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INTERNATIONAL



RUSSIAN SPECIAL

National hero

MC-21 set for grand entrance at MAKS as aerospace sector looks to its future

£3.90



Repairing damage

Will fix for Trent 1000 mend Rolls-Royce's reputation? **8**

Piloting the future

Southwest in training to find flightcrew of tomorrow **12**

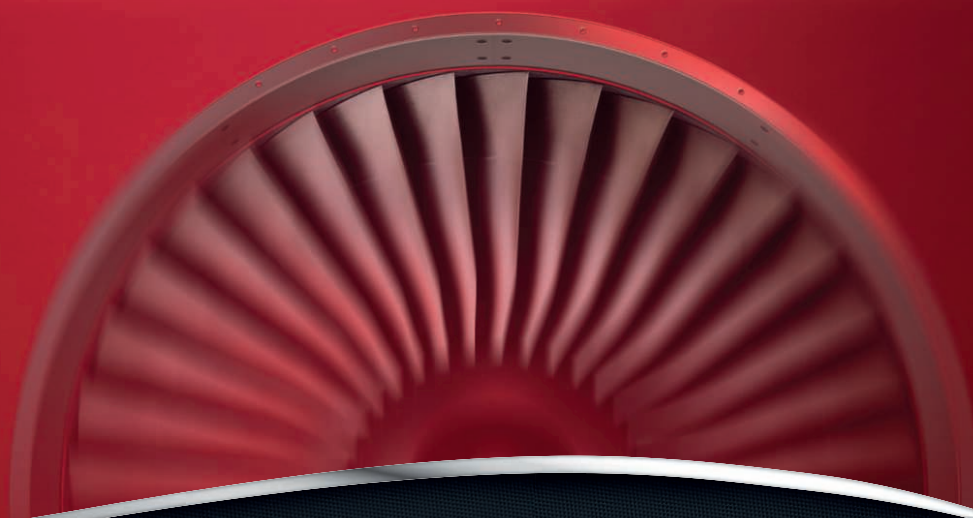
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Ural A321 makes forced landing after departure from Moscow **P7**

Sergei Iltitsky/EPA/EFE/Shutterstock

BEHIND THE HEADLINES

Michael Gubisch travelled to Moscow for a Russian industry round-up ahead of the MAKS air show (P23). And Murdo Morrison grilled Meggitt's chief on the firm's progress (P14)



Airbus

NEXT ISSUE TOP 100

After a mid-year break, we will return with our annual aerospace ranking, to be published on 3 September

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AirTeamImages

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Greater speed and size were the order of the day as *Flight* powered into its seventh decade



Russian Helicopters

Russian Helicopters pushes ahead with Ka-62 **P30**

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now with updated enhanced data and in-depth market analysis
flightglobal.com/commengines



Image of the week

Pilots from the US Air Force's 5th and 25th Flying Training Squadrons put a trio of Northrop T-38C Talons through their paces in a sortie over Oklahoma. The service's 431-strong fleet of the legacy jet-powered type will eventually be replaced by 351 Boeing T-X trainers

View more great aviation shots online and in our weekly tablet edition:

flightglobal.com/flight-international



US Air Force

The week in numbers

35%

Cirium Dashboard

SpiceJet's Q1 to end-June operating revenue soared to \$423m – thanks to the demise of Indian rival Jet Airways

\$1.11bn

London Gatwick airport

Robotic parking and automated boarding feature in five-year investment scheme to speed up London Gatwick operations

50

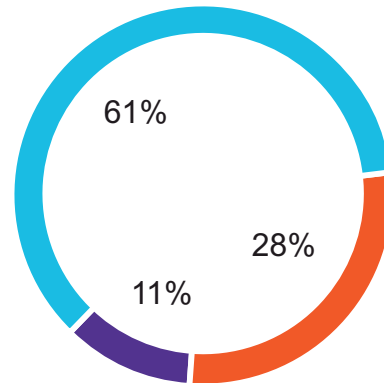
Cirium Dashboard

Number of staff being trained to do heavy checks on Airbus A350s at Lufthansa Technik's airframe MRO facility in Malta

Question of the week

Last week, we asked: **IAG short-haul strategy?**
You said:

Total votes: 2,893



Stick with Airbus family
1,765 votes

Room for 737 Max
807 votes

Mixed messaging
321 votes

This week, we ask: **Delaying 777-8?**

☐ Smart move ☐ Damage limitation

☐ Watch out sales

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Rival development strategies

Holding pattern

Boeing seems to be fighting multiple crises at present, as problems across its range mount up. But pausing the 777-8 may provide vital breathing space

The crisis meetings in Seattle have got longer and bleaker in recent weeks, as the fallout from the 737 Max grounding continues amid significant disruption to Boeing's other existing and future programmes.

The revelation that development of the 777X family's smaller, ultra-long-range -8 variant has been suspended comes in the wake of the serious delay to the baseline -9. Meanwhile, the proposed New Mid-market Airplane (NMA) is in limbo as Boeing rightly focuses on returning the Max safely to service. The NMA already looks like being the longest-running airliner launch in history, if indeed it ever becomes a reality.

Of course, the 777-9 should now be well into its flight-test programme. Instead, it remains firmly on the ground – ostensibly due to a redesign of part of the high-pressure compressor in its GE Aviation GE9X powerplant.

A maiden sortie is now expected in early 2020, which is around when deliveries should have begun. The -8 was due to follow two years later in 2022, but this schedule is now on ice. Boeing has made it clear that the GE9X woes are the pacing item on the -9, and that the -8 move is to reduce “development risk”.

Given revelations that have emerged around the certification of derivative programmes in the wake of the 737 Max grounding, there is likely to be increased scrutiny on policies applied during the development of the 777X – another “grandfathered” design.

Boeing is bullishly adhering to its target of a 2020 first delivery for the -9, which looks

wildly optimistic at best. The decision to park the -8 should help Boeing's engineers stay within their capacities as they work to mitigate the damage caused by the GE9X delay.

The decision to pause the -8 is softened by the fact that it is aimed at the relatively niche ultra-long-haul market. According to Cirium's Fleets Analyzer, the 777-8 represents only 15% of total 777X orders – just 53 aircraft.

Boeing is bullishly adhering to its target of a 2020 first delivery for the -9, which looks wildly optimistic at best

Airbus is no stranger to the issues Boeing is currently facing. It had to suspend the A380F and ultra-long-range A350-800 programmes to ensure it could get control of the baseline variants. In the end, neither version made it off the drawing board.

Could the same fate could befall the 777-8? Probably not, as with the demise of the 777-300ER, the smaller 777X variant will provide a counter to the A350-1000 – albeit with a surplus of range capability. But Boeing may decide once the -9 is back on track that a larger 777X model, rather than a smaller one, is where its focus should be. ■

See This Week P7

Green shoots

In business aviation, sales slumps are usually broken by the arrival of new products – and the latest shipment report from the General Aviation Manufacturers Association (GAMA) shows that rule still holds true.

The business jet sector recorded its strongest first-half output for five years, GAMA data shows, delivering 316 aircraft – a rise of 12.5% year on year. This strong performance aligns with the arrival in the market of several new models, such as the Embraer Praetor 600, Gulfstream G500 and, notably, the Pilatus PC-24.

They will be joined over the coming months by at least five more new business jets, including the overdue Citation Longitude, which should further boost this year's delivery numbers.

While business aircraft manufacturers will never again experience the heady days of the pre-financial crisis bubble – thankfully, many would say, because the situation was unsustainable – the industry has never been so busy.

Investment in new programmes and technologies has been a great tool to stimulate the market. This strategy will be vital to its continued survival. But rather than seeking ever-greater luxury, the industry's top priority now must be to improve its environmental performance.

Aviation generally is increasingly being singled out as a source of CO2 emissions, and users of business aviation – with its image as existing solely for a wealthy minority – are likely to come under less forgiving scrutiny than a family taking a short-haul holiday flight.

The industry must lead the development and adoption of sustainable technologies, including electric or hybrid-electric propulsion, and spur the uptake of biofuels. After all, with great power, comes great responsibility. ■

See Business Aviation P19



Pilatus

Cleaning up

BRIEFING

CAE WINS MORE MAX SIMULATOR ORDERS

TRAINING Southwest Airlines ordered another three Boeing 737 Max simulators from CAE in the second quarter, doubling its planned inventory of the devices. The airline has already received – and is now setting up – one 737 Max full-flight simulator, which will become operational in October. Two more will follow in early 2020, with the final three online in 2021.

ONEX DEAL FOR WESTJET CLEARS HURDLE

FINANCE The Canadian Competition Bureau has granted approval without conditions to Onex Partners for its acquisition of WestJet, removing another regulatory obstacle and bringing the Toronto-based private equity firm closer to completing the buyout. A majority of WestJet shareholders voted in favour of the proposed acquisition during a meeting in July. WestJet and Onex entered into a definitive agreement on 12 May.

AIR CANADA FLAGS NEW A220 ROUTES

ROUTES Air Canada has disclosed Montreal to Seattle, as well as Toronto to San Jose in California, as the first new routes it will open using its new Airbus A220-300s from 4 May 2020. The Star Alliance carrier will initially deploy the type from Montreal and Toronto on existing Canadian and transborder routes. Delivery of the airline's first of 45 A220s is due later this year.

NORWEGIAN AXES US FLIGHTS FROM IRELAND

AIRLINE Norwegian is to end all flights between Ireland and the USA from 15 September, as it looks to cut loss-making routes. The carrier had launched the six routes from Cork, Dublin and Shannon in July 2017 using Boeing 737 Max aircraft. However, Norwegian has been forced to wet-lease capacity to backfill for the grounded narrowbody and says this, plus uncertainty over the Max's return, has led to the conclusion that "these routes are no longer commercially viable".

LHT GROWS A350 CAPABILITIES IN MALTA

MAINTENANCE Lufthansa Technik has built up the capabilities of its Maltese facility to serve as an airframe overhaul centre for Airbus A350s, extending the site's existing heavy maintenance approval for the baseline A350-900 to the -1000 variant. The MRO provider intends to induct the A350s of its "first three customers" at the site by year end, it adds.

DREAM CHASER TO LAUNCH WITH VULCAN

SPACEFLIGHT Sierra Nevada has selected United Launch Alliance's Vulcan Centaur rocket to launch its Dream Chaser spacecraft's six NASA cargo resupply missions to the International Space Station, beginning in 2021.

FLIGHT INTERNATIONAL LANDS AT NEW HOME

DIVESTMENT Flight International is now part of DVV Media International, following Reed Business Information's divestment of its aviation publishing and conference activities. The FlightGlobal portfolio that has transferred to DVV also features *Airline Business*, the publishing activities at international air shows – including *Flight Daily News* and *Flight Evening News*, plus conferences and awards events. DVV Media International is owned by German newspaper publisher Rheinische Post and is based in Surrey in the UK.

DISPOSAL GARRETT REIM LOS ANGELES

For sale: Japanese VIP 'Air Force One'

Former government 747-400 – configured for official state business, with lounge and office – on market for \$28million

A Boeing 747-400 that carried Japan's emperor and several prime ministers on official state business is for sale for \$28 million.

The former government aircraft – which previously bore the military registration 20-1101 – entered service in 1991 and flew under the callsign "Japanese Air Force One", according to the jet's current owner, CSDS Aircraft Sales & Leasing of Los Angeles. The 747 has logged about 16,300h of flight time.

"One of the lowest-time Boeing 747-400s in the world. Aircraft has been maintained to the highest possible standard," says CSDS in a social media post.

"Shows like new. Bedroom, shower, office and lounge area. Aircraft will be delivered fresh from C-check and paint. This looks like a factory-new aircraft."

CSDS also bought another of Japan's VIP 747s (20-1102), but that will be converted into a cargo aircraft, says company president Ben Sirimanne.

The Japanese Air Self-Defence Force originally planned to part-out the two aircraft for \$11.9 million, but they are now stored at Pinal Airpark in Arizona, a bone-yard for commercial aircraft.

The four-engined jet has seats for 85 people – far fewer than a typical commercial layout for more than 400 passengers in a three-class configuration.

With parts of the VIP interiors to be turned over to museums, the aircraft will benefit from the installation of a new bedroom, shower, lounge and an office.

Japan replaced its 747-400s with a pair of 777-300ERs in April 2019. ■

DELIVERY

Virgin latest to join A350-1000 club

Virgin Atlantic has become the second UK airline in the space of a few weeks to take delivery of an Airbus A350-1000, with the formal handover of its first aircraft in Toulouse.

The delivery came after its London Heathrow-based rival British Airways took delivery of its first -1000 in July and introduced the type into service the following month.

Virgin's first aircraft (G-VLUX) was officially accepted on 9 August at Toulouse-Magnac airport. It is the first of 12 of the Rolls-Royce Trent XWB-powered aircraft the airline has on order, with deliveries due through to 2021.

The 335-seat widebody will initially operate between London Heathrow and New York John F Kennedy, with the inaugural flight to be flown on 10 September. ■



UK carrier received first of 12 widebodies at Toulouse in early August



R-R attempts to power out of trouble
This Week P8

PROGRAMME JON HEMMERDINGER BOSTON

Boeing puts long-range 777-8 on hold

Airframer cites need to ensure 'seamless' introduction for indeterminate delay, having already postponed -9's first flight

Development of the long-range 777-8 has been put back, just weeks after Boeing announced a delay in the first flight of the larger -9 variant.

The move to "adjust" the timeline of the ultra-long-range 777X variant is to "[reduce] risk in our development programme, ensuring a more seamless transition to the 777-8", says Boeing.

It comes after a review of the twinjet's development schedule and 777X customer requirements.

The airframer gives no indication of how long the development pause will last, and would not elaborate further.



Smaller variant has amassed 53 orders from three carriers combined

"We remain committed to the 777-8, which will be the most flexible commercial jet in the

world and offer our customers optimal range and payload," Boeing adds.

The 777-8 is the smaller, longer-range variant, which is designed to carry 384 passengers in a two-class configuration and fly up to 8,730nm (16,200km), compared with 426 passengers over 7,290nm for the -9.

Cirium's Fleets Analyzer indicates that Boeing has taken a combined 53 orders for the 777-8 from Emirates, Etihad Airways and Qatar Airways.

Suspending development of the 777-8 also throws into doubt Boeing's participation in the Project Sunrise contest being run by Qantas, which is seeking an aircraft capable of performing non-stop services between Australia's east coast and Europe.

Boeing says it will continue to work with current and potential 777X operators. "This includes our valued customer Qantas," it adds.

The delay to the 777-8, first reported by industry publication *The Air Current*, came just weeks after the airframer pushed back the 777-9's first flight because of an issue with the GE Aviation GE9X engines that power both 777X variants.

First flight of the widebody twin was scheduled for this year, but that has now been delayed until 2020. However, the airframer maintains that certification and first delivery will still take place next year. ■

COMPETITION DAVID KAMINSKI-MORROW LONDON

'Compelling option' provides ray of hope in Qantas contest

A delay to development of the Boeing 777-8 will not necessarily rule the airframer out of Qantas's high-profile "Project Sunrise" initiative to acquire an aircraft capable of operating nonstop services between Sydney and London.

