ISSUE 2, VOLUME 9: MAY – JULY 2017

ARABIAN AEROSPACE

THE MAGAZINE FOR AEROSPACE PROFESSIONALS IN THE MIDDLE EAST, NORTH AFRICA AND TURKEY

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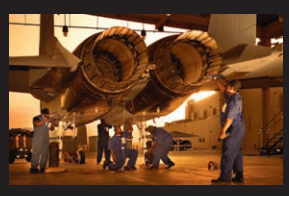

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These random bans are not the way to promote safety

I had the honour of chairing the World Aviation Safety Summit held in Dubai in April. It was, as ever, great to meet professionals from all around the globe who are committed to ensuring that aviation remains the number one means of safe long-distance travel.

Safety should be our number one priority, and maintaining confidence in aviation by those who book themselves or their goods on to our aircraft is essential.

But the recent moves led by the United States Government undermine the good work and the expertise developed over the past century by the industry professionals.

The decision – allegedly backed by 'intelligence' – that led to the banning of laptops, tablets and other portable electronics in aircraft cabins flying from a targeted list of airports, is ill thought-out. That became apparent when the UK, which shared the same intelligence information, also banned the equipment… but from different countries.

Of course, we recognise the difficult truth that the aviation industry remains on the front line as terrorists persist in trying to strike our airlines and airports – in this case through creating an explosive device that looks like a battery for portable electronic devices.

But I am sure many of us must share the view expressed by such groups as the International Air Transport Association (IATA), the European Aviation Safety Agency (EASA) and the Flight Safety Foundation, that these latest measures are ineffective and potentially dangerous.

IATA director general, Alexandre de Juniac, says UK and US authorities should work with the airline industry to "find a way to keep flying secure" without requiring passengers on certain flights to check their electronic devices.

"The current measures are not an acceptable long-term solution to whatever threat they are trying to mitigate. Even in the short term, it is difficult to understand their effectiveness," he said.

The American targeting of Doha, Abu Dhabi and Dubai – the hubs of the airlines considered a major commercial threat by American carriers and their political lobbyists – is surely more than a coincidence. All three remain clear for the UK and, indeed, Dubai's security standards and systems were declared "best in class" by a UK audit. Dubai has also stepped up secondary checks.

Industry and safety experts have rightly argued that filling the hold of a commercial airliner with the lithium-ion batteries used to power most consumer electronics would create a hazard all its own and it becomes increasingly clear that it could have disastrous consequences. That is why the bulk transport of these on aircraft is banned under the Dangerous Goods Act.

As far as I can see, the only security that this measure will provide is financial security to American carriers.

Putting domestic politics above true safety processes and practices is ill-judged and I would urge the governments of the US and UK to communicate with the experts and put proper SAFE measures in place.

Safe landings.

Alan Peaford, Editor-in-chief

COVER: IATA Middle East head Muhammad Ali Al Akbari. PICTURE: BILLYPIX

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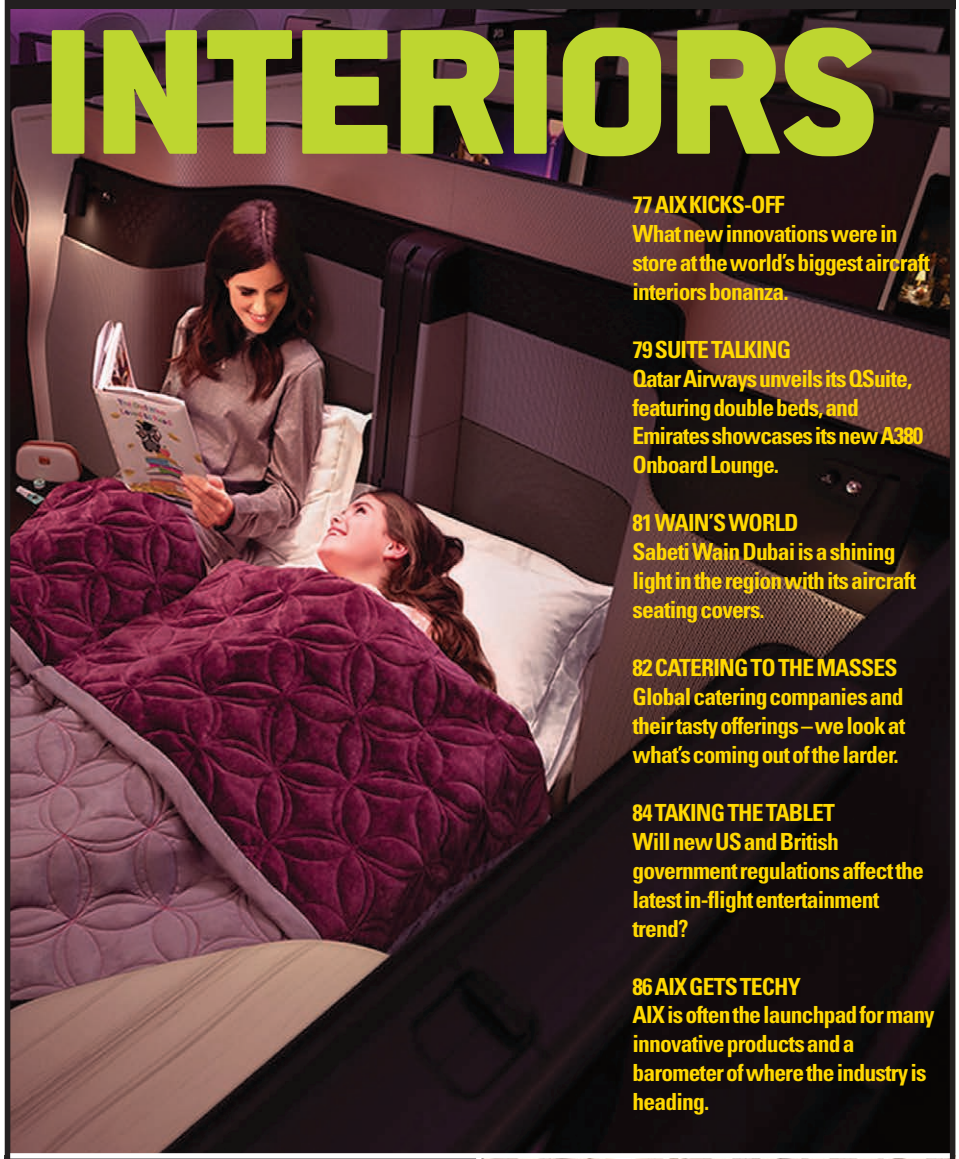

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Abu Dhabi terminal delay

The opening of Abu Dhabi's $2.94 billion Midfield Terminal has been delayed by two years, GCC newspapers have reported.

The regional media attributed the announcement of a 2019 opening to Sheikh Hazza Bin Zayed, vice chairman of Abu Dhabi's executive council, who visited the terminal.

The Midfield Terminal is designed to house 65 aircraft gates and comprise 3,500sqm of duty free retail. The project is being built by a partnership of Arabtec, Consolidated Contractors Company of Greece and Turkey's TAV Group.

Arabian Aerospace sources had earlier reported problems in construction of the roof of the massive terminal structure but Abu Dhabi Airports Company refused to comment on the reports.

DAE adds to ATR portfolio

Dubai Aerospace Enterprise (DAE) has completed the purchase of a portfolio of ATR 72-600 aircraft from GE Capital Aviation Services (GECAS).

The purchase brings the total number of owned and committed ATR 72-600 aircraft in DAE's fleet to 57, making it one of the largest lessors of the type worldwide.

In addition, DAE has options with ATR for a further 20 aircraft of the same type.

Flynas orders 80 neos

Flynas has signed an agreement with Airbus for 60 A320neo family aircraft.

In addition, the carrier has converted 20 A320ceos from a previous order to A320neos, bringing the airline's total firm order to 80.

The deliveries are scheduled to take place from 2018-2026.

RedBull lights up Abu Dhabi

Abu Dhabi's Corniche was filled with the roar of powerful light aircraft as the RedBull air race came to the UAE capital.

The Czech Republic's Martin Sonka clinched his first race win since he joined the World Championship in 2010.

Rising winds that brought the racetrack alive didn't affect Red Bull Team Sonka pilot, whose time of 53.139 blew away his opponents by more than a second. Spain's Juan Velarde clocked 54.166 for the silver spot on the team's first podium finish

Set within eight kilometres of pristine beachfront with a backdrop of magnificent modern architecture piercing the blue sky, 14 pilots flying high performance aircraft such as the Edge V2/V3 and MXS-R. go through a series of races including qualifying, elimination and finals.

See pilot interview Page 116.

PICTURE: PAUL MERRITT

Alligators add bite

A top official from Russian Helicopters has confirmed that the delivery of the 46 Kamov Ka-52 'Alligator' helicopters, ordered by the Egyptian Navy in 2015, will begin in the second half of this year.

In an interview with Russian news agency, *TASS*, Andrei Boginsky, CEO of Russian Helicopters subsidiary, Progress Arsenyev Aviation Company, said the first batch of the Ka-52 reconnaissance/attack helicopters (also known by the NATO reporting name Hokum-B), would be delivered before the end of 2017.

Meanwhile, Russian state-owned arms exporter, Rostec Corporation, also confirmed that Egypt would soon receive some of the Ka-52 helicopters ordered for deployment on the Mistral class helicopter dock vessels acquired from France in 2014.

Each vessel can carry up to 16 helicopters.

Semmco touches down at Dubai South

Semmco, the British engineering company that designs, manufactures installs and services aircraft ground support equipment and aviation access platforms for a global client network, has opened a maintenance and assembly operation in Dubai South (Dubai World Central).

It is the company's first overseas office in its 25-year history. UK manufactured products are to be shipped, flat packed, to Dubai and then assembled at the Semmco facility before being quality-checked and delivered to customers.

EASA thumbs up

EgyptAir Training Center has passed the European Aviation Safety Agency (EASA) inspection reviewing quality standards of maintenance training programmes on Boeing B777/ B737-800NG, Airbus and Embraer aircraft.

Gulf Air signs tech agreement with Sabre

Sabre has signed a new agreement with Gulf Air to expand core passenger services technology covering reservations, departure controls and all other aspects that touch passengers directly.

Gulf Air chief commercial officer, Ahmed Janahi said: "We continue to invest in and focus on enhancing the passenger experience and doing so via a multi-faceted approach that includes cutting-edge technology solutions to make the entire travel experience a more convenient and comfortable one for Gulf Air passengers.

"We are pleased to utilise an expanded range of solutions provided by Sabre, geared towards increasing passenger satisfaction and giving them greater control over their travel."

PAS in the market for new aircraft

Egyptian airline Petroleum Air Services (PAS) says it will, in 2017, invest up to $80 million in a fleet modernisation programme that is aimed at replacing most of its old aircraft.

Vice-president, Hany Adoun, said the Cairo-based oil industry support and commercial aviation service provider had opened negotiations with several global aircraft manufacturers.

Although no sales agreements have been announced, Adoun said that some new aircraft would be delivered to boost the fleet between July and October this year.

PAS has also completed the construction of a new aircraft hangar at the Nozha Airport in Alexandria. Adoun said the new service facility would enable the company to expand the provision of maintenance services beyond Egypt to cover the needs of contracting and petroleum extracting companies as far afield as Algeria and Basra in Iraq.

Mad on MAX

Boeing has signed an agreement with Iran Aseman Airlines, for the purchase of 30 Boeing 737 MAX aircraft with a list price of $3 billion. The agreement also provides the airline with purchase rights for 30 additional 737 MAXs.

First-class upgrades

Oman Air has renovated three A330-300 aircraft first-class cabins.

Executive vice president products and brand development, Abdulaziz Al Raisi, said: "Over the years, Oman Air has made an enormous investment in new aircraft, new destinations and an array of exciting products and services – each with the aim of providing an even more enjoyable experience for our guests.

"We have been able to achieve this with the generous support of the Government of the Sultanate of Oman. However, that support has been reduced significantly over the last three years and Oman Air is progressing towards becoming entirely self-supporting."

Up in the air

Oman's SalamAir has begun operations after securing its Air Operator's Certificate (AOC) from the Oman Public Authority for Civil Aviation (PACA). The low-cost carrier's inaugural commercial flight between Salalah and Muscat took place on January 31.

Iran goes wide with latest delivery

Iran Air took delivery of its first new wide-body aircraft when it received an Airbus A330-200 in March.

This is the first of a firm order placed by the Tehran airline in December 2016 for 100 Airbus aircraft – 46 single-aisle and 54 wide-body jets – to renew and expand its fleet.

The aircraft features a two-class cabin layout, seating 32 passengers in business and 206 in economy.

The handover coincided with the airline's 56th birthday celebrations.

The carrier is widely expected to receive its first Boeing 777-300ER earlier than planned, as it is considering taking one that was cancelled in production by Turkish Airlines.

The fast train for Istanbul

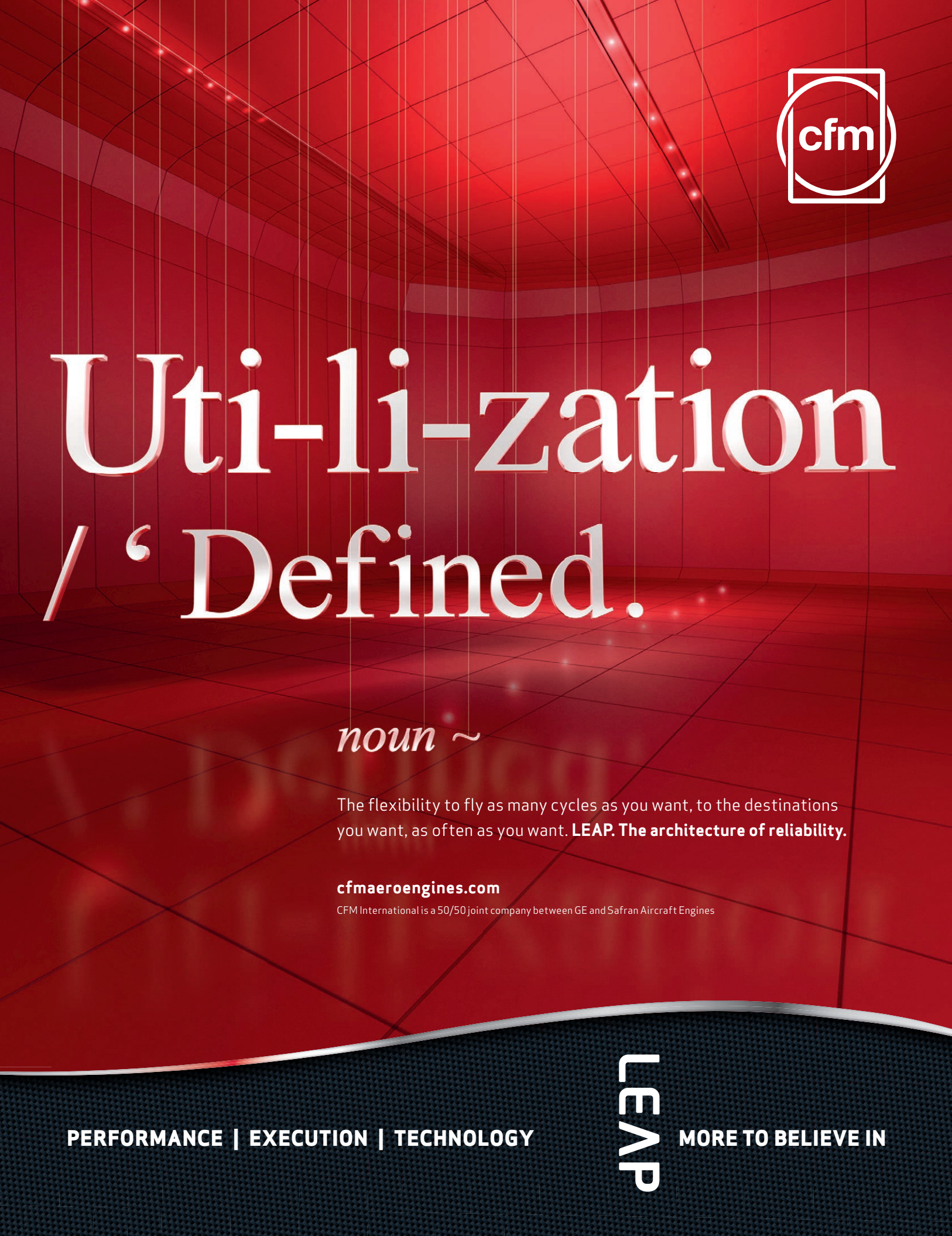
The International Air Transport Association (IATA) and Hasan Kalyoncu University (HKU) announced a new partnership agreement to train more than 10,000 airport employees of the New Istanbul Airport.

Scheduled to open in 2018, Istanbul New Airport is forecast to be one of the largest in the world, with a capacity of up to 200 million passengers once it reaches full operational capability.

Turkish civil aviation regulations stipulate that all airport employees must complete specific training before the facility can be granted its operating certificate. This means around 10,000 employees must be trained in 2017 and 2018. The total number of employees requiring training could be as high as 100,000.

Bahrain's US link

Kallman Worldwide, organiser of the US presence at trade shows in eight industries on six continents, will represent the region's fastest-growing industry event, the Bahrain International Airshow (BIAS), in the United States, beginning with the 2018 edition.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Xybase deal has eastern promise

Nexus has signed a memorandum of understanding (MoU) with airport operations management systems provider Xybase.

"We had an immediate affinity for Xybase; they are aggressive and entrepreneurial like us and share a global vision for the growth of their business," said Abdullah Al-Sayed, founder & chairman of Nexus.

The MoU calls for the companies to work toward a joint venture, where Xybase will help Nexus grow its business in the Association of Southeast Asian Nations (ASEAN) countries and China, and, in turn, Nexus will reciprocate for Xybase in the Middle East, India and Africa.

Texel excels

Bahrain-based Texel Air has received its initial European Aviation Safety Agency (EASA) Part 145 approval and has extended its maintenance services to include the Airbus 320 family and Boeing 737 Classic and NG family.

The company said that this would further expand and enhance its service offerings to build on existing capability at the Muharraq Airport.

The decision to seek EASA 145 approval was to meet the growing demand from existing and new customers.

Clipped wing

Singaporean budget carrier, Scoot, made contact with an Emirates aircraft at Changi Airport, Singapore. Both Changi Airport and Scoot confirmed that the on-ground accident happened between Emirates EK405, which was bound for Dubai, and Scoot TZ188, which was departing for Tianjin.

A Changi Airport spokesperson said there were no injuries and passengers aboard the Emirates plane were re-booked on other flights scheduled to depart later the same day.

Lockheed Martin rolls out new freighter

Lockheed Martin has introduced the latest member of its C-130J Super Hercules family – the LM-100J commercial freighter. Employees who designed and built the aircraft celebrated in February with a traditional 'roll-out' ceremony at the Lockheed Martin Aeronautics facility in Marietta, Georgia.

George Shultz, vice president and general manager, air mobility & maritime missions said: "We are at this point thanks to the hard work and dedication of Lockheed Martin employees and suppliers, who have literally designed and built this new chapter of Super Hercules operations. The Federal Aviation Administration (FAA) has been an essential partner in this aircraft's production and we look forward to continuing to work together as we move into the LM-100J's critical flight-test phase."

Yahsat enters long-term partnership

Signing up: Farhad Khan, Yahsat Chief Commercial Officer and Gleb Larionov, X SAT FZ.

Yahsat has started a long-term strategic partnership with UAE communications solutions company XSAT.

Under the agreement, XSAT is committed to capacity on Yahsat's upcoming Ka-band satellite, Al Yah 3, to be launched later this year.

Farhad Khan, Yahsat's chief commercial officer, said: "We are delighted to be partnering with XSAT for our satellite broadband service, YahClick. This agreement is a great example of the strength of home-grown companies working together to provide improved services to customers. It also demonstrates our commitment to offering our customers flexibility, combined with the highest levels of technical support and extensive satellite broadband coverage."

Pallet-able deal

Saudia and Saudia Cargo have awarded the management of their containers and pallets to Unilode Aviation Solutions.

Operations began in April and Unilode will set up regional offices in the airline's hubs in Jeddah and Riyadh.

It will also operate a repair shop in Jeddah for the maintenance and repair of unit load devices (ULDs) and galley carts.

Iran's growing trend

Iran is experiencing growing air passenger numbers from around the world – a trend that looks like continuing during 2017, according to a study by ForwardKeys.

Total international arrivals were up 18.3% last year, sustaining an upward path since 2013 (up 2.7%), 2014 (24.8%) and 2015 (12.7%).

The pattern is reflected by a consistent year-on-year increase in total scheduled seats:
2014 (up 10.5%),
2015 (18.3%),
2016 (17.3%).

A right Royal deal

Royal Jordanian Airlines is to receive line replaceable unit (LRU) components pool support from Turkish Technic on its V2500 engines. The services and spares provided will be based in Turkish Technic's Istanbul base and supply stations throughout the world.

DXB wow factor

Dubai Airports has unveiled the world's fastest free airport Wi-Fi connection to millions of passengers travelling through DXB each month. Named WOW-Fi, the service provides internet connections of up to 100mbps – surpassing all other airports.

Fashionable Saudi start-up

Proposed Saudi Arabian low-cost carrier, Flyadeal, is offering potential passengers the chance to have a say in selecting the designer for the new airline's staff uniforms.

According to the airline, a sister company to Saudi Arabian Airlines, this is the first time an airline in the region has involved its future customers in shaping the look of its cabin crew uniform.

The airline launched the contest to find the perfect designer through its social media channels and said it has been "wowed" by more than 700 designs from more than 140 young Saudi-based designers.

TAV hot in Chile

Turkey's TAV Operation Services will operate two lounges at Chile's Arturo Merino Benítez Santiago International Airport terminal building and provide meet-and-assist services.

TAV Operation Services general manager, Ali Bora Isbulan, said: "We undertake innovative projects with our advanced technology and strong infrastructure. We are glad to add the new lounges to our existing operations."

Good move on Badr-4

Arabsat and ONT signed an agreement in February to launch a Tunisian broadcast platform on the Arabsat Badr-4 satellite.

The platform operation will start by the end of the second quarter of 2017 and will allow Tunisian and regional broadcasters to have a direct access from Tunis to the growing 26°E neighbourhood, with a coverage encompassing the MENA region and western Europe.

Arabsat CEO, Khalid Balkheyour, said: "This agreement will enhance our relationship with Tunisia, where we are already present through our satellite control station, as well as the HQ of our strategic partner, ASBU.

Intelligent training deal

MOMook, the intelligent business and training management software developer, has signed a two-year contract with the Algiers Aviation Training School (ATS).

"Through the partnership with ATS, we aim to bring solutions that would fulfil all the client's requirements. Particularly, as the company grows, we are glad to offer modern and customisable software to reach ATS' business goals and improve their results," said Egle Vaitkeviciute, CEO of MOMook.

Partners progress

Etihad Aviation Group and Lufthansa German Airlines have unveiled details of a new commercial partnership. The two airline groups have concluded a $100 million global catering agreement and a memorandum of understanding (MoU) to cooperate on aircraft maintenance, repair and overhaul.

AFRAA heads to Tunisia

The African Airlines Association (AFRAA), in partnership with Tunisair, will stage the sixth Aviation Stakeholders Convention from May 7-9 2017 at the Medina Mediterranea Hotel in Yasmine Hammamet, Tunisia.

Jewers doors open

Jewers Doors has expanded its Middle East business and moved to new, larger offices overlooking the Business Bay in Dubai.

Sim for Morocco

ALSIM has announced the sale of an ALX light turboprop simulator to the Morocco Aviation Private Academy (MAPA), located in Benslimane.

Etihad signs

Etihad Airways Engineering has signed a three-year contract with Air Tahiti Nui for the heavy maintenance of its Airbus A340-300 fleet.

Under the contract, Air Tahiti Nui will send nine Airbus A340 inputs for C-checks to Etihad Airways Engineering's Abu Dhabi MRO facility.

The project has already been initiated and will run until the end of 2019.

Oman promotion

Oman Air has signed a memorandum of understanding with Taiseer to help promote local businesses in Oman – in particular small and medium-sized enterprises (SMEs) – to the carrier.

Dream win

STG Aerospace has won a contract to supply Boeing with its next generation photo luminescent floor path marking system, saf-Tglo SuperSeal UltraLite (SSUL), for the Boeing 787 Dreamliner.

Captain Nevin Darwish and first officer Alia Al Muhairi fly the Emirates Airbus A380 aircraft.

Emirates turns spotlight on women

Emirates gave centre stage to its women employees on International Women's Day on March 6.

Women make up close to 44% of the airline's workforce – around 29,000 female employees including more than 150 nationalities.

Women employed at Emirates come from diverse backgrounds and work across the entire spectrum of airline operations.

More than 18,000 are cabin crew, while the rest are represented across technical, as well as in professional and leadership roles.

