals including the massive Al-Yamamah agreement with Saudi Arabia.

ALCOA TO HELP COMAC HOLD TOGETHER

AIRLINERS Alcoa has extended its partnership with Chinese airframer Comac to develop the fastening system for the in-development C919 narrowbody airliner programme, with which Comac hopes to break into the single-aisle market dominated by the Airbus A320 and Boeing 737. Alcoa had earlier said it was co-operating with Comac to develop aluminium structural concepts and alloys for the C919, scheduled to fly in 2014 for service entry in 2016. Alcoa is also a supplier of alloys, structural extrusions and fasteners to Comac's ARJ21 regional jet programme.

DYNAMIC STRENGTHENS BELL INDIA CONNECTION

ROTORCRAFT Bell 407 airframe components and cabin assemblies are, from this year, to be made in Bengaluru by Dynamic Technologies. Bell India general manager Rishi Malhotra describes the 10-year, \$243 million deal as “an important step forward in expanding our customer service, engineering and manufacturing capabilities in India”. In 2008, Dynamic bought Oldham CNC of Bristol, a supplier of machined components and tools to AgustaWestland, Airbus, Boeing, GE, GKN, Lockheed Martin and Magellan.

DIEHL BUYS THALES OUT OF AIRCABIN JOINT VENTURE

RESTRUCTURING Germany's Diehl Group has completed its takeover of Thales' 49% stake in interiors joint venture Diehl Aircabin. The share acquisition leaves Diehl as sole owner of the Laupheim-based cabin equipment manufacturer and will not affect operations. Thales will retain its 49% shareholdings in avionics and interior lighting joint venture Diehl Aerospace, and in fuse specialist Junghans Microtec. Diehl holds the remainder of both businesses.

GAVARNIE SAYS ALOHA AGAIN TO ISLAND AIR

AIRLINES Honolulu-based inter-island carrier Island Air is being sold to an undisclosed customer, a move the airline says will help it compete with dominant player Hawaiian Airlines. Gavarnie Holding, which acquired Island Air in 2004 from Aloha Airgroup, says the new owner, a US mainland capital management firm, has “some interests in aviation” but does not own an airline. Island Air expects to operate seven ATR turboprops by end-2013 and will phase out its last two Bombardier Dash 8-100s by June 2013.

DELTA SHEDS HEADS BUT STILL TOPS TABLE

LABOUR Delta Air Lines is still the largest airline industry employer, as revealed in the latest World Airline Rankings by *Flight International* sister title *Airline Business*. The US carrier, which has held the crown since its 2008 merger with Northwest Airlines, had 78,392 staff at the end of 2011. Delta's workforce peaked at 84,306 in 2008 but has declined since the merger. Number two, with 66,522 staff, is American Airlines. Download the report at flightglobal.com/war

NEMO'S WAR

Last year brought the NH90 rotorcraft's first deployment, by the Italian army in Afghanistan – and performance was flawless, says the service's aviation commander



LUCA PERUZZI GENOA

In mid-2010, Italy began preparing for the first deployment of the NH Industries NH90 tactical transport helicopter (TTH). The effort was led initially by an NH90 task group at the Italian army's experimental aviation centre, and then by the service's 7 Regiment, "Vega".

A helicopter squadron called Task Unit Nemo was established, trained and certificated for the out-of-area mission. This comprises five NH90 TTHs – or UH-90As, to use the Italian defence ministry's designation – and some 45 personnel, including five crews and a team of 15 maintenance operators.

The original plan had been to deploy earlier in 2012, but between 18 August and 23 September the NH90s and unit personnel were flown aboard US Air Force Boeing C-17 strategic transports to Herat, Italy's main operating base in Afghanistan and the site at which the nation leads the Regional Command (RC) West element of the NATO-led International Security Assistance Force (ISAF).

Each helicopter required about two days' work to be returned to flight status. Col Salvatore Annigliato, commander of the Italian army's aviation battalion in Afghanistan, says the first helicopters and personnel immediately began an acclimatisation period until the unit was declared fully operational on 26 September. This milestone was achieved after 90 sorties and 60 flight hours, including about 36h flown in operational conditions, he adds.

LOCAL REQUIREMENTS

Also called Task Force Fenice, the battalion counts among its rotary-wing assets 10 AgustaWestland AW129C Mangusta attack helicopters and six Boeing CH-47C+ Chinook transports. To cope with Afghan theatre requirements, the service decided to deploy the ad hoc interim operational version of the TTH, the NH90 IOC+ Enhanced. This features stable mission software compared with the initial operating capability training version, as well as an almost complete avionics and mission systems suite.