FlightGlobal understands, from a source close to the initiative, that Boeing is keen to remain within the competition and has put a "compelling option" to the Australian carrier intended to "help manage potential timing issues".

Boeing has offered the 777-8 as an alternative to the Airbus

A350 to serve the routes between the UK and eastern Australia. Qantas already uses Boeing 787s on a nonstop route between London and Perth.

Qantas says it is continuing to work with both Boeing and Airbus on Project Sunrise.

"We have the best and final offers from both manufacturers, which is a key part of helping finalise our internal business case," says the carrier. "We still expect to make a decision by the end of this calendar year."

Airbus declines to give details

on its discussions with Qantas, citing confidentiality reasons. It notes that Qantas has been in discussions with pilots' representatives concerning 22h flights.

It claims that the A350 is the "perfect solution" for Project Sunrise, and says the aircraft would be capable of operating to London from either Sydney or Melbourne.

Airbus has already delivered the A350-900ULR – currently operated by Singapore Airlines – but has yet to confirm development of a -1000ULR variant. ■

INCIDENT

Ural A321 downed after bird strikes

Both engines on a Ural Airlines Airbus A321 failed before the aircraft conducted a forced landing in a field outside Moscow. The Russian carrier says the aircraft lost power in both engines following a severe bird strike as it departed Moscow Zhukovsky for Simferopol early on 15 August. Russia's Interstate Aviation Committee has confirmed the airframe as VQ-BOZ, a CFM International CFM56-powered aircraft. Ural Airlines is crediting the "professionalism" and "co-ordinated actions" of the crew in safely bringing down and evacuating the aircraft. Only minor injuries were sustained by the seven crew and 224 passengers on board. The aircraft suffered "significant" damage, the airline adds.



PROPULSION DOMINIC PERRY LONDON

R-R attempts to power out of trouble

UK manufacturer must master challenges on current engines, while funding development of alternative technologies

The multiple problems afflicting its Trent 1000 engine may finally be receding, but Rolls-Royce's ability to repair the damage to its reputation is another matter altogether.

Although disruption to Boeing 787 operators using the R-R powerplant is still "significant", according to the UK firm's chief executive, Warren East, it has eased considerably since 2018.

The number of aircraft on the ground with engines awaiting new compressor or turbine blades should be down to single digits by year-end, said East, speaking on a half-year results presentation on 6 August.

East acknowledges that the situation is "unacceptable" – but a willingness to shoulder blame does not lessen the damage to the manufacturer's reputation for engineering excellence.

This may not have a huge effect on those aircraft where R-R has a monopoly position – in particular the Airbus A350 and A330neo – but the market may be less forgiving on other types: the only new-generation widebody where an engine choice is available is, of course, the 787.

The R-R powerplant faces competition on the Dreamliner from the GE Aviation GENx, and holds a market share of 33% against its US rival.

Data from Cirium's Fleets Analyzer shows that the GENx has been picked on 60% of all in-service and ordered 787s, while no engine selection has been made for the remainder.

HOLDING STEADY

East says R-R's "assumption" is that it will "maintain the market share we have today" in future contests. "If the customer is a Rolls-Royce house, we would say we are more likely to win that, but we are not taking anything for granted," he says.

Although R-R gained orders in the first three months of the year



Production problems slowing Trent 7000 deliveries have stabilised over first two quarters of this year

from Air Premia and Lufthansa, it subsequently lost out to GE, which won commitments from Air New Zealand (ANZ) and Qatar Airways.

East says the manufacturer was "not surprised" to see existing GENx operator Qatar select the same powerplant for its next batch of 30 787-9s, but was "disappointed" by ANZ's defection on a deal for eight -10s, plus 12 options.

However, East is quick to point to the particularly "aggressive" competition at present, and notes feedback from ANZ indicating that GE made "an extraordinary offer that was non-refusable".

While R-R may try to match some discounts, East says it can only go so far, noting "limits of commercial common sense".

But keen pricing is not just limited to engines. Boeing has also reduced the price of its Dreamliner family as a competitive response to Airbus, and is "giving the A330neo a run for its money", says East.

That presents another problem for R-R, in that an aircraft where its engines only have a one-in-three chance of selection – and are suffering from durability or reputational problems – is being aggressively pitched against a platform on which the Trent 7000 is the sole powerplant available.

In other words, if the 787 wins against the A330neo, there is a

better than even chance that R-R will be left with nothing.

East is staying positive on the re-engined A330, however. "Actually, in the first half of the year, if you look at the mood music now compared with 12 months ago, the story with the A330neo is very different," he says.

RECOVERY

There is an argument that concerns about the engine's durability – following the Trent 1000 issues, and with the production system that delayed the Neo's service entry – have caused operators to shy away from the re-engined widebody.

The A330neo secured important commitments at the Paris air show in June, but combined total orders for the -800 and -900 are at only 248 aircraft, according to Airbus data covering the period to end-July.

R-R does at least now have a handle on the production problems that dogged the early stages of the Trent 7000 programme: its delivery rate to Airbus "improved in the first quarter" and was sustained over the subsequent three months.

In the first half, R-R shipped 54 Trent 7000s to Airbus and is now "comfortable" with the required output, East says.

But while current output seems stable, R-R could face a

bigger challenge in future as aviation comes under increasing pressure to reduce its environmental impact.

East says that over the past six months the aviation industry has been "set up as the villain of the piece as far as environmental damage is concerned".

But he acknowledges that while the industry is "built on setting fire to hydrocarbons", there is a pressing need to "wean ourselves off that".

R-R's agreement to acquire Siemens' electric and hybrid-electric aerospace propulsion activities – due to complete in late-2019 – will assist with that ambition.

Technology can also be leveraged from the company's power systems division, he says, which is "exposed to applications where electrification is playing a key role today".

Additional research and development will be required to help with the transformation, but engineering resources can be moved within the business as other engines mature.

However, East is also quick to point out the contradiction at the heart of its strategy: the ability to bankroll development of future alternative propulsion systems rests on R-R's continued success in selling products that "probably drive the carbon footprint". ■



Tribunal clears way for tie-up between Air Canada, Transat
Air Transport P10

THIS WEEK

ANALYSIS JON HEMMERDINGER BOSTON

Delivery figures show true impact of grounding

Boeing delivered just 19 aircraft in July, down significantly on the previous month, though demand for passenger and freighter widebodies boosted orders.

The meagre shipment numbers in July – largely related to the 737 Max grounding – have done little to help the airframer’s year-to-

date delivery figures either.

By end-July, Boeing had handed over 258 aircraft, down from 417 during the same seven months of 2018, according to the manufacturer’s latest data.

Boeing’s July deliveries included 12 787s, which went to Biman Bangladesh Airlines,

China Eastern Airlines, Etihad Airways, Turkish Airlines, Uzbekistan Airways and lessors AerCap, Air Lease, BOC Aviation and GECAS.

It also shipped two 777 Freighters – one each to FedEx Express and Qatar Airways – and two 767-300Fs, one each to

FedEx and UPS.

Boeing’s backlog climbed in July, however, as it netted deals for 31 aircraft.

Still, the airframer has taken orders for a total of only 139 aircraft this year, down 71% on the 478 units it booked over the same period in 2018. ■

FLEET MAX KINGSLEY-JONES LONDON

787 switch salves Air Lease’s Max pain

Lessor converts 15 orders for grounded narrowbody to five Dreamliners, boosting future supply of twin-aisle type

US-based Air Lease has taken steps to mitigate its exposure to the ongoing Boeing 737 Max crisis with an opportune deal to switch 15 of its orders to the 787.

Speaking during its second-quarter earnings call on 8 August, Air Lease chief executive John Plueger said the lessor is working on the basis that it will receive no further 737 Max aircraft during 2019, though he emphasised this was an independent view and did not reflect Boeing’s position.

“Frankly, I hope our assumption is wrong, as we do look forward to delivery recommencement of the Max as soon as possible,” says Plueger.

As of 30 June, Air Lease had outstanding orders for 150 737

Max, but it has signed a memorandum of understanding with Boeing to switch 15 of these to a deal for five 787-9s.

Plueger says Air Lease was “short in the second quarter of this year of 787-9s [on order]”, with demand for 2020-2022 deliveries greater than supply in its backlog. The lessor considered that “the wisest thing to do was to convert 15 of our Max 8s and 9s into five additional 787-9s”, he says.

The suspension of Max deliveries coincides with Airbus’s continuing production delays affecting A321neo shipments, which has resulted in Air Lease having to adjust its contracted delivery schedule, according to the lessor’s chief financial officer Greg Willis.



Gary Hie/EPA-EFE/Shutterstock

Airline’s plans see no further deliveries of re-engined jet this year

Plueger says the combination of the Max grounding and A321neo delays has led to a rise in short-term demand for single-aisles, which has helped drive up certain

lease rates. Air Lease has helped provide interim capacity for some Max customers either through dry lease or short-term wet leases from other operators. ■



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FINANCIAL
DAVID KAMINSKI-MORROW
LONDON

TUI results show cost of ongoing Max suspension

Tour operator TUI Group is expecting a €300 million (\$335 million) impact on full-year financial results as a consequence of the continuing suspension of Boeing 737 Max operations.

TUI says, in a third-quarter briefing, that it has secured replacement aircraft leases to the end of its summer 2019 flight programme. It puts the combined cost of the Max grounding at €149 million, with €144 million of this from second and third quarters.

TUI's markets and airlines division suffered, turning in a near-€115 million earnings loss compared with the previous €26 million profit. TUI says this reflects "tougher prior-year comparables" as well as the Max costs.

Grounding of the Max cost TUI's Northern Region operation some €84 million during the third quarter, wiping out the €14 million benefit of the later Easter holiday period. The Max costs also means the share of earnings for Canada were down €8 million.

The Easter benefit of €7 million for the Central Region was fully offset by €17 million in Max-related aircraft replacement costs, while the Western Region bore Max costs of €43 million. ■



Board will recommend C\$18 per share offer from flag carrier

ACQUISITION DAVID KAMINSKI-MORROW LONDON

Tribunal clears way for tie-up between Air Canada, Transat

Quebec judges rule Group Mach attempt to prevent deal is 'contrary to public interest'

Canadian financial judges have intervened to block real estate firm Group Mach from obstructing Air Canada's intended acquisition of Transat AT, the parent company of carrier Air Transat.

Quebec's financial markets administrative tribunal has blocked a trade offer by Group Mach to acquire a substantial stake in Transat AT.

Group Mach had disclosed on 2 August an offer to purchase at least 6.9 million voting shares in Transat AT – amounting to 19.5% of the company – at a price of C\$14 per share. At the time this was a higher price than the C\$13 per share being offered by Air Canada for Transat AT.

Group Mach had argued that Air Canada's offer "undervalued" Transat AT and it set a 13 August deadline for Transat AT shareholders to accept the deal.

But the tribunal has accepted an application by Transat AT to block the Group Mach offer. The decision was not unanimous – two judges agreed but a third dissented – but the majority view has prevailed.

The two supporting judges state in the ruling that they consider the Group Mach offer to be "abusive" and "coercive", as well as "contrary to the public interest".

Their ruling criticises the "short timelines" for informed decision-making, making it clear

that the tribunal has "no choice" but to intervene.

The majority ruling means Group Mach is barred from acquiring any Transat AT shares under its scheme, and also forbidden from using proxies associated with shares deposited under it. Air Canada has since raised its offer for Transat AT to C\$18 per share.

Transat AT shareholders are set to meet on 23 August to consider and vote on approving the Air Canada agreement. The board of Transat AT says it is reiterating its "unanimous recommendation" that the Air Canada tie-up is "in the best interest" of the company and its shareholders. ■

MODIFICATION CIRIUM PERTH

Split-scimitar wing-tips cut Virgin Australia's fuel bill



Airline is fitting the devices to five 737NGs that operate long sectors

Virgin Australia has become the first Australian carrier to install Aviation Partners Boeing split-scimitar wing-tip devices on a Boeing 737-800.

The aircraft (VH-YIV) re-entered service on 8 August after the installation work, and is the first of five 737-800s that will be fitted with wing-tip modifications.

"With fuel one of the largest costs for airlines, we're attracted to the benefits winglets provide,"

says the airline's acting chief operations officer Stuart Aggs.

"The fuel benefits increase with sector length so we'll be retro-fitting the winglets to five of our Boeing 737NG aircraft currently operating services to destinations like Fiji, New Zealand, Bali and the Pacific Islands."

The other aircraft which will be fitted with the devices are registered VH-YIU, -YIJ, -YIR and -YIS, Virgin Australia says. ■



Southwest trains eyes on pilot pipeline
Air Transport P12

LOGISTICS CIRIUM PERTH

A321P2F set to deliver the benefits for Qantas

Qantas will become the first operator of the Airbus A321P2F converted freighter under an expanded partnership with Australia Post.

The Oneworld carrier says it will introduce up to three A321P2F jets from October 2020, which will offer an additional 9t payload over the Boeing 737-300Fs that it operates on domestic freight services.

Qantas Group chief executive Alan Joyce says that moving to higher-capacity freighter aircraft has been driven by higher demand for next-day deliveries, primarily as a result of the continued growth of e-commerce in Australia.

“Consumer preferences and expectations are rapidly changing and together with Australia

Post we’re responding by growing our dedicated freighter fleet to provide a better experience for consumers and businesses,” he adds.

Cirium’s Fleets Analyzer shows that Qantas Group owns two conventional A321s that are operated by Jetstar; the pair appear to be likely candidates for the passenger-to-freighter conversion programme.

The A321P2F programme is being developed by Airbus and ST Engineering Aerospace through their EFW joint venture.

Qantas says that its seven-year agreement with Australia Post is valued at over A\$1 billion (\$679 million) and includes priority access to freight capacity on flights operated by the Qantas Group and its global partners. ■



FLEET

Thais land first AirAsia X A330neo

AirAsia X has received its first Airbus A330neo. The -900 variant – leased from Avolon – will be operated by the Malaysian carrier’s AirAsia X Thailand affiliate and joined by a second of the type later this year. AirAsia X Thailand has configured the twinjet with 365 economy- and 12 premium-class lie-flat seats. AirAsia X is the A330neo’s largest customer, with 66 aircraft on order. In addition, the carrier placed a tentative commitment at the 2018 Farnborough air show for a further 34 units, although this has yet to be finalised.

BACKLOG DAVID KAMINSKI-MORROW LONDON

Airbus closes in on next A320 milestone

Orderbook analysis shows airframer should hand over 9,000th aircraft from narrowbody family by early September

Airbus appears likely to deliver its 9,000th A320-family aircraft during August or early September, analysis of the airframer’s production backlog shows.

The manufacturer had delivered a total of 8,951 jets from the single-aisle family by the end of July. These comprised 8,037 of the A320ceo models plus 914 of the re-engined A320neo variants.

Airbus delivered 52 A320-family jets in July and, given the single-aisle production rate, this suggests the 9,000 mark will be reached towards the end of this month.

No details of the likely customer recipient of the 9,000th aircraft – or the specific model or assembly plant involved – have yet been disclosed.