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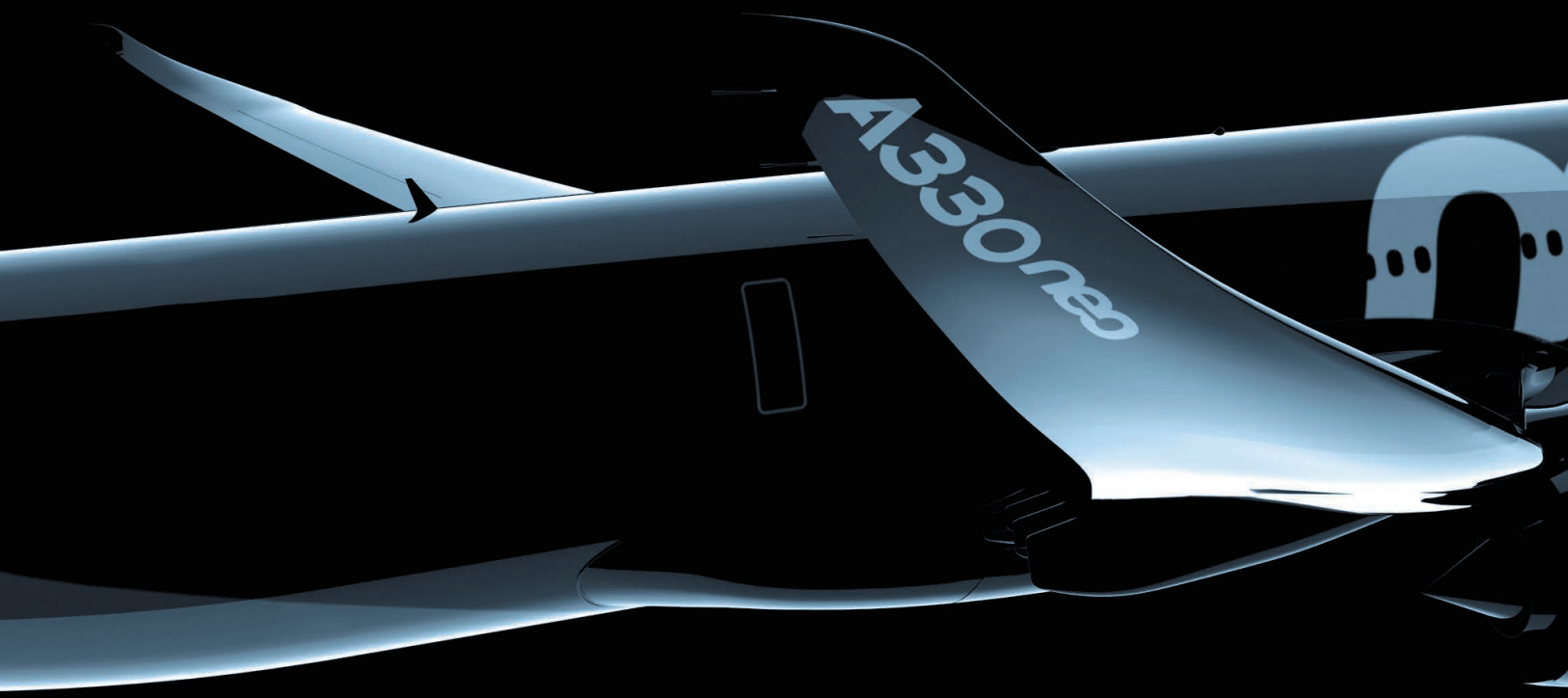

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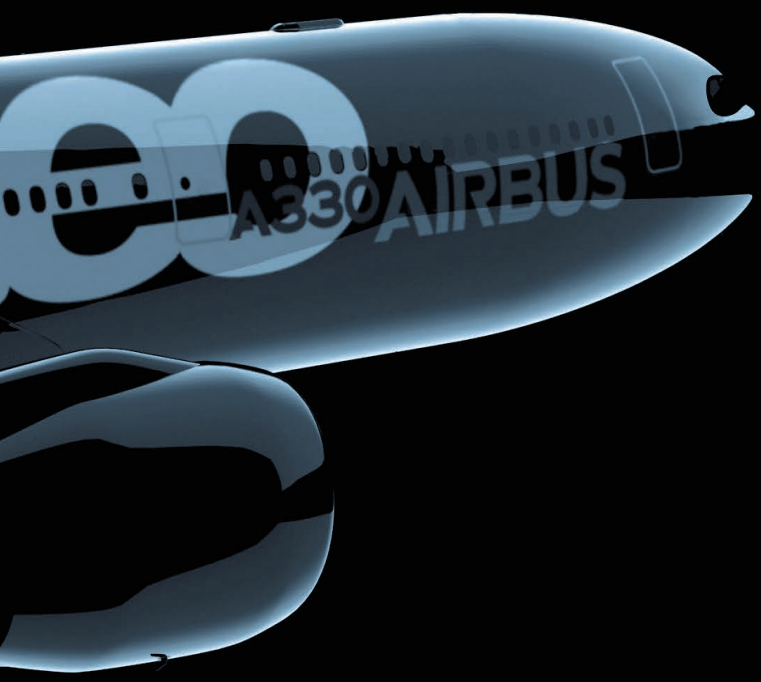


AIRBUS

Over the past decade, the biggest story in the commercial airline sector has been the seemingly unstoppable rise of the Arabian Gulf's three major carriers – Emirates Airline, Etihad Airways and Qatar Airways. But recent months have brought a slowing in their expansion. **Alan Dron** *investigates whether this is a temporary setback, or the first signs of a more significant swing in their fortunes?*

IS THE 'BIG 3' BUBBLE ABOUT TO BURST?

If there has been one factor that has cropped up in virtually every airline's annual report over the past year, it has been CEOs bemoaning the drop in yields they have experienced.

An airline boss once commented: "It's easy to fill an aircraft – making a profit out of it is the tricky part."

That has become very apparent. Although more people are travelling and, in many cases, airlines' revenues are up, their profit margins have been squeezed increasingly tightly.

Emirates Airline announced last November that, in the first half of its 2016-17 financial year, profits nose-dived to AED786 million ($214 million), down from AED3.1 billion for the same half-year period in the preceding financial year.

Etihad's 2015 figures were good – net profit up 41% at $103 million – and Etihad Aviation Group president and CEO, James Hogan, said in February 2017 that the airline had seen sustained growth in 2016 "in a very tough business environment".

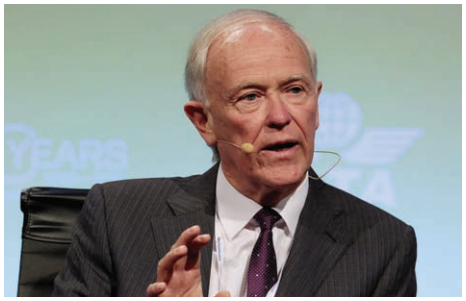
The group's 2016 figures had not been released at the time *Arabian Aerospace* went to press, but should be known by the time of publication.

Best of the bunch

The best of the bunch was Qatar Airways, which recorded a net profit for its 2016 financial year of $445 million, four times higher than in 2015. Unlike most airlines, the Doha-based carrier actually recorded an increase in its profit margins, although that reporting period ended on March 31 2016. It remains to be seen if those healthy figures continued throughout the rest of last year.

The slump in oil prices over the past two years has had a noticeable effect globally. On the one hand, airlines have benefited from vastly lower fuel costs (assuming they were not tied up in unfortunate fuel hedging arrangements). However, lower costs have led to increased competition from rivals and, thus, lower fares.

Also, capacity is growing rapidly. The huge orders placed by many of the world's airlines two to three years ago are now starting to materialise



Top: Qatar's Akbar Al Baker; Centre Etihad's James Hogan; Above: Emirates' Sir Tim Clark.

in the form of new aircraft on airport ramps. Airlines are desperate to fill seats and are cutting fares, especially on heavily trafficked routes where they are in competition with one or more rivals.

"I think there's a combination of factors at play here," said Saj Ahmad, chief analyst at UK-based consultancy Strategic Aero Research, which has good connections with Middle Eastern carriers.

"The lower oil price hasn't really helped them as it could have. What it's meant for less agile competitors is that they've been able to lower their costs. There's been some bottom feeding; prices dropped to such an extent because [some airlines] weren't interested in yield, they just wanted bodies on seats.

"Additionally, the costs of mainline carriers are still higher than those of low-cost carriers (LCCs), so they're losing traffic that they would usually snare all year round. To prevent the loss of traffic to other carriers, the Middle East's big three (ME3) are lowering fares to match."

Showing just how tough the market has become, even Gulf-based LCCs, such as Air Arabia and Flydubai, plus hybrid carrier Jazeera Airways, saw their 2016 profits drop by varying amounts in 2016.

Organic growth

While Ahmad does not see the ME3 panicking, he does foresee a slowdown in their organic growth, with fares typically $40-50 lower than they were a couple of years ago. "Most, if not all, passengers opt for value in pricing beyond anything else. I think that's what caught them [the carriers] off-guard to a certain extent."

One development that could allow Emirates to garner a slightly higher yield from customers would be the introduction of a premium economy cabin. The airline has been mulling over the possibility of introducing this for some months now and president, Sir Tim Clark, said in March that it was still studying the pros and cons of such a move.

All three major Gulf carriers still retain large order backlogs, notably of Boeing 787s and Airbus A350s. To limit the capacity growth, Emirates, in particular, is weeding out older aircraft from its fleet.

Older Airbus A380s will soon start to come off lease and won't be renewed, said Ahmad. "If you start taking out that [A380] capacity, plus some of the older Boeing 777-300ERs, capacity will probably stay as it is."

The airline also announced in December 2016

that it was deferring delivery of six A380s from 2017 to 2018 and a further six from 2018 to 2019.

Emirates' next major fleet decision is whether to choose the Boeing 787 or Airbus A350 as its new wide-body. Clark has said that today's softer market conditions means that there is less urgency behind that decision and that the first examples of whichever aircraft is chosen are unlikely to start to be delivered before 2021-22.

Ahmad, who admits to being a fan of the Seattle product, believes that the 787's operating economics make it the most likely choice, given its capability to handle short-, medium- or ultra-long-haul routes: "I think that will become their standard-bearer in the below 300-seat category," he said.

He is sceptical of reports that Emirates may look at introducing a narrow-body fleet for regional Middle Eastern routes. For one thing, LCCs, such as Flydubai, already have a good product in the marketplace and have been accepted by a population that once equated 'low-cost' with 'poor quality'.

Etihad has a whole different set of problems. For several years it appeared unstoppable, building up its unique business model of taking stakes in airlines outside the Gulf that it thought it could successfully turn round and link into its increasingly comprehensive global network of partner carriers.

Cost-base problems

This model has worked well with smaller members of the group, such as Air Serbia and Air Seychelles, but has seemingly run aground upon coming up against more intractable cost-base problems at Airberlin and Alitalia. Airberlin's accounts have stayed stubbornly in the red despite sustained management attempts to improve matters.

Alitalia is also proving difficult to turn round. A new business plan was presented to the Italian Government in late March. This included shrinking its short-haul business through the disposal of 20 A320-family aircraft and effectively turning it into a low-cost operation.

It is believed that the new business plan will require further substantial job cuts and the Italian trade unions are unlikely to play ball this time around.

When Etihad took its 49% stake in the Italian flag-carrier in 2014, Hogan said he believed the Alitalia brand could be a world-beater. However, he also made it very clear that there needed to be major changes at the Italian airline, whose short-haul European services, in particular, have suffered from heavy competition from European LCCs such as Ryanair and EasyJet, and whose domestic services face an increasing rival in high-speed trains.

The news that Hogan, the architect of Etihad's successful growth, is leaving the company later this year, may be an indication that patience in Abu Dhabi has run out over the wayward German and Italian operations.

"I think whoever steps in to take Hogan's job will have to re-evaluate what Etihad's equity alliance represents," said Ahmad. "I think

Continued on Page 20

CONTINUED FROM PAGE 19

there will be small, piecemeal moves to undo Hogan's plans for equity stakes and go more towards Emirates' pattern of organic growth."

Meanwhile, in an indication that steadily tightening macroeconomic conditions are affecting even the most successful airlines, Etihad has announced it intends to reduce staff numbers.

The Abu Dhabi-based carrier said in December 2016 that a company restructuring would "result in a measured reduction of headcount in some parts of the business".

An Etihad spokesman said that the airline was "operating in an increasingly competitive landscape, against a backdrop of weakened global economic conditions", adding: "It's a challenging time. Remaining competitive involves an on-going process of organisational reviews and restructuring in different parts of the business, in order to reduce costs and improve productivity and revenue."

Job losses

The airline has said that most job losses will come about through natural attrition, with departing personnel not being replaced, rather than by redundancies.

In an intriguing move that shows its expansionist appetite is not yet sated, however, Etihad has signed an agreement with one of the harshest critics of the ME3, Lufthansa.

The two companies signed a multi-faceted commercial partnership agreement in February that will bring about cooperation via codeshares and in catering and MRO services.

It followed a deal, agreed between the two late last year, in which Airberlin will wet-lease 38 narrow-bodies to Lufthansa Group, most of which will be operated by Lufthansa's Eurowings LCC.

Qatar Airways has remained largely free from major problems in the past year, although its horizon is not entirely trouble-free. The carrier has walked away from accepting four previously ordered Airbus A320neos powered by the Pratt & Whitney PW1100G, due to operating restrictions related to the powerplants' start-up time.

In addition, slow deliveries of the twin-aisle A350-900 had a cumulative effect on the Doha-based airline's schedules in the second half of last year, resulting in the cancellation of some 800 services.

Qatar Airways' CEO, Akbar Al Baker, told *Arabian Aerospace* at the Arab Air Carriers Organization annual meeting in Casablanca in late November that the combination of the A320neo and A350-900 problems could cost the airline $400 million in the 2016-17 financial year.

Qatar Airways also had a setback with its planned Saudi subsidiary, Al Maha Airways, failing to get off the ground, although Al Baker says he has not given up on the idea of expanding into Saudi Arabia and there have been rumours that Al Maha may be resurrected.

However, despite these setbacks, Qatar Airways has continued to expand. It plans to take a 49% stake in Italy's Meridiana if the deal gets approval from the European Union's competition authorities.

In March, Al Baker also announced plans to establish a subsidiary in India as soon as possible to tap into that country's rapidly expanding air travel market, saying that the new airline would have up to 100 aircraft.

Additionally, Al Baker is keen to invest in Royal Air Maroc and Casablanca Airport. Casablanca acts as a hub for many flights to and from West Africa, with passengers connecting there with services to Europe or North America.

However, Ahmad believes that investment in that region carries risks. The North African market is vulnerable to terrorist acts, which can have a serious dampening effect on air travel and Ahmad questions why Qatar Airways would want to expose itself to that risk.

If the security situation remains calm, building up Casablanca as a hub would be a reasonable idea, he believes, but he feels that the airline would be better advised to rely on continuing its organic growth. Its expansionist policies include taking a 20% stake in IAG, parent company to British Airways and Iberia, while it has also bought 10% of South America's LATAM Airlines Group.

It has also continued to invest heavily in new aircraft – 30 Boeing 787-9s and 10 777-300ERs, plus a letter of intent for up to 60 737 MAX 8s. The latter aircraft will not join the Qatar Airways fleet, but will be used to provide new capacity in airlines in which it invests. Meridiana is an obvious choice, as it currently has a heterogeneous and increasingly elderly fleet, including McDonnell Douglas MD82s and MD83s dating back to the late 1980s.

Hostile airspace

There are some factors that the ME3 can do little about. The unrest in Syria, Iraq, Libya and Yemen continues to exact a toll in suspended routes and detours around potentially hostile airspace. And geopolitical effects, such as US President Donald Trump's executive orders banning travellers from several Middle Eastern countries, plus the UK's forthcoming exit from the European Union, have had a dampening effect on economic sentiment.

When people are worried about the future, they tend not to spend so much money on airline tickets.

Ahmad believes that the problems currently facing the ME3 will be transient: "I don't think the challenge facing them will last. They're halfway through an 18-month problem." However, a key indicator will come with the next set of annual results from Emirates, due in May.

US carriers lead protests over ME3 subsidies

One major problem that appears to be coming to the boil again is the accusation by some US airlines and trade unions that the ME3 are rapidly expanding their fleets and pushing their way into markets – particularly the US – at least partly due to the help of illegal subsidies from their respective governments.

No conclusive proof of this has been forthcoming, despite the US carriers commissioning hefty reports on the subject. These have been countered by equally weighty documents produced by Emirates.

The US shouts of 'foul play' were particularly loud in 2015, but died away last year when they gained little traction with President Barack Obama's administration.

Major US carriers Delta, United and American believe that President Donald Trump, with his pledge to focus on rebuilding US industries, will be more amenable than his predecessor to reviewing the open skies agreements that exist between the US, UAE and Qatar.

Some observers have noted that the major US carriers were all in favour of open skies when it gave them free access to other nations' airspace, but were less enthralled when new rivals began to use it to their advantage to break into the US markets.

There is little doubt that US consumers have been attracted by not only the competitive ticket prices offered by the ME3, but also by their superior in-flight service standards, an area in which US carriers have lagged badly over the past decade and where they are now trying to make up ground with new cabins and improved amenities.

The view in some quarters – notably expressed to *Arabian Aerospace* at the Arab Air Carriers Organization AGM in Casablanca last November by Qatar Airways' CEO Akbar Al Baker – is that Trump, as a businessman, will be content to allow the market to take its course.

However, the nationalist sentiments expressed by his administration have given the major US carriers hope that he will take a more interventionist role than his predecessor.

Recent months have seen the smouldering row burst into flames once again. The spark that caught the tinder seems to have been Emirates' decision to launch a fifth-freedom service that originated in Dubai but then landed in Athens before flying to New York Newark Liberty International Airport.

Fifth freedom rights allow an airline to carry revenue traffic between foreign countries as a part of services connecting the airline's own country. In this case, the Emirates Boeing 777-3000ER operating the service picked up additional passengers in the Greek capital before heading on to the US.

Several US carriers complained bitterly at this latest encroachment on their home turf. Emirates responded by pointing out that US carriers only served Athens on a seasonal basis and that the Athens city authorities had approached Emirates to launch the new service. It also pointedly noted that several other European cities were keen for Emirates to launch similar services connecting their airports to the US.

A demonstration of some 200 United employees took place at Newark as the first Athens service was due to arrive, protesting at the new route. Newark is a United hub and the airline is one of the US airlines that operates to Athens over the summer months.

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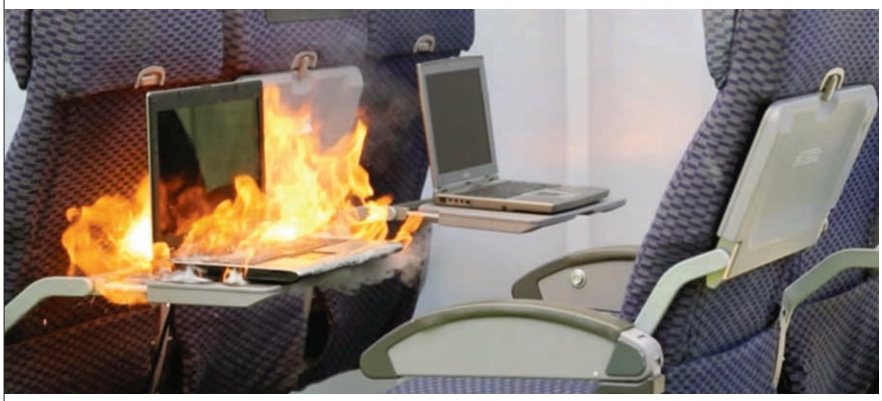
A controversial move to ban laptops and other portable electronic devices from aircraft is creating a focus on security versus safety. **Alan Peaford** *reports.*

Row flares up over controversial laptop bans



There are many reported incidents of laptops and other devices catching fire on aircraft
PICTURE: © PLANE GUARD

The European Aviation Safety Agency (EASA), the International Air Transport Association (IATA) and the Flight Safety Foundation have weighed in to the debate following the US Government's shock decision on March 21 to ban the carriage of portable electronic devices (PEDs) larger than a mobile phone on US-bound flights departing from 10 African and Middle Eastern airports

UK regulators followed suit shortly after, but its list of restricted airports notably excluded major hubs like Dubai, Abu Dhabi and Doha.

According to both governments, the ban followed unspecified intelligence that Daesh, or terror group Al Qaida, had been developing an explosive that looks like a PED battery.

This follows the bombing on Daallo Airlines Flight 159 from Mogadishu to Djibouti last year in which the suspect was the only casualty. It is believed the device was smuggled through X-ray by airport staff and handed over for him to take on board.

Bomb detection specialists Dr William McGann, chief executive officer of Implant Sciences Corporation, and former Homeland Security officer, Robert Liscouski, have warned about the threat from devices carried on to aircraft in developing countries, which, they say, have a lack of up-to-date security measures.

But aviation industry professionals claim the "knee-jerk" reaction by the US and, subsequently, the UK, happened without discussion and could create even greater risks.

EASA went as far as to issue a new warning about the risks of carrying large numbers of electronic devices in checked baggage. "PEDs containing lithium batteries are considered as dangerous goods. They should preferably be carried in the passenger cabin," it said.

Dangerous goods regulations prohibit the carriage of spare batteries and the International Civil Aviation Organization (ICAO) advised global regulators last year to ban carrying bulk shipments of such batteries in cargo holds of passenger jets following a number of catastrophic hold fires.

Two Boeing 747 crashes – a UPS freighter in Dubai in 2010 and an Asiana Cargo plane in 2011 – were traced to palettes of lithium ion batteries.

Last year, the Federal Aviation Administration (FAA) logged 31 cases in which lithium-based batteries either caught fire or smouldered on airline flights.

IATA CEO, Alexandre de Juniac, believes the ban isn't an appropriate solution to the threat, would hurt the airlines affected, and should be overturned. "UK and US authorities should work with the airline industry to find a way to keep flying secure without requiring passengers to check their electronic devices," he said.

"The current measures are not an acceptable long-term solution. Even in the short term it is difficult to understand their effectiveness."

A number of commentators have argued that the US ban on the three main Gulf hubs of Dubai, Doha and Abu Dhabi is politically or commercially motivated. American carriers have been lobbying President Donald Trump to halt the commercial success of the Arab carriers by reversing or restricting its open skies agreements.

Hugely disruptive

Emirates president, Tim Clark, said he believed the airline's home airport in Dubai was as safe as any other in Asia, Europe or the Americas. He said the measures would be "hugely disruptive" for Emirates and questioned why some airlines and airports were affected by the new security measures, and others not.

"If these devices are viewed as potential instruments of threat, they can be loaded on any aircraft anywhere," he said. "To suggest that Dubai doesn't have the equal capabilities, or better, than the Europeans, the Americans and the Asians in terms of search, interdiction and surveillance, I find amazing."

The Gulf carriers have announced plans to ease the headache for passengers by allowing them to hand in their PEDs at the boarding gate for stowage in the cargo hold. There will be no charge.

First and business-class passengers can now borrow tablets on board Emirates' US-bound flights, while Qatar is to offer an on-board laptop loan service to premium passengers.

Emirates says devices handed in will be packed into boxes, loaded into the hold, and returned to customers at their destination.

However, CNN quoted Doron Myersdorf, CEO of StoreDot, as saying: "Having them all stacked together goes against the regulations of lithium ion transportation which limits how many batteries you can ship together."

The Flight Safety Foundation, a non-profit organisation funded by airlines and other groups to reduce the risk of accidents, has also expressed concern. "It's potentially a transfer of consequential risk," said Greg Marshall, vice president of global programs.

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EMBRAER

The ownership of Turkish regional carrier, Borajet, has changed hands, with the new owners planning to cut costs and improve service standards. **Alan Dron** *reports.*

Asset firm answers the Borajet distress call

Turkish regional carrier, Borajet Airlines, plans to expand its international route map following its acquisition by an Istanbul-based investment group.

SBK Holding specialises in 'distress asset management', taking on companies that have encountered financial difficulties and turning them around. It has investments in several sectors including energy, pharmaceuticals and tourism.

Borajet is its first venture into commercial aviation, although it is keen to expand in the sector.

It acquired Borajet for $258 million in January, after it bought the shareholding of the airline's founder, Dr Yalcin Ayasli.

SBK Holding vice-chairman, Umut Suna Uygun, said Ayasli had been linked – wrongly – to last July's attempted coup in Turkey. "He's a kind and honourable man," she said, but he had, nevertheless, taken the decision to leave Turkey for the US.

Uygun is now Borajet's general manager.

Affected by the downturn

Like most Turkish airlines, Borajet has been affected by the downturn in the country's economy, with the sharp drop in tourism, due to terrorist incidents, hitting the aviation sector.

The country's two largest carriers, Turkish Airlines and Pegasus Airlines, have recorded financial losses for the past year as a result, although Pegasus is confident that it will return to profit in the current financial year.

Uygun said that the airline's financial position had attracted SBK's attention: "We love a challenge. We are very successful in turnaround stories."

Buying the airline had initially been an opportunistic move, as the aviation sector had not featured in SBK's strategic plan. However, following its entry into the aviation marketplace, it is now looking for further aviation assets, she said.

SBK appreciated that Borajet was a small operation, but added: "We are a young and ambitious organisation and willing to increase our assets in this industry."

The first objective is to restructure the airline, said Uygun. There were some minor management issues, but the main initial focus will be to reduce costs: "We plan to implement a new cost control system because it's not working properly at the moment. We empower each employee about this. A cost control system starts from the bottom."

Second-hand turboprops

Borajet was founded in 2008 and began operations in 2010 with three second-hand ATR 72-500 turboprops. Based at Sabiha Gökçen International Airport, Istanbul's secondary hub, the airline currently has a fleet of 12 Embraer E-190LR and E-195LR regional jets, which it employs on an extensive network of domestic destinations, as well as to Iran, Iraq and Europe – especially Germany. Its domestic route map includes smaller cities and routes not normally served by other carriers.

It also operates several business jets on charter services, including a Bombardier Global Express XRS for long-range executive flights.

In October 2016, Borajet announced a deal with Brazilian aircraft manufacturer, Embraer, and Ireland-based lessor, AerCap, for three E190 E2s and two E195 E2s – the first leasing contract for the new-generation Embraer regional jets. The new aircraft are due to arrive from Q1 2018.

Uygun said her aim was to keep the existing Embraers and use the new aircraft for expansion: "We are a significant buyer of the E2. We believe in the future of this aircraft. It will make a big difference for us."

Five of the existing Embraer E190LRs are used on wet-lease services for Turkish Airlines and it is possible that links with the national flag-carrier may increase.

Borajet operates a fleet of Embraer E-190LR regional jets such as this example and the slightly larger E-195LR version.

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BOEING

IATA's new regional vice-president Africa & Middle East (AME) tells **Alan Dron** *about the airline industry's priorities in the region and how the two geographic regions in his remit are shaping up to current market conditions.*

FIRST AMONG EQUALS

After more than two decades at Saudi Arabia's national carrier, Muhammad Ali Albakri has moved from Riyadh to the International Air Transport Association (IATA) regional office in Amman, to take up the role of representing the organisation's members in two very different regions.

"Muhammad Ali Albakri is stepping into a critical role at IATA," noted the organisation's director general and CEO, Alexandre de Juniac, when Albakri's appointment was announced.

"Africa and the Middle East are among the fastest growing markets for air transport. While the region has tremendous potential, it also faces some big challenges. Infrastructure, regulation and taxation must align to support the social and economic benefits of a successful aviation sector.

"I am confident that Muhammad's solid aviation background will deliver great value to our members and aviation in general across AME," added de Juniac.

Albakri succeeds Hussein Dabbas, who led IATA in the region from 2012 until June, 2016. Among Dabbas' leadership contributions during his tenure was the successful integration of IATA's activities in the Middle East and Africa into one region.

Albakri will lead IATA's regional office for AME, where more than 120 employees are responsible for the organisation's operations across 68 countries. This includes the operation of IATA's settlement systems, which handle some $23 billion of industry money annually across 38 nations.