The latter includes alert and de-icing

equipment, a full electronic warfare suite and a reduced Selex ES communication package with two multiband VHF/UHF SRT-651/N-S sets and one high-frequency SRT 170/M6 radio equipped with cryptography, to allow for secure communications between air and land operators. However, the aircraft lacks a satellite communication terminal.

Earlier restrictions, including using the rear ramp, landing at an altitude above 6,000ft (1,830m), and flying in snow and icing conditions, have been lifted. Platform protection has also been enhanced, through the addition of ballistic protection and two Oto Melara pintle mounts for Dillon 7.62mm gatling guns.

"Since September 2012, Task Unit Nemo's five NH90s and personnel have flown 300h in more than 400 sorties, without a single mission having to be aborted for technical malfunctions, and assuring all missions assigned by RC West," says Annigliato.

"With two helicopters always available, two on maintenance cycle and one in attrition status, the unit was able to lodge the required 65 flying hours per month until 2012's end."



**Not a single mission
was aborted for
technical reasons**

This figure was then elevated to 80h, while aircraft availability allowed the unit to maintain four helicopters operational for limited periods," he adds.

WINTER SEASON

The most-used airframe accumulated 96 flying hours, operating in hot-and-high environmental conditions, with temperatures reaching above 40°C (104°F) during the earlier deployment stage, and conducting day and night missions from elevated forward operating sites such as at Chagcharan (7,850ft elevation) in brown-out conditions. With the arrival of the winter season, NH90s are flying in adverse weather conditions characterised by snow and ice, with temperatures often below -10°C.

"The capabilities being provided by Task Unit Nemo are in line with the operational requirements of Combat Support and Combat Service Support, forward medical evacuation and helicopter sniping in support of ISAF special force command expressed by RC West headquarters," says Annigliato.

Less than one month into the NH90 deploy-

ment, the Italian army's aviation battalion led a mixed ISAF and Afghan air assault mission to move an Afghan army battalion from Farah province capital to a forward operating base in Gulistan district – a distance of some 75nm (140km). Operation Grasshoppers made use of 15 helicopters, including two Afghan Mil Mi-17s, four Italian AW129Cs, six Chinooks (two each from Italian, Spanish and US units), two US Army Boeing AH-64 Apache attack

"Task Unit Nemo's five NH90s and personnel have flown 300h in more than 400 sorties"

COL SALVATORE ANNIGLIATO

Italian army aviation commander in Afghanistan

helicopters and one NH90. Conducted in three phases during three days, the operation involved the movement of 700-plus personnel in more than 20 sorties and six main mixed helicopter formations, totalling about 100 flying hours. "Although mainly used for trans-

portation and forward medevac missions, the single NH90 was employed to provide special forces with helicopter-sniping cover," says Annigliato.

In November, Task Unit Nemo assets participated in Operation Worker Ant, with the NH90 acting as airborne platform for the Joint Tactical Air Control to provide command and control functions and synchronise the aerial fire and intelligence support for ground troops. "Thanks to 'Rover 4' connectivity through onboard communication equipment, this allows up-to-date intelligence coverage and multinational co-ordination," says Annigliato.

The NH90 became the most requested platform for special forces operations, mainly conducted in night and reduced-light conditions with the Thales helmet mounted system and display, Selex ES navigation forward-looking infrared sensor and digital map generator. These enabled a range of missions, including helicopter sniping, thanks to the aircraft's fly-by-wire flight control system, which offers a smooth ride and platform ➤

» stabilisation, air interdiction vehicle and mission controller capabilities. "The NH90 platform is so far responding well to the theatre's environmental and operational conditions and, in some areas such as propulsion power, exceeding expectations," says Annigliato.

"While operating in hot-and-high conditions, the engines offer at least a 10% increase each in available power compared with the flight manual. The boroscope inspection shows the integral particle separator to be working as requested. The airframe has not so far showed specific issues related to the theatre's flying environment and the wear conditions of rotor blades and powerplant are comparable to other aviation battalion rotary-wing assets."

He adds that issues such as windshield cracks, for which remedies have already been identified, have yet to show in operations; likewise the poor robustness of the cargo compart-

The NH90 platform is so far responding well to the theatre's environmental and operational conditions

COL SALVATORE ANNIGLIATO

Italian army aviation commander in Afghanistan

ment floor. Light damage to tyres when landing on stony ground requires attention, he says, but the problem is "expected to be solved soon".

The NH90 maintenance team conducts safety inspections at 50h and 100h intervals in the first two years. The 300h maintenance stop on the first helicopter will be conducted in Italy, with similar activities on other NH90s performed locally. An AgustaWestland field service representative supports the unit at Herat.