Airbus delivered the 8,000th twinjet from the line, to Air



Recent deliveries have included re-engined variant for Air Seychelles

China, in February last year.

Meanwhile, US carrier Frontier Airlines has converted a batch of 15 A320neo orders to the larger A321neo.

The airline had 34 A321neos

on order – none of which has yet been delivered – but this figure has risen to 49 in the airframer’s latest backlog revision.

Frontier’s firm A320neo commitment has correspondingly

reduced to 165 aircraft, of which 41 had been delivered by the end of July.

The US carrier is one of the airlines that signed up for the long-range A321XLR variant of the A321neo during the Paris air show.

Investor Indigo Partners unveiled a memorandum of understanding for 50 A321XLRs during the show – consisting of 32 new orders and conversion of 18 A320neo-family jets already in the backlog.

Frontier Airlines is due to receive 18 XLRs out of the 50. The A320neos already in service with the operator are fitted with CFM International Leap-1A engines.

Conversion of the 15 Frontier A320neos takes Airbus’s total orders for the A321neo to one shy of 2,700 aircraft. It has so far delivered 204. ■



Graduates will be eligible for position in right-hand seat of a 737

EMPLOYMENT JON HEMMERDINGER BOSTON

Southwest trains eyes on pilot pipeline

Low-cost US carrier addresses first officer shortage with scheme that allows recruits to accumulate hours elsewhere

Southwest Airlines is seeking to head off a potential flight-crew shortage through a new partnership with several industry players that could provide the airline with up to 400 additional pilots every year.

The effort aims to guide new cockpit crew through initial training and then help them land jobs as flight instructors or charter aircraft pilots, where they can accumulate hours before applying for roles as Southwest first officers.

US regulations from 2013 require new pilots to have 1,500h of flight time – a level some believe has exacerbated the shortage of crews.

But accumulating hours is not the primary goal of Southwest's new training programme – called Destination 225 – vice-president of flight operations Alan Kasher tells FlightGlobal.

Rather, the partnership will help pilots receive training and experience that prepares them for jobs in an airline environment.

"The quality of the training is the key," he says. "What we did is build our foundational principles into their training programmes."

The carrier's partners include training and flight simulator specialist CAE, and charter and private aircraft operators including Jet Linx Aviation, Swift Air and XOJet. Another participant, aviation services company Argus, has reviewed the training CAE and the charter partners will provide, and will evaluate pilots' performance through the programme.

Southwest has no shortage of recruits now, but is concerned by looming retirements and a potentially weak hiring pipeline.

"There's a point in three to five years where it becomes challenging," Kasher says.

For several years now some industry observers have warned that pilot retirements, combined with a shortage of recruits, are already limiting supply.

Washington DC-based trade body the Regional Airline Association cites a CAE study which estimates that US carriers will need 110,000 new pilots by 2028. Boeing, meanwhile, forecasts the industry will need 645,000 new commercial pilots globally over the next 20 years.

Southwest will interview all Destination 225 applications and

accept those expected to excel in the training programme and as eventual pilots in its operation.

The programme provides several training tracks called "pilot pathways", which align with 2013 regulations enacted after the 2009 crash of Colgan Air flight 3409.

FLIGHT TIME

Though the regulations require new pilots have 1,500h of flight time, it reduces the baseline to 750h for military pilots and 1,000-1,250h for flight school graduates.

Destination 225 applicants without flight experience will enter a CAE flight-training programme, where they will learn to fly and be exposed to Southwest's "general operating philosophies on the flightdeck", says Kasher.

For instance, students will learn Southwest's checklist procedures and concepts like "human factors" in the cockpit, he says.

CAE says it expects to train some 700 new pilots through the programme in 10 years, with students paying for their training.

Pilots will then have a chance to accumulate flight hours working as a CAE flight instructor or

flying for the charter and business jet operators. This process can take four years, after which the pilots will be eligible for interviews with Southwest.

Destination 225's other tracks similarly help former military pilots and flight school graduates land jobs at charter companies, where they can build hours and work toward a job in the right seat of a Southwest Boeing 737.

"At the end, they are guaranteed an interview," Kasher says.

Some airlines – notably regional carriers – have criticised the 1,500h rule, saying the environment pilots fly in is more critical than cockpit hours, and argue that many applicants lack experience relevant to airline operations.

But Kasher stresses Destination 225 will train recruits to be airline pilots. "They start in an airline environment," Kasher says. "They are coming out of... training with foundational skills that traditional civilians don't get."

The first Destination 225 training class begins in January. Southwest anticipates some 100-140 recruits will enter the programme in the first year. ■



Meggitt benefits
from end-user
focus
Defence P14

SAFETY DAVID KAMINSKI-MORROW LONDON

More L-410 beta-range events emerge

Russian investigators find several instances of abnormal propeller pitch movement on Khabarovsk Airlines turboprops

The inquiry into the fatal crash of an Aircraft Industries Let L-410 in Russia have revealed several other incidents involving beta-range propeller pitch on the type.

The Khabarovsk Airlines aircraft (RA-67047) came down on approach to Nelkan in November 2017 after the right-hand engine entered the beta range, effectively reversing thrust and causing the L-410 to roll into the ground from low altitude.

Russia's Interstate Aviation Committee says it identified another case of in-flight beta status annunciation with a separate Khabarovsk L-410 (RA-67036) which was approaching Ayan airport in March 2015.

The turboprop was travelling at 115kt (213km/h), at a height of 850ft, when the annunciation occurred for the right-hand engine.

But a back-up system – a pitch lock, designed to stop the blades moving into reverse – appears to have activated and stopped the



Aircraft Industries

Multiple aircraft in carrier's fleet have demonstrated potential issue

propeller, as intended, at a 9° pitch.

Investigators state that the beta status annunciation lasted 21s, the aircraft descended 360ft, but it did not roll more than 10° to the right.

Subsequent ground trials of the engine, in various modes, could not replicate the beta status annunciation.

"[This case] was not classified as an incident," says the

Interstate Aviation Committee. "Therefore, no preventive measures were developed at that time."

No information was provided to the aircraft, engine or propeller designers and manufacturers and the aircraft remained in operation, with "no further attempts" made to determine the cause, it adds.

Two months after the fatal Nelkan accident another beta-

status annunciation incident occurred, this time involving a third Khabarovsk L-410 (RA-67040) on the ground in January 2018.

The annunciation from the right-hand powerplant – together with a pitch-lock signal – was generated after engine start, when the pitch control was moved from feather mode to minimum in-flight pitch angle.

VALVE FAULT

Specialists examined the propeller governor and found that it met acceptance test requirements, but that assessment of the beta valve exhibited some "sticking", says the inquiry.

This could have caused uncommanded propeller overspeed and blade movement below the minimum pre-set angle, adds the Interstate Aviation Committee.

But the conclusion that the governor design is vulnerable to possible hard seizure has proven controversial. Czech authorities, representing the state of manufacture, are "positive" that the governor design "excludes" beta valve seizure.

While work has been carried out on L-410s fitted with GE Aviation H80-200 engines, involving modification of beta switches and adjustment of propeller and governor systems, the Interstate Aviation Committee says two more cases of abnormal Khabarovsk Airlines operations occurred in April and May last year.

After engine start on aircraft RA-67035, when the pitch control was moved into the "fine" position, the beta-range and pitch-lock annunciations activated, followed by propeller overspeed.

Czech authorities have told the inquiry that the April occurrence related to an incorrect beta-switch adjustment procedure, while the incident in May involved contamination of the beta switch. ■

ACCIDENT

Czechs argue insufficient rudder applied before Nelkan crash

Czech investigators believe the crew of an Aircraft Industries Let L-410 did not apply sufficient rudder to counter yaw, after a propeller pitch reversal, before the aircraft fatally rolled into the ground on final approach to Nelkan.

Russia's Interstate Aviation Committee, which led the inquiry, states that the pitch setting of the blades dropped to -1.8°, significantly below the minimum in-flight setting of 13.5°, while the Khabarovsk Airlines aircraft was just 558ft above ground.

The inquiry says it suffered an "extremely improbable" uncommanded shift of the right-hand propeller into the "beta" range – effectively reversing its thrust – and the crew had been unprepared to respond to this

highly unlikely scenario.

While the Russian probe says the pitch reversal and the forward setting of the throttle levers caused the aircraft to enter a "significant" roll to the right, Czech authorities have formally requested an amended interpretation.

The Czech side says the crew increased power on the left-hand engine, leading to a developing yaw which – combined with low airspeed and "only small rudder deflection" – resulted in a roll that could not be compensated by aileron deflection alone.

Within 14s of the onset of the problem the first officer had identified that a propeller had entered the beta range.

But while the pilots attempted to recover the aircraft using ailerons, elevators and rudder, as well

as the left-hand throttle control, they did not feather the right-hand propeller.

Manufacturer Aircraft Industries says the certification process for the particular L-410 variant – the UVP-E20, fitted with GE Aviation H80-200 engines – did not consider propeller pitch reversal to be a risk.

"[This] was the reason why [no] instructions for flightcrew for this event were introduced into [the aircraft flight manual]," it told the inquiry. Analysis had indicated that the probability of such an event was 10-14 and, as a result, crew training was not required.

Seven occupants, including the two pilots, had been on board the aircraft and only a single passenger survived the 15 November 2017 accident. ■

STRATEGY MURDO MORRISON LONDON

Meggitt benefits from end-user focus

With an impressive technology portfolio, UK first-tier manufacturer is increasingly turning its attention to aftermarket

When seven out of every 10 products you sell is sole-source with your customer – as well as your own invention – it is easy to take things for granted as a first-tier aerospace manufacturer. “We had become a bit complacent sitting on that [intellectual property] position,” admits Tony Wood, who is halfway through his second full year as chief executive of Meggitt.

The UK firm, whose portfolio spans aircraft wheels and brakes to engine controls and fuel-containment systems, has delivered another set of solid six-month results. The figures reflect some of the strategies that the former Rolls-Royce executive has initiated.

A key change by Wood, who took over in January 2018 after a year as chief operating officer, was a new corporate structure – with the aftermarket business as one of four divisions. This helped to give a fresh focus to Meggitt’s approach to airline customers and other end-users, says Wood.

The company had always been renowned for its technology, winning an impressive array of original equipment contracts. However, Wood says, it was less good at securing long-term support packages, which reduce competitive risk by ensuring a steady revenue stream from the aftermarket.

An example of its new approach is a contract with Lufthansa Technik, signed at June’s Paris air show, which will see Meggitt staff embedded in the German maintenance provider’s Shenzhen complex in China. Under the arrangement, to come on stream in the next few weeks, that team will directly handle any Meggitt-made content on the aircraft.

“A key benefit from this is we receive all the data, which helps us predict the parts and resources we will need in the future,” says Wood. It is one of seven contracts won under Meggitt’s Smart Support aftermarket proposition in the first half.



Strong orders from defence sector include contract to supply fuel bladders for F/A-18E/F Super Hornet

The attention to the aftermarket – which currently makes up just under half of Meggitt’s revenues, a proportion likely to rise as the ramp-up on a number of commercial and military programmes eases back – is one of several corporate shake-ups at the Bournemouth-headquartered firm.

“We receive all the data, which helps us predict the parts and resources we will need in the future”

Tony Wood
Chief executive, Meggitt

In fact, the company will soon not be Bournemouth-headquartered at all. In the first quarter of 2020, it will open a greenfield facility at the Ansty technology park near Coventry that will house a new HQ and parts hub, as well as consolidating four existing UK factories into a single location.

Reducing Meggitt’s sprawling global industrial footprint without damaging capacity or capabilities has been a priority of the

company, which, in 2016, had set a target of a 20% reduction in its 56 sites. That number is already down to 42 and will reduce to 35 once Ansty opens next year, and Wood is not ruling out further closures. The moves have seen the average workforce in a Meggitt operation rise from 200 to more than 300, with around 1,000 at the bigger sites. “It means we are now a more grown-up company in terms of career paths,” he says. “It also means we can get a better cost structure and efficiencies.”

In the six months to 30 June, Meggitt reported a 12% increase in revenues to £1.07 billion (\$1.3 billion), with 9% coming from organic growth. This reflected, says the company, a “strong trading performance in civil OE and defence”. Underlying operating profit was up 7% to £161 million.

Both main sectors contributed to the performance, with revenues in civil aerospace – the largest proportion of Meggitt’s business – up 9% organically, and defence growing 13% on the same basis.

In civil aerospace, there was “particularly good growth” on the Boeing 787 and Airbus A320neo family, as well as the 737 Max.

Wood says the company is still delivering 42 shipsets a month for the grounded narrowbody – it supplies \$150,000 worth per aircraft of sensors and cockpit equipment, as well as composite parts for the CFM International Leap engine – although it took a hit on the aftermarket side in the first half as airlines cut back on spares provision.

BIG BUSINESS

In business aviation, Meggitt announced new contracts to supply the braking system for the Embraer Praetor 500/600, worth \$500 million over the life of the programme, and the braking and tyre monitoring system on the Dassault Falcon 6X, worth \$1.2 billion over the aircraft’s lifetime. The company also says that growth in defence orders has been particularly strong, with an organic book-to-bill ratio of 1.33.

Aside from a previously announced 10-year deal for high-temperature composite components on the Pratt & Whitney F135 engine for the Lockheed Martin F-35, there was new business from Lockheed, Boeing and the US Defense Logistics Agency, the latter to supply fuel bladders for the F/A-18E/F. ■



Pegasus deliveries
inch slowly forward
Defence P16

UPGRADE GARRETT REIM LOS ANGELES

USAF completes A-10 re-winging

The US Air Force has installed the last set of replacement wings on its fleet of Fairchild Republic A-10 Thunderbolt II aircraft, completing the Enhanced Wing Assembly programme that began in 2011.

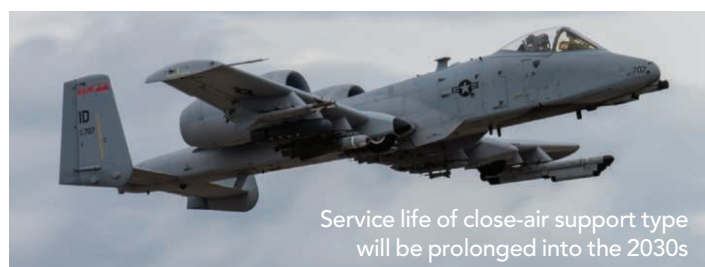
Some 173 pairs of new wings were fitted to A-10s at the Ogden Air Logistics Complex at Hill AFB in Utah, while 11 sets were installed at Osan AFB in South Korea, says the USAF. Wing replacement was required due to the heavy stresses endured by the aircraft, and the upgrade will prolong service life into the 2030s.

Boeing was awarded a \$1.1 billion contract in 2007 to build re-

placement wings at its plant in Macon, Georgia.

The new wings should last for 10,000 flight hours before needing a depot inspection. The structures also include an improved wire harness design to make removal easier, while reducing the likelihood of damage during maintenance, says the USAF.