Nine million jobs

The fast-growing AME region is home to 58 of IATA's 265 member airlines and accounts for 11.6% and 15.5% of global traffic in terms of revenue passenger kilometres (RPKs) and freight tonne kilometres (FTK), respectively. Aviation supports some nine million jobs and $130 billion of GDP across Africa and the Middle East.

Over the past 20 years, the Middle East has become the region that has shown the most spectacular growth worldwide, while Africa has seemed stuck in a much slower lane, with state-owned carriers, limited infrastructure and a reluctance among some states to embrace the 'open skies' scenario envisaged under the Yamoussoukro Declaration.

There have also been complaints in recent years from several African airlines that the rapid expansion by the major Gulf carriers Emirates, Etihad and Qatar Airways (together with Turkish Airlines) into Africa has siphoned off much traffic to hubs in Abu Dhabi, Doha, Dubai and Istanbul.

So, how does IATA reconcile the interests of its African and Middle Eastern members?

"We stay neutral," said Albakri. "We keep all our members at arm's length, treat them all equally and hope that they find solutions to their commercial disputes very soon that will be to the benefit of them and of travellers."

In his list of priorities as he takes up his new role, safety and security naturally come top. Just 24 hours after he talked to *Arabian Aerospace*, the US and UK governments slapped restrictions on taking electronic devices into the cabins of airliners departing from several Middle East and North African nations, a reminder of how critical security is in this part of the world.

Airspace congestion

Beyond security, however, congestion is perhaps the issue that requires most attention from Albakri and IATA. Airspace congestion remains an on-going problem and is "a very complicated issue", he said. This is exacerbated by the geographic proximity of major hubs such as Dubai, Abu Dhabi and Doha, together with the rising numbers of aircraft that wanted to use those airports or overfly the region. "We are trying to convince people – governments and others – to collaborate and invest in advanced technologies to solve this problem."

Failing to reach solutions would ultimately be counter-productive to nations' own economic growth plans, he added.

A further priority for Albakri and IATA is improving infrastructure across the AME region, as well as trying to manage the extra charges and taxes that are being imposed on the aviation industry by national governments as their incomes dip due to the drop in oil prices in recent years.

The privatisation of airports in some countries is also leading to higher charges.

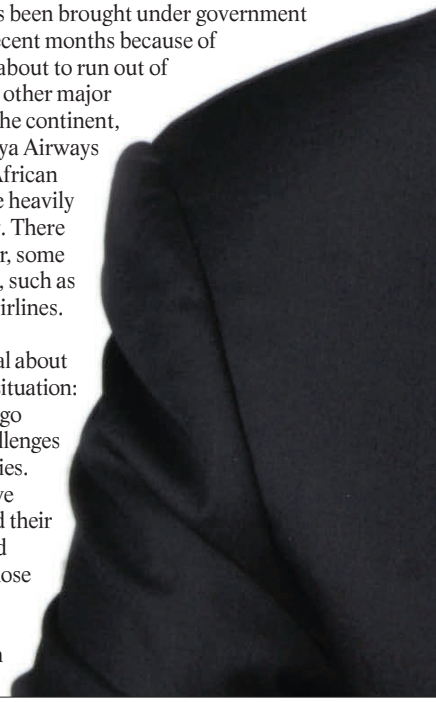
Financial charges on airlines, for so long a major problem in Europe, are starting to raise their head in the Middle East. While Albakri said it is difficult to speculate for the reasons behind their introduction, "they are counter-productive to growing the industry in the region". IATA will be working with individual airports and government bodies to push for consultation before any further financial burdens are introduced.

However, although even the Gulf region has experienced an economic slowdown over the past couple of years, Albakri pointed out that both Africa and the Middle East are faring relatively well: "Compared to other regions in the world they are still progressing."

Although the full benefits of the Yamoussoukro Declaration have still to be felt in Africa, he pointed out that 21 nations had already signed up to it and IATA would continue to urge the others to join the group: "There are positive signs that people are moving in that direction."

African airlines have appeared fragile for many years: Nigeria's best-known international carrier, Arik Air, has been brought under government control in recent months because of fears it was about to run out of money. And other major carriers on the continent, such as Kenya Airways and South African Airways, are heavily loss-making. There are, however, some bright spots, such as Ethiopian Airlines.

Albakri is philosophical about the current situation: "All airlines go through challenges and difficulties. We do believe they will find their own way and overcome those difficulties." Having said that, African



A man of initiative…

Muhammad Ali Albakri is a Saudi national and latterly served as Saudi Arabian Airlines' executive vice-president for strategic projects and transformation.

In that role he was charged with delivering various initiatives as part of a broad transformation strategy devised to strengthen the competitiveness of the airline as it aims to double in size by 2020.

Under Albakri's leadership, Saudia successfully moved its second-largest domestic hub operation into the new Terminal 5 at Riyadh's King Khalid International Airport in May 2016. He led similar relocations of the airline's operations to new facilities in Jeddah and Cairo.

His career at Saudia spanned 26 years. He rose through the ranks of the airline's IT division, eventually being appointed as vice-president of information technology (2009-2016) concurrent to holding the responsibility of CFO (2012-2016). In those roles, Albakri led the strengthening of the carrier's technology infrastructure and the modernisation of its financial practices and processes.

governments have to be prepared to step in to help struggling airlines and position them to be a force for economic growth, he said.

For its part, he added, IATA will actively advocate on behalf of its members with African governments, as well as continuing to push safety improvements such as the IATA operational safety audit (IOSA), which has been shown to bring real improvements in the safety standards of airlines that participate.

Similarly, African nations must continue to work on issues such as improving their aviation infrastructure.

"I am tremendously excited to take-up this challenging role," he commented. "IATA has made critical contributions to the development of aviation around the world.

That work is especially evident in Africa and the Middle East, where the industry is rapidly changing.

"I have seen first-hand the transformational power of IATA's global standards, such as fast travel, e-freight and new distribution capability.

"These boost competitiveness and please customers at the same time. In my new role, I am excited to be responsible for the full suite of IATA's activities and shall be a tireless advocate for aviation's success in the AME region."

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November	
Special Fare and Ticketing- Intermediate	13 - 17 November
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December	
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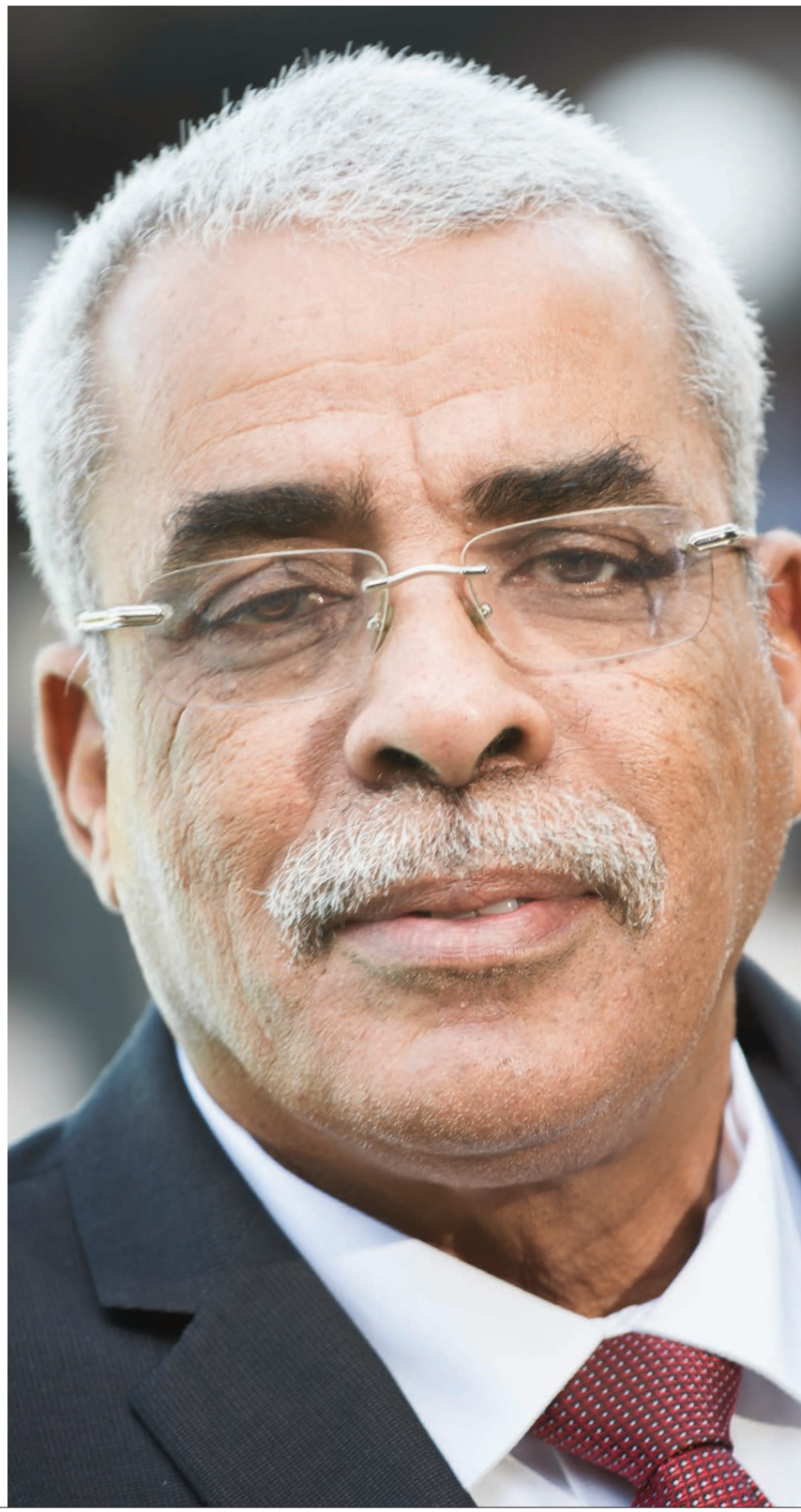
Mauritania Airlines International is plotting slow, steady growth in a bid to avoid the fate of its predecessors. **Martin Rivers** *and* **Vincent Chappard** *talk to Mohamed Radhy Ould Bennahi, chief executive of the third airline to fly Mauritania's flag in a decade.*

THIRD TIME LUCKY?



When Mauritania Airlines International was established in December 2010, it marked the third attempt at a flag-carrier in a decade by the Islamic Republic.

Just three years previously, Mauritania Airways, a joint venture with Tunisair, had been set up with the same aim of providing connectivity for the little-known west African nation. Its rapid fall from grace followed the slow demise of Air Mauritanie, the country's historic flag-carrier, which cooperated with pan-regional carrier Air Afrique for most of its four decades in the skies.

That financial headwinds grounded both predecessors is hardly surprising when one considers Mauritania's vital statistics. With an agriculture-focused economy and a small, conservative population that typically eschews overseas travel, the country suffers from weak demand on both the inbound and outbound sectors.

Mauritania Airlines International is the only carrier in the country, accounting for all of the 248,000 passengers who flew with locally registered operators in 2015.

Government is determined

But, with just seven foreign airlines serving capital city Nouakchott on a scheduled basis – Air Algérie, Air Côte d'Ivoire, Air France, Binter Canaria, Royal Air Maroc, Tunisair and Turkish Airlines – the government is determined to make a success of its flag-carrier, leveraging the company for economic development and improved bilateral relations.

Winning Mauritania's removal from the European Union's Air Safety List in December 2012 was a watershed moment for the sector. Predecessor Mauritania Airways had ceased operations just one month after it was banned from EU skies amid accusations of "persisting deficiencies" in its operations and maintenance.

Air Mauritanie had also been banned by the UK Government prior to the introduction of a Europe-wide blacklist.

"We've invested a lot. We've improved a lot," Mohamed Radhy Ould Bennahi, the new flag-carrier's chief executive, told *African Aerospace*. "Everyone, including the civil aviation [authority], did their best to get out of this blacklist. But all this is behind us. We are now a member of IATA [the International Air Transport Association] and we are IOSA [IATA operational safety audit] certified."

The removal of EU restrictions allowed Mauritania Airlines International to begin serving Las Palmas in the Canary Islands, a Spanish territory located off the north-western coast of Africa, in May 2013. Flights from Nouakchott are now operated four-times weekly with a stop in Nouadhibou,

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Mauritania's second largest city. Another link to Paris followed in December of the same year, but was suspended in February 2015 for "commercial reasons".

As of the beginning of 2017, the overseas route network also includes Abidjan in the Ivory Coast, Bamako in Mali, Casablanca in Morocco, Conakry in Guinea, Dakar in Senegal, and Tunis in Tunisia. Other international routes that have been trialled and suspended include Algiers in Algeria, Banjul in Gambia, Brazzaville and Pointe-Noire in the Republic of Congo, and Cotonou in Benin.

On the domestic front, triangle flights are currently operated between the two main cities and Zouérat in the north.

The flag-carrier serves its network with a fleet of two Boeing 737-500s, one 737-700, one 737-800 (newly delivered in November) and one Embraer ERJ 145. Mauritanian president, Mohamed Ould Abdel Aziz, has announced that one 737 MAX will also arrive in Nouakchott later this year.

"Above all, we want to renew our fleet," said Bennahi, who formerly headed up SOMAGAZ, Mauritania's state-owned gas company. "The 737-500s will be withdrawn from the fleet. Not necessarily with the arrival of the 737 MAX – they can still fly for a while – but our strategy is to get them out of the fleet. And we would like to strengthen our fleet further. We are thinking about other types of aircraft. We need aircraft adapted to our needs."

PICTURE: ADOLFO BENTO DE URQUIA

Brand new route

He confirmed that Brazzaville flights could be re-launched as soon as this year, along with a brand new route to Jeddah in Saudi Arabia.

Paris may also return to the network, strengthened by the improved performance of the MAX and greater connectivity through the Nouakchott hub. "We believe that conditions have changed and, by relying on our network in Africa, we think it can be re-opened under better conditions," Bennahi said of the suspended route.

Mauritania Airlines International presently accounts for 55% of flight frequencies and 40% of seating capacity across all markets in the country, making it the largest operator by both metrics. When looking at available seat kilometres (ASKs), however, it falls into third place behind Turkish Airlines and Air France. That reflects the relatively lengthy flight times on the Nouakchott-Istanbul and Nouakchott-Paris routes, as well as Air France's deployment of wide-bodies.

Asked what would make the latest incarnation of Mauritania's flag-carrier more successful than its forebears, Bennahi emphasised the importance of fleet optimisation and the need to "trust partners and passengers".

"These two main axes will help the company improve itself while seeking efficiency," he said, acknowledging strong competitive headwinds from both Africa and Europe.

"I can confirm that the company's financial situation has improved compared to last year. We are approaching break-even. And this improvement has been achieved through two things: firstly, through the efforts we are making concerning our operation, which means that we have more passengers. Second, through the fall in oil prices."

The opening of Nouakchott-Oumtounsy International Airport last June should also help things along. The new gateway, located to the north of the capital, is capable of handling two million passengers a year. It comprises two runways, four jetways, a 320,000sqft passenger terminal, a freight terminal, and a VIP reception area.

"The airport offers more prospects at several levels, especially in working conditions," Bennahi said, acknowledging the poor state of the now-decommissioned gateway. "We believe that other destinations will develop, bringing more activity to the company."

Bilateral restrictions pose little obstacle for Mauritania Airlines International, he continued, owing to widespread compliance with the principles of the 1999 Yamoussoukro Decision (YD) in west Africa.

"This is not difficult given the agreements that exist with the states," Bennahi insisted, referring to the multinational treaty that was designed to liberalise cross-border flying on the continent. "Traditionally, Mauritanian airlines have operated in these countries, so access is not that difficult."

His remarks concord with the upbeat assessment of René Decurey, the chief executive of Air Côte d'Ivoire, who recently told *African Aerospace* that "all the governments stick to" YD in the sub-region.

However, other airlines have complained that the liberalisation agreement exists on paper only.

In late 2014, for example, Habiba Laklalech, deputy chief executive of Royal Air Maroc, accused the Mauritania Government of deliberately curtailing access to the country. "We used to have [a weekly allocation of] 14 flights," she said of the Casablanca-Nouakchott route. "Then the state reduced them to 11, to nine, to seven and now five."

Royal Air Maroc has, subsequently, been allowed to deploy freighters once weekly on the city pair. But its dwindling presence in the passenger market comes as Mauritania Airlines International ramps up activity, now serving Casablanca three times weekly from the capital and twice weekly from Nouadhibou. Outbound services were also previously operated from Zouérat.

Restrictive practices

While concerns about protectionism will do little to boost confidence in the flag-carrier, the problem is far from unique to Mauritania. Indeed, Royal Air Maroc has itself been accused of restrictive practices, reportedly lobbying the Rabat government not to grant Air Arabia Maroc access to west African destinations.

After just six years of operations, it is too early to know whether Mauritania's third attempt at a flag-carrier will secure a better legacy than its predecessors.

However, whereas Mauritania Airways was dependent on Tunisian investors, and Air Mauritanie spent its final years courting a Moroccan bailout, the new flag-carrier is going it alone as a locally funded entity. For better or for worse, success now hinges on the dedication and resourcefulness of home-grown Mauritanian expertise.

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Air Cairo is betting big on a turnaround in fortunes for Egypt's long-suffering tourism industry. **Martin Rivers** *talks to chairman and chief executive Yasser el Ramly.*

Why Air Cairo is rolling the dice...

News that EgyptAir is scaling back its fleet renewal programme frankly surprised no-one when it was confirmed by Sherif Fathy, the country's transport minister, in December.

Fathy had repeatedly warned that the flag-carrier faces troubling headwinds, telling *Arabian Aerospace* as long ago as November 2015 that he was re-evaluating plans for dozens of aircraft orders.

At the time, his main concern was the bombing of Metrojet Flight 9268 shortly after take-off from Sharm el Sheikh Airport – an attack that claimed 224 mostly Russian lives, and prompted several countries to ground routes to the Red Sea resort. Coming on the heels of the 2011 popular revolution and the 2013 military coup, the terror atrocity signalled a new low for Egypt's reeling aviation sector.

Hopes of a swift recovery in 2016 were dashed by a triumvirate of further disasters and security scares. In March, an unstable man with a fake suicide-bomb belt hijacked EgyptAir Flight 181; in May, 66 people died in the still-unexplained crash of EgyptAir Flight 804; and in September, another troubled passenger tried to storm the cockpit of Flight 462, which was operated by EgyptAir's short-haul subsidiary, Air Cairo.

Even as its parent knuckles down for a drawn-out period of uncertainty, however, Air Cairo is pressing on with ambitious plans to nearly triple in size – placing all bets on the still-reeling European market.

Yasser el Ramly, its chairman and chief executive, admits that the strategy is high-risk.

Tide is slowly turning

While several governments have softened their travel advisories for Egypt, Russia still bans all flights to the country and Britain still advises against flying into Sharm el Sheikh Airport. Nonetheless, Ramly believes the tide is slowly turning for Egyptian tourism, and he is positioning Air Cairo at the front of the queue to benefit from gradual normalisation.

"The demand, of course, was affected after the crash of the Russian aircraft. The first half of the year [2016] was very tough from January to June," he said during an interview at the annual meeting of the Arab Air Carriers'

Continued on Page 34

"We would like all the markets we serve to be all-year-round, so that customers can always find an aeroplane to spend a nice holiday in Egypt."

YASSER EL RAMLY

CONTINUED FROM PAGE 33

Organisation in Casablanca in November. "But, still, we operate around 30 weekly flights to Europe with good loads, even 75% load factor."

Confirming that the airline is sticking by plans to deploy 20 aircraft by the end of the decade – up from seven at the time of writing – he repeated the oft-versed claim in Egypt that tourism slumps do not last forever.

"The recent difficulties postponed our plan by two aircraft," the chief executive continued. "We were supposed to be 10 [aircraft] by the beginning of 2017; instead it will be only eight. But I think by this coming summer we will have 10 or 11 aircraft."

Air Cairo launched operations in 1997 as a charter specialist, before diversifying with low-cost scheduled flying when EgyptAir became its majority shareholder in 2003. The airline presently deploys Airbus A320s – all but one of which are configured in an economy-only layout.

Business model

Despite the brand name, Cairo plays only an incidental role in the business model. Just one of Air Cairo's aircraft – the unit with a business class cabin – is based in the capital. The other six are spread liberally between cities on the Mediterranean coast (Alexandria); the Red Sea (Sharm el Sheikh, Hurghada and Marsa Alam); and the Nile River (Asyut, Sohag and Luxor).

"Our flights out of Cairo are less than 5% of the total operation," Ramly said. "We concentrate on the secondary airports. Even for the Gulf and Middle East we don't fly from Cairo a lot… So, for us, the competition is coming from the low-fare carriers in the Gulf and Egypt."

Air Cairo's strategic shift towards low-cost scheduled operations came at a time when EgyptAir was trying to capitalise on the growing popularity of self-booked travel around the world – particularly in Europe. For years, management split their attention between legacy charter partners and independent travellers. But, with tour operators now fleeing the country en masse, Ramly finally seems ready to turn his back on package holidays.

"Eighty-five per cent of our operations now are scheduled flights. It could move to 90% this coming summer," he confirmed.

"We want to introduce a new strategy in the Egyptian market, to make our scheduled flights available to many customers, not only for the tour operators and the people who have a programme with the hotel. We would like all the markets we serve to be all-year-round, so that customers can always find an aeroplane to spend a nice holiday in Egypt."

Although charter contracts will continue to be signed for the foreseeable future, their main purpose will be to add capacity on pre-existing routes during the high season.

With Air Cairo, thus, becoming a traditional scheduled operator, management are opening up to distribution channels that were previously considered superfluous. Last June, they completed the transition to Amadeus' Altéa reservation and inventory systems – an upgrade that paves the way for future interline and codeshare agreements with other carriers.

"We want to sell [tickets] on any distribution system to market ourselves for regular flights to Sharm el Sheikh and Hurghada and other tourist airports," Ramly affirmed. "One of the reasons that we moved to the Amadeus system is because we would like to have cooperation with some of the private airlines in Egypt and the Middle East, and in Europe as well. We have already signed an interline agreement with EgyptAir and we are ready to take this step with airlines in Europe and the Gulf."

The chief executive added that business class may be offered on some new aircraft – potentially up to 25% of the fleet – but declined to repeat earlier claims about moving from a low-cost to a full-service business model. "Actually, we are low-fare," he said, opting for the ambiguous hybrid term that is favoured by both categories of airlines.

Air Cairo already provides a free checked luggage allowance and free on-board meals to all customers.

As of December 2016, the airline's scheduled network comprises 11 destinations in Europe (Belgrade, Billund, Bratislava, Budapest, Copenhagen, Dusseldorf, Hannover, Munich, Oslo, Prague and Stuttgart); eight in the Middle East (Amman, Doha, Hofuf, Jeddah, Kuwait, Qassim, Riyadh and Yanbu); and Tbilisi in the Caucasus. Charter flights are, meanwhile, operated to Armenia, Austria, Germany, Poland and Russia.

New scheduled routes to Warsaw and Katowice were being lined up as this article went to press, while Linz and Vienna are also in the pipeline for early 2017. Asked about other prospective markets, Ramly said that Bucharest, Dubai, Kazakhstan and one additional point in Germany are under evaluation – along with a resumption of flights to Baku.

New aircraft livery

The expansion will coincide with the introduction of a new aircraft livery, though management have decided not to adopt a brand-name more reflective of the network.

"We studied [whether we should] change our company name," Ramly admitted, referring to the airline's limited presence in Cairo. It currently serves just three scheduled routes from the capital: Hofuf, Jeddah and Yanbu. "But we found that we built it up over the years, so we will keep it. Even though it's Air Cairo, Cairo is Egypt."

With Russian President Vladimir Putin pledging to restore flights to Egypt in the near future – ending more than a year of diplomatic pressure over airport security – Ramly is not alone in predicting an imminent tourism recovery.

Colliers International, a commercial real estate firm, says that hotel revenues are already rising across Egypt, buoyed by the return of German charter operators last autumn.

However, having dropped from 14.7 million in 2010 to 9.3 million in 2015, visitor numbers have a long way to climb before the crisis is over. If 2017 becomes another disappointing year, Air Cairo's gamble will have been a costly mistake.


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A UAE Navy AS565SB Panther lifts off a UAE vessel at the start of IDEX/NAVEX 2017. The helicopter participated briefly in the opening ceremony.

Abu Dhabi shows boast $5billion sales bonanza

With more than 1,200 companies in attendance, spanning all corners of the globe, Abu Dhabi's International Defence Exhibition (IDEX), as well as the Naval Defence Exhibition (NAVDEX), has established itself as a top venue for many in the defence world. With 12 halls, a centre plaza and docks with many vessels on show from Kuwait, Pakistan, the UAE and the UK it was quite an extravaganza. **Alan Warnes** *was there.*

The two exhibitions offer a unique platform to establish and strengthen relationships with government departments, businesses and armed forces in the UAE. They were held under the patronage of HH Sheikh Khalifa bin Zayed Al Nahyan, president of the UAE and supreme commander of the UAE Armed Forces.

The UAE's defence industry is young, but it is very keen to learn and pull in technologies and experienced personnel. When the oil runs out, it does not want to rely on foreign companies for its defence, so for now its splashing the cash.

This year's events, which took place from February 19-23 at the Abu Dhabi National Exhibition Centre (ADNEC), saw more than $5 billion (AED 18.833 billion) of sales announced. Two of the biggest deals were aerospace-related.

Abu Dhabi-based Maximus Air was the biggest winner with a $485 million contract to acquire air cargo aircraft.

It currently operates a fleet of Russian-built An124s and Il-76s, but the modernisation is likely to involve five brand new LM-100J Super Hercules.

The first civilian version of the C-130J was rolled out on February 9, just 10 days before IDEX started, but Lockheed Martin would not disclose the first customer. The company has only stated that it has received letters of intent (LoIs) for the acquisition of 25 LM-100Js. Brazil's Bravo Industries has purchased 10, while Safair, the South African-based C-130 operator owned by ASL Aviation Group, has also ordered 10.

Sweden's Saab won a $234 million (AED 865m) contract from the UAE for the acquisition of a third Bombardier G6000 GlobalEye. It had announced an airborne early warning & control (AEW&C) sale worth $236 million in a press release on January 4 this year, saying the aircraft would "provide access to a detailed situational awareness that, for example, can be used for border surveillance, search and rescue operations and for tackling

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terrorism and organised crime" but it did not disclose the customer.

That came from a UAE spokesperson on the second day of IDEX during his daily 3pm briefing.

Saab is also believed to have received a contract to upgrade the Erieye systems on its two Saab 340 AEW&C aircraft.