Italian army aviation battalion assets are usually deployed at forward operating bases to better support ground troops. Such operational doctrine is not hurting the NH90's availability during the forward deployment, although a maintenance team of two to three operators accompanies the assets in case.

Italian army NH90s are flown in a heavily armed transport configuration, centred on a five-member crew including two pilots, a flight engineer and two gunner operators. Characterised by a stow position limiting the encumbrance in the cargo doors area, each of the two lightweight Oto Melara-sourced guns weighs 220kg (485lb) with a 4,400-round ammunition box. To conduct forward medical evacuation missions, the helicopter can also embark a fully equipped intensive care station for treating the wounded, managed by the Italian army's specialised medical team.

PRODUCTION DOMINIC PERRY MARIGNANE

CONFIDENCE IN SALES PROSPECTS REMAINS HIGH AFTER A MIXED 2012

TO THE outside observer at least, for NH Industries (NHI), the three-company consortium that produces the NH90 troop transport and naval helicopters, 2012 was a mixed year.

Although it delivered about 40 helicopters in 2012 – and those destined for France and Belgium attained full operational capability – there have been persistent complaints from one customer over late deliveries and several future clients, largely cash-strapped southern European nations, have hinted at cutting or cancelling their orders.

Additionally, the NH90 continues to languish on Australia's "projects of concern" list of problematic defence procurement programmes.

However, Dominique Maudet, executive vice-president of global business and services at Eurocopter – which, with a 62.5% shareholding, is the consortium's largest partner – remains in bullish

mood. In his view, the programme is beginning to reach maturity as it ramps up to a production rate of 50-60 aircraft per year to tackle a backlog of close to 400 units.

Even at the increased level of manufacturing, notes Maudet, it will still have almost seven years of work remaining.

However, the achievement of full operational capability for both troop transport (TTH) and maritime (NFH) variants – although called "Step B" in the NFH's case – is the key development for the NH90, representing a "major milestone for the programme", says Maudet.

"This is a massive step because it means the customer is saying 'I bless, I like, I will take the helicopter in this configuration', he says.

NH90s destined for the French navy and army – called the Caiman by both services – achieved full operational capability in 2012,

along with those for Belgium, and those for the German army, the Royal Netherlands Air Force and Royal New Zealand Air Force are to attain the standard in early 2013.

The type can now also be described as combat proven, following a successful deployment by the Italian army (see *main feature*). Maudet says: "The Italians are very happy with what they got in Afghanistan. Most of the feedback is that it's a very good aircraft and providing outstanding capability."

Germany will follow suit later this year, sending a detachment of its NH90 TTHs, configured for a medevac role, to Afghanistan.

With Belgium having received its initial example on 21 December, only two of NHI's customers – Spain and Portugal – have yet to take delivery of any of their helicopters. Spain has already trimmed its commitment from an initial 45 units to 38, but looks likely to accept at least some, if not all of its order, driven by the fact that local jobs – at Eurocopter's Albacete assembly plant – depend on it.

The first locally assembled NH90 made its maiden sortie from the Spanish factory just before Christmas. However, no delivery date has yet been scheduled.

Portugal, meanwhile, has 10 of the TTH variant on order for its army, but has been discussing with Eurocopter and the NATO Helicopter

Management Agency for some time on ways that it might be able to cancel that commitment.

Maudet agrees that Lisbon appears to have neither the appetite nor the finances to complete the deal. He says any cancellation would be a "disappointment and a shame" but points out that "it is [only] 10 helicopters" – or a shade under 2% of the total orderbook of

Lisbon appears to have neither the appetite nor the finances to complete its deal for 10 NH90s

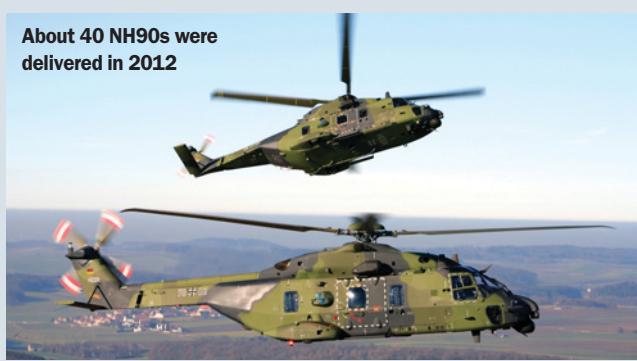
522 units. "It is not a catastrophe although, of course, I would have preferred 10 more," he says.

Further orders, which Maudet is confident of securing this year, would also diminish the effects of any Portuguese cancellation.