Introduced in 1976 as a close air support aircraft, the A-10 is heavily armed, with one 30mm GAU-8/A seven-barrel Gatling gun and up to 7,200kg (16,000lb) of mixed ordnance. The aircraft has eight under-wing weapons stations and three pylons under its fuselage. ■



Service life of close-air support type will be prolonged into the 2030s

US Air Force



AP/Shutterstock

DEBUT

Sukhoi's 'Hunter' takes to the skies

Russia's Sukhoi S-70 Okhotnik – or “Hunter” – stealthy unmanned air vehicle (UAV) has performed its first flight, from an undisclosed location on 3 August. Lasting more than 20min, the maiden sortie included several passes and banked turns over the airfield at around 2000ft, after which it successfully landed, says the Russian defence ministry. The S-70's flying-wing design resembles that of the Dassault Neuron or Northrop Grumman X-47B, giving it a low radar cross-section. It also uses “special materials and coatings that make it practically invisible to radar detection equipment,” the defence ministry says. However, the exposed engine exhaust nozzle will likely negate some of those stealthy characteristics. The aircraft is equipped with targeting equipment, electro-optical sensors, radio hardware and other types of reconnaissance equipment. The S-70 is capable of a maximum speed of 540kt (1,000km/h).

TECHNOLOGY CRAIG HOYLE WARTON

RAF Typhoon training is virtual reality

Improved mission simulators developed by BAE Systems are expected to achieve initial operating capability in 2021

BAE Systems is advancing work on a new synthetic training capability that will be employed by the UK Royal Air Force's Eurofighter Typhoon squadrons in less than two years.

Scheduled to achieve initial operating capability in April 2021, the new system will comprise three full mission simulators and three operational mission trainers installed at RAF Coningsby in Lincolnshire, and two of each at the service's Lossiemouth site in Scotland.

The fixed-base devices will be supported by a so-called “reference system” simulator at BAE's Warton facility in Lancashire. Using this, software updates will be proven before being rolled out to frontline units,

concurrent with modifications made to their aircraft.

Full capability will be reached around two years after the initial declaration, says Archie Neill, operational training director at BAE Systems Air, due to the time needed to replace current equipment without interrupting the delivery of training.

The RAF now uses the Eurofighter programme's ASTA infrastructure, which relies on production-standard avionics, along with UK-specific enhanced deployable cockpit trainers, at both of its Typhoon bases.

BAE was in late 2017 selected by the UK Ministry of Defence as its strategic partner for the project. It has since been working with suppliers to develop the

replacement system, which draws on gaming and virtual reality technology.

“Offloading live flying to the simulator is not just about cost – it's about security”

Archie Neill
Operational training director,
BAE Systems Air

Once fully operational, the new equipment will support a system equally balanced between simulator-based activities and live flying, for a total of around 20 “training events” per month for each pilot.

“You need to test the individual in the air sometimes... but there is better training in the synthetic environment,” Neill says. “The tactics we are using are being observed,” he adds. “Offloading [live flying to the simulator] is not just about cost – it's about security.”

The acquisition forms part of a wider Defence Operational Training Capability (Air) requirement, under which devices at multiple sites will be networked together. These will include Coningsby and Lossiemouth, plus RAF Waddington in Lincolnshire, and eventually RAF Marham – home to the UK's Lockheed Martin F-35Bs.

The new training equipment will also be supplied to Typhoon export customer Qatar. ■

PROGRAMME GARRETT REIM LOS ANGELES

Pegasus deliveries inch slowly forward

USAF receives three more tankers as airframer works on resolving flaws with boom actuator and remote camera system

Boeing delivered three more KC-46A Pegasus aerial refuelling tankers to the US Air Force (USAF) on 8 and 9 August, a week after winning a \$55 million contract to redesign the aircraft's boom telescope actuator.

That effort is required to address hardware specification flaws driven by the service's initial requirements; changing the design and retrofitting the aircraft will likely cost more than \$300 million, according to a US Government Accountability Office (GAO) report released in June.

Programme officials told the GAO that developing a solution, and receiving Federal Aviation Administration certification, would likely take three to four years.

The boom's issues became apparent during developmental flight testing, when pilots of light-



Pilots of F-16s warned over contact issue during flight-test phase

er receiver aircraft – such as the Fairchild Republic A-10 and Lockheed Martin F-16 – reported they needed more force to connect and disconnect their aircraft from the boom than with older tankers such as the Boeing KC-135 and KC-10, says the GAO.

That additional force can cause the receiving aircraft to

suddenly lunge and collide with the boom, risking damage to the cockpit canopy or tail, or the boom itself.

Testing also uncovered a problem with the KC-46A's remote vision system, a set of cameras used to guide the boom into an aircraft's fuel receiver.

Sun glare on the cameras at

certain angles can cause washout or blackout on the refuelling operator's display screen, making safe operation difficult at times.

Boeing is expected to pay for solving the issue with the vision system. The airframer says it is still in discussions with the service over a final fix.

Deliveries of the tanker trio in early August bring to 16 the number of KC-46As delivered to the USAF. Boeing had aimed to hand over 36 tankers in 2019, but the service is expected to accept no more than three aircraft monthly, bringing the likely total number of tankers shipped by year-end to no greater than 28.

Boeing's KC-46 deliveries to the USAF have been slowed – and at times halted – by issues with foreign object debris found inside the airframes. ■

ROTORCRAFT DOMINIC PERRY LONDON

Berlin rolls out fix for grounded Tiger helicopters

Germany is working to progressively bring its Airbus Helicopters Tigers back into service after a safety issue forced their grounding on 2 August.

Berlin's decision to suspend flights of the army's attack helicopter fleet was based on information from the airframer that certain titanium bolts in "safety critical" areas could suffer from a manufacturing defect.

An air safety committee determined on 8 August that the entire 56-strong active fleet should be grounded for checks

and that the affected bolts should be replaced.

The helicopters to have undergone the examination process have now been returned to service, with the remainder to follow over the coming weeks.

However, the German army has no timeline for their full return to operations. Checks and replacement of the fastenings can take up to 4h per helicopter, it says.

Similar bolts installed in non-safety-critical areas on the Tiger and NH Industries NH90 will be



Attack type is progressively returning to service following checks

replaced as part of routine maintenance, says the Bundeswehr.

The issue is not thought to

affect the aircraft of other Tiger operators Australia, France and Spain. ■

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PROGRAMME KATE SARSFIELD LONDON

Gulfstream fulfils promise on G600 service entry

An unnamed US customer has taken delivery of the first Gulfstream G600. The handover, which took place on 8 August, came just over a month after the super-large-cabin jet secured US type certification.

While validation of the G600 was delayed slightly by the partial shutdown earlier this year of the US government, including the Federal Aviation Administration, Gulfstream president Mark Burns says the company has kept it “promise to customers” of 2019 service entry for the 6,500nm (12,000km)-range type.

Burns says the G600’s “outstanding performance, industry-leading innovative technology and stylish, comfortable cabin”

means the model “continues the emergence of a new generation of [clean-sheet] Gulfstream aircraft” that started with the G500. The 5,200nm-range business jet was launched in 2014 alongside the G600 and entered service in September 2018.

“We have only just begun,” says Burns.

Although he does not disclose details of potential new products, Gulfstream is expected to launch within the next 12 months a longer-range and longer-cabin variant of its flagship 7,500nm-range G650ER, to rival Bombardier’s Global 7500.

The latter aircraft entered service late last year and boasts the largest cabin and longest range, at



Super-large-cabin jet gained US type certificate at the end of June

7,700nm of any traditional business jet.

Gulfstream is also believed to be working on a revamped and re-engined version of the G280 – de-

veloped in partnership with Israel Aerospace Industries – and a new large-cabin model, to plug a gap in its range between the 3,600nm super-midsize type and the G500. ■

DEVELOPMENT CIRIUM LONDON

Fraundorfer prepares Tensor for flight

Two-seat ultralight gyrocopter aimed at owner-flyer market is designed as precursor to six-passenger air taxi by 2025

German firm Fraundorfer Aeronautics intends to start test flights of a prototype two-seat gyrocopter this year, with a plan to introduce a six-seat version by 2025.

The Donaunorth-based company unveiled the Tensor two-seater in May, which it is now preparing for flight testing. Certification – initially as an ultralight aircraft for the owner-flyer and training markets – is targeted for “summer” 2020. Deliveries are scheduled to begin later that year, says Fraundorfer’s head of sales and marketing, Klaus-Peter Leinauer.

The manufacturer’s strategy is to expand the platform’s capability and customer base in stages. Certification as an aerial observation and special mission platform under European Union Aviation Safety Agency regulations is planned for 2022, and approval for a six-seat variant suitable for the air taxi market is scheduled for 2024-2025, says Fraundorfer.

At an airspeed as low as 22kt



Short wings should provide 30% of aircraft’s required lift at high speed

(41km/h), the Tensor will offer similar capabilities to a helicopter but will be much quieter and cheaper to operate, says Fraundorfer. Take-off will require a 90m (300ft) ground roll, while landing will be possible within 30m, the company adds. The aircraft will have a maximum cruise speed of 115kt, and a range up to 320nm (593km).

While the gyrocopter concept is not new, Leinauer says the Ten-

sor has a more refined design and performs better than existing platforms. The manufacturer used computational fluid dynamics analysis to optimise the rotor head and the design of the airframe which features a fully enclosed cabin.

A pair of winglet-equipped wings aft of the cabin provide up to 30% of required lift at high speed, thus reducing loading and drag on the rotor. Illustrations in-

dicate that the six-seat variant will also be equipped with short canard wings for more lift and stability.

A pusher propeller – with three blades on the Tensor and six blades on the six-seater – is integrated into the tail boom, leading to an empennage with a horizontal tail plane and three downward-facing fins. The two outer fins are connected, via struts, to the main wings.

Leinauer says Fraundorfer’s design will provide a higher degree of aerodynamic stability than in other gyrocopters at both high and low airspeeds. In stable flight, he says, pilots will be able to take their hands off the controls and the aircraft will maintain its attitude.

While the gyrocopter will initially be powered by a Rotax piston engine, Fraundorfer says that it could alternatively be equipped with fuel cell- or battery-powered electric motors or a hydrogen combustion engine. ■



Urban mobility's disruptors prepare to let their ideas fly
News Focus P20

ANALYSIS KATE SARSFIELD LONDON

Jet deliveries generate first-half thrust

Figures from General Aviation Manufacturers Association reveal strong industry performance in six-month period

Business and general aviation manufacturers saw half-year billings climb by \$1 billion year on year, as output increased across the industry, with the lucrative jet market registering its strongest performance for five years.

In its latest industry review, released on 12 August, the General Aviation Manufacturers Association (GAMA) recorded deliveries of 1,116 aircraft, valued at \$9 billion, in the six months ended 30 June. This compares with 1,033 aircraft, worth \$8 billion, in the same period a year earlier.

Business jet deliveries rose by 12.5% year on year, to 316 units, compared with 281 shipments in the first six months of 2018, GAMA data shows. This marks the strongest first half for the segment since 2014, when 318 business jets were delivered.

PILATUS PERFORMS

Key to the performance is the production ramp-up of the Pilatus PC-24. Deliveries of the superlight twin began in February 2018 and three examples were handed over in the first half of that year, rising to 16 for the first six months of 2019. Pilatus expects to deliver 40 of the type over the course of 2019.

Cirrus Aircraft, another company making its debut in the jet market, recorded a 24% rise in deliveries of the SF50 Vision Jet over the period, growing from 25 to 31 units. With a backlog for the single-engined type approaching 600 aircraft, the Duluth, Minnesota-based airframer is preparing to ship 80 Vision Jets in 2019, before reaching full-rate production of 100 aircraft in 2020.

Embraer's output rose over the first six months from 31 to 36 aircraft, GAMA data shows. While this almost entirely as a result of an increase in Phenom 300E shipments – from 17 to 21 aircraft – the data also records the first delivery of the Praetor 600 during the period. The super-midsize

Bombardier aims to hand over around 20 Global 7500s this year



Legacy 500 derivative was launched in 2018 alongside its midsize stablemate, the Legacy 450-based Praetor 500. That aircraft secured Brazilian certification on 13 August and is due for service entry in the second half.

Rival Textron Aviation shipped 90 Cessna Citation-series business jets between January and June, six more than the same period last year. The strongest performers were the CJ4 and Latitude, with shipments climbing from 13 to 16 units, and from 24 to 27 units, respectively.

Business jet deliveries rose by 12.5%, to 316 units, compared with 281 shipments in the first six months of 2018

GAMA also lists the final delivery in the first quarter of the Citation X+ after a 23-year run. The Mach 0.935 twin has been replaced in the product line by the slower but larger-cabin Longitude, for which Textron has a substantial order backlog. Service entry for the flagship super-midsize twin is due in the third quarter.

Strong demand for the clean-sheet G500 helped to boost Gulfstream's output from 52 aircraft in the first six months of 2018, to 65 units this year. The airframer has

delivered over 20 of the super-large-cabin business jets since the type entered service in September. It was joined in service in August by its longer-range stablemate, the G600, and the airframer is now accelerating production of both models to keep up with demand.

Bombardier will also boost its output of high-end models this year, on the back of new aircraft programmes. The Canadian airframer had a lacklustre six months, with shipments of 59 Challenger 350/650s, Global-series aircraft, and Learjet 70/75s, against 65 units the previous year, GAMA data shows. Its flagship, the Global 7500, entered service in December 2018 and while only two units were shipped between January and June, Bombardier has targeted deliveries of up to 20 examples in 2019, from a backlog of around 110 aircraft.

Continued weak demand for the Learjet family persuaded Bombardier earlier this year to revamp, reposition and rebrand its entry-level product in an effort to boost sales. The newly named Liberty 75 is scheduled for certification and service entry in 2020.

Dassault is hoping its in-development, super-wide-cabin 6X will have a positive effect on its Falcon output, as fierce competition at the top end of the market resulted in a flat six-month performance. GAMA's report does not include Falcon shipments – the French airframer will release delivery numbers as part of its half-year

earnings on 4 September – but Cirium's Fleets Analyzer records 16 deliveries for the period – five for the flagship 8X, four 7Xs, one large-cabin 900LX, and six 2000LXS jets – against 15 shipments in the same period last year.

At the top end of the market, the Airbus ACJ320neo has made its GAMA debut, with two examples of the re-engined narrowbody delivered to their owners in the first quarter. The initial aircraft was handed over in January to UK luxury charter company Acropolis Aviation and is now undergoing cabin outfitting at AMAC Aerospace's completion centre in Basel, Switzerland. Redelivery is scheduled for the end of the year. Comlux Aviation received its ACJ320neo in March and the narrowbody is being outfitted by sister company Comlux Completions, for redelivery in 2020.

TURBOPROPS SLOW

The turboprop sector was the worst performer during the first six months of the year, GAMA data shows, with output falling by 11%, from 260 to 233 units. Piper's M600 accounts for more than 50% of the slide, with deliveries falling from 15 units in the first half of 2018 to only one aircraft this year. The airframer says the low output follows "a very busy fourth-quarter delivery period" for its flagship turbine-single and points to a "very strong" backlog; deliveries will ramp up again in the second half, it says. ■

TECHNOLOGY MURDO MORRISON LONDON

Urban mobility's disruptors prepare to let their ideas fly

Event next month will give forum for innovators pushing new forms of air travel in cities

Barcelona or Beijing, Los Angeles or Kuala Lumpur, a bird's-eye view of every modern metropolis will have one thing in common: long ribbons of concrete and tarmac lined with frequently stationary cars whose occupants are anxious to get from A to B as quickly as possible.