The UAE went public with the $1.27 billion deal for two GlobalEyes at the Dubai Air Show in November 2015. These are expected to be delivered in 2019/2020.

Raytheon emerged as the biggest international winner, with two contracts amounting for nearly $380 million. These were a $165 million (AED 611m) order that the spokesperson simply referred to as 'missiles', and a second bigger one worth $223 million (AED 828m) to supply the UAE Air Force and Air Defence Force (UAE AF&AD) with air-defence system equipment and spare parts.

Enduring relationship

Chris Davies, president of Raytheon International, must have been buzzing. In the run-up to the exhibition he had spoken of the company's partnership with the UAE: "Over the last 30 years, Raytheon and the UAE have built a close and enduring relationship supporting the Emirates' civil defence infrastructure, security, local manufacturing and training on a number of strategic fronts.

"Raytheon has expanded its UAE customers from one to nine, and we have diversified our partnerships in line with the country's economic aspirations and development roadmaps, such as the Abu Dhabi Vision 2030."

Others who went home happy included Abu Dhabi/Al Ain-based Horizon Flight Academy, which trains UAE AF&AD helicopter pilots and personnel from other allied countries. It was granted a deal worth $8 million (AED 30m) to train pilots and develop their skills.

Dassault Aviation won a $14 million (AED 51m) contract to provide technical support for aircraft of the UAE AF&AD.

Florida-based NorthStar Aviation has been contracted to provide technical and logistical support for the Bell 407 helicopters it has supplied, valued at $4 million (AED 15m). This presumably includes the 29 surviving Bell 407MRHs supplied to the Joint Aviation Command (JAC).

Finally, AgustaWestland Aviation Services was awarded a $2.4 million (AED 9m) deal to modernise the interior cabin of VIP aircraft – presumably some of the 15 AW139s operated by Abu Dhabi Aviation.

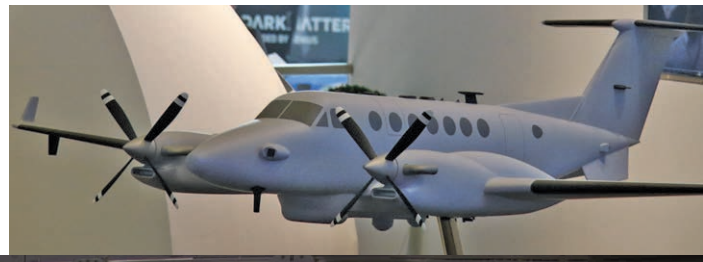
Etimad's intriguing proposition

One of the more intriguing exhibits at IDEX was a large model of a Beech 350 ISR aircraft inside a secure area at the Etimad Holdings pavilion. The company specialises in homeland security and was awarded a $77 million (AED 285m) contract for maintenance of border security systems and critical infrastructure at the event. While I was denied access because of its sensitivities, a spokesman did tell me that the Beech 350 was "a UAE solution for the UAE".

It seemed, judging from the US contractors sitting in the area, that Etimad is working with an international partner to plot the way ahead for its ISR aircraft, undoubtedly using the UAE's new Yahsat satellite system.

It is likely to be Inmarsat, which successfully tested the L-Band asymmetric intelligence, surveillance and reconnaissance (LIASR) system in March 2015. It was made available to US customers in June 2015.

Inmarsat claimed in 2015 that "the innovative new LAISR service will meet the high-speed, BLOS connectivity requirements of airborne intelligence, surveillance and reconnaissance (AISR) missions across the globe".



The mysterious Etimad Beech 350 ISR aircraft is a project that the company was keen to keep quiet.

NorthStar Aviation's NSA407MRH was seen modified with a Hughes DISD HeloSat system. When it enters operational use with the UAE AF&AD's JAC it will appear in a more tactical colour scheme.

Learning the lessons of war

NorthStar Aviation was showing off one of its Bell 407MRH multi-role helicopters. Its four-station weapons platform was fitted with two AGM-114 Hellfire missiles, a GAU 19 machine gun, M134 mini-gun and Hydra 70 rocket pod.

There are plans to integrate the Raytheon Talon laser-guided rockets, Raytheon AGM-176 Griffin lightweight precision-guided munition and Lockheed Martin direct attack guidance rocket (DAGR), according to the company's senior vice president and chief pilot, Terry Key.

The UAE AF&AD'S JAC has taken delivery of 30 Bell 407MRHs (or NSA407MRHs, as the company calls them), although one was lost, along with both crew, in an accident in Yemen in June 2016.

The NSA407MRH had been modified with a white satcom system on top of both weapon platforms.

Wayne Marhefka, from Hughes Defence and Intelligence System Division (DISD), said the company has recently won a contract with NorthStar to supply its HeloSat system. This is essentially a 360-degree beyond-line-of-sight (BLOS) satcom capability that can transmit HD video. "It will allow the helicopter to send imagery recorded with its FLIR Star Safire 260 electro-optical/infrared (EO/IR) system [or 380HD, which is the current UAE requirement] back to the ground commander from up to 500 miles away," Marhefka said. "It gives the helicopter an intelligence, surveillance, target acquisition, and reconnaissance (ISTAR) capability."

The requirement is believed to have been driven by lessons learned in war-torn Yemen, from where the NSA407MRH on show had recently returned.

NorthStar, meanwhile, is working with Boeing Bell Helicopters on an armed variant of the Bell 429 for a "Middle Eastern air force".

NorthStar's Terry Key said working on the twin-engined helicopter would be easier: "It can carry more and integration would be simpler because we wouldn't have to take out the fuel cells as we do on the Bell 407."

Bell had planned for a Royal Air Force of Oman (RAFO) Bell 429, one of five in service since April 2016, to be at the event. Unfortunately, it never turned up.

Panther on parade

The JAC/Navy operates eight AS565SB Panthers, fitted with a disc-shaped Agrion array radar under the nose for anti-submarine/anti-surface warfare. This example, seen close to the NAVDEX exhibition, is fitted with four AS15TT anti-shipping missiles. MBDA is proposing its new Sea Venom lightweight anti-ship missile to the UAE Navy to replace the AS15TT, which has a range of 10 miles (15kms) and works in conjunction with the Agrion radar.

A model on the PAL Aerospace stand showed a Dash 8 Q300 fitted with torpedoes, in UAE Navy Force markings.

PAL's new force multiplier for Dubai show

A visit to the re-branded PAL Aerospace (formerly Provincial Aerospace Ltd) from Newfoundland, Canada found it was marketing a Dash 8 Q300 as the force multiplier.

PAL claims it is a contract ISR platform, designed for domestic and international special missions.

The aircraft would be owned, operated and maintained by the company under a power-by-the-hour contracting system. It runs a similar scheme with two Dash 8 Q315s, delivered to the UAE AF&AD in March and April 2012, which fly with the UAE Navy Force.

Other equipment integrated on the maritime patrol aircraft includes an EO/IR turret, maritime surveillance radar to identify and classify targets out to 200 nautical miles, an automatic identification system (AIS), a drop hatch to allow the deployment of life rafts and smoke canisters, as well as an extended-range fuel tank that will provide endurance for up to 10 hours.

According to PAL, a force multiplier is currently being customised with a new satcom, which it hopes will be ready for the Dubai Air Show.

Interestingly, a model of a Dash 8 Q300, fitted with torpedoes and in UAE markings, had the serial number 1322. This follows on from the tail numbers (1320, 1321) of the two Dash 8 Q315s that PAL delivered to the UAE Navy.

PAL Aerospace, partnering with Airbus and its C295W, won a $2.3 billion contract in December to run Canada's fixed-wing search and rescue (FWSAR) requirement. All 16 airlifters will be delivered by 2023 in a deal which will see PAL providing 20 years of in-service support.

UAE AND RUSSIA TO DEVELOP FIGHTER

Russia's Rostec chief executive, Sergei Chemezov, told reporters that work would start next year on developing a light fighter with the UAE. Both countries have apparently reached an initial agreement on how to move forward on the next steps of the ambitious programme, which would continue UAE's quest for technology transfers throughout the defence industry.

Kick-start for Bahrain F-16 talks

According to Lockheed Martin, the new US administration has kick-started discussions with the Bahrain Government over the purchase of more F-16s.

It is proposing to upgrade 20 existing Block 40s, delivered in 1991/92, with the new Northrop Grumman APG-83 active electronically scanned array (AESA) radar, an upgraded mission computer and avionics, as well as new cockpit.

The two sides are also discussing the sale of "between 16-19 Block 70 F-16s", which are brand new F-16s with the V upgrades.

Taiwan (144) and South Korea (134) have already gone for the F-16V upgrade and probably Singapore (60) too – although the terms of that work is unclear.

Meanwhile, proposals made to UAE Government for an upgrade to its existing Block 60s have not moved on, although the company did confirm discussions are on-going.

Instead, Lockheed Martin is focusing its efforts on supporting the UAE F-16s because of their increased combat operations in Yemen and Libya.

Egypt is also receiving Lockheed Martin's attention, with discussions under way on putting 30 Egyptian Air Force Block 15s through an avionics structural upgrade to bring them up to Block 52 standard. The remainder of the fleet are already Block 52s or upgraded to its equivalent.

Archangel deliveries completed

Florida-based Iomax was showing off the 23rd Archangel precision strike aircraft, of 24 on order by the UAE AF&AD.

Based on the Thrush S2R-660 agricultural aeroplane, the company has been delivering the Archangel since July 2015, eight months after being awarded the contract in November 2014. The last aircraft (2383) was expected as *Arabian Aerospace* was going to press, and will complete the 48 armed intelligence, surveillance, and reconnaissance (ISR) platforms ordered by the UAE.

The initial delivery of 24 AT802 border patrol aircraft (BPA) took place between November 2010 and June 2013. These were employed by the Special Operations Command before the programme was reassigned to the UAE AF&AD.

However, as Iomax explained, it subsequently received a request from the UAE AF&AD to provide a proposal for an additional enhanced ISR/strike aircraft.

Extensive analysis of lessons learned from the AT802 BPA saw both parties agree necessary enhancements requiring a different technical approach. Consequently, the Thrush S2R-T660 platform was selected, designated as Archangel, to replace the earlier 802 BPAs.

Iomax confirmed that six of the initial 24 AT802 BPA aircraft are presently being operated by the Royal Jordanian Air Force, while an additional 12 are in the process of being transferred to the Egyptian Air Force for border security purposes.

The remaining six aircraft are believed to be operated by 222 Squadron, based at Al Minhad, alongside the Archangels of 333 Squadron. At least six of the AT 802 BPAs have been flown in eastern Libya to support the government's fight against jihadi militants, including Daesh.

The 23rd Iomax Archangel precision strike aircraft to be delivered to the UAE AF&AD was on show in the central plaza.

JAC UH-60s upgraded

A Joint Aviation Command UH-60L Blackhawk, configured through a limited upgrade to the army battlefield helicopter (ABH) role, was displayed in the NAVDEX static display.

It was mounted with a 7.62mm machine gun and Hydra-70 rocket pod on external stores pylons and a FLIR Systems 260HD turret, although this will be upgraded to the 380HD in the near future.

The work has been contracted to Global Aerospace Logistics (GAL).

Inside the UH-60L was an auxiliary fuel tank that boosted the helicopter's range by 30 minutes to three-and-a-half hours. According to one of the crew, the dust-covered helicopter had recently returned from operations in Yemen.

Meanwhile, AMMROC is also understood to be upgrading the 40 UAE AF&AD/JAC UH-60Ms with a fully integrated weapon system. In addition to the 7.62mm gun and Hydra-70 rocket pod, it will be armed with Talon laser-guided rockets and Hellfires. They will be mounted on the bigger external stores support system (ESSS) with its four station pylons. Only 18 of the 40 JAC UH-60Ms are understood to be configured at any one time.

Helmet-mounted displays have been integrated into the upgrade too, cutting back the pilot and co-pilot's work in the heat of battle.

The UH-60Ms are going through the bigger upgrade because they have a glass cockpit and are easier to work on. The concept was proved at the Yuma Proving Grounds in Arizona last year.

A UH-60L being displayed on the docks had been upgraded to army battlefield helicopter (ABH) configuration, with two 7.62mm machine guns, two Hydra 70 rocket pods and FLIR Systems 260HD in the nose.

Eliminator aims to knock out opposition

Orbital ATK marked the latest incarnation of its proven armed Caravan – the AC208II Eliminator.

The original AC-208 has been modernised with high-definition (HD) EO/IR systems with integrated laser designator.

Under each wing there are now dual rail pylons, which can accommodate two Hellfires, thus doubling its current firepower. Alternatively, a 2.75inch rocket pod, which can house the advanced precision kill weapon system (APKWS) rocket, guided advance tactical rocket (GATR) or others, can be fixed under each wing.

Orbital ATK has been supporting the Iraqi Air Force (IqAF) since 2007, when the first missionized Cessna 208 aircraft was delivered.

To date, three armed aircraft (AC-208B), three reconnaissance aircraft (RC-208B), and five trainer aircraft (TC-208B) have been supplied in support of the US Government contracts for rebuilding the IqAF.

Orbital ATK continues to support the IqAF armed Caravan programme through a $11 million contractor logistic support contract awarded last August.

Three AC-208 Caravans are also serving the Lebanese Air Force. Between the two countries, more than 3,000 Hellfires have been fired in the battlefield. Both Iraq and Lebanon are prospective AC-208II Eliminator operators.

Just deserts

Following the Farnborough International Airshow last July, the Embraer KC390 later flew to Cairo, Egypt and Abu Dhabi.

According to Jackson Schneider, Embraer's executive vice president, defence and security, it was flown several times in the region to test the aircraft in the harsh desert conditions.

After the Paris Airshow in June, the KC390 prototype is expected to continue on to one of the Middle East countries for similar reasons as last year but in a more challenging flight envelope, before heading to the Far East.

The Brazilian Air Force is the only customer of the tactical airlifter to date, with 28 on order.

Lebanon US training

Embraer confirmed that Lebanese Air Force pilots are currently being trained on the A29 Super Tucano at Moody AFB, Georgia.

Three of the six aircraft, which are built at Jacksonville, Florida, have been handed over to Sierra Nevada Corporation. The company supports the US Government A29 Super Tucano foreign military sales (FMS) effort.

Pilots have also been trained on the Afghanistan Air Force aircraft, with eight of the 20 delivered by mid-February.

Embraer is in discussions with 10 other countries, although it would not disclose any of them.

Sierra Nevada was keen to add that the Super Tucano is the only aircraft with a USAF military type certification, unlike other aircraft in the same light attack category.

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The AAR Corporation may prefer to stay clear of the limelight but, as **Alan Warnes** *found out, it certainly knows what it's doing.*

SAY AAR – BUT SAY IT QUIETLY...

AAR Corporation, based near Chicago's O'Hare Airport in Illinois, supports many governments all over the world… but you might not know.

It also has a fleet of its own aircraft, but none wear a livery broadcasting their presence.

Rahul Shah, senior vice president, strategic growth and business development Asia Pacific, Middle East and Africa said: "AAR has been running for 62 years and has increased its profits every year except for the one in the wake of September 11.

"We are successful because we specialise in 'best practices' in our component repairs and depot-level maintenance and supply chain, coupled with robust IT technologies and procedures."

AAR is a company carving a nice niche for itself providing complete logistics support (CLS), MRO and contracting airlift in the government and defence world.

Under its AAR Airlift Group, the company provides aerial transport services, using its own fleet or customer aircraft, to enable government and defence customers to transport personnel, supplies and mail in austere and harsh environments around the world.

With a rotational base of pilots, flight crew, and maintenance and logistics professionals, the group provides turnkey aviation solutions to customers.

On the government side, AAR's initial rise to prominence came from supporting the US Government's needs, primarily in the Middle East.

But, now, AAR is also collaborating directly with US allies, working in Abu Dhabi with the Advanced Military Maintenance Repair and Overhaul Center (AMMROC), and providing CLS (also known as performance-based logistics) work for foreign fleets and flight-hour support for airlines worldwide.

In South Africa, it is supporting the national airline's fleet of 70 aircraft in a pay-per-hour component contract, out of Johannesburg.

According to Randy Martinez, senior vice president for AAR's strategy and business development: "We tailor our services to the customer's needs; we don't have a fixed menu." He then provided an insight into the way the business is moving: "We saw the performance-based logistics/flight-hour business make up about 20% of the global aerospace sector's trade during 2005-08; now its around 37-40% and by 2025 some estimate that it will reach 60%," he said. "While this is just the commercial sector, the military may follow a similar kind of pattern."

From humble beginnings…

AAR was founded by Ira Allen Eichner in 1955, but rebranded the Allen Aircraft Radio (AAR) in 1961.

Today, AAR is turning over $1.7 billion with a massive headquarters close to Chicago-O'Hare International Airport in Illinois. It employs more than 4,500 people in at least 20 countries around the world, serving both government and commercial customers in the Middle East and North Africa. It is striving to expand its business in the region.

AAR Airlift has been working in Afghanistan providing helicopter and fixed-wing airlift support. At the peak of business in the country, the AAR Airlift Group was the largest single contractor providing airlift support by some margin. However, since the US military scaled back its efforts there, the fleet size has also been reduced accordingly.

Supply chain work in Afghanistan includes a five-year, CLS foreign military sales (FMS) deal worth approximately $72 million to sustain the Afghan Air Force's fleet of four C-130Hs – the company's first C-130 CLS contract.

Under the deal with the US Air Force, AAR provides all operational, maintenance, logistics and technical functions needed to support and sustain fleet readiness requirements within Afghanistan.

AAR is known in the US for its impressive MRO network and now it is sharing its expertise with local partners overseas. For instance, it is working in Abu Dhabi with AMMROC to set up a state-of-the-art military MRO.

AMMROC, a joint venture between Mubadala, Sikorsky and Lockheed Martin, selected AAR in December 2014 to support its creation of a new aerospace facility at Al Ain.

Under a $38.6 million contract, AAR is assisting in the design, outfitting and integration of key areas in AMMROC's state-of-the-art facility. The support areas it is working on include hangars, work areas, and machine and special processes shops for the military maintenance centre.

From left: AAR runs several MRO facilities in the USA, including this one at Miami. Setting up such sites with high-tech procedures helped AAR to win a $38.6 million contract with Abu-Dhabi based AMMROC.

Vertical replenishment is another skill of AAR's SA330 Puma pilots.

AAR supports UN operations in Africa with S-61Ns.

PICTURES: AAR.

Martinez added: "We have set up a large network of MRO facilities in North America, so we have the skills and experience to put the systems in place needed to run a world class MRO facility."

With AAR's MRO know-how, AMMROC is aiming to work on 45 different variants of platforms, spanning 36 types, which will total more than 500 aircraft.

AAR is targeting the implementation of common procedures with work on eight platforms, A330 MRTT, AH-64, CH-47, C-17, C-130, F-16, Mirage 2000 and UH-60, now under way.

"AAR is the third largest independent MRO in the world and the largest MRO in the USA – we know what we are doing," Martinez emphasized.

In September 2015, the US Department of State awarded AAR Airlift its biggest ever deal, a 10.5-year contract, potentially worth up to $10 billion, to provide airlift support for its International Narcotics and Law Enforcement Affairs (INL/A) bureau.

Any contract worth that much has to be exciting, but the success has been tempered by DynCorp International. The company, which is the incumbent and has been running the INL/A's CLS contract for 25 years, has filed numerous protests and a lawsuit against the US Government that is expected to be heard by August.

The Government Accounting Office (GAO) upheld the award decision on December 20 last year, but AAR cannot commence work until the lawsuit hearing. Under the programme, AAR Airlift will provide maintenance, operations, and logistical support to the fixed and rotary-wing aircraft fleet for the Department of State's INL/A.

AAR Airlift also supports the UN and the US military in Africa.

"We work with the US Department of Defense in several locations," said Shah. "These include Niger, the Democratic Republic of Congo, Uganda and the Central African Republic, using CASA 212s and Sikorsky S-61Ns [from AAR's subsidiary, EP Aviation] that are ideal for the rugged airfields you often have to fly from in Africa."

On February 7 this year, the United States Transportation Command (USTRANSCOM) awarded AAR Airlift a $204.2 million contract to provide aviation services throughout the USAF's Africa Command (AFRICOM) area of responsibility. This will cover the provision of fixed- and rotary-wing aviation services that include cargo and passenger transportation, as well as casualty evacuation (CASEVAC).

$275m Falklands deal

The UK Ministry of Defence (MoD) has contracted AAR for search & rescue (SAR) and support helicopter services in the Falkland Islands since April 1, 2016.

The 10-year contract is valued at approximately £180 million ($275 million).

AAR Airlift is working with British International Helicopters (BIH) and Air Rescue Systems (ARS), to provide a combined SAR and support helicopter service to the British Forces South Atlantic Islands (BFSAI) operations.

The programme includes AgustaWestland AW-189 SAR helicopters, Sikorsky S-61 support helicopters, flight operations, maintenance, logistics, and facilities support at the Mount Pleasant complex in the Falkland Islands and surrounding maritime region. The mission includes all-weather SAR, helicopter emergency medical services, rescue hoist operations, passenger and cargo transfers, and night vision imaging systems.

Readiness states vary from 15-60 minute response and require a 24/7/365 alert posture.

AAR has also been subcontracted by Northrop Grumman for the past 22 years supporting the UK RAF's E-3D Sentry AEW1 AWACS fleet at RAF Waddington in the UK.

The new edition of the F-15 is now ready for action in Saudi.

Saudi super Eagle has

The Royal Saudi Air Force has officially inducted the new Boeing F-15SA tactical fighter in a ceremony at the King Faisal Air Academy. **Jon Lake** *reports.*

It was a treble celebration in Riyadh at the King Faisal Air Academy (KFAA) as the college celebrated its 50th anniversary, marked the graduation of its 91st course of students, and welcomed the first of the Boeing F-15SA tactical fighters developed for the Royal Saudi Air Force (RSAF).

King Salman attended the celebrations with his son, Defence Minister and Deputy Crown Prince Mohammed bin Salman, and Omar Al-Bashir, president of Sudan.

The day's ceremony included a parade and a flypast, which featured one of the first four F-15SAs delivered, while two more aircraft were displayed on the ground.

The king and the other VIP guests were also shown a specially commissioned film marking the 50th anniversary of the KFAA, and another about the new F-15SA and its advanced technologies.

The F-15SA is a derivative of the two-seat F-15E Strike Eagle multi-role fighter, and is claimed to be the most advanced variant of the Eagle built to date, incorporating a host of features taken from the advanced F-15K Slam Eagle (used by South Korea) and the F-15SG (operated by Singapore), as well as some 'new-to-the-Eagle' systems.

It features two additional outboard under-wing hardpoints (stations 1 and 9). Their use required the development and installation of a new digital fly-by-wire (FBW) flight control system, which now features a disorientation recovery capability.

The aircraft is equipped with the Raytheon APG-63(V)3 active electronically scanned array (AESA) radar, BAE Systems' digital electronic warfare system/common missile warning system (DEWS/CMWS), a joint helmet-mounted cueing system (JHMCS), and an AN/AAS-42 infrared search and track (IRST) system, as well as the Tiger Eyes third generation low altitude navigation and targeting infrared for night (LANTIRN) navigation pod.

Contrary to expectations, the aircraft does not feature the new large-area display used by the F-35 in either cockpit.

Increased thrust

The F-15SA is powered by increased thrust General Electric F110-GE-129 engines and is able to carry a wide variety of weapons, including long-range AIM-120C7 advanced medium range air-to-air missile (AMRAAM) and short-range AIM-9X Sidewinder air-to-air missiles, AGM-84 SLAM-ER air-to-surface missiles, AGM-88 HARM high-speed anti-radiation missiles and GBU-39 small diameter bombs (SDBs), as well as laser- and dual-mode laser/GPS-guided weapons of up to 2,000lb weight.

Saudi selection of the F-15SA reflected the kingdom's long-standing policy of dividing its major aircraft procurements between the US and Europe (mainly the UK).

Having ordered an initial batch of 72 Eurofighter Typhoon swing-role fighters, Saudi attention switched back to the USA, and to new derivatives of the F-15E, including the 'stealthy' F-15SE Silent Eagle and other 'advanced F-15' configurations that were not low observable (LO) or stealthy, but did incorporate advanced targeting systems and new weapons capabilities.

The fighter offers little that the Typhoon does not already provide, though it does have an AESA radar (an as yet unfunded upgrade for Saudi Typhoons).

Though the F-15SA has a long-range and heavy-payload capability, the aircraft does not have a long-range stand-off weapon in the class of the Storm Shadow cruise missile, now being integrated on RSAF Typhoons.

The RSAF requested 84 new-built F-15SA jets and an upgrade package for the 70 surviving Saudi F-15S fighter-bombers (to bring them to the same standard) in 2010, and this request was notified to the US Congress in November 2010.

The resulting $29.4 billion contract for 154 advanced Eagles, plus logistics, spares, maintenance support and weapons, signed on December 29 2011, formed the biggest component in a $60 billion package that became the biggest-ever US arms sale to a foreign country.

Attrition of the RSAF's F-15S fleet means that there will now be no more than 68 aircraft

landed in Riyadh

available for conversion, reducing the total F-15SA force to a maximum of 152 aircraft, and likely fewer than that, with further attrition likely between now and the end of the conversion programme, and with the first three instrumented prototype aircraft unlikely to enter operational service.

A total of 144 F-15SAs would allow the RSAF to field six squadrons. The first of these will be the 55th Squadron, currently the F-15S training unit and slated to be the Formal Training Unit (FTU) for the F-15SA.

The 55th Squadron is part of the 5th Wing at King Khalid Air Base at Khamis Mushayt in southwest Saudi Arabia, along with the 6th Squadron, which is also due to convert from the F-15S to the F-15SA.

F-15SAs will also replace the original F-15S variant with the 92nd Squadron, part of the 3rd Wing at King Abdullah Aziz Air Base at Dhahran, on the Gulf coast, near Bahrain, and with an un-numbered Weapons & Tactics School (possibly known as the Fighter Weapons School) co-located at Dhahran, and probably forming part of the 11th Wing.

Not currently active

The remaining three F-15SA units are expected to include the 29th Squadron at King Faisal Air Base (KFAB) at Tabuk in the northwest of the country. This unit is not currently active, having last operated the Tornado ADV until disbandment in 2007.

Two more units could include the 15th Squadron (an inactive former F-5E unit previously based at Khamis Mushayt) and the 17th Squadron (an inactive former F-5E unit once based at Taif).