He declines to be drawn on which contest the NH90 is most likely to win, although Norway's NAWSARH competition for as many as 16 search and rescue helicopters with a further six options, looks a probable candidate.

It faces challenges from AgustaWestland's AW101 and the Sikorsky S-92. Eurocopter has also pitched its EC225, presently banned from overwater flight by

About 40 NH90s were delivered in 2012



NH Industries

Although capable of carrying 11-12 soldiers in a basic configuration with a three-person crew, the installation of the pintle-mounted guns reduces the transportation capabilities of NH90 IOC+ Enhanced platforms to eight troops.

USEFUL LOAD

"In addition to the five-member crew, the standard payload for RC West area operations in summer season is based on six fully equipped soldiers of 130kg each, or around 800kg," says Annigliato.

"During winter season we can carry seven soldiers, while a maximum useful load of eight troops or 1,000kg of internal cargo is imposed by the cabin layout, operational conditions permitting," he adds.

"The latter also required new operational procedures to rapidly exit and board using the

helicopter rear ramp, as the forward cabin area is dominated by the two pintle-mounted gun systems." However, he says, "together with ballistic protection, the latter are not limiting at all the emergency egress from the side-sliding doors."

With a Thales electronic warfare suite, including the same company's radar warning receiver, plus Cassidian MILDS II missile launch detector, Selex ES RALM 01/V2 laser warning receiver and MBDA chaff and flare dispensers, Task Unit Nemo's NH90s embody a modular composite ballistic protection kit. Weighting about 260kg, this protects the cargo cabin floor, while the cockpit features armoured seats for the two pilots.

"The avionics are responding well and so far have not shown problems. The digital map generator and the weather radar enhance navigation and ground separation capabilities,

while the projected data on the helmet-mounted system and display in 'configuration 3', which offers a tangible improvement with night vision system compared to 'configuration 0', together with the fly-by-wire flight control system modes and the navigation FLIR, provide a significantly better situational awareness during landing operation in brown-out and white-out condition.

"Moreover, the Selex ES mission planning and analysis system significantly reduces crew workload during the mission, tangibly increasing flight safety," adds Annigliato. The icing alert and de-icing system on the aircraft's rotor, engine and horizontal stabiliser have also worked properly in the current winter season, expanding the flight envelope. ■



Watch video of a New Zealand air force NH90 landing aboard an amphibious assault ship at flightglobal.com/canterbury

The programme has an order backlog of almost 400 units



NH Industries

NH90 ORDERS AND DELIVERIES BY CUSTOMER

Country	Variant	Orders	Deliveries
Germany	TTH	122	28
Italy	TTH/NFH	116	24
France	TTH/NFH	61	13
Belgium	TTH/NFH	8	1
Finland	TTH	20	15
Sweden	TTH	18	6
Australia	TTH	46	18
Oman	TTH	20	12
Greece	TTH	20	4
New Zealand	TTH	9	5
Spain	TTH	38	0
Netherlands	NFH	20	8
Norway	NFH	14	2
Portugal	TTH	10	0
Total		522	136

SOURCE: NH Industries

Norway's civil aviation regulator. However, the navalised NH90 remains a slight favourite because of Oslo's existing commitment for 14 of the type.

A problem for NHI is that Norway's relationship with the NH90 has been fraught. Its defence ministry has offered frequent, vocal criticism of delays to its order.

At one point last year it openly suggested that any further hold-ups would lead it to procure Sikorsky's MH-60 Seahawk instead.

Oslo is in possession of only two NH90s, with a third due early this year, but Maudet believes Norway is "very positive" despite the acknowledged problems during the "acceptance process". The delays to

Norway's order, he says, are down to an unfortunate combination of factors, including the complexity of the specification on Norway's variant which has been hard to achieve.

A further problem was generated by the way NHI is structured.

AgustaWestland is responsible for the assembly of all the naval variants for the export market, including those for Norway. It has been moving production of the NH90 NFH from its Vergiate, Lombardy plant to another site in Tessera, near Venice, about 300km (186 miles) away.

"The combination of a very complex helicopter – the most complex of all our variants – in an IOC [initial operating configuration], in the middle of an industrial transfer from one factory to another with a very demanding customer, has been the cause of the problems," Maudet explains.

Nonetheless, he is confident of improvement, both in terms of quality and pace of delivery, and believes it will hand over up to six aircraft to the customer this year.

Maudet also feels it is unlikely that Norway will look to an alternative vendor: "It is really down to the customer [to decide] whether any other supplier would be able to produce a specially designed helicopter in the time available.