If the locals are fortunate, there will be an efficient metro or tram system, but, in almost every instance, travelling within the city will be tedious, tiring and time consuming. For those in a rush, urban congestion is a great equaliser. The same laws of time and motion apply to the chief executive in her chauffeur-driven limo as the cleaner in his crowded subway carriage.

Occasionally, there is a way to rise above the chaos. In Sao Paulo – one of the most traffic-snarled conurbations on the planet – helicopters whisk wealthy executives from downtown office blocks to apartment complexes and

weekend homes in the country.

However, such personal freedom is beyond the means of 99.99% of citizens, and besides, in most urban environments strict safety regulations ban or severely limit the use of private rotorcraft. In London, for instance, helicopters are restricted to selected air lanes and must land at the capital's only heliport, in Battersea. The rules in New York are much the same.

The Jetsons – a 1960s cartoon series – presented a comic vision of an everyday family who travel around their futuristic city in a transparent-domed flying car. More than 50 years on, that world of democratised mobility in three dimensions has not arrived.

However, if the dozens of enterprises developing electrical vertical take-off and landing (eVTOL) and other air mobility platforms have their way, we could be heading for the biggest revolution in urban travel since

the car replaced the horse and carriage. The fact that this new breed of aircraft will have significantly lower noise and carbon footprints than conventional helicopters adds to their appeal.

Those behind the eVTOL concepts range from seed-funded start-ups to the world's most powerful airframers. Airbus, Boeing and Embraer each have divisions, subsidiaries, or teams looking at urban air mobility solutions. Propulsion and technology giants including GE Aviation, Honeywell, Rolls-Royce and Safran are also heavily involved in projects.

Taking the subject very seriously, too, are regulators and lawmakers. An environment for affordable eVTOL machines will require not just major changes to the certification regime but a complete rethink of air traffic management (ATM) above our cities.

A conference at Farnborough on 3-4 September will provide a

Boeing's PAV eVTOL concept began trials earlier this year



forum for many of these innovators, as well as the regulatory authorities. Organised by Farnborough International, the Global Urban Air Summit's programme includes speakers from developers such as Bartini, SkyDrive, Vertical Aerospace and Volocopter, as well as Airbus and Boeing.

GAME CHANGING

Also giving their perspective will be representatives from the UK Civil Aviation Authority (CAA) and air navigation service provider NATS, the US Federal Aviation Administration and NASA, as well as the Japanese government's Future Air Mobility Office, academics, ATM experts and management consultants.

Urban air mobility platforms have "the potential to make a very significant change in terms of how society values time", argues Pete Kunz, chief engineer for Boeing NeXt, a "business division building the ecosystem that will define the future of urban, regional and global mobility", set up a year ago. Kunz – whose colleague Mildred Troegeler, Boeing's director global airspace integration, is speaking at



Volocopter's twin-seat, 18-propeller electric air taxi is already flying and approaching EASA certification



Delayed take-off
Special Report P23



Boeing

the conference – says that, while helicopters have their limitations, new mobility solutions have the potential to become “part and parcel of people’s daily lives in an urban environment”.

“To help cities cope, transport solutions need to safely and sustainably improve the way people get from A to B”

Harini Kulatunga
Head of unmanned aerial mobility solutions, Airbus

While Kunz will not speculate on a timescale for this new era, he is certain “we will not wake up and find the sky filled with air mobility vehicles”. Any change, he says, will be “progressive”.

The next few years are likely to see demonstrations of various platforms, but any breakthrough will depend on the alignment of three factors: consumer demand, mature technology, and

regulatory acceptance from a safety point of view. Industry will have to work with the regulators, rather than “trying to force their hand”, he says, but the authorities will also have to collaborate to ensure that there are common rules internationally.

According to Harini Kulatunga, head of unmanned aerial mobility solutions at Airbus, a speaker on day one, growing conurbations are one of the main drivers for new methods of travel.

“By 2030, 60% of the world’s population will be urban. To help cities cope with this massive population growth, transport solutions need to safely and sustainably improve the way people get from A to B,” she says. “Urban air mobility enhances the coverage and reach of the transportation system with minimal land impact [and] sustainable city development becomes possible.”

CONNECTED ELEMENTS

Urban air mobility is about more than developing eVTOL platforms, she maintains. “It’s actually a complex ecosystem with critical pieces including designing a safe

vehicle, offering the service to passengers, designing a safe ATM system, as well as building infrastructure that integrate with existing transportation modes.” As well as having a “long history in designing, manufacturing and certifying airborne vehicles”, Airbus is also involved in developing digital ATM solutions as part of its Airbus Urban Mobility initiative, she adds.

When it comes to creating that regulatory infrastructure, the UK’s CAA is already “on the front foot”, insists Jon Round, head of airspace, ATM and aerodromes, who will also speak on the first day. The authority is working on technology trials with Volocopter and is inviting other platform developers to approach it via the innovation hub on the CAA web site. The biggest challenge for regulators, he believes, will be adapting a “very mature system” and assuring existing airspace users, from airlines to recreational aviators, that “the safety culture that we hold so dear” will never come under threat.

WELL ADVANCED

At the EBACE business aviation convention in Geneva in May, Volocopter’s chief executive, Florian Reuter (his colleague, head of global public affairs Fabien Nestmann is speaking at the Farnborough event), said the start-up’s two-seat, 18-propeller, and nine-electric-engine urban air taxi was flying and approaching European Union Aviation Safety Agency certification. He envisages a future where electric-powered aircraft such as Volocopter’s will complement larger, traditional business aircraft, flying passengers from airports into and around congested cities.

Another developer appearing at the summit is Vertical Aerospace. The Bristol-based company flew an unmanned version of its battery-powered, four-rotor eVTOL prototype last September and in July this year partnered with Honeywell to use the US group’s fly-by-wire technology in a future passenger variant.

Also providing an update on its eVTOL concept will be Ilya

Khanykov, president of Russian firm Bartini, whose company name and four-seat, four-coaxial-propeller design is inspired by the Bartini effect, the boost in thrust from mounting counter-rotating thrusters in a nacelle, which was discovered by Italian-Soviet aircraft designer Robert Bartini.

Hosting the first session on day two, on vehicle innovation, is Gwen Lighter, chief executive of GoFly, a competition to encourage developers of novel airborne personal transport systems, funded by Boeing, Pratt & Whitney and 20 other companies and industry bodies.

GoFly culminates in a fly-off in the San Francisco Bay area on 29 February, where more than 40 teams will take part to win the largest in a series of prizes worth a total of \$2 million. The fly-off is part of a “multi-day celebration of innovation” involving an air show, exhibition, lectures and workshops.

According to Lighter, a “convergence of breakthrough technologies” including lightweight materials, 3D printing, rapidly advancing sensor technology, and smaller, more powerful batteries is clearing the way for independent businesses to develop a “whole new personal flying industry outside the confines of large organisations”, in the way that Silicon Valley disruptors were able to do in social media and e-commerce. She believes that aviation is entering a “golden age” where “a huge white space is opening for innovation”.

As in the decades after the Wright Brothers, a flurry of visionary entrepreneurs is likely to consolidate into a handful of harder-nosed companies able to commercialise and industrialise some of these concepts.

Perhaps the most successful disruptors in an emerging urban mobility market will not be new names but seasoned hands such as Airbus and Boeing. Next month’s summit will provide an opportunity to assess the potential of the technology, and ponder whether a new dimension in the way we travel across our cities is about to open. ■



KEY SPEAKERS



Dr. Khalfan Al-Shueili, Chief Executive Officer, Oman Aviation Services



Idriss Al Rifai, Founder and CEO, Fetchr



Henk Mulder, Head, Digital Cargo, IATA



Abhiskesh Shah, Co-Founder and CEO, RSA National

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Russian Helicopters



UAC

(Clockwise from above), the Il-114, Superjet's SaM146, the MC-21 narrow-body takes to the air, and Russian Helicopters' in development Ka-62

DELAYED TAKE-OFF

Ahead of Moscow's biennial MAKS air show, we look at the state of the country's aerospace industry, profiling its major players and their key programmes, and looking at some of the external pressures that the sector faces



United Engine

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UAC



Putting on a united front

The country's biggest aircraft manufacturer has streamlined an organisation that is dispersed over a vast geography, but sanctions are forcing a change of approach

MICHAEL GUBISCH MOSCOW

When construction of Moscow's television tower in the city's Ostankinsky district began in 1963, prestige was clearly a consideration in building what was then the world's tallest free-standing structure. The 540m (1,772ft)-high tower was completed four years later, and kept its record until the CN Tower in Toronto was completed in 1976 (and it remains the tallest building in Europe).

However, the structure's true objective was more than to demonstrate the construction capabilities of the former Soviet Union. The Ostankino Tower was part of an exten-

sive network of transmitters throughout the Soviet Union, built to ensure that broadcasters could reach audiences across the enormous, largely remote territory.

Complications included – for a start – the provision that transmissions had to cover the 10 time zones between the USSR's European border and its regions in the far east. Meanwhile, the infrastructure had to function amidst harsh conditions: summer temperatures regularly soar above 40°C (104°F), and plummet below -40°C in the winter.

While not as large as the former Soviet Union, Russia remains an enormous country. To some extent, the challenge of doing business across its sprawling geography is

the same now as it was for the creators of the Ostankino Tower, where the problems of distance must be overcome. That is why Yury Slyusar, president of Russia's United Aircraft (UAC), stressed the importance of digital communications between the state manufacturer's facilities during an interview with FlightGlobal.

UAC is comprised of around 30 entities across Russia, including design bureaux Ilyushin, MiG, Sukhoi, Tupolev and Yakolev, amphibious aircraft specialist Beriev, and multiple aircraft manufacturing plants, suppliers, research and test facilities, repair sites and leasing companies – with a total workforce of more than 98,000.

While aircraft were traditionally developed by one of the design bureaux in Moscow and built in manufacturing facilities elsewhere, Slyusar describes UAC's engineering activities today as a "single, distributed design bureau". New aircraft projects or upgrades of existing equipment are addressed by the group as a whole, rather than individual units, he says, adding that "every piece is involved in this process".

CENTRAL MANAGEMENT

Without a digital infrastructure, the sheer scale of the group's footprint would make co-operation between sites and central management a daunting task. Reaching Sukhoi's Yuri Gagarin aircraft manufacturing plant in Komsomolsk-on-Amur – which assembles the Su-27, Su-30, and Su-35 fighters, and the civilian Superjet 100 – around 560 miles (900km) northeast of Vladivostok and seven time zones away, involves an 8h flight from Moscow.

But distance aside, UAC's greater challenge is to turn the group's diverse constituent parts into an integrated company with a coherent product line. Slyusar acknowledges that the individual design bureaux developed their own "engineering schools" during the Soviet era, as internal competition was encouraged by the nation's leadership.

This continued to shape activities after the USSR's collapse in 1991, but today UAC faces international competition, in the commercial arena at least, from formidable foes Airbus and Boeing. Lingering internal rivalries will only help UAC's competitors, although some jealousies are understandable given the group's scale and limited number of large programmes.

A corporate restructure has been initiated to consolidate UAC's activities into two dedicated divisions: civil and military aviation. As part of this restructure, Sukhoi Civil Aircraft (SCAC) has been merged with Irkut, bringing together the respective manufacturers of Russia's two main commercial aircraft programmes, the Superjet 100 regional jet and the in-development MC-21 single-aisle. UAC is also jointly developing with Chinese manufacturer Comac the CRAIC CR929 widebody.

In April, UAC named Ravil Khakimov as president of both Irkut and SCAC, appointing the latter's previous chief, Alexander Rubtsov, as vice-president of sales and marketing for

"UAC's engineering activities today operate as a single, distributed design bureau"

Yury Slyusar
President, UAC

the new civil division. However, FlightGlobal understands that Rubtsov left UAC shortly after. As the larger of the two firms, Irkut has been selected as the base company for the new civil aviation division.

Slyusar acknowledges it is "not an easy process" to unite the separate design bureaux in a single company and create new subdivisions along product lines. He admits that management is facing "difficulties from inside", but says the manufacturer is continuing the process, which it aims to complete by year-end.

As part of the effort, UAC is evaluating creation of a new brand for its commercial aircraft division, which covers the Superjet, MC-21, an update of the Ilyushin Il-114 regional turboprop, and potentially the CR929 too. However, no decision has been taken, the company says.

The manufacturer intends to create commonality between the MC-21 and Superjet through an update of the 100-seat regional jet. In 2018, SCAC disclosed that it was studying a shrink of the type for 75 passengers and had discussed the project with several operators; S7 Airlines has tentatively committed to take up to 75 examples of the new derivative.

The airframer has proposed a new, composite wing as a "main option" and equipment substitutions to increase Russian-made content on the type and to reduce the aircraft's dry weight by 12-15%. SCAC suggested the 75-seat variant could enter service around 2023.

Slyusar confirms the programme is aimed at replacing certain Western systems with Russian-made equipment to provide "new pricing and better reliability". But he says that no decision has been made about the future version's capacity. Shrinking the existing SSJ100 is being considered only as an option, he insists, noting that "it is not the main task".

TECHNICAL RELIABILITY

The focus of attention, he says, is to align the Superjet with the MC-21 and to improve the former's technical reliability and production costs using Russian equipment, to provide "similar or better quality at lower price" than Western manufacturers.

UAC claims it is being supplied with certain Western equipment under less favourable conditions than Western airframers receive.

Earlier this year, Russia's trade and industry ministry issued a formal Rb 3.5 billion (\$558 million) research and development tender to "maximise import substitution" of Superjet component and systems. The tender seeks a sole contractor to supply equipment under a project dubbed "SSJ New", with a deadline to submit bids by 15 December.

State corporation Rostec – UAC's majority shareholder – said in July that its KRET radio-electronics division will provide a prototype inertial navigation system for the Superjet. The Russian INS will be presented at MAKS air show and flight-tested in the autumn.

SCAC has previously suggested that it intends to adopt MC-21 technology for the Superjet. The company said it was aiming for a "unified" platform for the two aircraft, with both types looking "exactly the same" from a pilot's point of view, while the cabin interior would feature the same design approach and level of comfort.

To further broaden the family concept, UAC has proposed to Comac that the CR929 should



The Superjet assembly line at Sukhoi's factory in Komsomolsk-on-Amur in the far east



Two early-production MC-21s make their way down the final assembly line

» also adopt “proven decisions and design features” from the Superjet and MC-21. But Comac has its own single-aisle programme under development – the C919 – and might seek its own commonality with the widebody.

UAC’s main lesson from the Superjet programme has been to establish a more responsive and capable aftermarket support infrastructure, with more spare part suppliers, warehouses, MRO providers and local partners close to operators. Slyusar notes that aircraft support problems became a more pressing issue as the in-service fleet grew after the type entered service in 2011; Cirium’s Fleets Analyzer shows that 172 Superjets had been built by 15 July.