Other possible numberplates would be those of the 42nd and 66th Squadrons, former Dhahran-based units operating the F-15C/D and Tornado, respectively.

The full order was originally to have been fulfilled by 2019, but the programme has already suffered significant delays, mainly due to difficulties in the development and clearance of the new FBW flight control system, which held up delivery of the first aircraft by more than a year.

The first four F-15SAs arrived in Saudi Arabia on December 13 2016, supported by a USAF KC-10A Extender tanker and staging via RAF Lakenheath, a US Air Force F-15 Eagle base in the UK.

Two of the aircraft were new-build F-15SAs (the sixth and tenth off the line) while the remaining pair were the 'prototype' conversions – existing F-15S airframes converted to F-15SA standards under the so-called F-15SR programme (though *Arabian Aerospace* understands that the F-15SR designation will not be used in service).

One of these was converted by a Boeing team, the second by a Saudi team from the newly rebranded Alsalam Aerospace Industries, formerly known as the Alsalam Aircraft Company.

Alsalam is building new forward fuselage sections, wings and under-wing pylons for the remanufactured aircraft, which will be converted at its facilities in Riyadh.

All four aircraft were hastily repainted with Saudi national markings (having been ferried wearing USAF star and bar insignia), and also gained the RSAF's now obligatory 'God Bless You' logos before joining the F-15SA Formal Training Unit at Khamis Mushayt Air Base. Interestingly, the RSAF painters seem to have overlooked the US star and bar marking above the port wing!

A second batch of three further new-build F-15SAs arrived in Saudi Arabia in early February (a fourth aircraft having returned to Boeing's factory airfield at St Louis, Missouri, having suffered a technical problem). A third batch of five aircraft arrived in late March.

Plans abandoned

Initial plans for a US-based training unit were abandoned and, instead, the 55th Squadron, with a cadre of largely Boeing-employed US instructors, immediately began training experienced RSAF F-15S aircrew on the new type.

Ironically, on the same day that the first four aircraft arrived in Saudi Arabia, US media reported that the White House had stepped in to halt the sale of a $1.29 billion package of Paveway II, Enhanced Paveway II and Paveway III laser-guided bombs, unguided bombs, joint direct attack munition (JDAM) tail kits and other bomb components. These were intended to replenish the RSAF's current weapons supplies, which were becoming depleted due to the high operational tempo in multiple counter-terrorism operations, rebuilding war reserves and providing options for future contingencies. They were halted due to US concern over civilian casualties of Saudi-led air strikes in Yemen.

The Islamic Republic of Iran is rarely mentioned in lists of cutting-edge technology but, when it comes to drones, the country punches well above its technological weight, as **Mohammad Razazzan** *reports.*

HOME DRONE

While Iran has struggled with putting together the systems needed to deploy a tactical attack drone, it has done a good job with affordable, reliable engines and airframes.

Iran has one of the oldest drone development programmes in the world. It began in the early 1980s during its war against Iraq. Over the years, and in spite of crippling international sanctions, it has developed a colourful ecosystem of military unmanned air vehicles (UAVs).

Though some of Iran's past drones have been more credible than others, it's hard not to be impressed by the quantity and diversity of unmanned aircraft produced over the past 30 years.

The Iran Revolutionary Guards Corps (IRGC) appeared to mark a milestone in its UAV production when it rolled out the Shahed-129 in late 2012. Up until then, its drone fleet mostly included smaller aircraft with short range and endurance. IRGC minders claimed – but experts have been unable to independently verify – that the larger Shahed can fly for 24 hours straight.

Making drones that can fire guided missiles appears to be a more difficult feat for Iran's aviation industry. During the Iran-Iraq war, Iranian forces equipped early versions of the Mohajer UAV with RPG-7s rocket-propelled grenades. More recently, Iran claimed that its turbojet-powered Karrar drone could drop bombs as well as fire a type of homebrew guided missile called the Sadid.

Iran shows no sign of slowing down its drone development programme, which hit an obsessive tempo after it captured a US Sentinel stealth surveillance drone in 2011.

The country has also had success in exporting its drones to proxies, such as Hezbollah, where they mostly play the same intelligence, surveillance, and reconnaissance (ISR) role.

Hezbollah has experimented with suicide drones (not quite the same thing as Cruise missiles, but not that far off), and Israel can probably anticipate a more complex aerial environment in the next Lebanon conflict.

Iran has used drones extensively in Syria and Iraq, supplying both countries' governments with reconnaissance data and identifying targets for manned airstrikes. Iranian drones have been spotted flying over Syrian battle zones since the early days of the Syrian civil war. Altogether, Iran probably has more operational experience with drones than any country other than Israel or the United States.

In 2015, Venezuela's president, Nicolas Maduro, announced that his country had collaborated with Iran to develop and produce a fleet of surveillance drones to patrol the country's borders. The Arpia-001 drones, which are based on Iran's Mohajer series, will be used to seek out drug smugglers.

Also, Iranian officials have told the media that Russia wants to import the technology of one of the Iranian-made drones. The official refused to unveil more details. Iran earlier gave Russia a copy of ScanEagle – a US spy drone – as proof that its elite forces have reverse-engineered and mass produced the American UAV.

The first operational Iranian drone was the Ababil, which first saw service in 1986 during operations against Iraq.

The Ababil is still in production today. Isfahan's HESA produces several UAV types, among them the Ababil-1 and its scaled-down AM-79 derivative for operator training.

The Ababil-1 weighs a little less than 440lbs. It can loiter for two hours at speeds up to 160 knots and a can operate at altitudes of up to 16,500 feet. A solid-fuel booster assists take-off from a rail-type platform. The main wing unfolds and the vehicles assume a 'canarded' aerodynamic configuration. A rear-mounted piston engine driving a pusher propeller powers the vehicle during cruise and the design features optical sensors in the fuselage nose.

The Ababil-1 follows a flight path loaded into its computer before take-off, but the operator can assume control or reprogram waypoints during flight. The operator uses a Panasonic portable computer and joystick-style device for manual trajectory control – all of which he or she can carry in a normal-sized suitcase.

While HESA's designs consist largely of aluminium alloys, Tehran-based Qods Aviation Industries prefers composites.

The Mohajer, a medium-size surveillance drone, followed soon after the Ababil and also saw service in the Iran-Iraq war. Some versions were reportedly equipped with rocket-propelled grenades, making the Mohajer one of the first weaponised drones.

The 118in Mohajer-2, featuring a 150in wingspan, weighs just 187lbs. Its twin-boom tail and a pusher propeller give it a distinctive look. The UAV's 25hp piston engine provides for 90 minutes of powered flight at a maximum speed of 108 knots and altitudes of up to 9,900 feet. In practice, operational range falls to less than

The Iran drones: (clockwise from top left) Ababil; Fotros; Pars Lifesaver; Shahed; Saba; Karrar and Arpia

27nm (to maintain a radio link with the truck-based control post) if the operator needs real-time video imagery.

Equipped with a flight control system and autopilot, the Mohajer-2 normally follows a preloaded flight path with up to 99 waypoints, using a GPS receiver for navigation. The vehicle lasts for some 20 to 30 flights.

The Mohajer 4, the fourth iteration of the drone, remains in use today. During the Israel-Hezbollah war in the summer of 2006, Israeli forces shot down a Hezbollah-operated surveillance drone, the Mirsad-1, which is believed to be derived from the Mohajer.

The Karrar ('striker') is the latest in a growing line of indigenous Iranian drone offerings. It was developed as an unmanned combat air vehicle (UCAV), becoming the first long-endurance, combat-capable Iranian drone of note.

Externally, the vehicle resembles a World War II-era German V-1 terror rocket and US target drone designs of the 1970s. It makes use of a basic aerodynamic shape, which is stabilised by straight wing appendages.

The Karrar is a turbojet-propelled drone capable of carrying a single bomb. Iran claims that it has a range of about 600 miles.

With the Shahed 129, Iran became a pretender to the drone major leagues. Capable of carrying out 24-hour surveillance and strike missions, the Shahed 129 reportedly shares many of the capabilities of the US Predator and Reaper drones.

The HESA Shahed 129 series is a dual-role platform capable of reconnaissance work and attack. It was developed by the Shahed Aviation Industries Research Center of Iran, with production handled by HESA.

It appeared during September 2012, remains in active production and may have been procured by the Syrian Government for its long-running civil war campaign begun in 2011. The Shahed 129 was debuted in mid-2012.

One of Iran's most impressive drones is also one of its only non-military versions. Technology developer RTS Labs has created the Pars lifesaver drone.

The Pars carries a stack of flotation devices, which it drops over people in emergency situations in the water.

The Ra'ad-85 is a hybrid between a drone and a precision-guided bomb. Technically, it is a UAV that is packed with explosives. The pilot can steer the Ra'ad, kamikaze style, into moving targets.

Upon its unveiling, the Ra'ad garnered widespread ridicule, as the demonstration model appeared to be held together with brown duct tape.

Iran Aviation Industries Organization (IAIO) manufactures Fotros. The vehicle is said to exhibit an operational endurance of some 30 hours with a range out to 2,000km. A service ceiling of 25,000 feet is reported. Of course, due to Iranian secrecy, these values can be considered suspect until formally proven.

The Fotros can carry missiles for air-to-ground attacks. In theory, this makes it roughly equivalent to the drones that the US uses for targeted killing operations in Pakistan, Yemen and Somalia.

Iran replicates captured drone

On December 4 2011, Iranian forces captured an American Lockheed Martin RQ-170 Sentinel UAV near the city of Kashmar in north-eastern Iran.

The Iranian Government announced that the UAV was brought down by its cyber warfare unit, which commandeered the aircraft and safely landed it.

The United States Government initially denied the claims but, later, President Barack Obama acknowledged that the downed aircraft was a US drone and requested that Iran return it.

A week later, Iran announced that it intended to carry out reverse engineering on the captured stealth aircraft.

On May 11, 2014 Iran unveiled a copy of the Sentinel UAV, displaying its version next to the original. In November that year, Brigadier General Amir Ali Hajizadeh, commander of the Islamic Revolution Guards Corps (IRGC) Aerospace Force, announced that a domestic version, modified to carry out both bombing and reconnaissance missions, had made its maiden flight.

Damage has been caused at important sites like Baraqish in Yemen.

Striking at the heart of the heritage dilemma

Current conflict in Yemen is putting important archaeological sites at risk. **Jon Lake** *asks what can be done to preserve the ancient infrastructure?*

Since 2015, a Saudi Arabian-led coalition has been involved in a war in neighbouring Yemen, supporting the regime of President Abdrabbuh Mansur Hadi against Houthi rebels, Al Qaeda in the Arabian Peninsula insurgents, and forces loyal to the former president, Ali Abdullah Saleh.

Though there has been fighting on the ground, the emphasis has been on an intensive air campaign.

Human casualties now exceed 10,000, according to the UN, and damage has been caused to a number of important archaeological and heritage sites. These include the pre-Islamic walled town of Baraqish, the Great Dam of Marib, and the old cities of Sana' and Zabid (both of which were designated as World Heritage sites).

Yemen is especially rich in important archaeological sites, including ancient walled cities, historic mountaintop villages, prehistoric burial sites and even long rows of trilithons (standing stones) that were linked with the incense trade.

St John Simpson, a senior curator at the British Museum in London, has said that the Arabian Peninsula has "one of the highest densities of archaeological sites and a very long history of urban civilisation, with ancient infrastructure, palaces and temples". This makes Yemen something of an archaeological jewel.

Bijan Rouhani: "There was no reason to attack a residential centre that is a World Heritage site as well."

No strategic importance

Some of the sites that have been damaged are alleged to have been of no strategic importance, according to the UK Committee of the Blue Shield, a non-governmental organisation (NGO) that seeks to protect cultural property in time of conflict.

It has been suggested that such damage was, thus, sometimes avoidable.

After one attack, Bijan Rouhani, vice-president of the International Council on Monuments and Sites' risk preparedness committee, noted that: "There was no reason to attack a residential centre that is a World Heritage site as well."

The United Nations Educational, Scientific and Cultural Organization (UNESCO) sent a list of World Heritage sites to the coalition when the air campaign began, reminding air commanders of their obligations under the 1954 Hague Convention for the protection of cultural property in the event of armed conflict. Under its auspices, there can be a criminal liability for some cultural offences.

Experts working for the University of Oxford's endangered archaeology in the Middle East and North Africa (EAMENA) project have now drawn up a further cultural heritage list. This may increase the legal pressure on the coalition. Experts hope that combatants will use it as a no-strike list when planning their attacks, thereby protecting Yemen's heritage sites from damage.

EAMENA is documenting ancient sites across the region using Google Earth, which Oxford University's Robert Bewley described as a "phenomenal source that is transforming how archaeologists do their work", combined with conventional historical field records and a resource of about 40,000 aerial reconnaissance photographs taken by the British Royal Air Force between the 1950s and 1970s.

Colonial power

The pictures were taken during a period when the UK was the colonial power in Aden (later southern Yemen) and when Britain supported Oman in its long war against Yemen-based insurgents, and (with Saudi Arabia and Jordan) supported the royalist side in the North Yemen civil war.

It is estimated that 400-2,000 sites would make it on to the final cultural heritage list.

Professor Peter Stone, chairman of the UK Committee of the Blue Shield, was optimistic that the EAMENA list would make a difference, explaining that NATO air strikes in Libya in 2011 managed to avoid damaging some important historic sites. "We have got some relatively good evidence that these lists work," he said.

The Blue Shield is actively encouraging the use of no-strike lists by military planners, and especially targeting experts, who, it says, must be convinced to incorporate the information into their targeting plans. The organisation believes that today's air forces have an unparalleled ability to spare cultural, historic and archaeological treasures by using precision bombing techniques.

The Saudi-led coalition conducting operations against Yemeni targets is using a very high proportion of precision-guided munitions, and does have a desire to avoid collateral damage, in a way in which Russian and Syrian Government forces conducting air operations against Aleppo, for example, did not. In the latter case, a much higher proportion of 'dumb', unguided weapons were used.

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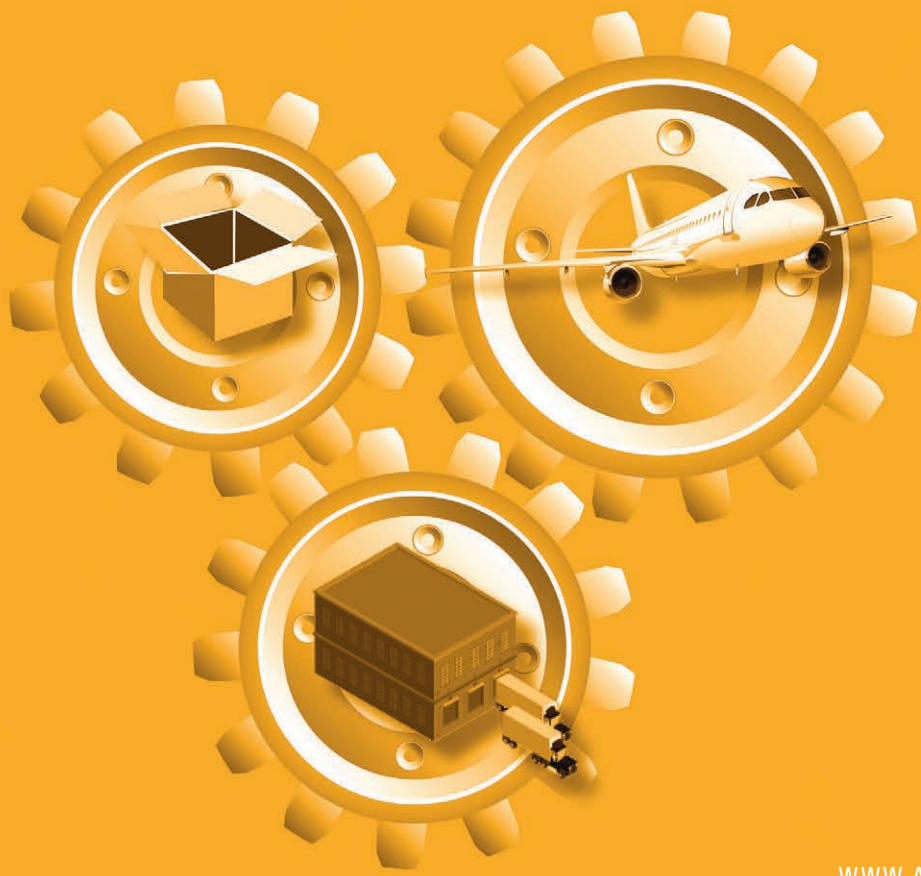

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Saudi Arabia's armed forces are undergoing a major expansion programme, with a heavy emphasis on aviation. New helicopters are being delivered to a bewildering array of service branches – some of which have only recently established their own air arms. **Jon Lake** *reports.*

GOLDEN HELOS...

The Saudi Arabia Ground Armed Forces consist of the Saudi Arabian Army (also known as the Royal Saudi Land Forces or RSLF), administered by the Ministry of Defence and Aviation, and the Saudi Arabian National Guard (al- aras al-Wa an or SANG), which comes under the administrative control of the Ministry of the National Guard.

The Saudi Arabian National Guard comprises 200,000 personnel, plus 25,000 tribal levies, making it very nearly as big as the 300,000-strong Army, (see separate story on Page 52).

The Saudi Arabian Army includes the Royal Guard, which was incorporated into the Army in 1964, but which retains the unique mission of protecting the House of Saud, and which is in the process of building up its own dedicated air element. This will be equipped with 10 of the 34 new Boeing AH-64E Apache Guardian aircraft now on order for the RSLF, which already operates 12 AH-64D Longbow Apaches upgraded from AH-64A configuration.

The AH-64E Apache Guardian (previously known as the AH-64D Block III until 2012) is the latest version of the Apache, and features more powerful T700-GE-701D engines and an upgraded transmission to accommodate the extra power, new composite rotor blades and an improved landing gear. These confer increased cruise speed, climb rate, and payload capacity.

The aircraft also has improved digital connectivity, with the joint tactical information distribution system, and the capability of controlling unmanned aerial vehicle (UAVs).

The sale of these Apaches was outlined in a 2010 Defense Security Cooperation Agency (DSCA) notification to the US Congress that also included 72 UH-60M Black Hawk transport helicopters, 36 AH-6i light attack helicopters, and 12 MD530F helicopters, all for the Saudi Arabian National Guard.

With 36 more AH-64E helicopters ordered for the SANG, deliveries of the 70 Apaches began in early 2014.

There has been no monolithic contract for the requested total of 72 Black Hawks, though there have been a succession of smaller orders for the Royal Saudi Land Forces Aviation Command (nine aircraft) and Saudi Arabian National Guard (16 and then eight helicopters).

The UH-60M is the latest Black Hawk variant and incorporates more powerful and more reliable General Electric T700-GE-701D engines, enhanced wide chord rotor blades, and active vibration control, giving better handling qualities.

Fully digital

The new variant features a fully digital common avionics architecture system (CAAS) 'glass' cockpit, as well as monolithic machined parts that provide structural improvements compared to the UH-60A and UH-60L.

A contract for the 12 MD530Fs was placed on July 16 2012, and the type entered service with the SANG in March 2013, operating in the training role, preparing pilots for the AH-64E and the newly acquired AH-6i.

Some 29 Saudi pilots logged more than 3,000 flying hours during the first year of operation.

A support contract was signed between MD Helicopters and the US Department of the Army's Army Contracting Command at Redstone Arsenal, on November 12 2014.

The MD530F is ideally suited as a trainer for the AH-6i, since both aircraft are derivatives of the same Hughes/MDH/Boeing OH-6/Model 500 family.

The AH-6i is the export version of the AH-6S Phoenix, which was developed for the US Army's restarted ARH or Armed Aerial Scout programme.

A derivative of the A/MH-6X Mission Enhanced Little Bird (MELB) helicopter used by US special forces, the AH-6S had a cabin stretched by 15 inches (380mm) and an extended nose to house avionics black boxes.

The Armed Aerial Scout programme was abandoned in late 2009 to save money, but the export-optimised AH-6i continued, and the prototype AH-6i made its maiden flight on September 16, 2009.

The AH-6i has a glass cockpit and composite main rotor blades based on AH-64D Block III/AH-64E equipment, and is powered by an uprated Rolls-Royce 250-CE30 engine.

The aircraft has an endurance of 12 hours and carries a maximum payload of 2,400lb, which can include AGM-114 Hellfire semi-active laser-guided missiles, laser-guided or unguided 70mm rocket pods, and M134 7.62mm six-barrelled mini gun and/or .50 calibre GAU-19B machine guns, as well as an under-nose L-3 Wescam MX-15Di electro optical/infrared (EO/IR) sensor turret with laser rangefinder/designator and laser pointer.

Jordan expressed interest in the AH-6i in May 2010 but it was Saudi Arabia that became the launch customer for the aircraft when it requested 36 AH-6i aircraft with related equipment and weapons from the United States via the foreign military sale (FMS) route in October 2010.

This led to an August 2014 $234 million FMS contract for 24 AH6i helicopters for the SANG. Boeing began final assembly of the Saudi Little Birds in December 2015, and the first deliveries followed in July 2016.

The AH-6i is the export version of the AH-6S Phoenix, which was developed for the US Army's restarted ARH or Armed Aerial Scout programme, now in action in Saudi.

Fuselages for the Saudi AH-6i helicopters are being provided by MD Helicopters, after sub-assembly in Monterrey, Mexico. Boeing then kits out the fuselages.

The helicopters undergo acceptance flight-testing by the US Department of Defense's Defense Contract Management Agency, before being handed over to the Saudi customer. It is understood that a number of Saudi pilots trained in Mesa before deliveries commenced.

Deliveries were expected to conclude in February.

With the lions share of the helicopters listed in the 2010 DSCA notification going to the Saudi Arabia National Guard, the command of the RSLF is now pushing ahead with its own helicopter procurement plans.

It is expected that more attack helicopters will be procured for the RSLF Aviation in order to develop its combat capabilities in the light of experience gained and lessons learned during the war in Yemen.

As well as attack helicopters, the Royal Saudi Land Forces Aviation Command wants to improve its heavy-lift and transport capabilities. In December 2016, the US State Department informed Congress of the administration's intent to sell 48 CH-47F Chinook Cargo Helicopters to the RSLF in a deal worth $3.51 billion.

The CH-47F is the latest version of the Chinook and features more powerful 4,868-shaft-horsepower (3,630 kW) Honeywell engines, a Rockwell Collins CAAS cockpit, and BAE Systems' digital advanced flight control system (DAFCS).

Monolithic construction

The airframe makes greater use of single-piece 'monolithic' construction, which reduces maintenance requirements and vibration.

The Saudi CH-47Fs will be fitted with embedded GPS inertial navigation systems, common missile warning systems (CMWS) and defensive armament, including 7.62mm M240H machine guns and M134D miniguns.

They will also have a full suite of defensive systems and aids, including warning systems, an infrared signature suppression system (IRSS), and a ballistic armour protection system.

The helicopters will also have a fast rope insertion extraction system (FRIES) and an extended-range fuel system (ERPS).

The Saudi order will help Boeing to maintain an active production line and fill the gap that would otherwise have existed between the end of the CH-47F Block I production in 2018 and the start of CH-47F Block II production in 2021.

Airbus Helicopters hopes for orders from Saudi Arabia – possibly for its NH90 tactical helicopter, and for other helicopters in the company's range.

In March 2013, the German Government announced that it had approved several arms export deals with countries in the Middle East, including the delivery of 23 unspecified Airbus helicopters to Saudi Arabia.

In June 2016, French Foreign Minister, Laurent Fabius, announced that Saudi Arabia was to buy an initial batch of 23 Airbus HC H-145 multirole helicopters worth about €500 million ($535m), following a meeting with Saudi crown prince and defence minister, Prince Muhammad bin Salman. It was suggested that these were to be used for a "wide range of police and civil support missions, but not for military missions".

Why the SANG will

Building a 156-strong rotary-wing fleet is a part of the Saudi Arabian National Guard's modernisation effort, which fits into the country's 2030 modernisation plan.

David Oliver *reports.*

The Saudi Arabian National Guard (SANG) is one of the three major branches of the country's armed forces.

With more than 200,000 personnel, the force is under the administrative control of the Ministry of the National Guard, rather than the Ministry of Defence and Aviation.

The current minister is Prince Miteb bin Abdullah bin Abdulaziz Al Saud, who was appointed in 2013.

The SANG differs from the regular Saudi army as it is forged out of tribal elements loyal to the House of Saud. It is responsible for internal security roles, as well as the protection of vital government installations and oilfields.

At its inception in 1917, the guard was 30,000 strong. Modernisation began 44 years ago with help from the US Army in a train, advise, assist and modernise role. The SANG now involves civilians, military personnel and local hires, such as interpreters.

Northrop Grumman and a Saudi company provide contract trainers to the SANG. They are embedded in the units all the way down to battalion and, in some instances, company level.

Under a plan conceived by the Saudi royal family eight years ago, the Ministry of the National Guard is creating a comprehensive helicopter capability, including the introduction and deployment of four different types.

The first of three SANG operational aviation brigades is set to become fully operational later this year.

Major General Frank Muth, from the US Army Office of the Program Manager (OPM) SANG, said that 24 Sikorsky UH-60M Black Hawks and 12 Boeing AH-64E Apache Guardian helicopters had already been already delivered to Saudi Arabia.

Planned arrival

Speaking at the recent International Military Helicopter conference in London, he added that the planned arrival of the first 12 of 24 AH-6is in May, some nine months after the type was formally accepted by the service, would mean that the 1st Aviation Brigade would be fully stood up at Khashm Al An Airfield, near Riyadh.

This new airfield, built at a cost of $200 million, has a 2.1km runway, four HQ buildings, barracks, dining facilities, motor pools, sports fields and a mosque.

Sikorsky was awarded a $30.5 million foreign military sales (FMS) contract on August 19 2014 by the US Army Contracting Command for 12 UH-60M Black Hawks for SANG. Ten days later, Boeing was awarded a $234.7 million contract for 24 AH-6i light attack helicopters. That deal included an initial spares package and ground-support equipment.

Saudi Arabia is the initial export customer for the AH-6i, which first flew on September 16 2009. The aircraft has an historic growth path that dates back to the original Hughes OH-6 Cayuse, which flew in 1963, although there is little in common between the two other than the characteristic shape.

Powered by an 850shp (634 KW) Rolls-Royce 250-C30R/3M turboshaft engine, the AH-6i has a new six-bladed main rotor and a canted four-bladed tail rotor, offering improved hot-and-high performance, extra payload and additional internal fuel for three-hour endurance.