"It's not just a case of taking a Seahawk off the line, it is a specially designed helicopter for the customer." ■

AFTER COMANCHE

Plans for a new military helicopter are being honed at the Pentagon – but analysts warn they might not be sufficient to sustain design capabilities and the industrial base

DAVE MAJUMDAR WASHINGTON DC

Expert opinion is divided over the potential benefits of the Pentagon's nascent efforts to develop a new prototype attack helicopter. The Department of Defense hopes its efforts will preserve what it believes to be a vital component of the USA's defence industrial base, but analysts question if it will be enough.

Speaking at a Credit Suisse conference in New York in November, undersecretary of defense for acquisition, technology and logistics Frank Kendall said the helicopters sector was one area he is concerned about "preserving our capacity" for new designs. "I sent a letter out to the services recently on starting a prototyping programme that DARPA [Defense Advanced Projects Research Agency] will lead that I'd like the services to be involved in."

The prototype attack-helicopter development programme could get under way "a year or two down the road", says Kendall. However, the Pentagon first plans to undertake a concept-definition phase, after which it will proceed with an "X-plane" programme.

The idea, Kendall says, is to preserve the USA's engineering design talents which, if allowed to atrophy, would be extremely difficult to rebuild.

"High-performance aircraft is one area where I'm starting something... helicopters is another possibility," says Kendall. "We haven't done a new attack helicopter, for example, in quite a long time."

MATURING TECHNOLOGIES

The benefits would be to preserve engineering design talent and shore up the industrial base, says Kendall. It would also mature cutting-edge technologies so they could be readily applied to next-generation operational aircraft, he adds. But, most importantly, it preserves the ability to create an integrated design and fly it, which would build confidence in the technology.

"I think something like this is important in

the USA if we want to sustain a rotary-wing technical base," says Paul Kaminski, head of the Pentagon's Defense Science Board, who formerly held Kendall's position. "We haven't done a lot of fundamental work in new designs in rotary-wing aircraft for some time now."

Dan Goure, an analyst at the Lexington Institute, notes that "with the exception of the Sikorsky S-97 Raider, there really hasn't been anything new in helicopters in a very, very long time".

MAINTAINING LEADERSHIP

Jacques Gansler, a former Pentagon procurement chief, and Roger Liptz, chair in public policy at the University of Maryland, make the argument that "it would be desirable to maintain our leadership in that helicopter field. Therefore, investments in that area would be important."

The DoD used to partner NASA to develop such technologies, but that effort has largely ended. "Which makes something like this even more important," notes Kaminski.

One of the biggest advantages to building prototypes is it affords policymakers options to put any useful designs that emerge into production at a later date, adds Kaminski. That is especially true if a production effort is not financially feasible in the imminent future.

However, the importance of competition is stressed by Gansler. Ideally, multiple contractors should submit proposals and at least two different prototype designs should be built to broaden the industrial base and force competition, he says.

Developing prototypes could afford the DoD a chance to radically advance technology. "One of the things we might consider doing is looking at some less aggressive and some more aggressive paths and maybe we'll be fortunate and see both turn out," Kaminski says. "In that case, we might have a hard decision on what to do. Maybe we won't be successful in either, in which case we might see the industry decline some. Or we may be successful in one of the two."



The most recent US attempt at a new military helicopter design, the Comanche, was cancelled in 2004

"With the exception of the Sikorsky S-97 Raider, there hasn't been anything new in helicopters in a very long time"

DAN GOURE

Analyst at the Lexington Institute

Fiduciary discipline must be among the critical drivers for any prototype programme the DoD embarks upon. "A key piece of the R&D [research and development] effort for the next-generation helicopter is affordability. Cost will be a principal design consideration," says Gansler. But while prototyping projects such as Kendall's proposed attack helicopter are necessary to sustain the industrial base, Kaminski cautions that such enterprises are not sufficient to do so on their own.

"Eventually, you have to put something into production to keep the manufacturing base to go with it," he says.



Getty Images

Prototypes should be designed to transition into production easily, Gansler says. Cautionary examples are presented by the long line of failed US attempts to develop a new helicopter design in recent decades, the most recent being the ill-fated Boeing-Sikorsky RAH-66 Comanche.

But transitioning a design from a prototype to a production model tends to be expensive. "Where the expense comes in is in transitioning to the scale of an engineering and manufacturing development programme and into production," Kaminski says.

Another problem building prototypes cannot address are problems below the level of the big prime contractors, Gansler says. Often, second- and third-tier component manufacturers, which often supply multiple primes, are much more vulnerable during a downturn than larger companies.

Richard Aboulafia, an analyst at the Teal Group, suggests that instead of building prototypes of a new airframe, it might be wiser to

invest in the design and development of subsystems. Prototype airframes have historically tended to be single-purpose technology demonstrators, he notes.