“For us, that is a big [programme],” Slyusar says. He acknowledges that operators have been affected by “certain problems... [which] are not great for the programme”. The type’s sole two Western customers – Mexican carrier Interjet and Irish wet-lease operator CityJet – have had a range of technical issues, prompting them to withdraw aircraft from service.

UNCERTAIN

In mid-July, Interjet had parked 16 of its 22 Superjets, Cirium’s Fleets Analyzer shows, while delivery of a further eight on-order aircraft looks uncertain. The jets were parked – some units having been in storage since April 2018 – with dozens of the aircraft’s PowerJet SaM146 engines out of service after a dispute over maintenance. In 2018, Bloomberg reported that Interjet was forced to take four Superjets out of service and was cannibalising them for parts to keep the remaining fleet operational.

CityJet, meanwhile, withdrew its entire fleet of seven Superjets from service after the carrier’s last scheduled flight with the type in

January. The Dublin-based airline declined in February to provide detail about its decision to stop operating the type. But Brussels Airlines – which had previously wet-leased four SSJ100s from CityJet – said in late 2018 that the aircraft had been affected by operational problems that led to “many cancellations”, and the twinjets required longer maintenance checks than other equipment.

UAC contends that CityJet stopped operating its Superjets because it was “reconsidering its business model”, but this is disputed by the airline.

Citing Russian carrier Azimuth, Slyusar says the aircraft is capable of reaching “good” utilisation rates of more than 300h a month. He says that building up an aftermarket support system is an “absolute priority”, but setting up that ecosystem – in addition to de-

veloping a clean-sheet aircraft – is a “hard... financially very hungry task”.

“It’s easier when you have the infrastructure around,” he says. The planned effort to establish a more capable support structure for the Superjet is seen as an investment to prepare the ground for the MC-21 and CRJ929 programmes.

On 5 May, an Aeroflot Superjet crash-landed at Moscow Sheremetyevo airport after the aircraft was struck by lightning soon after take-off. Russian federal air transport authority Rosaviatsia says that the lightning strike disabled the aircraft’s communication systems and other equipment, prompting the pilots to return to Sheremetyevo.

ONGOING INVESTIGATION

“The investigation is assessing the aircraft’s controllability before the landing and – at the time of writing – had yet to reach conclusions and make recommendations over the cause of the accident. However, Russia’s trade and industry minister Dennis Manturov said in June that “all of [the aircraft’s] systems” were “functional” after the lightning strike.

“The aircraft was absolutely controllable, and controlled, by the pilot right up to the landing itself,” he says. Manturov asserts that the accident involved an “abnormal situation” with “three impacts and large overload”.

The twinjet bounced after a hard landing and caught fire, which destroyed the rear part of the fuselage. Forty-one of the aircraft’s 78 occupants died.

While the investigation is ongoing, it is not clear what effect, if any, the accident could have on the Superjet programme. But the crash landing has attracted publicity to the aircraft and – given the distinctive Superjet name – this may be a factor in UAC evaluating a unified brand for its commercial programmes.

Irkut disclosed in April that it had completed assembly of the fourth MC-21-300 flight-test



MC-21-300 prototypes have been tested at speeds typical of airline operations



An interior concept of the CR929 – a Russian-Chinese widebody joint venture – on display at the Zhuhai air show

aircraft, which is set to join the certification fleet later this year. The third test aircraft conducted its first flight in March from the company's assembly plant in Irkutsk, and was the first to have been fitted with a passenger cabin.

The manufacturer has not specified how many hours have been completed since the first aircraft took off for its maiden flight in 2017; the second joined the flight-test programme the following year. General designer Oleg Demchenko says that the flight tests – from Moscow's Zhukovskiy airport – have demonstrated that the twinjet's "main design and technological solutions are chosen correctly". He adds that "no critical issues have been found" with the aircraft, which is designed to make inroads into a market currently split between the Airbus A320 family and Boeing 737.

The MC-21-300 test aircraft have reached altitudes, speeds and endurance levels typical of airline operations, while manoeuvres at the edges of the flight envelope – with high angles of attack, in stall and flutter conditions – have been "successfully practised", he says. Individual systems and software packages are being modified as a result of the flight tests, which, Demchenko notes, is "common for such a complicated programme".

UAC has decided to publicly show the MC-21 for the first time at the MAKS air show in Moscow because the Russian exhibition is seen as more representative for the twinjet's creators and customers. Cirium's Fleets Analyzer shows that all of the programme's existing 175 orders are from Russian customers –

leasing firm Aviakapital-Servis, a subsidiary of state corporation and UAC majority shareholder Rostec; Ilyushin Finance; Vnesheconombank-affiliated VEB-Leasing and regional operator IrAero.

Aeroflot has committed to leasing 50 MC-21-300s. Cirium Fleets Analyzer shows that Russian carriers Red Wings and UTair have signed lease contracts too, while Azerbaijan Airlines has tentatively agreed to take the type. Irkut's website also indicates Kyrgyzstan Air Company and Kyrgyz operator Avia Traffic as customers for the aircraft.

PROGRAMME DELAYS

Serial production has been postponed until late 2020, following multiple programme delays. A previous target was to roll out the first production aircraft in late 2019, but that plan had to be changed after US sanctions came into effect in January, Rostec said earlier this year. The embargo includes restrictions on importing advanced materials and covers UAC subsidiary AeroKompozit and Rostec unit Technologiya. Both entities are involved in the production of the MC-21's carbonfibre wing, empennage and nacelle components, and had employed Western raw material suppliers for the components.

The manufacturers had to switch to alternative, domestic sources. Efforts to establish such a supply chain had been ongoing for some time, but UAC notes that additional testing is required to confirm the new material's performance.

"Of course we are feeling the pressure of the sanctions," admits Slyusar. He notes that UAC's military activities have been subject to sanctions for some time, and claims that prospective international customers – who were considering an order for the Russian jets – were put under "tremendous pressure" by Western competitors not to acquire UAC's products.

In Slyusar's view, such activity has little to do with political tensions between governments, but is entirely motivated by commercial interests.

The latest set of sanctions have taken this a step further, he suggests. The effect on AeroKompozit created a "bad feeling" within UAC because the supplier is a "purely civil company", he says. The group appealed, but Slyusar says: "We did not get any answer why this was done." UAC's restructure is therefore also aimed at isolating the group's civilian operations from potential further embargoes. "We sincerely hope [sanctions] will not affect our civil programmes," Slyusar says.

Engine designer Aviadvigatel, which has developed the PD-14 turbofan for the MC-21, is covered by the latest sanctions too. The programme's test aircraft so far have been equipped with Pratt & Whitney (P&W) PW1400G engines, although UAC has said that the first serial-production MC-21 will be powered by PD-14s.

Cirium's Fleet Analyzer shows that the PW1400G has been selected for 83 and the PD-14 for 49 on-order MC-21s, with no engine selection for the remaining 43 aircraft. Irkut »

» declines to provide detail on what engine split it foresees for the MC-21 in the long term. The manufacturer said in March that it was “not abandoning” its partnership with P&W.

Production of the MC-21 is set to ramp up to “at least” 70-100 aircraft per year by 2024, says Slyusar. He notes that, in recent years, Russian operators introduced around 100 mainline aircraft per year – primarily from Airbus and Boeing – and says: “We have been tasked to capture a big portion of this market with the MC-21.” He adds: “We want to be the main player [in Russia], at least with the MC-21.”

Alongside the Superjet programme – which has an annual output of around 30 aircraft – the updated Il-114-300 and, ultimately, the CRJ929, Slyusar foresees total yearly civil aircraft output of around 150 units.

GOVERNMENT INITIATIVE

The primary market for these aircraft will be Russian operators. Slyusar says that a government initiative to boost point-to-point air transport from secondary cities should create increased demand, especially for the Superjet and MC-21. But former SCAC president Rubtsov told FlightGlobal at the Farnborough air show in 2018 that the Superjet was built for a “global market”, because “the Russian market is too small”.

Slyusar also recognises that UAC needs to sell its aircraft beyond the Russian “base” in order to sustain its activities. Realising international sales is a “main task”, he says – both for its civil and military programmes.

The co-operation with China to build the CRJ929 is a strategy for UAC – the partnership also spans Rostec business United Engine and

its Chinese counterpart AECC – to gain access to a market larger than Russia and improve sales prospects for a new clean-sheet programme. The 50:50 joint venture also represents an opportunity to share resources, as China is arguably one of few countries able to invest in a new aircraft programme for a market split between Airbus and Boeing.

First flight of the CRJ929 is targeted for 2025, with certification around 2027. Comac and UAC are in discussions with airlines from China and Russia in a bid to secure launch orders for the programme later this year, Comac told FlightGlobal in February.

The two manufacturers are in the concept design phase for the aircraft, which is to be completed by year-end or early 2020. The team will then move on to the definition phase, with a plan to freeze the design in 2022. Rolls-Royce and GE Aviation have been selected as finalists for a bid to provide upgraded versions of their current products as initial powerplants for the twinjet.

UAC and Comac have decided to assemble the aircraft in Shanghai and split programme activities between the two countries. UAC foresees an engineering centre in Russia, but FlightGlobal understands that discussions about such an operation were still ongoing in April, without a decision.

Russia’s contribution to the CRJ929 has so far been handled by the former SCAC division and has comprised a relatively small team of 50-100 engineers, UAC says. Meanwhile, the group has been evaluating options how its other design bureaux can be involved in the programme. This is especially relevant as engineering requirements are set to grow

“The Superjet was built for a global market, because the Russian market is too small”

Alexander Rubtsov
Former president, SCAC

substantially once detailed design begins during the definition phase.

As all large aerospace projects are multinational efforts today, it is no surprise that Russia is reaching out to China to develop a new long-haul aircraft. Few countries, let alone individual manufacturers, can establish of such programmes without drawing on international resources. But with multiple sanctions in place against Russia and little sign of political change in the nation’s relations with Western governments, there is no prospect that Russian manufacturers can participate on a meaningful scale in Western programmes.

EXISTING CAPABILITIES

So what can Russian manufacturers do to support their activities? State-backed projects like the Superjet and MC-21 – and similar efforts in the military sector – seem to be necessary to maintain and further develop existing capabilities. If it were not for these programmes, these capabilities might feasibly be lost. The question is, however, whether a model of building aircraft largely dependent on the Russian domestic market offers long-term sustainability, and whether that model creates long-term value for the aerospace industry as a whole. ■

Lesson from Superjet programme has been importance of aftermarket support



MICHAEL GUBISCH MOSCOW

Russian fighter manufacturer RSK MiG is preparing production of an updated version of the Ilyushin Il-114 regional turboprop in a bid to create additional workload beyond its long-standing MiG-29 family.

The manufacturer – a division of United Aircraft – rolled out the MiG-35 series' latest version, the MiG-35, in 2017 and is now in the process of promoting the jet to countries operating previous Fulcrum versions, director general Ilya Tarasenko told FlightGlobal during an interview in Moscow.

Half of RSK MiG's business comes from the supply of new aircraft, while the balance is covered by support activities for the in-service fleet at the air forces of Russia and approximately 30 other nations.

"We support all the aircraft that our company manufactures throughout their life-cycle," Tarasenko says. "When the life-cycle is over, we switch to another aircraft, which is also supported throughout its life-cycle."

FIRM TIES

As India has been a long-standing customer, the country is "obviously a main market" for the MiG-35, and the manufacturer has a plan to delegate support activities to local providers as part of its bid for a fighter deal, Tarasenko adds.

But he declines to provide any details about the company's order and delivery situation and shows much more interest in discussing the Il-114-300 project.

Production of the twin-turboprop's prototype has begun, with a plan to conduct a first flight in 2020. "Currently we are working with the airlines to fix requirements to the aircraft," he says.

Engineering activities for the aircraft – featuring updated Klimov-TV7-117-01 engines, new cockpit equipment and a new cabin interior – are being led by Ilyushin's design bureau. The aircraft will be available with different cabin configurations for 68, 60 and 52 passengers.

"For any company that burns money, any programme that brings in money is important"

Ilya Tarasenko
Director general, RSK MiG

Despite the prototype production having started, Tarasenko says MiG is in a position to immediately include additional specifications in the manufacturing process.

Certification is targeted for 2022, with a plan to start serial production at an initial rate of 12 aircraft per year. The manufacturer's existing capacity would facilitate an increase to



Aircraft can operate from unpaved airstrips, or with ski-and-wheel landing gear

Optimal Ilyushin

Fighter manufacturer RSK MiG is preparing to open a new revenue stream with an Il-114 update, targeting the versatile regional turboprop at states with poor airport infrastructure

36 units per year, says Tarasenko.

He foresees demand for 300 Il-114-300s across Russia and further sale opportunities abroad. Southeast Asia represents the second-largest market for the type, he says.

Marketing efforts will concentrate, in particular, on countries without highly developed airport infrastructure, with remote areas and island destinations. The aircraft is designed to operate from unpaved runways and can be equipped with ski-and-wheel landing gear for operation in arctic conditions.

STIFF COMPETITION

Tarasenko acknowledges that countries with limited airport infrastructure have been targeted by the two Western turboprop manufacturers ATR and Bombardier, whose Q400 programme was earlier this year signed over to an affiliate of fellow Canadian airframer Viking Air. Tarasenko argues that both in terms of acquisition and maintenance cost the

Il-114-300 will be competitive against both these turboprop types.

All of the turboprop's new cockpit and cabin interior equipment will be supplied by Russian manufacturers. RSK MiG estimates that the "fully domestic production of Il-114-300 will yield about \$5 billion savings on phasing-out of import components".

The Il-114 is not the company's first civilian project – RSK previously manufactured the Il-103, a single piston-engined trainer that found employment in South Korea's air force, among other operators.

Tarasenko insists that RSK MiG's survival is not dependent on the Il-114-300 programme, but admits: "For any company that burns money, any programme that brings in money is important. We have a business plan for the Il-114 where we see what profits we can obtain. That is why we are implementing the programme under authority of [parent group United Aircraft]." ■

Russia's rotorcraft player looks for lift

The helicopter manufacturer is rising to the challenge of developing new markets in India and China, and diversifying into fixed-wing as it starts work on an updated An-2 biplane

MICHAEL GUBISCH MOSCOW

Russian Helicopters is in a curious position with the development of its Kamov Ka-62 medium-twin. The single-rotor helicopter – an anomaly in the Kamov range, which is dominated by co-axial designs – was unveiled in 2012, with a plan to enter service three years later.

However, after multiple delays and a brief hover in 2016, the helicopter completed its first flight in 2017, with the manufacturer subsequently saying that it needed to redesign part of the rotorcraft.

An intriguing aspect of the programme is that the 6.5t aircraft competes with the Leonardo Helicopters AW139 that Russian Helicopters

builds together with the Italian manufacturer through their HeliVert joint venture, which also involves oil giant Rosneft. Built at a site on the outskirts of Moscow, the AW139 is additionally manufactured in Italy and the USA.