With an integrated digital cockpit leveraging AH-64E Apache software, the AH-6i features full-colour multifunction displays, integrated digital map, military qualified/commercial-off-the-shelf avionics, armoured crash-resistant pilot seats, and a night vision goggle (NVG) compatible cockpit.

The aircraft will be equipped with the L-3 Wescam MX-15Di HD multi-sensor electro-optical/infrared (EO/IR) system and an armament package that includes the M134 minigun or Gau-19 machine gun, APKWS guided rockets and Hellfire missiles.

The first of the AH-6is for the SANG was in pre-flight testing in June 2016 at Boeing's Mesa production facility.

The company sub-contracted the green airframe manufacturing to MD Helicopters, which builds them at its Monterrey facility in Mexico.

PICTURES FROM THE LEFT: US Air Force General Joseph Lengyel, chief of the National Guard Bureau, meets SANG Minister, Prince Miteb bin Abdullah bin Abdulaziz Al Saud, during a visit to troops providing training, advice and assistance.
PICTURE: US ARMY NATIONAL GUARD.

The SANG currently has 24 UH-60M Black Hawk transport helicopters similar to those operated by the Royal Saudi Land Forces.
PICTURE: DEPARTMENT OF DEFENSE.

The arrival of the first 12 of 24 Boeing AH-6i armed reconnaissance helicopters in May will see the 1st Aviation Brigade fully stood up at Khashm Al An Airfield near Riyadh.
PICTURE: BOEING.

soon be on song

Systems assembly and integration is carried out by Boeing, with the last of the 24 helicopters arriving at Mesa in February 2017.

Boeing undertook the training of an initial cadre of US flight instructors for the US Army OPM-SANG, with the Saudi students arriving at Mesa in September 2016. The company expects to rotate seven Saudi pilots through Mesa for 12 months at a time.

"The SANG as an aviation force didn't exist eight years ago and, as of 18 months ago, it had no operational aircraft. The 12 MD 530F training helicopters were delivered in 2013," explained Muth.

Similar engine

The MD 530Fs, built by MD Helicopters, are also based on the Hughes/McDonnell Douglas OH-6 Cayuse. They are powered by a similar engine to the AH-6i and differ only in having a five-blade main rotor, a two-blade tail rotor and a smaller cabin.

The MD 530F is capable of carrying weapons and is in service with the air forces of Jordan and Afghanistan.

Muth explained that this new force has had to be built entirely from scratch. "When building up the capability, it's not just about the aircraft; it's the people, it's the training, it's the life-cycle maintenance, it's the facilities and all the rest," he said.

The 1st Aviation Brigade, based at Khashm Al An Airfield, will be at full strength when it receives the initial 12 AH-6is in May.

The 2nd Aviation Brigade facility at Hofuf is expected to see construction start this year and

The MD 530F light training helicopter was the first type to be delivered to the SANG.
PICTURE: DAVID OLIVER.

to be completed in 2019, while the 3rd Aviation Brigade base at Jeddah will commence in 2019 to be operational by 2021.

A fourth training brigade, equipped with MD 530F training helicopters, is also being established, with a $200 million aviation training centre of excellence expected to be completed by June 2018 at Dirab.

Each aviation brigade will comprise 24 UH-60Ms, split between two companies of assault and medevac/C2 helicopters; 12 AH-64E Apaches for attack/security; and 12 AH-6is for armed reconnaissance.

Only 24 AH-6is are currently under contract as part of the FMS process, so if all three brigades are to have an equal number of aircraft, further helicopters will need to be purchased before the 3rd Aviation Brigade is stood up in 2021/22.

While Boeing cannot disclose details of the contract, the company said the sale of additional aircraft was something it was discussing.

In February 2017, Muth received the go-ahead from the US Army Aviation Center of Excellence at Fort Rucker, Alabama, to conduct AH-64 Echo-model Apache and UH-60 Mike-model transitions into Saudi Arabia.

Proof of principle

"This is a test case, a proof of principle, that they are going to look at for six months," Muth said. Some 42 aviators providing training, assistance and modernisation efforts for the SANG will develop a training programme that covers the fleet. "We are training everything across the board from maintainers to refuellers to firefighters, not just pilots," Muth said.

Individual training has involved slings, hoists, casualty evacuation (CASEVAC), forward-looking infrared (FLIR), night-Sun, and limited forward arming and refuelling procedures (FARP) operations.

In addition, there is aerial gunnery, multi-airframe combined live-fire and company task force mission readiness exercises, and initial air ground integration training.

The aviation training timeline for SANG officers and enlisted personnel is approximately 24 months and 15 months respectively.

Kuwait ready for more Apache support.

$400m boost for Kuwait Apaches

Apaches have been a cornerstone of the Kuwait defence force and the Gulf state is stepping up support for the iconic helicopter, as **Jon Lake** *reports.*

In January 2017, the US Defense Security Co-operation Agency notified Congress of a possible $400 million foreign military sale (FMS) of sustainment and support services for Kuwait's 24-aircraft fleet of Boeing AH-64D Longbow Apache attack helicopters. The sale would include Apache unit- and depot-level support, generators, vehicles, equipment, spares and repair parts, as well as helmets, training devices, and simulators.

Kuwait was the 11th Apache customer worldwide, and the seventh international air arm to select the AH-64D.

The first six aircraft were officially rolled out on March 6 2007, following their delivery over the preceding few months.

A 16-aircraft order had been signed in 2002, and eight further aircraft were added subsequently, allowing the equipment of two units – the 17th and 20th Attack Helicopter Squadrons at Ali Al Salem.

At least four of the new AH-64Ds were initially based at Fort Hood (TX) for training.

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Since then, the Kuwaiti Apaches have proved their versatility, most recently in Exercise 'Desert Panther', which saw them supporting a ground force from Qatar and a battalion of the Kuwaiti National Guard in an anti-terrorist operation on Kuwait's border.

Last year, Kuwaiti Apaches exercised with US Army Apaches from the 1st Battalion, 10th Aviation Regiment, 40th Combat Aviation Brigade and with MQ-1C Gray Eagle UAVs from Company F, 277th Aviation Regiment, during a live-fire exercise near Ali Al Salem Air Base.

A General Atomics Gray Eagle marked targets with a laser while a joint terminal air controller from the US 82nd Expeditionary Air Support Operations Squadron cleared the Apaches to fire. This was the first time that an Army Gray Eagle had laser-designated a target for a Kuwait Apache.

The Gray Eagle is a derivative of the Predator UAV, powered by a heavy fuel engine (HFE) that can use either jet or diesel fuel.

Kuwait hosts large numbers of USAF, US Army and British Royal Air Force Predator, Reaper and Gray Eagle UAVs, for operations in Iraq and Syria.

UAE awards $17.3m support deal to Saab

Saab has received a $17.3 million two-year contract to support the two Saab 340AEW&C (airborne early warning & control) aircraft operated by the UAE Air Force and Air Defence (UAE AF&AD), together with their Erieye airborne radars, and associated ground equipment. **Jon Lake** *reports.*

The Saab 340AEW&C was ordered in November 2009 to meet an interim UAE AF&AD requirement, pending selection of a 'definitive' solution to the air force's long term AEW and air surveillance requirement.

It was intended both to provide an interim operational capability and also to allow training and the formulation of doctrine, tactics, and methods of employment.

The 1.5 billion SEK ($220 million) contract covered the sale of two former Flygvapen (Swedish Air Force) Saab 340AEW&C regional turboprop aircraft, fitted with Erieye active electronically-scanned array (AESA) radars, and with airborne command and control systems.

The contract also included the necessary ground equipment, initial spares, and support services. The first aircraft was delivered in late 2010.

The Saab 340AEW&C aircraft are understood to have formed a new squadron at Abu Dhabi Airport.

The Saab 340AEW&C aircraft are understood to have formed a new squadron that was co-located with the UAE AF&AD's transport fleet – initially based at Al Bateen, but subsequently moving to a new military enclave at Abu Dhabi Airport.

Shortly before the delivery of the second aircraft in April 2011, Swedish Ambassador, Magnus Scholdtz, told local media that Sweden had "offered to sell four more such aircraft to the UAE", though by then, Saab's official contender to meet the UAE's long-standing AEW requirement was a Saab 2000-based Erieye system, competing with the Boeing 737 AEW&C and Northrop Grumman's E-2D Hawkeye.

In the event, Saab 'switched horses' again and, in November 2015, announced that it had received a $1.27 billion order for two so-called GlobalEye aircraft – Bombardier Global 600 business jets equipped with a more advanced derivative of the Erieye radar (and other surveillance systems) known as the swing-role surveillance system (SRSR).

Jonas Hjelm, head of Saab's support & services business area, said the recent agreement represented a confirmation of the company's "ability to deliver a comprehensive support solution over the product's entire life cycle, during which we are able to guarantee availability for the customer".

Upgrades on their way for Qatar's Patriot Advanced Capability Block 3 (PAC-3) surface-to-air missiles.

$93m deal boosts Qatar defence

A $93 million contract modification has been awarded to Lockheed Martin to cover the sale of advanced air defence missile technology to Qatar – specifically providing for upgrades to Patriot Advanced Capability Block 3 (PAC-3) surface-to-air missiles.

The US Department of Defense made the announcement in January. The deal was done through Army Contacting Command in Redstone Arsenal, Alabama.

These upgrades primarily provide for "obsolescence redesign" work, and will run through to 2020, allowing delivery of the weapons to proceed as planned by September 2021.

PAC-3 is the latest version of the Patriot air defence system and, as such, is a high-velocity interceptor missile system that defends against a range of incoming threats, including tactical ballistic missiles, cruise missiles and aircraft.

The weapon incorporates advanced hit-to-kill technology, enabling better accuracy, enhanced safety and improved reliability.

The PAC-3 represents a significant upgrade to nearly every aspect of the system, focused on improving lethality against ballistic missile targets, with greater agility, discrimination and range.

In November 2012, the US Defense Security Cooperation Agency notified Congress of a possible foreign military sale (FMS) of 11 Patriot Configuration-3 systems to the Government of Qatar. The proposal included missiles, launchers and associated equipment, parts, training and logistical support at an estimated cost of $9.9 billion.

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In October 2014, this resulted in a $2.4 billion contract to supply 10 Patriot missile defence systems to Qatar. Qatar thereby became the 13th customer for the Patriot system, and the fourth of six Gulf Cooperation Council members to select the weapon, also becoming the eighth international customer for the PAC-3 version of the missile.

Deliveries to Qatar were finally provided for as part of a December 2016 contract that covered deliveries of the Patriot Advanced Capability-3 missiles and PAC-3 missile segment enhancement missiles to the US Army, as well as the sale of interceptors, launcher modification kits and related equipment and spares to Qatar, Saudi Arabia and Korea.

Qatar's AW139s: Set to play a key role in the intervention force.

Qatar sets up air intervention force

In January 2017, Lebanese newsletter Tactical Report *reported that Sheikh Tamim Bin Hamad Al Thani, the Emir of Qatar, had approved the creation of a special air intervention force to counter the threat of terrorist attacks and to facilitate special operations behind enemy lines.* **Jon Lake** *reports.*

For many years, Qatar's army included only a single special forces company (Q-SOC – Qatar Special Operations Command), and this was widely assumed to have an internal security role.

But that changed in 2011, with Qatar's participation in the campaign to overthrow Libya's Muammar Qaddafi, during which the country's special forces were the first foreign military troops on the ground in Libya, providing basic military training to rebel brigades in the Nafusa mountains.

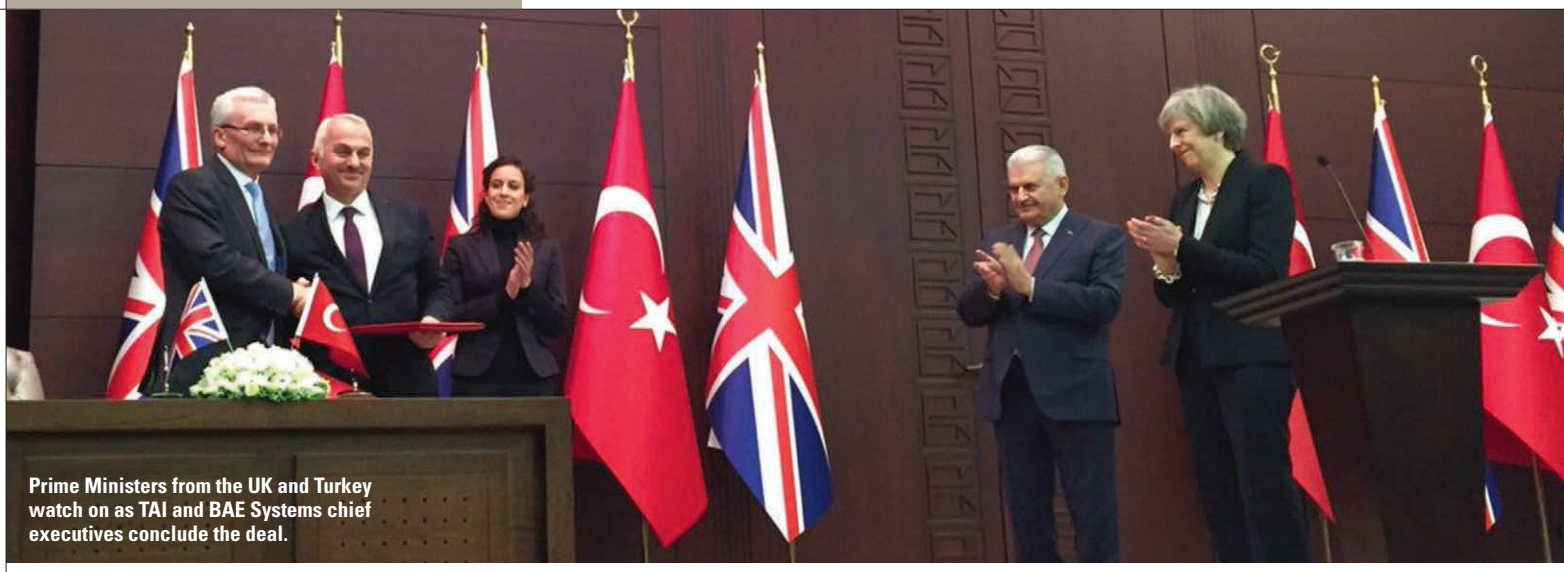
The Q-SOC force was backed by about six or eight of the country's 12 Dassault Mirage 2000 fighter-bombers, but relied on air force helicopters – particularly the Westland Commando 2As and 2Cs of the 9th Multi-role Squadron, and the new AgustaWestland AW139s of the 20th Squadron.

Later in 2011, it was reported that Qatar had established a Sunni Arab intervention force to help the anti-Assad Free Syrian Army and other rebel groups in their efforts to oust the regime of Syrian President Bashar Assad.

This force was largely recruited from the Islamic Fighting Group in Libya and from Iraq's Ansar al-Sunna.

Qatar airlifted about 1,000 fighters from each group from Libya and Iraq to the southern Turkish town of Antakya, ready for operations in the Syrian provinces of Idlib, Homs, and Jabal al-Zawiya.

In 2012, the Emir of Qatar called for an Arab intervention force to be sent to Syria to halt the escalating conflict. Then, in October 2015, Khalid al-Attiyah, Qatar's Foreign Minister, suggested that it could intervene militarily following Russia's intervention in support of President Bashar al-Assad. Though, in the event, the Gulf emirate confined itself to providing arms and financial and political backing to anti-Assad rebel groups, prevented from doing more, in part, by the lack of dedicated air support for its own special forces – prompting the creation of the new special air intervention force.



Prime Ministers from the UK and Turkey watch on as TAI and BAE Systems chief executives conclude the deal.

Turkey fighter deal is a sign of the times

The first development phase of Turkey's future fighter has kicked off, as domestic lead Turkish Aerospace Industries (TAI) signed an agreement with the UK's BAE Systems to collaborate on the TF-X programme. **Beth Stevenson** *reports.*

TAI and BAE Systems signed a so-called heads of agreement deal in Ankara on January 29 in the presence of Turkish Prime Minister, Binali Yildirim, and his UK counterpart, Theresa May.

The agreement is expected to lead on to a contract worth some £100 million.

BAE Systems first began a partnership with TAI for TF-X in 2015, when the British company was chosen to assist with the design of the aircraft, based on its fighter development experience.

"We are a leader in designing, manufacturing and supporting fighter aircraft and are in an excellent position to contribute technical and engineering expertise and experience of managing complex projects to this key Turkish programme," said BAE chief executive, Ian King.

"The announcement signals an exciting next step in relations between both Turkey and the UK with the cooperation between BAE Systems and TAI paving the way for a deeper defence partnership."

BAE said that, at its peak, "hundreds of Turkish and UK engineers will collaborate on the TF-X programme, helping to support the skills, technology and technical expertise required to deliver the programme".

Details remain unclear

Despite the announcement, details on the development still remain unclear on the specific role BAE Systems will be playing, and on the programme's current status.

Neither company was willing to comment on the announcement and what exactly it entails since the programme began in 2011, but it has been reported that Turkey wants technology transfer under the partnership deal it has sought from the offset, which could help BAE remain at the heart of fighter aircraft manufacture into the 2030s.

The company's involvement in the Royal Air Force's Panavia Tornado GR4 development is due to end relatively soon as the service retires the fleet in 2019. And, despite its Eurofighter Typhoon manufacture having been bolstered by a 2016 deal with Kuwait, that aircraft still remains a fourth generation fighter.

BAE Systems does, however, part-manufacture the Lockheed Martin F-35 Joint Strike Fighter, which Turkey is on contract to purchase.

For the domestic market, the twin-engined TF-X is expected to replace the Lockheed Martin F-16s that are in service, and complement the Turkish Lockheed Martin F-35A, six of which are on contract out of a total requirement for 100 aircraft.

It has been reported that TAI is targeting a first flight of the TF-X in 2023, with Turkey expected to procure large numbers of the type.

Launch customer

Another indigenous development in Turkey, the TAI Anka unmanned aerial vehicle, was manufactured with the domestic customer in mind as the launch customer, and the two aircraft types are expected to be able to operate in partnership.

The Typhoon's engine is also expected to be integrated into the fighter, following the signing of a memorandum of understanding between Eurojet and Turkey's Aselsan in 2015. However, an indigenous engine development has also been touted by the parties involved.

Aselsan is, additionally, developing an active electronically-scanned radar for the TF-X programme, further emphasising the domestic industry focus on the effort.

Export will be the key test for the programme, with Pakistan having previously expressed an interest in partnering on TF-X, although no further announcements have been made since.

The largest defence export customer for Turkey is the US, which, considering its own esteemed aircraft manufacturing, is highly unlikely to adopt a Turkish fighter. Other Middle Eastern customers, such as Saudi Arabia, Qatar and the United Arab Emirates, are also key customers, while Germany and Malaysia are high on the list.

IRAQ'S LAST L-159 IS A NEW FIRST

The first new production Aero L-159 to be built for 13 years was handed over to the Iraqi Air Force on December 31 last year. It was rolled out to the media on March 31 devoid of any markings. **Alan Warnes** *reports.*

Rolled out: The dual-seat L-159T1 advanced light combat aircraft at Aero Vodochody.

Interestingly, the dual-seat L-159T1 advanced light combat aircraft (ALCA) on show at Prague-based Aero Vodochody was the final example of an Iraqi Air Force (IqAF) order for 12 aircraft.

While it was the centre of attention, its national colours and serial were covered, as the company was keen not to identify the operator.

The aircraft made its first flight on December 26 last year and was officially handed over to the IqAF on December 31. Since then, it has been used to train a third batch of Iraqi pilots at Aero Vodochody's Odolena Voda site just outside Prague.

It will be delivered with another dual-seat aircraft, which is currently being overhauled, later in the year.

The IqAF is using the L-159As for close air support on a daily basis, flying from Balad Air Base to defeat the so-called Islamic State.

Iraq signed a $29.68 million (750 million koruna) deal in March 2015 for 15 L-159s. Three were delivered direct from Czech Air Force stocks and 12 came from Aero Vodochody.

After the last of 72 L-159s ordered by the Czech Air Force left the production line in 2004, it went into long-term store at Aero Vodochody with around 40 other examples.

Since then the company, along with Czech arms agency, Omnipol, has been trying to sell them.

The IqAF acquired 12 from the aerospace company, which would include 10 single-seat L-159As and two dual-seat L-159T1s. There were enough to cover the L-159As and one two seater, which meant Aero had to restart the production line in early 2016. All the tooling was gathered and reassembled, while the younger generation workers were trained by older hands on how to build the aircraft.

It marked a new era for the company, which now has the L-159 and upgraded L-39NG as the flagships of the company.

With the L-39 sold to several Middle East and African countries, Aero is keen to highlight the capabilities of the newer more powerful lead L-39NG lead-in fighter trainer with new avionics to the two regions.

Far left: Rockwell Collins managing director for the Middle East, Turkey and North Africa, Talel Kamel, greets Husam Olabi, head of the internship programme at the Khalifa University and, on his right, Abdulrahman Al Marzouqui, a former trainee at Rockwell Collins and student at the university.

Left: The agreement with Taqnia Defense could see the Saudi company integrating Rockwell Collins avionics. Taqnia is planning to build helicopters, like the S-70, under licence.

Rocking well all over the world

Technology giant Rockwell Collins was at IDEX but **Alan Warnes** *discovers it is about a lot more than just defence.*

Although headquartered in Cedar Rapids, Iowa, no one understands the needs of the international market better than Rockwell Collins.

Its recent purchase of Florida-based B/E Aerospace, a leading interiors provider, for a massive $8.3 billion, will connect the company with even newer markets.

The company cut its teeth in flightdeck avionics, cabin electronics, mission communications, simulation and training, and information management, all delivered by a global workforce and a service and support network that crosses more than 150 countries.

Colin Mahoney, Rockwell Collins senior vice president, international and service solutions said: "We have had a presence in the UAE for more than 20 years. It has been a key to our success here. We have a strategic capability with AMMROC and, in Saudi Arabia, we work with AEC."

Partnership agreements

The company is investing in a number of partnership agreements in the region. These include a training opportunity with Khalifa University in the UAE. It began two years ago and is expected to expand. The latest class of interns will begin working at the company's sites in Europe and the Middle East.

Colin Mahoney: "We could partner with Taqnia on all kinds of aircraft retrofits."

Talel Kamel, Rockwell Collins managing director for the Middle East, Turkey and North Africa, said: "We are proud of this collaboration, which enables us to share our knowledge and expertise in domains such as avionics and communication with the students, while at the same time establishing a talent incubator to support our further developments in the region."

Last December, Rockwell Collins signed an agreement with Taqnia Defense to collaborate on military rotary and fixed-wing avionics opportunities in Saudi Arabia. Work will focus on aircraft manufactured, assembled and upgraded in the kingdom.

Mahoney continued: "We could partner with Taqnia on all kinds of aircraft retrofits. We can partner in technology evaluations to include our commercial flightdecks."

Rockwell Collins has been a supplier to the armed forces in Saudi Arabia for more than 50 years and is already manufacturing and supporting avionics and military communications in the kingdom with a private Saudi company.

The agreement with Rockwell Collins is another step in the evolution of local Saudi aerospace industry capabilities, which is fully in line with Saudi Arabia's Vision 2030 and the National Transformation Program 2020.

"Around 7% of what we do in the company is in the MENA region and that is set to increase with the acquisition of B/E Aerospace, which was announced last October," said Kamel.

Acquiring B/E Aerospace will allow Rockwell Collins to integrate its smart technologies into the cabins of big airliners.

Mahoney is excited about the acquisition. "Pre-B/E, our sales are around $5 billion but with B/E it grows to $8 billion. They offer bespoke services – first class and very customer-focused. The interior systems division will be the fourth division after commercial, government systems and management information services."

Narrow-body content

In the combined company, Rockwell's content on the Airbus A350 and Boeing 787 will triple, while narrow-body content is doubling. It will see the Rockwell Collins overall business shift to a 55% commercial 45% defence mix.

Mahoney added: "Strategically, it is more effective to expand our footprint in markets where we are already established.

"We reviewed our international strategy about eight years ago and we realised there was the opportunity to accelerate international [business]. As a result, 42% of our market is outside the USA today; the acquisition expands that to more than half."

By mid-March, the majority of Rockwell Collins and B/E shareholders approved moving forward with the deal. A company spokesman said: "We are on track for the completion of various anti-trust regulatory reviews – approvals are still needed from the European Union, China and the Philippines. Regulatory approvals have already been received from the US, South Korea and Turkey. We don't foresee any issues."

Leonardo paints a bigger picture

Mauro Moretti – looking for more success from Middle East markets.

The Italian defence giant formerly known as Finmeccanica has rebranded as Leonardo. Its UK division has enjoyed much success with Middle Eastern sales and **Beth Stevenson** *visited the London base to find out what the new organisation has in store.*

Following a year of rebranding and restructuring to better align the company with its target markets, Leonardo has established a single UK-based entity, which global chief, Mauro Moretti, claims will bolster its position in key export markets.

Leonardo MW Ltd will be the single entity that all the former Finmeccanica divisions in the UK now trade under, most notably bringing together the rotorcraft and electronics divisions to offer a single point of contact for all UK sales.

Of the £2.3 billion revenue brought in by the UK-based divisions in 2016, £1.3 billion was in exports: "Our business is now export-led in line with the aims of the UK Government," Moretti told a media briefing to mark the establishment of the new entity. "We work together with the Government on exports to more than 35 countries."

Norman Bone, chairman and managing director of Leonardo MW, added: "This is exactly what the UK Government has asked us to focus on, so that we wouldn't be entirely dependent on them."

The company has traditionally seen a lot of success in the Middle East, most recently with the sale of 28 Eurofighter Typhoons to Kuwait. That deal was negotiated through the aircraft division of the company, formerly operated under the guise of Alenia Aermacchi.

While it was negotiated through the Italian division of Leonardo, one of the most significant elements of the contract is that it will include the first integration of the Captor-E active electronically scanned array (AESA) radar developed by the Euroradar consortium and led by Leonardo in the UK.

The partner nations have supported development of Captor-E, but are yet to sign a contract to integrate the AESA radar as an upgrade to the mechanically-scanned system that is currently in service on their aircraft.

Kuwait had been a key customer for the company, having purchased its defensive aids systems for the air force's Boeing AH-64D Apache rotorcraft fleet, and carrying out training at Leonardo's Electronic Warfare Operational Support (EWOS) centre in Lincoln.

Saudi Arabia, meanwhile, is a key Typhoon operator, and sales of the fighter are conducted by the UK via BAE Systems, with 65% of the avionics provided by Leonardo.