"I'd say, let's look at bang for buck," Aboulafia says. "What if we were to take this airframe development concept and divert the cash to engines, avionics, weapons and sensors. Would we not be better serving the warfighters and taxpayer?"

TRADE STUDY

However, it is entirely possible that there is indeed a critical art of systems integration or airframe design that is being lost, adds Aboulafia. In that case, a prototype could be very useful in preserving those skills. "You would have to do a trade study," he says.

Kaminski says he is an advocate of "aggressive prototypes" that can potentially offer revolutionary capabilities, particularly in this sort of difficult budget environment.

"It's not a bad time to take some risks ex-

pecting that many of the things won't turn out," he says. "But you might see some very interesting game-changing designs come out of some of these activities."

Potentially, such efforts could yield breakthroughs in range, payload and speed. It could also yield benefits in avionics and stealth. But perhaps more importantly, at policy level, it gives senior decision-makers a menu of options to choose from once the fiscal climate is more favourable.

"The prototyping programmes aren't that expensive in the big scheme of things," notes Kaminski. However, Gansler cautions that the DoD should not build prototypes simply for the sake of building them. "What good is that? You can't use it," he says. "Even if you have demonstrated it in terms of technology, if you put it on the shelf until you need it, you still have to then produce it in volume affordably." ■



Dave Majumdar blogs on US defence aviation programmes at flightglobal.com/dewline

SHARING YOUR VISIONS

As we do in every tablet edition (see P2 for details), we here present a selection of stunning snaps posted to our AirSpace galleries, plus our Image of the Day blog's picks of what the industry has to offer



(Clockwise from top)
Boeing's B-17, a star of
flyvertosset's AirSpace
gallery; Hounddogone's
MAS 747-400; a CF-18
from mikeythepilot;
flyvertosset's B-29;

a US Air Force shot
of a C-17 in American
Samoa; an F-15 flare-up,
again from flyvertosset;



PHOTO SPECIAL



(Clockwise from left)
SFO airport and a
Special Ops Learjet,
both from flyvertosset;
Hounddogone's Bell
Huey cockpit, and
Boeing E-3D; Martin

Needham's Bond
AW139; EnoAeroPics'
Flybe Dash 8; sunshine
band's Swiss Airbus
A340 over Egypt; and a
Kazakh C295 displayed
by Airbus Military





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

End of an era as tower tumbles

Peter Bish asks us to join him in mourning the passing of his office for many years, the 38.8m (127ft) control tower at Heathrow, which has just been demolished as part of the modernisation of the airport's Terminals 1 and 2.

The tower, along with the whole of the original Central Area, comprising Terminal 2 and the Queens Building, is being cleared to make way for the new "Heathrow East" mega terminal, now, confusedly, to be renamed Terminal 2. The current T1 faces the same fate as the old T2.

The Queens Building and what later became Terminal 2 were part of the original Frederick Gibberd red-brick buildings that were the nerve centre of the new London airport when they opened in 1955. But by the turn of the century, T2 had become cramped and unloved.

Progress, of course, but "sad news for us former Heathrow ATCOs", says Peter, who took this shot (right) on 10 January and is co-author of *Heathrow ATC: The First 50 Years*.

Power of eight

First it was the A380 and 787 – aircraft designations that used the number 8, which is seen as lucky by the Chinese



Old storeys: the tower is demolished earlier this month

airlines it was hoped would make up a significant proportion of customers.

Then the G250 business jet became the G280, although Gulfstream had an added incentive after finding out that, in Chinese, the pronunciation of 250 is similar to the word for stupid.

Now even the airlines are "eight" it, with British Airways making a big play of the fact that its flights to and from Chengdu – to be launched later this year – will carry the numbers BA88 and BA89. It is also offering promotional fares of £508, although its faith in the power of the magic number does not go so far as to give seats away for £8.

And there is no truth in the

rumour that Willie Walsh is changing the airline's name to British Eightways in a bid to lure Chinese passengers.

All talk

Clive Lawrence has an answer to Peter Martin's question "What does it mean?" about a piece of management-speak from our interview with Volvo Aero executives – Yuckspeak #924 (*Flight International*, 8 January).

"My Babelfish tells me: despite not being able to change anything, they are trying to please all the people all the time," says Clive.

He adds: "As for who speaks like this: try any politician."

Ryan hot air

It has been dubbed the worst job in PR – by none other than Michael O'Leary, the man who is doing the recruiting. Ryanair has drawn up a shortlist of candidates to replace Stephen McNamara as head of communications for the frills-free airline.