Russian Helicopters director general Andrey Boginsky is quick to point out that HeliVert is a pure assembly plant, which uses imported components. Speaking to FlightGlobal in Moscow, he says that “unfortunately” helicopters produced at the site are granted Russian airworthiness certificates only.

AW139s assembled at Leonardo's Italian production line are certificated under European Union Aviation Safety Agency (EASA) regulations. “The absence of this [EASA] certificate makes it impossible for us to expand

the scope of sales [beyond] the Russian market,” Boginsky says. He asserts that the helicopters assembled by HeliVert are the same price as Italian-made AW139s – noting: “Our added value is only the labour cost.”

Russian Helicopters asked Leonardo to either extend EASA certification to HeliVert-assembled AW139s or to substantially reduce the equipment's price. As Boginsky says: “From a customer's point of view, if you purchase a [helicopter] without a European certificate, you significantly decrease your chances to liquidate this item in the future outside Russia.

“This is why it is logical that customers come to us with the question: ‘What is the advantage of buying this helicopter?’”



The Ka-62 – powered by Safran Helicopter Engines Ardiden 3Gs – is to be certificated under both Russian and European regulations. Boginsky foresees deliveries beginning in 2020. “We are talking to potential operators and leasing companies regarding the purchase of the first four machines,” he says.

In 2018, the manufacturer disclosed that it had “modified and reinforced” the Ka-62’s shrouded tail rotor and empennage. Boginsky says the effort included modifications to the main and tail rotor gearboxes to improve their reliability and extend the equipment’s service life. The upgraded components are currently being tested on the helicopter, and he says the required performance of the new equipment has yet to be confirmed: “Based on the [test] results, we will be able to understand how successful we were making those changes.”

Ultimately, the plan is to deliver two Ka-62s per month from the assembly line at the Progress Arsenyev Aviation Company, north-east of Vladivostok. But Boginsky says such output will be only feasible “if we fulfil the requirements of different customers”. The rotorcraft has been designed for medevac, search and rescue, offshore, corporate and cargo operations.

LIGHT-SINGLE SEGMENT

Meanwhile, the manufacturer’s VR-Technologies subsidiary is working on a light single-engined development, the VRT500. A mock-up of the co-axial rotor equipped five-seater was presented in April during Milano Design Week, as studio ItalDesign was involved in the rotorcraft’s design. The VRT500 has a maximum take-off weight (MTOW) of 1,600kg, and represents Russian Helicopters’ return to the light-single segment it vacated when production of the Mil Mi-34 ended in the early 2000s.

Boginsky says a series of aerodynamic tests for individual components have been completed but notes that these did not include fuselage assessments. While a first flight was previously scheduled for 2019, Boginsky now expects this to take place from the assembly line in Ulan Ude in late 2020 or early 2021. He attributes the delay to extended supplier talks around plans to certificate the helicopter under both Russian and European regulations: “We have to do a great deal of work with the suppliers of this helicopter regarding the best price conditions and conditions for warranty and post-warranty.”

The VRT will initially be powered by a Western engine, with a Russian-made powerplant set to become an option at a later stage. Boginsky says that selection of all the suppliers for the project has been “practically completed”, but declines to name companies beyond Russia’s United Engine (UEC), which is working on the domestic powerplant.

Russian Helicopters forecasts sales of around 1,000 VRT500s by 2035, which would translate to a 15% market share in the light category.



Ulan Ude Aviation Plant will assemble updated TVS-2DTS biplane

Russian Helicopters

This year, the manufacturer intends to deliver the first two Mil Mi-38 helicopters. The 15.6t rotorcraft, powered by twin Klimov TV7-117V engines, has been developed as replacement for the venerable Mi-8 and Mi-17, and is now in serial production. In January, the Mi-38 underwent cold-weather trials in Yakutia to demonstrate its operability in temperatures down to -50°C (-58°F). This was followed by tests in hot-weather conditions, with temperatures up to 45°C, in the city of Astrakhan, and high-altitude operations up to 9,800ft at Elbrus, a peak in the Caucasus mountains.

“We are always open for partnership and co-operation with other manufacturers”

Andrey Boginsky

Director general, Russian Helicopters

Boginsky says the first two deliveries will be made to Russia’s defence ministry this year, and that the next two Mi-38s – in civilian configuration – will be handed over during the first half of 2020 to a “special flight team of the Russian Federation”, indicating deployment by a government agency.

FlightGlobal understands that the initial two helicopters for the defence ministry will be configured for troop and cargo transport missions. Boginsky says that the helicopter has been “upgraded” to fulfil requirements from Russia’s defence ministry as part of an ongoing effort to expand the rotorcraft’s capability and improve equipment service life. Noting the possibility of an electronic warfare version, he says “we will do everything to prepare this mission... if the defence ministry gives the requirement”.

Russian Helicopters has been subject to Western sanctions against Moscow’s indus-

trial base. Boginsky says the embargoes “mainly” affect military programmes, but this implies some degree of disruption for its civil lines too. But he argues that the import restrictions have hurt Western equipment suppliers more than the airframer.

Citing dust protection devices as an example, Boginsky says that in the past Russian Helicopters employed products from US filtration specialist Pall for a number of its rotorcraft, including the Mi-28 attack helicopter and Ka-226 light utility twin. When the restrictions came into effect, these parts were no longer available and Russian Helicopters developed alternative solutions in-house, which, he claims, “turned out to be better than what we received from Pall”.

Boginsky also asserts that the move to locally-sourced equipment has not increased costs. He acknowledges that the in-house development represented an increased risk for the production line, but claims that Western equipment suppliers charge Russian manufacturers higher prices for their equipment than Western airframers receiving the same or similar components. United Aircraft made a similar claim regarding Western-made equipment installed on the Sukhoi Superjet 100.

ALTERNATIVE SOLUTIONS

Although the move to locally-made products may involve an increased development effort, Boginsky insists that the final prices for alternative solutions tend to be “not higher and in some cases even lower” than original, Western supplies. He notes that Russian Helicopters’ strategy is to employ UEC powerplants wherever possible, but stresses that the manufacturer has no intention of moving away from suppliers like Pratt & Whitney Canada or Safran.

Despite the strain of sanctions and commercial limitations of the HeliVert joint venture, Russian Helicopters does not appear to have lost its appetite for potential future »



Ka-62 medium-twin completed first flight in 2017, but some redesign has been required

Russian Helicopters

» co-operation with Western manufacturers. Boginsky says: “We are always open for partnership and co-operation, both in using foreign components and [building helicopters], provided that our partners do not restrict us in the sale of those helicopters. And we are always open to take part in programmes for assembly of our helicopters... outside Russia.”

At the Aero India show in February, Russian Helicopters disclosed preliminary agreements with five Indian manufacturers to produce components under a planned deal to supply 200 Ka-226T utility helicopters to the country’s army and air force.

Under the proposal, some 60 helicopters will be produced in Russia, with the balance due to be assembled in India via a joint venture with Hindustan Aeronautics. The five preliminary supplier agreements cover provision of rotor blades, fuselages, gearboxes and landing gear. Boginsky says that the programme foresees up to 80-90% localised production, but does not specify a schedule for the project. “We expect our Indian colleagues will soon invite the Russian side for commercial negotiations,” he says. In addition, Russian Helicopters plans to pitch the Ka-226T for India’s looming 111-unit Naval Utility Helicopter requirement.

Earlier this year, Russian Helicopters reached an agreement to assemble a total of 45 Mi-8/-17s

in Kazakhstan until 2025. The manufacturer is also in the “final stages” of talks with Chinese aerospace group AVIC regarding the latter’s planned Advanced Heavy Lifter (AHL) helicopter. Boginsky says Russian Helicopters intends to participate in the project by designing certain components for the AHL. “This will not be a new model of our product range. This will be contractual design work from our side based on requirements from the Chinese side,” he says.

Nevertheless, he sees the AHL project as a stepping stone to potentially closer co-operation with Chinese manufacturers: “We do not yet know if this will become a request from our Chinese colleagues for a new helicopter. But if they come to us with such a request, we will be ready to consider it.”

ANTONOV PRODUCTION

But Russian Helicopters is not just focused on the rotorcraft world. Its Ulan Ude Aviation Plant has been selected to manufacture an updated, turboprop-powered version of the Antonov An-2. The world’s largest single-engine biplane was manufactured by the Ukrainian manufacturer until 1971, though production continued in Poland until 2002.

Rebranded TVS-2DTS, the updated aircraft completed a first flight in 2017, powered by a Honeywell TPE331-12 turboprop engine and

– perhaps surprising for a low-cost utility aircraft – features a composite fuselage. Boginsky says that the manufacturer has not yet decided whether the airframe will be built from glassfibre or carbonfibre, and that the design will be finalised by 2022. That implies a delay to the programme, as last year Russian Helicopters said that serial production was scheduled to begin in 2019.

Under an agreement with Russia’s government, the rejuvenated aircraft is to be employed to improve transport links to remote areas and to provide services like emergency, firefighting and agricultural flights. Some 200 TVS-2DTS planes will be delivered to Yakutia-based Polar Airlines, which has been tasked to develop regional aviation, Russian Helicopters says.

For Boginsky, the project is a step to position the manufacturer for potential future fixed-wing aircraft projects. Noting that during the Soviet era some of Russian Helicopters’ facilities were involved in fixed-wing aircraft production, he describes the TVS-2DTS as being “definitely a testing ground for us”. He suggests that building commuter aircraft or regional turboprops could be an avenue for Russian Helicopters as “no company in Russia, on an industrial scale, is involved in the design and production of the aircraft with less than 50 seats”. The only minor exception to that is Ural Works of Civil Aviation in Ekaterinburg, which licence-builds Let L-410 twin-turboprops.

Of course, the move into fixed-wing aviation would not be without difficulty, not least the internal stresses of competing with fellow Rostec company United Aircraft (UAC). Boginsky says Russian Helicopters’ interest in fixed-wing aircraft production is “a very delicate topic for us right now... a firm decision to get involved with fixed-wing aircraft will require quite a lot of investment, qualification and experience”.

Increasing internal competition within its aerospace division is perhaps not what Rostec management had in mind when the group acquired a stake in UAC. Boginsky notes, however, that his job is to make the most of Russian Helicopters’ capabilities and to find new areas of potential activity for the manufacturer. ■



First two Mil Mi-38 helicopters are set for delivery to Russian defence ministry this year

Russian Helicopters

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Rostec puts faith in its growth engines

NPO Saturn and Safran claim a 99.9% dispatch reliability since 2011 service entry



Russia's propulsion player is ramping up production of the home-grown rival to the PW1400G on the MC-21, and boosting aftermarket support for the SaM146 that powers the Superjet

MICHAEL GUBISCH MOSCOW

In June, Russian state-owned firm Rostec disclosed a Rb35 billion (\$541 million) loan package to boost development of several civil gas turbine programmes at the group's United Engine (UEC) subsidiary.

Rostec says the loan package – facilitated through the group's Novikombank subsidiary – will provide “comprehensive financial support” for the Aviadvigatel PD-14 and PowerJet SaM146 turbofans, and other programmes including the Klimov TV3-117 and VK-2500 turboshaft engines.

The PD-14 will be an option on the in-

development Irkut MC-21, while the SaM146 – which is jointly built by NPO Saturn and Safran Aircraft Engines – powers the Sukhoi Superjet 100.

UEC told FlightGlobal in June that it had produced a total of 16 PD-14s and had handed over two units to Irkut for flight tests on the MC-21, with a further three engines due for delivery later this year.

Meanwhile, production was under way of the first MC-21 to be powered by the PD-14, UEC said at the time.

In April, Irkut said that it had completed assembly and systems installation of the fourth MC-21, but did not specify what engines the

aircraft will be powered by.

The first three MC-21s have been fitted with Pratt & Whitney PW1400Gs, but Irkut previously said that the first serial production aircraft would be equipped with PD-14s. Irkut has indicated that the PW1400G will remain an option to power the narrowbody.

UEC describes the PD-14 as “an engine with a reasonable price”, which is “not inferior to the foreign analogues” – namely the geared turbofan and CFM International Leap series.

Specific fuel consumption “in cruise mode” will be 10-15% lower than previous-generation engines, UEC says. Meanwhile, the manufacturer has also outlined plans to modify the PD-14 to improve performance.

TRANSITION PHASE

Aviadvigatel disclosed in July that it lodged a request with Russia’s federal air transport agency Rosaviatsia to make the changes.

Rosaviatsiya certificated the PD-14 in late 2018, but the authority has yet to grant manufacturing approval for the engine’s serial production.

UEC intends to additionally certificate the PD-14 under European Union Aviation Safety Agency regulations.

“Overall, we want to implement 11 alterations to the engine,” says Aviadvigatel deputy director and PD-14 chief designer Igor Maksimov. “We deem them necessary for improving its performance and competitiveness.”

The modifications will include a new alloy for high-pressure turbine blades because the original material “didn’t prove sufficiently heat-resistant during intensive trials conducted last year”, says Maksimov.

He adds that “protracted red-line tests of the PD-14” have been carried out, and implies that

these helped the development team identify other spots for engine refinements.

Cirium’s Fleets Analyzer shows that the PW1400G has been selected for 83 and the PD-14 for 49 on-order MC-21s, with no engine selection for the remaining 43 orders.

“Difficulties [with the SaM146 engine] have been thoroughly analysed and are now being eliminated”

United Engine

To support Superjet operators, NPO Saturn and PowerJet have established two spare engine pools with a total of about 40 SaM146s.

Additionally, the two companies have set up a dedicated spare part pool for Russian Superjet operators and increased engine repair capacity in France and Russia, UEC says.

Today, shop facilities are in place to service 21 engines in parallel.

UEC notes that the effort is aimed at ensuring the aircraft’s “uninterrupted operation” and to provide “flexibility and targeted service to its customers in accordance with best international practices”.

Mexican carrier Interjet has withdrawn Superjets from operation because their engines were out of service following a dispute about the powerplants’ maintenance. Cirium’s Fleets Analyzer shows that Interjet has parked 16 of its 22 Superjets.

In January, Irish wet-lease carrier CityJet also suspended operations of its entire fleet of seven Superjets.

However, the airline did not disclose the reason why it withdrew the type from service, after introducing the aircraft in 2016.

Interjet and CityJet were the only two Western customers for the Superjet.

UEC says that NPO Saturn and Safran are “taking into account operating experience... to increase the service life of the SaM146 engine and to reduce the cost of its life-cycle”.

The manufacturer adds: “Difficulties [with the SaM146 engine]... have been thoroughly analysed and are now being eliminated through continuous work with the key engine elements”.

As part of that effort, the combustion chamber has been improved, and engineers are now in the process of developing an upgrade for an oil collector case.

UEC declines, however, to provide details about the engine problems on Interjet’s Superjet fleet and how these issues are being addressed.

MAINTAINING RESILIENCE

The manufacturer insists: “We assess the SaM146’s operation experience favourably.”

Since the Superjet’s service entry in 2011, the SaM146 has demonstrated “exceptional performance in service with an engine dispatch reliability of 99.9%”, UEC asserts.

Even though Aviadvigatel is among a number of Russian entities that have been affected by US sanctions, which were introduced in late 2018, UEC asserts that the restrictions have not made a “considerable impact” on its activities.