"The key markets for us in 2015 were Saudi Arabia and the US. Kuwait is clearly now very important after Leonardo led the Typhoon consortium to the win last year; that meant a lot of work for the people in the UK, and the first big Middle Eastern export that's been done for Typhoon not led by BAE Systems," Bone said.

Range of markets

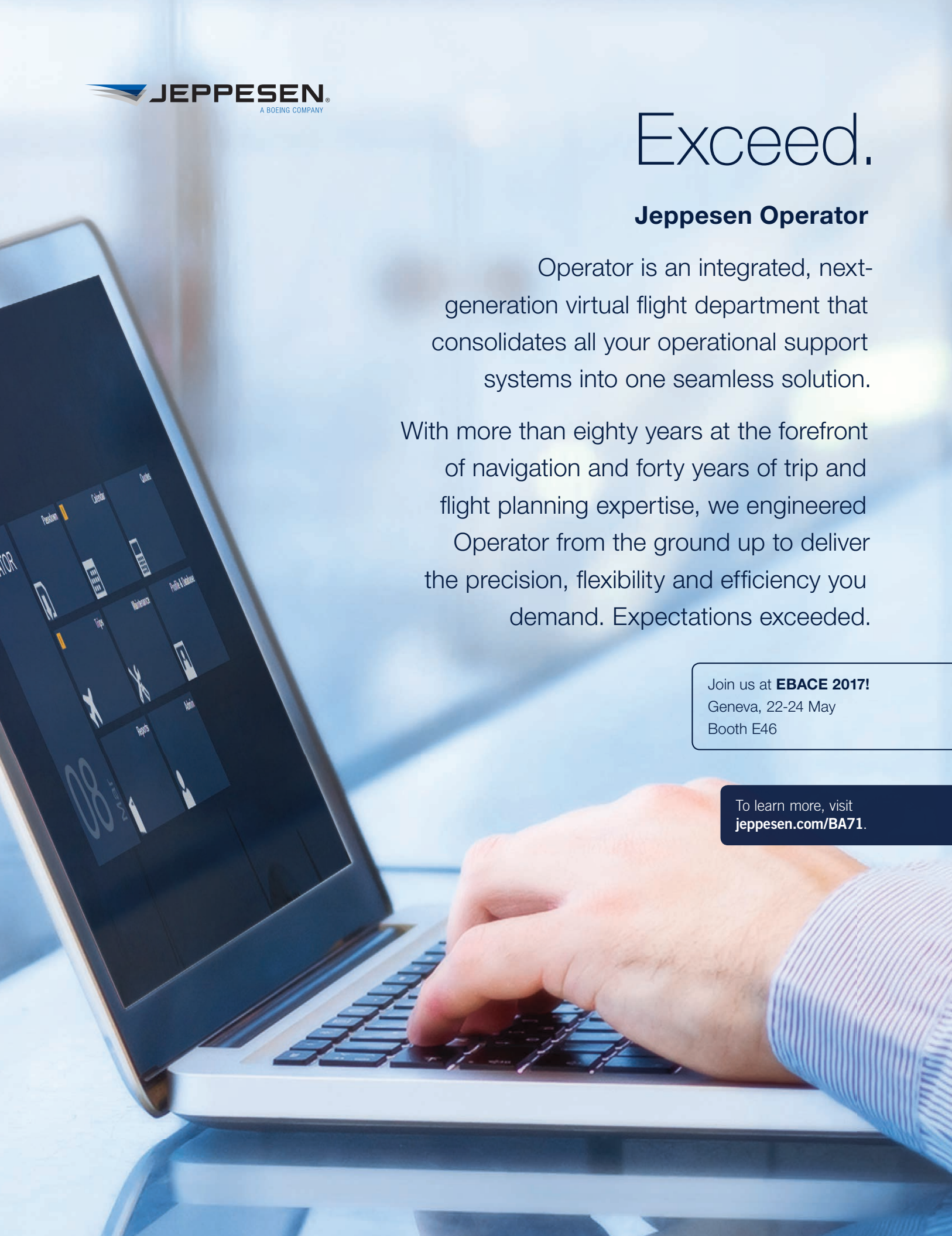
However, the company is noticeably targeting a range of export markets through the UK entity, pitching technology to a number of nations over the coming year, and not depending on any particular customer or region.

"I could probably name four or five countries that make up 50%, but the rest is a real spread and breadth across the board," added Bone.

A key offering for the Middle East market is the BriteCloud active decoy, which the company considers a leading technology in its field.

While Leonardo has an arrangement with Saab to pitch the system on-board the Gripen fighter – for which there are no Middle Eastern customers and very little traction in the region in general – it is also being offered for the Panavia Tornado and Typhoon, both of which are in service with Saudi.

On the land and naval side, the personal role radio is used by Jordanian land forces, while the Horizon medium wave infrared thermal imaging camera, HALO acoustic weapon locating systems, and LINAPS artillery pointing device, have all been sold to Middle Eastern customers through UK divisions of Leonardo.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Mr Niche Guy...

A new Abu Dhabi-based service aims to fill a perceived niche for passengers, which falls between the premium cabin of an airliner and an executive jet. **Alan Dron** *has been finding out more.*

Business executives, senior civil servants and families are all potential customers for a new company that believes it can cut travelling time and costs for affluent Gulf residents.

GI Aviation began operations earlier this year from Abu Dhabi's Al Bateen executive airport, initially operating a single Pilatus PC-12 NG single-engine turboprop. A second example of the Swiss-built aircraft should have joined the company by the time *Arabian Aerospace* goes to press.

Executive aircraft are commonplace in the region, so how does GI Aviation hope to find a gap in the market, especially with an aircraft that is not a jet?

General manager, Marios Belidis, believes that tighter budgets, caused by the slump in oil prices over the past couple of years, will help get GI Aviation off the ground.

Costs have become an issue for many companies in the region and Belidis, who managed the ground-handling services at Al Bateen before taking up his current role, says this is to GI Aviation's advantage.

"The plan was to introduce an affordable way of flying privately," he explained. "The right aircraft to allow competitive rates, while maintaining the same comfort as a jet, was the PC-12 NG."

The cost of flying in the PC-12 NG falls between the cost of a business, or first-class, airline ticket and the price of hiring a private jet. If a group is flying together – business executives travelling around the Gulf, or a family taking a weekend break, for example – the costs are pretty much comparable with flying 'up front' in a commercial airliner and can take less time.

Belidis accepts that some VIPs are simply not affected by cutbacks and will continue to hire executive jets for even short hops around the Gulf, but he believes a larger stratum of flyers is in the market for a more cost-effective alternative.

GI Aviation, which is backed by local investors, sees three main segments in its marketplace: business executives, senior government employees and the leisure element.

As with most companies based at airports that specialise in business aircraft, the time between stepping from a car outside the company's Al Bateen base and entering the cabin of the aircraft can be 10 to 15 minutes, compared to a minimum of an hour if using a commercial airliner. That time saving can be of considerable value to executives. And the aircraft takes off when they want it to, rather than at an airline's appointed time.

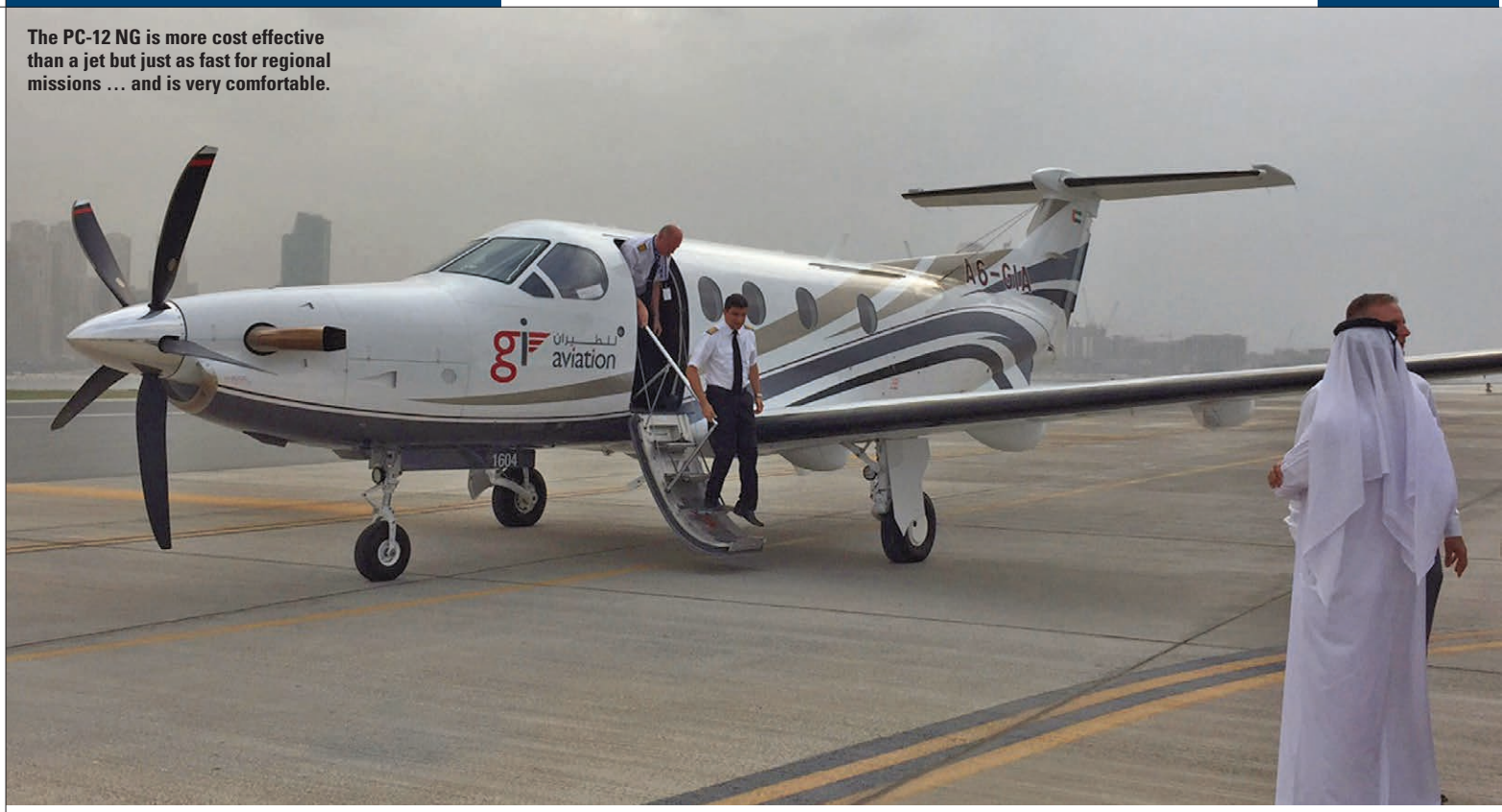
Certainly, the PC-12 NG is slower than an airliner or private jet – it cruises at around 520kmh (280kts) compared to, say, an Airbus A320's 860kmh (465kts) or a Cessna Citation M2's 750kmh (404kts) – but on a hop of an hour or so, the difference in journey time is small.

An hour's flying time from Al Bateen brings Muscat or Muharraq within range; two hours takes the aircraft and its passengers as far as Kuwait or Riyadh.

Senior government officials based at the UAE's federal capital of Abu Dhabi frequently visit regional offices in the northern emirate such as Ras Al Khaimah or Fujairah. GI Aviation is trying to have them recognise the benefits of using its aircraft for such journeys, noting that a flight from Al Bateen to either of the two emirates mentioned

Continued on Page 62

Marios Belidis believes the new market will soon open for the single engine Pilatus.



The PC-12 NG is more cost effective than a jet but just as fast for regional missions … and is very comfortable.

CONTINUED FROM PAGE 61

takes less than 45 minutes, as opposed to at least two hours by car.

The aircraft can take up to eight passengers, although it would be more usual for it to carry four or six, which would suit a small group of senior civil servants.

On the leisure front, GI Aviation believes that a family will be able to use the aircraft for a weekend in the northern emirates or Sir Bani Yas island: "We're in talks with hotels and resorts to fly people [there] in a package deal," said Belidis.

"I recently visited the Jumeirah Group Hotels and they said their concierge service does a lot of bookings for helicopters or jets, especially US and Russian expats. We're definitely looking at that."

Finally, the PC-12 NG is capable of operating medevac flights, with two stretchers and medical personnel in attendance.

Short or unimproved strips

GI Aviation also makes the point that the PC-12 NG is certificated to use short or unimproved strips and can tackle gravel or sand surfaces, not to mention shorter runways than either an airliner or executive jet. This opens up more airfields to passengers that are closer to their ultimate destination.

But will a PC-12 NG prove to be suitable equipment in a region where jets are paramount in both the executive and commercial sectors? There is a long-standing prejudice, not only in the Gulf, that aircraft with propellers are somehow 'old' or 'inferior' compared to the turbofan-powered alternatives.

From the safety point of view, Belidis believes that the aircraft does not have to prove its credentials. "We conduct demo flights to show brokers and influencers in the industry that the aircraft has the same safety standards as a jet."

The fact that it is built in Switzerland helps, he said, as the country's reputation for quality and good engineering is well known.

Neither has the single engine been a sticking point. The modern generation of corporate flyers is aware that modern turboprop powerplants are extraordinarily reliable and the Pratt & Whitney Canada PT6A-67P, which powers the PC-12 NG, is up there with the best. "People aren't really bothered by the single engine," said Belidis.

The engine also aids economy by being flat-rated to 1,200shp when it is capable of 1,845shp. Flat-rating the engine to around 65% of its capacity means that the maximum stresses it was designed to handle never arise, which results in better fuel economy and reduced maintenance costs.

On top of that, GI Aviation makes the point that a PC-12 NG costs around 30-40% less than a jet to charter. The new company hopes to attract a new clientele that has not previously used business aircraft.

Internally, the aircraft is hardly spartan. It has a cabin volume of 330 cubic feet, greater than that of a Beech King Air 250 twin turboprop and of most entry-level or light executive jets. It has a cabin capable of taking up to eight passengers, with interiors by Germany's BMW Group Designworks.

Externally, the NG benefits from a thorough revision of its aerodynamics, which has smoothed the airflow and squeezed extra knots from the aircraft.

If the PC-12 NG captures the imagination of corporate flyers and their accounts departments, one problem could still arise, cautions Middle East Business Aviation Association chairman, Ali Alnaqbi.

Welcoming GI Aviation when it opened its doors for business in January, he said that if it became too popular, too quickly, it could suffer from availability problems, which could damage its position in the marketplace. He suggested that a minimum fleet of 11 PC-12 NGs was necessary to avoid this.

Subject to availability

Belidis admits that beginning life with only two aircraft could lead to problems – "We always advise clients it's subject to availability" – and he accepts that having more equipment would allow the company to reduce the time between receiving an initial phone call requesting a flight and taking off to within three to four hours. But, he says, GI Aviation does not want to follow in the footsteps of some companies that have gone before.

"I'll be honest, most companies that [grew] really quickly, fell over. We have a new product in the market and we have to test that. If you had a fleet of five to 10 aircraft, the costs would be massive. If it does work well, you'll see us purchasing more aircraft."

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The Iran evolution...in

In the post nuclear-sanctions world, Iran is talking about its capabilities developed over the past three decades to maintain an aviation industry. This has led to a whole series of indigenous helicopters, as **Mohammad Razazzan** *reports.*

Iran had purchased four R44 helicopters from the United States to train local pilots.

In 1969, following the purchase of a considerable number of helicopters from Italian company Agusta, Iran made an initial step to establish a helicopter support and maintenance unit under the name Iran Helicopter Company Joint Stock.

Following this, with a substantial number of helicopters arriving from America's Bell Textron in 1973, extensive planning to support the new fleet was started.

Thus, the Iran Helicopter Support and Renewal Company (IHSRC – or Panha in Persian) became the largest helicopter maintenance centre in the Middle East.

Following the 1979 Islamic Revolution, severance of ties with the USA and the imposed war inflicted to the new regime, IHSRC experts were able to become self-sufficient in the maintenance and renewal of Iran's helicopter fleet, with the aim of supporting Islamic combatants in the battlefront.

In the wake of these achievements, the responsibility to repair and support different models of military and civil helicopters, including the Bell 205, Bell 206, Bell 212, Bell 214, CH-54 Chinook,

helicopters

RH-53D, SH-3D, Bell 412 and Mil Mi-17, belonging to domestic companies and also military forces, such as the Iran Red Crescent Organization, National Iranian Oil Company (NIOC), and Iran Army Aviation, was given to Panha.

Bell's relationship with Iran is long and complex. During the 1970s, Iran's then-leader, Mohammad-Reza Shah Pahlavi, developed a serious taste for western aircraft, including Bells, and soon built the largest fleet of military helicopters in the Middle East, including Huey-class 205 and 214s He also purchased more than 200 AH-1J Sea Cobra gunships.

But the Shah wanted to do more than buy Bells; he also wanted to build them.

While continuing to import hundreds of millions of dollars' worth of Bells, the Shah's government inked a deal with the company to pay half the development costs of a new variant of the 214A, a stretched and more powerful version labelled the 214ST, to be produced in Iran. Under the deal, Bell built a large aircraft factory in Iran.

A non-conforming prototype flew in Iran in 1977. After the Shah abdicated in 1979, Bell moved to develop the 214ST on its own.

After western sanctions following the Iranian Revolution, the official policy of the Iranian Government changed from having the best available in the world to being able to manufacture independently in order to meet domestic needs.

Since the 1990s, Iran has reverse-engineered parts, assemblies and, in some cases, whole aircraft, including the Bell 205, 206 and 214.

Iran Aircraft Manufacturing (HESA) and Panha are completing the work. The knock-offs are being marketed under the names Shahed 278, and Shabaviz 275 and 2061, and Panha 2091, a remanufactured AH-1J Cobra.

A light gunship derived from the Bell 206, the Shahed 285, was unveiled several years ago.

Nuclear deal

After signing a nuclear deal, following the removal of western sanctions, leading international manufacturers of civilian helicopters and spare parts have announced a willingness to resume cooperation with Iran and invest in Iranian projects.

Lockheed Martin, the largest US arms maker and parent of Sikorsky, has begun to study the possibility of selling commercial helicopters to Iran, but said the market may be small and the company still needed guidance from the US Government.

Lockheed, along with Boeing, is one of the first major US aerospace companies looking into selling to Iran for the first time since US sanctions were imposed.

Nathalie Previte, vice president of sales and marketing for Sikorsky, said the company had received numerous inquiries from existing customers, including leasing companies and operators, interested in possible helicopter operations in Iran.

Sikorsky's S-76 and longer-range S-92 commercial helicopters could be options for Iran, Previte said, although she added that the country has little of the offshore drilling activity that drives helicopter demand in the oil and gas sector.

Iran had purchased four R44 helicopters from the United States to train local pilots in 2014.

Russia and Iran JV

Russian Helicopters is to establish a joint venture to assemble light civil helicopters in Iran.

It is to form part of the Rostec and Industrial Development and Renovation Organization (IDRO) of Iran for the assembling of light civil helicopters manufactured in Russia.

A memorandum of understanding (MoU) was signed by Russian Helicopters CEO, Andrey Boginsky, and IDRO chairman, Mansour Moazami, aimed at promoting cooperation between Russia and Iran as part of the programme on upgrading the Iranian helicopter fleet.

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IRAN'S HELICOPTER OPTIONS

In the last two decades, Iranian aviation industries have tried to develop and design new helicopters or upgrade previous models. The aircraft include:

THE SHABAVIZ 206-1

Iran acquired more than 100 Agusta-Bell Model 206 types (206As and 206Bs, licence-produced Bell 206 and 206Bs) during the mid-1970s.

A small fraction of this fleet was still flying by 1990, attrition coming from service during the Iran-Iraq War, difficulties in acquiring replacement parts and lack of maintenance experience.

The Shabaviz 206-1 is a reverse-engineered Agusta-Bell AB-206. Its programme is one of many conducted by Panha and HESA, aimed at developing self-sufficiency in industry, primarily military industry, as well as sustaining the existing Iranian fleet.

SHABAVIZ 2-75

The Shabaviz 2-75 is a reverse-engineered Bell 214C produced in Iran. Panha and HESA also conduct this programme.

In October 2006, Bell-Textron filed a civil suit in the District of Columbia for selling, among others, the Shabaviz 2-75 and 206-1 helicopters, which it claimed "[traded] on Bell's reputation".

PANHA 209-1 (TOUFAN 2)

In December 1971, Bell signed a contract with the Imperial Iranian Government for 202 improved AH-1J Cobra gunships.

The improved Cobra, known as the International AH-1J, that resulted from this contract featured an uprated P&WC T400-WV-402 engine and stronger drive train to support 1,675 horsepower. Recoil damping gear was fitted to the 20mm gun turret, and the gunner was given a stabilised sight and even a stabilised chair.

Some 62 of the International AH-1Js delivered to the Shah's forces were tube-launched, optically tracked, wire-guided (TOW)-capable, while the rest were not.

Iranian AH-1Js saw service during the Iran-Iraq War but, because of a lack of spares, the fleet was reported grounded by 1990. The Iranian Government initiated a programme to bring these aircraft back online.

The Shabaviz 209-1 is an upgrade programme of the AH-1J Cobra attack helicopters conducted by Panha and HESA. In addition to service life extension, the upgrades have also made the helicopter's systems compatible with the Toufan anti-tank guided missiles (ATGM), a derivative of the US BGM-71 TOW missile.

It is not clear how many AH-1Js remained to be upgraded, but aircraft were displayed during exercises in 2006 and 2007.

The Iranian version's most notable visual feature is the new bulletproof canopy design. However, a deeper observational dissection of the revamped helicopter yields all-new forward and rear cockpit instrument panels for the crew of two, a new avionics suite, revised cockpit armouring, and a nose-mounted forward-looking infrared (FLIR) camera.

A radar warning receiver (RWR) has been installed to help manage protection of the vulnerable rear quarters of the aircraft. GPS has been integrated for improved battlefield navigation.

The Toufan retains the Sea Cobra's three-barrel M197 20mm Gatling-style cannon in its powered chin turret assembly, as well as the landing skid undercarriage. It also keeps its short armament wing stubs intact for the fitting of various weaponry, such as rocket pods and ATGMs.

Wing stub tips are thought to support the Misagh-2 short-range surface-to-air missile, this being an Iranian copy of a Chinese copy of the American AIM-9 Sidewinder.

SHAHED 278

The Shahed is a locally-designed Iranian light helicopter with a combination of components of several helicopter-types, visibly similar to the Bell 206.

Reported to have made its maiden flight between 1997 and 1998, and accumulated 200 flight hours by March 2001, the Shahed 278 was publically displayed for the first time in 2002.

The Islamic Revolutionary Guards Corps (IRGC) has designed and manufactured the combat version.

The body and propeller blades have been made of non-metal composite materials, which contribute to light weight, avoids corrosion, and, consequently, enables it to operate in diverse environments.

It has a flight endurance of more than four hours and enjoys a dual flight management system. In newer models, a multi-function display (MFD) can be installed, which improves repair and maintenance time.

Its main missions are patrolling and identification, air control and commander carrying, military and commercial pilot training, city traffic control, air ambulance, environment protection patrolling, and utilities lines supervision.

The different versions of this helicopter are used for firing anti-armour missiles.

SHAHED 285

The Shahed 285 was unveiled on May 24, 2009. The IRGC says the state-of-the-art helicopter is capable of taking part in seaborne and airborne combat operations.

The Shahed 285 can carry cannons, machine guns, guided missiles, anti-armour missiles and air-to-air and air-to-sea missiles.

The "100% domestic-made all-weather aircraft" has a slick aerodynamic design and is capable of taking off in harsh conditions. Its rotors and cabin are made from advanced composite materials.

The newly developed aircraft is easy to maintain and can be stored in combat zones for immediate access.

Compared to the American OH-58 Kiowa, which retains the airframe of the Bell 206, the Shahed 285 is a single-seater with a narrower fuselage, but retains the tail and power plant/rotor structures, and is intended for military use.

The helicopter performs military missions, including reconnaissance and combat patrols, and ground forces support.

The helicopter has a range of 800km and an endurance of about five hours. It is camouflaged in light blue for marine environments.

So far, it has used two types of weapons – anti-ship missiles known as Kosar, weighing 120kg with a range of about 25km installed on each side of the helicopter; and SADID 1 rockets, mounted four on each side, which, according to sources, have a range of 10km.

SABA 248

The last helicopter to be unveiled is the Saba 248, which was reportedly designed and built by Panha in partnership with the Defense Ministry's Aviation Industries Organization.

It was revealed during a ceremony, attended by top military officials, on March 7 this year.

The Saba 248 is a skid-equipped twin-engine, four-bladed utility helicopter that is similar in appearance to western platforms such as the AgustaWestland AW119 and Bell 427.

Although no performance specifications for the aircraft have yet been released, the AW119 and Bell 427 have cruise speeds of 267km/h and 273km/h respectively; ranges of 1,013km and 722km; maximum take-off weights of 2,720kg and 3,175kg; and can carry eight and seven passengers.

Judging from appearances, the Saba 248 will be in roughly the same class of performance.

Billed as both a civil and military platform, the Saba 248 is likely to be used by the Iranian armed forces for troop and cargo transportation, battlefield liaison, casualty evacuation, search and rescue, and observation and reconnaissance.

The national media reports did not say if it could be armed, and neither did they say how many helicopters might be delivered or when.

As well as being used by Iran, the Saba 248 is to be offered to the international export market with a particular focus on other Muslim nations, according to Iranian defence chief, Brigadier General Hossein Dehqan.

"Saba 248 is a medium-weight helicopter, capable of carrying eight occupants. The military hardware is able to participate in cargo and passenger transport missions as well as rescue, photographing and reconnaissance operations," Dehqan added.

Embraer Executive Aircraft will be displaying a range of its jets, including its Phenom 100 (above) and the Legacy 500 (right).

Nothing stands still at EBACE – not even the static display

This year's European Business Aviation Convention & Exhibition (EBACE) will see more than 500 exhibitors, feature 60 business aircraft on its new static location, and hold new and 'inspiring' forums. **Marcelle Nethersole** *looks forward to the event.*

EBACE, which takes place in Geneva, Switzerland from May 22-24 and is jointly hosted by the European Business Aviation Association (EBAA) and the National Business Aviation Association (NBAA), brings together everyone involved in the global business aviation sector – from industry leaders and manufacturers to flight avionics firms and charter/lease companies.