Scathing wit, thick skin and endless energy are doubtless attributes for the "brave soul" O'Leary says he wants for the "high profile and incredibly overpaid" challenge.

Business class travel definitely not among the perks.



Who wants to be his mouthpiece?

Safety first

Repeated accidents have tended to scare the public, and capital is more sensitive to a public scare than anything. Without doubt, flying must become less dramatic and more secure if the industry is to receive the financial encouragement it deserves and establish itself on a firm footing.

Rough crossing

Mr Anthony Eden must wish he had crossed from Paris by air.

His vessel, after emulating a bucking bronco all the way across, crashed into Folkestone pier, cannoned off the jetty and narrowly missed another ship. It all seems so primitive in comparison with an aeroplane.

Return to sender

A fragment of the Sputnik 4 satellite, which fell on to a

farm in Wisconsin, was accepted by the Soviet Embassy in

Washington on January 5. The piece was originally offered to the Soviet Union at a meeting of the UN outer space committee on September 14, but was refused.

Italy gets the boot

The Italian government has indicated its willingness to

provide a base for USAF (Europe) General Dynamics F-16 Fighting

Falcons which have been ordered to leave their base at Torrejón by the Spanish government. The Italian base will probably be in Sicily.



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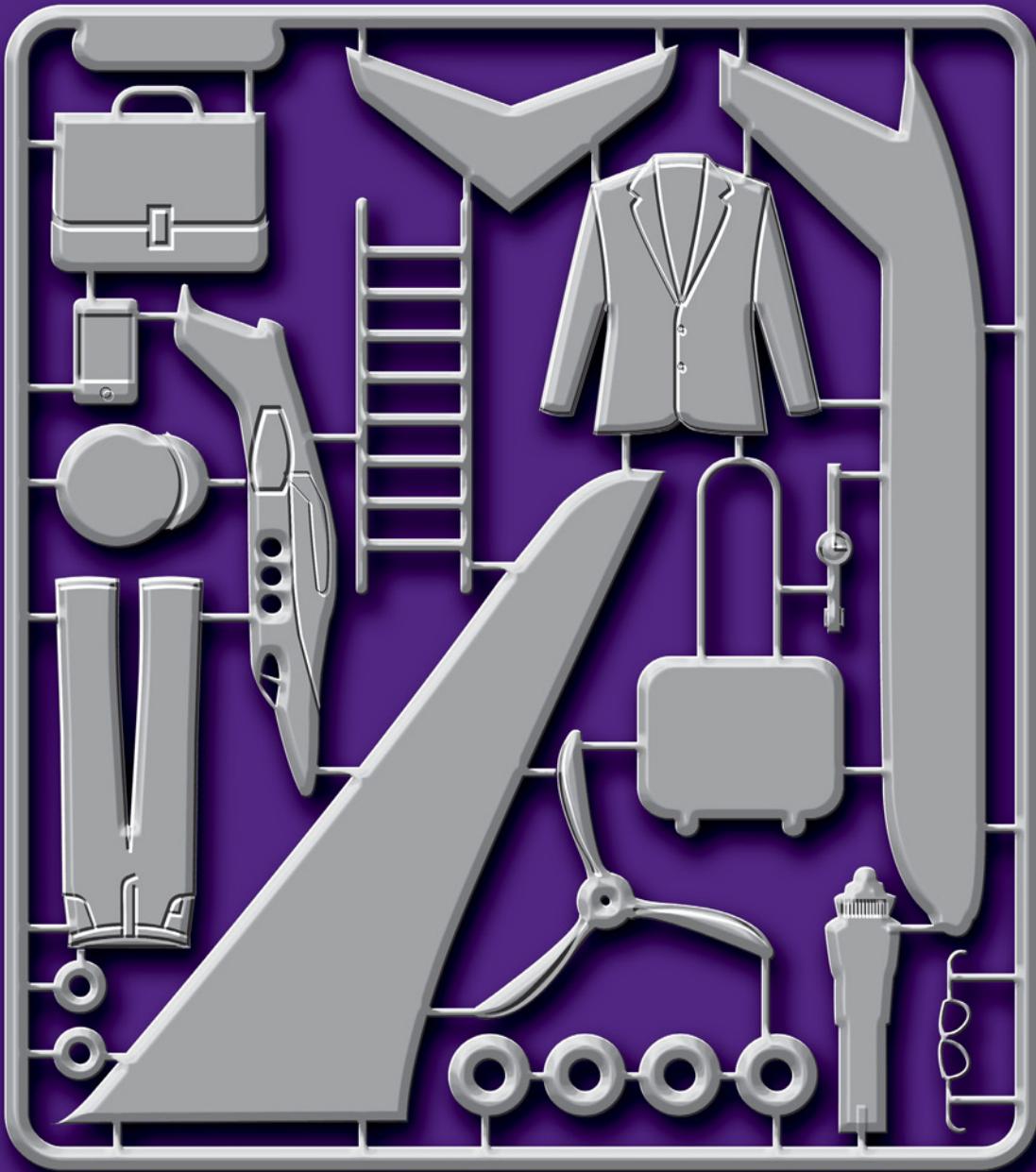
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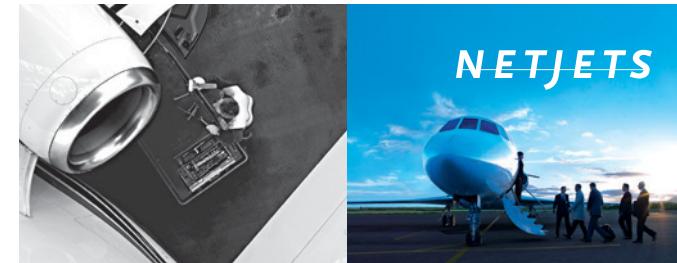