UEC notes that the PD-14’s development is directed towards the use of domestic suppliers and the share of imported components is “minimal”.

The strained relations between Russia and Western governments will likely make closer co-operation between UEC and international engine suppliers more difficult, however.

In addition to their PowerJet partnership, UEC also produces turbine blades and shafts for Safran.

UEC plans to raise production volumes and to start full-cycle blade casting and machining for the French group “in the nearest future”, it says.

To Pratt & Whitney Canada, UEC supplies casings and annular components. The effort is part of a programme aimed at establishing partnerships with “leading global aero engine manufacturers”.

UEC envisions a role as supplier for both hardware – component castings, machining and additive manufacturing – and services, through engineering, equipment testing, and provision of engine maintenance.

The manufacturer says that its “integration” in the international supply chain for civil engine components would “improve the efficiency of... [its] production potential” and facilitate diversification of its business. ■



The Aviadvigatel PD-14 and PowerJet SaM146 on exhibit at the Paris air show

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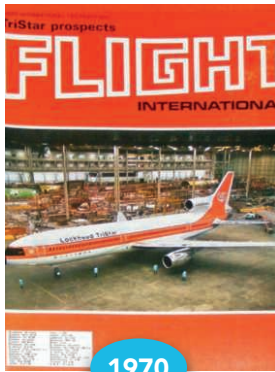


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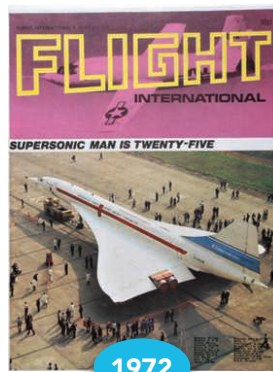
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1970



1971



1972



1973



1974

Feeling supersonic

Greater speed and size were the order of the day as *Flight* powered into its seventh decade

MAX KINGSLEY-JONES LONDON

During its transition from the “swinging ’60s” into the more sobering 1970s, *Flight International* adopted a bold new look. Gone was the long-held tradition of “selling the cover” each week to an advertiser and with it the often exquisite pieces of colour artwork that had become a familiar sight on the front of the magazine for four decades.

With the move from the sponsored covers during 1969, *Flight* incorporated its first major masthead revamp with a hefty rebrand that was a major departure from the style that had adorned the cover since our first decade, but appropriately retained the “windsock” shape.

Mike Ramsden, or “JMR”, would continue to lead the title throughout the 1970s. Our first leading article of 1970 looked back at the 1960s and concluded with the upbeat view of the decade ahead: “While there is always something to improve, the aviation industry as a whole enters the seventies in better heart

Flight



FLIGHT
INTERNATIONAL

and above all more commercially than at any time in its history.”

The 1960s had ended with the maiden flights of the Boeing 747 and Concorde, key milestones in civil aviation that set the agenda for the following decade. The 747 made its commercial debut in January 1970 but the world had to wait another six years for Concorde to enter service. When it did, appropriately JMR was on board the British Airways flight from London Heathrow to Bahrain.

“There are 30 farepayers and 70 rather less important people, including myself, on this happiest and most exciting of all the inaugurals it has been my luck and privilege to attend. The two stewardesses and four stewards, in special new uniforms, perform miracles of tolerance

and efficiency in an aisle jammed by newsmen festooned with cameras, lights, wires and microphones,” wrote Ramsden in his supersonic report in our 31 January 1976 issue.

He concluded his article with: “Time is what Concorde has to sell, and time is everyone’s most precious possession.”

As the decade ended, we bade farewell to *Flight*’s longest-serving writer, former editor and then editorial director Maurice Smith, who retired in 1978 after 42 years. His *Flight* service was interrupted by the outbreak of war, during which he flew 41 bombing missions on Royal Air Force Lancasters and Mosquitoes. ■

Read more about *Flight*’s history and our celebration of 11 decades in print at: flightglobal.com/Flight110



1975



1976



1977



1978



1979

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

Back to the future?

After all the talk about low-cost carriers considering introducing saddle-style “stand-up” seats to squeeze in yet more long-suffering self-loading cargo, Twitter and the UK tabloids had a field day when an image emerged of a passenger perched uncomfortably on a backless seat on an EasyJet flight from London to Geneva.

After a Tweetstorm that ranged from outraged comments about safety implications to quips about EasyJet charging passengers extra to put their feet up, the airline confirmed that the seats were “inoperative” and that no-one had been assigned them for the flight. Crew had seated the female passenger pictured on the broken seat elsewhere.

However, it was far from EasyJet's finest hour in terms of brand image, not helped by the employee who manages its Twitter feed requesting the person behind the original picture remove it from the site. This prompted a fresh burst of conspiracy theory and consumer rights fury from the keyboard warriors.

Flying colour

Greens everywhere have been committing to flying less because of the cost to the planet. Those named Green on the other hand have been enjoying flights for nothing, courtesy of Frontier Airlines.



The British national pastime



The UK's latest secret fighter – the Tornado XXL – is discovered around the back of a hangar at RAF Cosford (courtesy of the base's own Twitter feed)

The US budget airline has been offering to fly anyone with the surname Green – or Greene – on its network for one day for free. It is part of a “Green Week” in which the airline is stressing its environmentally friendly credentials with all its food and drink items recyclable or compostable, and a pledge to offset the carbon impact of the week's first flight – appropriately enough from Denver to Greenville – by planting trees.

Cue the queue

Queueing is not an Olympic sport, probably because everyone thinks the Brits would have an unfair advantage, but airline passengers in Russia seem to be keen to put in the practice, and it's all the fault of aircraft manufacturers.

Russian airfare search engine Aviasales says a survey of travellers who like to queue for boarding early found that over 40% do so because they want to be the first to put their luggage in the overhead locker.

“Some passengers worry there won't be enough space for their small backpack or jacket,” it adds. Our aeronautical medicine specialist is unable to advise on the official name for an irrational fear of overstuffed baggage bins –



Green machine

viduluscapsophobia or something similar, we reckon – but it is clearly a thing.

In fact, medical concerns – notably prevention of stress – seem to be behind much of the queueing phenomenon, Aviasales suggests, at least for those who are not simply joining the line through boredom or herd instinct.

“Some are afraid that they'll not have enough space on the bus carrying passengers from the gate,” it says, and one in five thinks there is a risk of being turned away from a full flight. And if that's not enough to make you sweat, then a fair few passengers worry that if they sit around sipping coffee instead of waiting in line, they'll end up with varicose veins.

Elemental

Flight: “So, this exciting new technology project – why did you abandon it?”

Spokesperson for Big British Plane Company: “At some point you realise there is too much unobtainium in there.”

Balloon goes up

It has been stated that a Government decision has

100 YEARS AGO

been taken which means that the airship branch of the

R.A.F. will cease to exist. This decision is to the effect that no more airships are to be built, and work on airships now under construction is to be stopped.

An airborne army

General Eisenhower's decision to set up his

75 YEARS AGO

headquarters in France has been accompanied by another

innovation. All airborne forces, British and American, have been combined in one Command, approximately the size of an Army.

East of Moscow

BOAC is hoping that, in the talks on trans-Siberian traffic

50 YEARS AGO

rights, the Russians will offer a wider choice of alternates east of

Moscow. So far such points as Leningrad have been suggested; these could involve a payload penalty on westbound flights.

Leahy on ascent

John Leahy, president and chief operating officer of

25 YEARS AGO

Airbus Industrie of North America, has been named senior vice-

president commercial for Airbus Industrie, of Toulouse, France. He replaces Charles Masefield, who will now head the UK Government Defence Sales Export Organisation.

100-YEAR ARCHIVE

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

FLIGHT INTERNATIONAL

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Offering some APT guidance

Like William Lonergan (*Flight International*, 30 July-5 August), I also used the tried and tested PAT method as a flight instructor, but in a more APT manner – attitude (always first), then power and trim.

Airborne, performance was always taught as the resultant of attitude first (including that of the pilot) and power, and I knew one very old instructor whose total instructing sphere consisted of just three basic attitudes.

Transiting through a variety of type ratings, including six separate jet transports, a must was to look up “flight with unreliable airspeed” tables in the flight manual and learn the basic attitudes and power settings – used to favourable effect in at least one “interesting” event.

Only one type – the Fokker F28 – was equipped with an angle-of-attack indicator, and approaches could be flown accurately using the “Alpha” mode on the flight director; sadly not approved for primary use.

But then, I am from a generation when my initial instrument

SAFETY

Questions remain over 737 Max

The BBC's *Panorama* programme, “Boeing's killer planes” – aired on 29 July, and detailing the flaws of the 737 Max – was a massive shock.

Boeing's alleged prioritising of cost reductions, purporting the 737 Max to be a modest development of the 737NG, and omission of the errant MCAS [Maneuvering Characteristics Augmentation System] in the 1,600-page manual for the aircraft are beyond comprehension.

Panorama suggested that rectification of 737 Max design flaws could involve a significantly longer period and far greater cost than Boeing appears to be anticipating.

In my view, a large number of passengers will avoid travel by the 737 Max until a trouble-free period has elapsed after its eventual service re-entry.

Your World Airliner Census (*Flight International*, 30 July-5 August) is highly relevant. Boeing's narrowbody orderbook consists of 2,701 Max 7, 8, 9, 10 and “variant TBD” aircraft, but nothing else – apart from 23 end-of-line 737-800s.

Might its narrowbody business be heading “up a creek without a paddle” for a period?

Derek Gilbert

Henley-on-Thames, Oxfordshire, UK



Re-engined narrowbody is in trouble

Gary He/EPA-EFE/Shutterstock

International trade and the co-operation that it thrives on is not just a matter of “taking new opportunities” and fixing deals. It is a matter of trust, close co-operation over many years of very hard work, and bringing together for maximum effect the skills of individuals from different countries, companies, universities, and science and research institutions.

Airbus is a spectacular example of how well it can be done. From European beginnings it has grown into a thriving and fully international organisation, making the fullest use of skills and facilities wherever they are. And there are plenty more examples of European initiative producing military aircraft and helicopters of world-leading class.

Are we about to throw away all these benefits for ourselves and our neighbours through ignorance in government? Looks rather like it, alas.

David Stevens

Woking, Surrey, UK

Falling Prey

It appears that your castigation of the *New York Daily News* for its “John Glenn Moon landing” Twitter gaffe might equally be turned on a target closer to home (*Flight International*, 30 July-5 August).

Your description [within an Airbus-themed item on the very same Straight & Level page] of the Boeing Bird of Prey as being an unmanned combat air vehicle was clearly in error.

Such information would surely come as a surprise to my Boeing colleague and fellow test pilot Doug Benjamin, who flew the Bird of Prey in person.

Capt Thomas Imrich

Mercer Island, Washington, USA

Boris: bad news for aerospace

Congratulations on managing not to drag your readers into the wretched political debate that continues to split the country in two – and a continent with it – despite the rosy and expensive promises of our new “great leader” [UK Prime Minister Boris Johnson].

I wouldn't bring it up either, except that he has surrounded himself with a protective band of malleable “yes” people who, as far as I can see, have no experience of, or interest in, engineering, science, technical education and even the arts.

rating was needle, ball and airspeed, and I was fortunate enough to hone my skills on – and enjoy flying – such classics as the Douglas DC-3 and -6B.

George Baczowski

Swardeston, Norfolk, UK

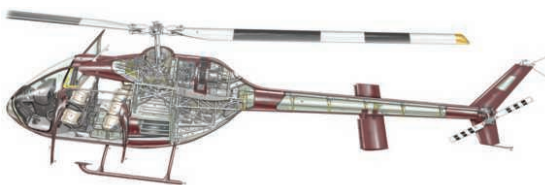
Long game

In your article on Virgin Orbit (*Flight International*, 16-22 July), you quoted the LauncherOne rocket's length as 70m (230ft).

The length of its Boeing 747-400 mother ship is indeed 70m, but LauncherOne is approximately 16m long.

Paul Baker

via email



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17 October

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verticalflightexpo.com

17-21 November

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dubaiairshow.aero

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5-6 December

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rotor.org/home/heli-expo

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11-16 February

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25-28 February

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WORK EXPERIENCE STEVE GRIMES

A flexible approach to engineering

As director of sales and marketing for SS White Technologies, Steve Grimes spends his days juggling multiple roles at the US firm, which designs and supplies pliable rotary shafts for aerospace customers

What sparked your interest in aviation?

We used to go to air shows when I was a child. My father did his National Service in the Royal Air Force and as he was a mechanical engineer, anything with an engine was brought to my attention. The different sounds and smells intrigued me. I will always remember the fast jets, the Red Arrows and the Battle of Britain Memorial Flight, which used to fly over our home occasionally on their way to displays.

How has your career progressed?

I was lucky enough to be offered a technical apprenticeship at British Aerospace (now Airbus UK) where, each week for six years, I spent one day and one evening at college and the rest of the week learning in a hands-on way. Following my apprenticeship, I worked as a design draughtsman on wing structures and ground equipment. I moved to another aerospace company to design bleed air ducting for aircraft, along with fuel and oxygen ducts for space rockets. A spell working as a project co-ordinator, a senior design engineer and a project manager helped me to understand the production planning aspect of business, including lean manufacturing. I then made a conscious decision to move out of aerospace into general industrial engineering. The pace was very different, as were the processes and controls. Through growth, contraction and change of ownership, I found myself as a general manager of SS White Industrial



Customisable parts suit a huge range of applications, says Grimes

(later to become SS White Technologies), for which aerospace represents around 45% of the business. I was promoted to managing director, with responsibility for aerospace accounts in the UK and Europe on behalf of our US parent. I recently moved to Florida, where I hold the group-wide position of director of sales and marketing.

What are the highlights?

The stand-out achievements are seeing “my” parts work on rocket engines; being lead engineer for “plumbing” systems integration in a turboprop nacelle; expanding my knowledge to include lean principles; becoming an engineering manager; meeting customers from across

the globe; running a business; and being able to influence the entire process.

What does your job entail?

There is a lot of administration, but I am responsible for strategic planning and setting goals through a variety of avenues including market analyses, organisational development, sales promotion, and social media.

What is SS White and what does it produce?

SS White designs, tests and manufactures customised flexible shafts for numerous aerospace applications such as in-thrust reverser actuation systems, flap and slat actuation systems, manual override for valves, windscreen wiper drives

— anywhere rotary motion needs to be transmitted from one position to another. Almost all of the commercial and military aircraft platforms in the air today — except those developed in Russia or the Soviet Union — rely on SS White products.

What do you enjoy the most?

I enjoy the challenge of juggling competing demands. This involves changing functional hats several times a day. I enjoy leaving at the end of each day knowing that we have made improvements to our business. I enjoy working in the aerospace industry, and get a buzz from the challenges of being part of a product that transcends all industries and their different regulatory environments.

What is the strategy for SS White Technologies?

To continue to excel in highly engineered markets where our custom engineered parts will continue to be produced over a period of years. The customisation of our flexible shaft assemblies makes them ideally suited to aerospace, medical and automotive applications. We will continue to work closely with emerging industrial applications. ■



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