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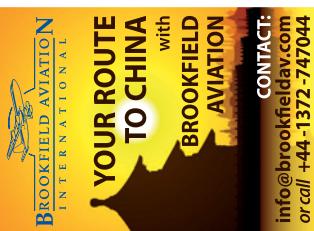
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WORK EXPERIENCE LYNN THOMAS

Long career Quest ends at Kodiak

After working on Wall Street for 20 years, Lynn Thomas finds being director of technical marketing at Quest Aircraft, which manufactures the Kodiak 10-seat single-engined utility turboprop in Idaho, a lot more fun

What was your first job?

Just like any kid, I delivered newspapers on my bicycle. I was always begging my parents to take me to the airport, so when I was 14 I started riding my bike to the airport in Greeley, Colorado to wash and wax aircraft and sweep the floors. I soloed when I was 16 and got my PPL when I was 17. I had no background in aviation, it was just in my DNA.

You worked in the public and finance sectors?

I worked my way through college, ending up as a physical education major. Then I was director of park and recreation departments for a number of cities. I started issuing bonds and a big Wall Street firm recruited me with the promise I could work a lot less hours and make a lot more money on the other side of the municipal bond market. So that is what I did for 20 years. I needed to get back to my roots so I tried to figure a way to issue bonds for corporate aviation companies. Then an aerobatics company came along and said: "Come work for us and you'll have a lot more fun." It was.

Do jets not appeal to you?

I don't need to go really fast. I like to do things that are interesting, whether rolling and looping or going fly fishing in the country. An aircraft is a means to an end and an adventure in between.

Does Quest only make the Kodiak?

We make one model and it is used


What is your favourite part of the job?

I love the challenge, the competitive part of it, and I really love building a team of dealers and salespeople. The sales function goes beyond specific salespeople. It is that team who are driving rivets so they understand the sales process, and when you take someone through the factory they understand this is the person who is providing their pay cheque. One of the neat things at Quest is that everybody is family: the aircraft owner, the operator, the guy sweeping the floor, the guy who ploughs the snow in the parking lot, the administrators. That is really exciting.

Your least favourite?

The economy in the past couple of years. We build a great aircraft and work to keep it moving forward and the company healthy. That has been extremely frustrating and I am sure every person working in aviation will express something similar. It has been a tough couple of years. Hopefully the economy is coming back. ■

Thomas finds talking to customers gives him new ideas for the aircraft

in multiple missions. We have different tyres, different cargo pods, you can put it on floats. You can put a bare-bones interior in it and haul freight. You can put an extremely nice interior in and make it an executive transport. We make a surveillance platform with cameras and sensors and all kinds of stuff on it.

What is your job at Quest?

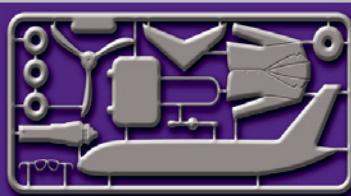
I spend a lot of time talking to potential customers, the actual users of an aircraft, and the people who help sell them. I work on how you relate the aircraft to a customer, and vice versa. I work with the dealer to deliver

the aircraft and do demo flights, air shows and conventions. I am involved at the factory in new options, new colours, and planning. It is a fascinating, broad-based job. I really enjoy working with the customers. They tell me what they are doing and give me ideas for the aircraft. It is rewarding to see the aircraft we build in action, and what it is doing around the world. We had aircraft in Haiti working after the earthquake and have many carrying out humanitarian and missionary work around the world. This aircraft is making a difference.



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