"While the show is the only major European event focused solely on business aviation, attendees come from as far as Africa, Asia, the Middle East and North and South America," said Peter Korns, NBAA's manager, operations.

It will kick-off with a keynote address by Bertrand Piccard, chairman of the Solar Impulse project, and the first to fly a solar-powered aircraft around the world.

Focus over the three-day event will be on the effects of Britain leaving the EU (Brexit), career development, as well as industry hot topics, including security.

"Every year, we try to introduce very topical sessions to the agenda so attendees are updated on the latest trends, tendencies and legislation in the European business aviation market," said Bianca Dorneanu, events operations manager for EBAA.

"Our annual 'state of the industry' session is always one of the most successful. Other topics this year are security challenges, best practices in environmental impact reduction, and the very controversial Brexit and its implications on air transport in Europe, as well as an educational session."

Aviation leadership

This year's show will feature networking opportunities, including a session called aviation leadership – cleared for take off; a women's networking event; the European business aviation communicators breakfast; and the YoPro networking brunch and debate.

"EBACE 2017 will also be more interactive and participatory than ever," said Dorneanu.

For the first time there will also be an EBACE careers in business aviation day. "This inaugural event is based on the annual career day programme hosted at NBAA's annual convention, which has shown year-over-year success," explained Korns.

"In partnership with EBAA, we want to carry this concept over to Europe, recognising that the challenge our industry faces in terms of the future workforce is, in fact, a global one."

Visitors will also discover there is a new location for the aircraft static display, as on-going construction for the Geneva International Airport passenger terminal is moving into the final phase. Complementary shuttle bus services will be provided to the new static display location.

Joe Hart, NBAA's director of static displays said: "This year's static display will feature nearly 60 aircraft, including new and pre-owned aircraft. The new location will make the static display even more convenient for attendees."

Companies displaying aircraft include Gulfstream, Bombardier Business Aircraft, Boeing Business Aircraft, and Pilatus.

Range of jets

Embraer Executive Aircraft will also be displaying a range of its jets, including its Legacy 450, 500 and 650, and its Phenom 100 and 300. The company will also be introducing its new Embraer Executive Jets CEO to European market.

"We are excited that EBACE is where we will be introducing Michael Amalfitano," said a spokesperson for Embraer. "His experience in the business aviation industry spans more than 35 years."

He added that the company has lots in the pipeline: "This year we are bringing to the market the enhanced versions of the Phenom 100 and the Legacy 650, with new technologies to further improve their performance. We are constantly studying market opportunities, including what we have called the 'premium transportation model'. We believe that new business models will increase demand for the segment.

"There is a huge gap between airlines and current business aviation utilisation. Considering business aircraft as a productivity tool, new technologies that enhance connectivity, communication and comfort, may offer many more people a premium service that complements regular point-to-point transportation.

"In the future, customers will continue to require products with high reliability, ease of maintenance and low operating costs."

LEGACY® 500
BY EMBRAER

LEGACY 500: LEAPS AND BOUNDS BETTER THAN OTHERS

"The cockpit design in the Legacy 500 is clean, dark and quiet, which is very nice. Everything's at 12 o'clock. The flight deck is efficient in layout, very easy for a pilot to get the airplane started and avionics loaded. As far as using the sidestick and flying the Legacy 500, it really is amazing. You can have the airplane go to a certain position and it'll hold that position in flight. It's really neat.

In most airplanes, you have the yoke in the middle; it can be very confining. We had a long trip, about five hours and 45 minutes, and I remember that trip, in the cockpit, I was able to cross my legs. I looked over at the other pilot and said 'Boy, this is nice. When was the last time you were able to cross your legs in the cockpit?' And you're able to do that in the Legacy 500.

The passengers are really taken aback, especially on takeoff. And they're shocked at how quickly we get to altitude and also how steep of a climb we're doing. They're really impressed by that. They're like 'Wow, that's pretty amazing.'"

- Brad Knaack, Legacy 500 Pilot

Watch Brad's story and request more information at
EmbraerExecutiveJets.com/Brad

The game-changing Legacy 500 — the first midsize jet with fly-by-wire controls — is the benchmark for the future in performance, passenger room and comfort. On the flight deck, the advanced Rockwell Collins Pro Line Fusion™ platform puts pilots in complete control in a cockpit environment that provides superior ergonomics. With seating for up to 12 passengers, the Legacy 500 delivers a smooth flight in a largest-in-class stand-up cabin with a flat floor, fully equipped galley, state-of-the-art inflight entertainment and elegant seating that converts into fully flat berths in a low cabin altitude. The main baggage compartment is the largest in class and complements generous inflight-accessible cabin stowage space. The clean-sheet-design Legacy 500 is also the fastest jet in its class, delivering a high-speed cruise of Mach 0.82 and excellent runway performance.

Rethink Convention.

EMBRAER
Executive Jets

ALFA AIR SETS SIGHTS ON CÔTE D'IVOIRE AND SENEGAL

Moroccan business charter operator, Alfa Air, is developing its activities in Côte d'Ivoire and Senegal, and the operator's founder and president, Chakib Lahrichi, has been explaining his vision for the development of the African business aviation marketplace.

Alfa Air is based in Casablanca, Morocco, having been established in 2007.

Its operations have grown steadily and its twin-engined fleet includes two jet Dassault Falcon 10s; a Falcon 20 and a turboprop BAe Jetstream 32, all operated across central Africa and northern Europe

Lahrichi said: "We have a strong tourism industry in Morocco, including the luxury end of the market, with key destinations like Marrakech, the cities of the south and the imperial city of Fez. The distances involved and the potential travelling time mean some tourists prefer to fly."

But VIP transport represents only 40% of Alfa Air's business. Its main activity is medical evacuation, mainly from Africa to Morocco; from the cities of Morocco to the hub of Casablanca; and from Morocco to Europe.

Alfa Air also operates an ad hoc freight business.

With one of the most advanced aviation and air transport sectors in Africa, Morocco's airports recorded record passenger traffic in 2016, according to the Moroccan Airports Authority (ONDA). Commercial air traffic recorded positive figures (+3.58%), while aircraft movements (+1.16%) and freight (+6.52%) were also up. And there are now five new fixed-base operations (FBOs) – Casablanca Mohammed V, Marrakech Menara, Rabat-Salé, Agadir and Al Massira Dakhla.

Chakib Lahrichi and the Alfa Air Falcon 20.

According to Lahrichi, this market is becoming more and more cramped and Alfa Air has to look beyond Morocco and exploit other markets. "So we have decided to concentrate on Côte d'Ivoire and Senegal."

Alfa Air has set up a company in Abidjan (Alfa Air Africa) and has taken steps to register an aircraft in Dakar and another in Abidjan. "The authorities in Côte d'Ivoire and Senegal are working hand-in-hand with business aviation operators. Senegal is very interesting for us as a medevac centre as well as for VIP transport, while Côte d'Ivoire has more potential for the transport of funds and mining," Lahrichi concluded.

Honeywell's MCS-8200 is a fuselage-mounted antenna suitable for commercial airliners and VVIP aircraft. This can theoretically deliver maximum data rates up to 30-50Mbps.

Middle East business aviation users, who have been putting off investing in in-flight connectivity systems, don't have to wait any longer, thanks to a number of recent innovations. **Steve Nichols** *reports.*

MUST FLY – I HAVE A MEETING IN THE OFFICE...

Users looking for an in-flight connectivity system that will give them an "office in the air" experience now have a few to choose from.

First up is Inmarsat's Jet ConneX (JX) system for business aviation that uses three Ka-band Global Xpress I-5 satellites. The system, which was due to enter commercial service introduction at NBAA in Orlando, covers the globe up to about 80-85 degrees latitude.

Inmarsat says JX promises to provide customers with the fastest global satellite data rates in business aviation.

It enables HDTV live streaming, advanced in-flight entertainment (IFE) and office features, voice over internet protocol (VOIP) telephony, virtual private network (VPN), high definition (HD) video conferencing, high-speed internet, social media and any internet-accessible applications.

Mark van Berkel, president and chief executive officer of MEBAA member TrueNorth Avionics, says his company is already getting a lot of enquiries about JX.

The company, which specialises in VVIP and head-of-state (HoS) aircraft in the region, such as the Airbus ACJ and Boeing BBJ, says its customers want a seamless connectivity experience and demand the very best.

"From personalised, gold- or platinum-plated TrueNorth handsets to the fastest available bandwidth, our customers require a high-quality service. We've been involved in integrating JX from the outset and have been talking to our customers about what it can offer," he said.

Honeywell has been developing two JetWave antennas for the JX system. The first – the MCS-8200 – is a fuselage-mounted antenna suitable for commercial airliners and VVIP aircraft. This can theoretically deliver maximum data rates up to 30-50Mbps.

Honeywell's smaller antenna is a tail-mounted parabolic dish – the MCS-8000 – that is better suited to smaller business jets.

You can buy a Jet ConneX data package that specifies a "maximum information rate" (MIR) as well as a "committed information rate" (CIR), which is the guaranteed minimum data rate per subscription level.

Guaranteeing a minimum information rate ensures that your service will always perform to at least that level. The current MIR is limited to 15Mbps – this is still more than 30 times faster than Inmarsat SwiftBroadband – but the company has hinted that it may increase the speeds beyond 15Mbps once the service is established.

Kymeta is also developing a flat-panel antenna for JX called the mTenna that would suit smaller business aircraft. This is a novel design using futuristic thin film transistors, although we may not see the mTenna commercially available until at least mid 2017 and possibly 2018.

A number of other suppliers are looking at supplying JX for users in the Middle East.

Stephan Egli, SITAONAIR's chief commercial officer, said: "The service is going to be very popular for users wanting global connectivity with high bandwidth."

The company is no stranger to users in the region, especially with its existing Inmarsat L-band SwiftBroadband systems.

"We are flying on many HoS aircraft, including Airbus ACJs, A330s and A340s, Boeing 767s and BBJs," said Egli. "However, not many people know about it due to our very sensitive non-disclosure agreements.

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"Comlux also has us flying with SwiftBroadband on two Airbus A320s and a Boeing 767."

Kurt Weidemeyer, Inmarsat's VP strategy and business, said: "A lot of our partners are working on supplemental type certificate (STC) programmes for a wide range of platforms and we want to get them on the JX network."

GDC Group is developing an STC for the installation of the Honeywell's Ka-Band JetWave hardware on different Boeing and Airbus aircraft, including the Boeing Business Jet, Airbus Corporate Jet and commercial configurations.

Derek Donahue, Satcom Direct's regional director for Eastern Europe, Middle East and Africa, (EEMEA), said that it has aircraft due to deliver with JX. "We have had a JX-equipped Airbus A320 going to a customer, plus we are working on a Boeing 747 and an Airbus A330.

"Our customers are craving more bandwidth and JX will deliver," Donahue added.

"We are also working on a Boeing 777 that will be equipped with three systems – Inmarsat JX, SwiftBroadband and ViaSat Yonder Ku.

"There is still a lot of interest in Ku-band connectivity, especially among customers who can't fit JX to their aircraft type."

You could be forgiven for thinking that Inmarsat's Jet ConneX is the only high-speed Ka-band solution available. But you'd be wrong.

ViaSat also has its Ka-band 'Exede in the Air' service.

James Person, ViaSat's director, global business development, general aviation, said: "Our Yonder Ku-band service for business jets has been around for more than a decade and its 1.5-2Mbps connection speed has been good enough for e-mails and web surfing while airborne, but people want more now.

"They want to be able to do everything in the air that they can do on the ground. With our ViaSat 'Exede in the Air' Ka-band service and its smaller dish they can get now a multi-megabit experience."

The Middle East is just on the edge of the KA-SAT coverage and, while Europe is well served, the satellite footprint is patchy over parts of Saudi Arabia, plus any areas south and east from there.

"We intend to roll-out further Ka-band coverage over time, just as cell phone operators expand their coverage," Person said.

ViaSat's Ku-band Yonder service also sells well in the Middle East, delivering megabit speeds to a small antenna.

Looking further ahead, when ViaSat adds the ViaSat-3 constellation it will eventually bring three terabits globally from around 2020.

Gogo believe business travellers will demand more speed and bandwidth. The company has begun to deploy 2Ku on commercial aircraft, delivering speeds up to 100Mbps per aircraft.

Person said: "Each of the three Ka-band ViaSat-3 satellites will bring 1,000Gbps of new capacity to the market. There has been exponential, not linear, growth in the mobile data market and we aim to supply that demand."

Users who have been put off by the alleged lower bandwidth available via Ku are also in for a treat.

So-called high throughout Ku-band satellites (HTS), such as Intelsat's EpicNG range, are being introduced, which use more powerful spot beams to boost data speeds.

Intelsat-29e is now in orbit and there are more HTS Ku-band satellites in the pipeline.

Intelsat says its new EpicNG high throughput satellite (HTS) Ku-band platform is delivering a 165% to 330% increase in spectral efficiency with ground platforms and modem technologies.

It is also giving up to 300% improvement in throughput when using next-generation antenna technology.

This has caught the attention of providers like Panasonic Avionics, which has partnered with Astronics to provide a new Ku-band in-flight internet and TV connectivity solution to VVIP and HoS customers.

Connection speed

Gogo Business Aviation is also keen to point out that its 2Ku solution is available. The company has begun to deploy 2Ku on commercial aircraft, delivering speeds up to 100Mbps per aircraft.

Gogo currently has 14 aircraft from four airlines equipped with 2Ku, with more than 1,200 scheduled for installation over the next two years.

Pascale Barhouche, Gogo's regional sales manager based in Dubai, said: "In the business aviation space many VVIP customers fly aircraft large enough to accommodate the 2Ku antenna, and most of those customers are based in the Middle East.

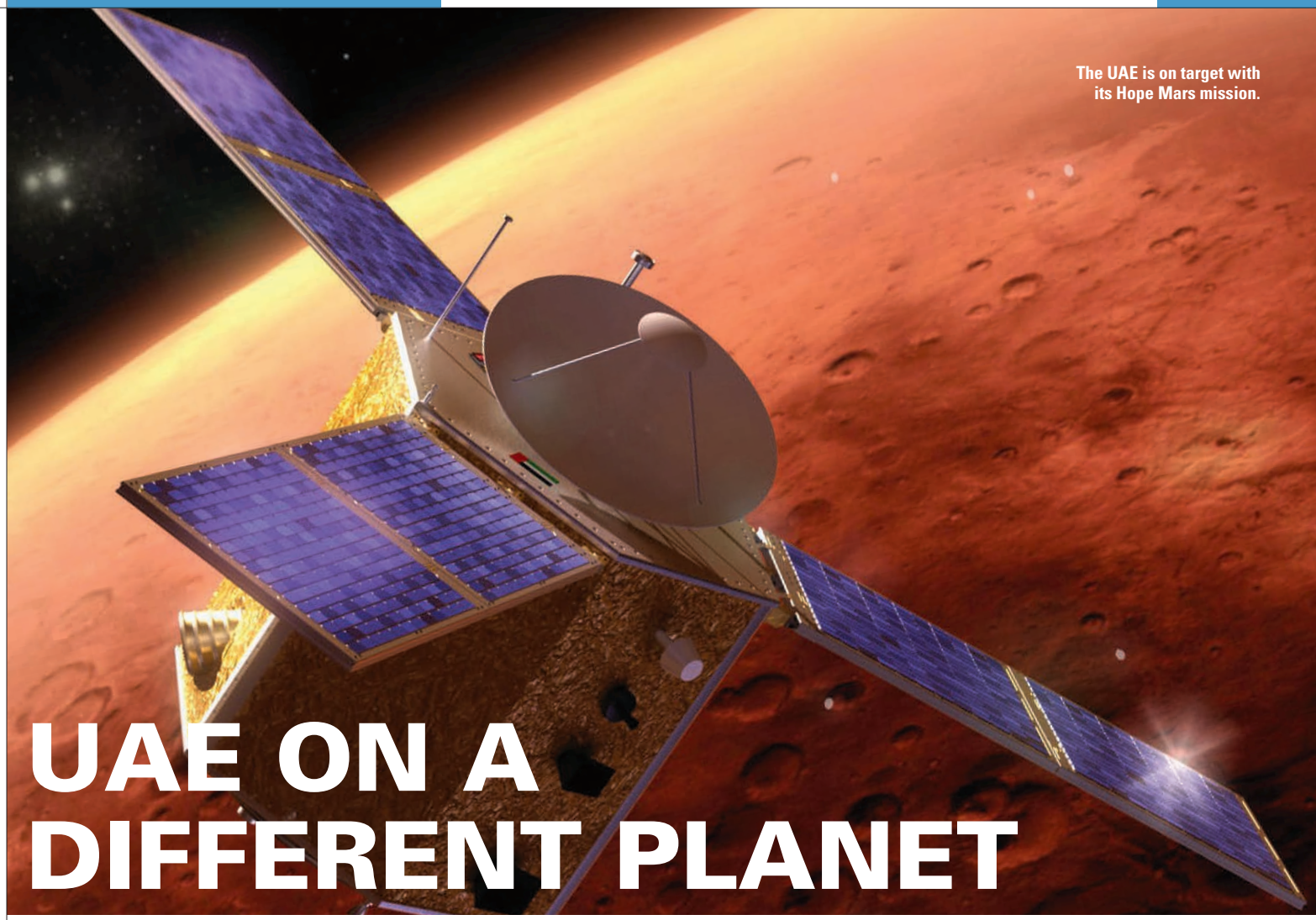
"So 2Ku is a viable option for them to consider if they want the latest technology providing high-speed connectivity to their aircraft. For the more standard-sized mid-to-heavy global business aircraft, Gogo offers Inmarsat's Jet ConneX Ka-band broadband service."

So how does Gogo see demand for faster services changing over the next few years?

"If history is any indication, we believe business travellers will demand more speed and bandwidth – just like we've seen an increase for it on the ground.

"In-flight connectivity has gone from being a nice to have, to a necessity. We also see connectivity enabling new services that will increase safety and efficiency, providing real-time turbulence data collected and delivered by the aircraft via Gogo's networks, and then aggregated and analysed for use by other aircraft.

"The better and faster the network operates, the better the services and apps will operate," Barhouche concluded.



The UAE is on target with its Hope Mars mission.

UAE ON A DIFFERENT PLANET

The Global Space Congress took place recently at the St Regis Saadiyat Island Resort in Abu Dhabi, demonstrating the UAE's commitment to the industry. **Steve Nichols** *was there.*

The international event, which attracted more than 600 experts and around 90 speakers, was held under the patronage of HH Sheikh Mohamed bin Rashid Al Maktoum, vice president and prime minister of the UAE and ruler of Dubai.

His Highness attended the first day of the event, hearing how the UAE space sector is forging ahead with its plans and inspiring youngsters across the Emirates.

Dr Mohammed Al Ahbabi, director general, UAE Space Agency, said that this was part of the wider plan to move the Emirates away from an oil-based economy to one based on science, technology and engineering.

The benefits include economic growth and diversification, encouraging advanced scientific research among students and graduates, and long-term global partnerships. Emirati space-based companies already include Thuraya and Yahsat.

This was emphasised with the signing of a memorandum of understanding with the Korean Space Agency at the event, the latest in a long series of MoUs with agencies worldwide. The UAE has a long-standing relationship with South Korea, as the country's Satrec Initiative is its partner on the DubaiSat and KhalifaSat programmes.

Dr Khalifa Al Romaithi, chairman of the UAE Space Agency, said: "The UAE space sector's strategic goals focus on building and strengthening international relationships and partnerships in the field, including developing bilateral relations with Arab states."

To underline the region's commitment, Yosouf Hamad Al Shaibani, director general of the Mohammed bin Rashid Space Centre (MBRSC), announced that the centre had submitted a request to host the 71st session of the International Astronautical Congress (IAC) in 2020.

The audience also heard that the UAE is on target with its Hope Mars mission, which will launch aboard a Mitsubishi Heavy Industries rocket from Japan in 2020.

It should reach the Red Planet in 2021 to coincide with celebrations that will mark the 50th anniversary of the UAE's foundation.

Once in orbit, Hope will explore the Martian atmosphere using

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scientific instruments that include visible, infrared and ultraviolet spectrometers.

Its data should help scientists build a holistic model of the planet's daily and seasonal cycles, and may explain why Mars lost a lot of its atmosphere to space.

Sarah Amiri, acting director, space science department at MBRSC, said that Earth and Mars have a lot in common, so this is a vital step to understanding our own world.

Shortly after the conference, the UAE also unveiled a new project that aims to establish the first inhabitable human settlement on Mars by 2117.

Called the Mars 2117 Project, it is set to be developed and executed in partnership with major international scientific research institutions.

Meanwhile, MBRSC showcased its space projects and initiatives including KhalifaSat, a 350kg Earth observation satellite, due for launch in 2018. This will join DubaiSat 2, which was launched in 2013, and DubaiSat 1, which pioneered UAE Earth observation technology in 2009.

It was also due to launch its Nayif-1 cubesat a week after the congress, a nanosatellite with a standardised and simplified cubic design, weighing about 1kg and with sides 10cm long.

Nayif-1 was eventually launched on Wednesday, February 15 and is transmitting data to schools and universities. It produces a communication footprint ranging from 5,000-5,500km and will orbit at a height between 450km and 720km for up to three years.

Cubesat missions

MBRSC also talked of future cubesat missions to follow on from Nayif-1, which was built by engineering students from the American University of Sharjah (AUS). It confirmed that there are other cubesat projects planned at five UAE universities.

The event was also an opportunity for youngsters to find out more about the industry through the Airbus 'Little Engineer' space workshop.

This gave students the opportunity to simulate a space mission and send an unmanned mission to Mars. Students were tasked with building space vehicles and a rocket, using science, technology, engineering and mathematics (STEM) in a hands-on fun way.

Industry partnership on education is a vital part of the Emirates' space programme. The congress heard how 16 young Emiratis had spent an intensive four months with Lockheed Martin in the US in 2016. This culminated in them witnessing the launch of the OSIRIS-Rex spacecraft, which will study Bennu, a near-Earth asteroid. A further event is planned for later this year.

Dr Alice Bunn, director of policy at the UK Space Agency, said that activities like this were vital to guarantee the next generation of space scientists and engineers, citing how UK European Space Agency astronaut Tim Peake's 'Principia' mission had done just that.

Showcasing the MENA region

Readers might be forgiven for thinking that the congress only focused on the UAE space industry. But it was also an opportunity for other Arab countries to showcase their exploits.

HH Prince Dr Turki Bin Saud Bin Mohammad Al Saud, president, King Abdul Aziz City for Science and Technology, spoke about Saudi Arabia's space industry. He said it had grown enormously since Prince Sultan bin Salman Al Saud took part in space shuttle mission STS-51G in 1985.

The kingdom has subsequently launched 13 satellites and this will rise to 20 by 2020. It is also planning the launch of a geostationary satellite in 2018.

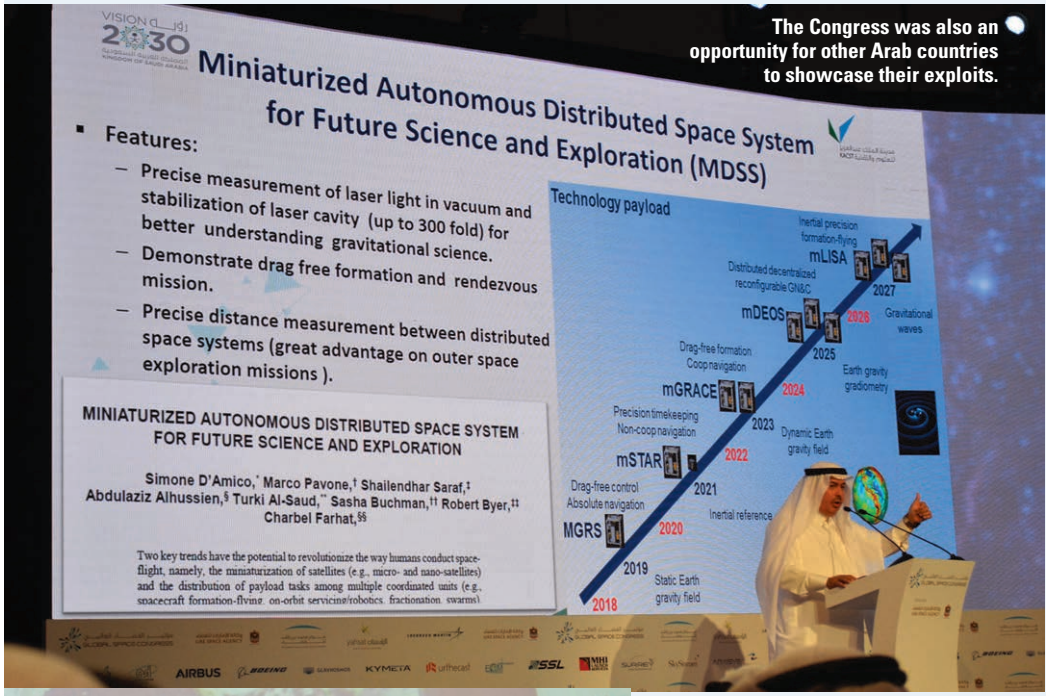
He said Saudi research is being used around the world and 10% of its space employees are female.

Algeria is celebrating the recent launch of two satellites, AlSat-1B – a medium-resolution Earth observation satellite built by SSTL – and AlSat Nano, a cubesat designed and manufactured by the Surrey Space Centre at the University of Surrey in the UK.

ASAL, the Algerian Space Agency, said the two satellites shared the ride into space. AlSat Nano will deliver an educational and technology demonstration mission for the UK Space Agency and ASAL.

Egypt launched its first satellite for TV in 1998. In 2007 it also launched its first Earth observation satellite.

Dr Mahmoud Hussain, acting chairman, for Egypt's National Authority for Remote Sensing and Space Sciences (NARSS), said it has plans for further space projects and longer-term plans to build satellites.



The Congress was also an opportunity for other Arab countries to showcase their exploits.

Professor Anu Ojha: hands-on and interactive sessions for local youngsters and undergraduates.

Inspiring the next generation

Two space masterclasses were held at the event, presented by the UK National Space Academy and the UAE Space Agency.

Academy director, Professor Anu Ojha, OBE, and general manager, Dr Kierann Shah, led hands-on and interactive sessions for local youngsters and undergraduates.

Professor Ojha received his OBE for services to science education in the UK, after helping school teachers learn innovative and exciting ways to involve space when teaching science, technology, engineering and mathematic (STEM) subjects.

The UAE Space Agency is using some of his techniques nationally to inspire its next generation of space scientists and engineers.

Bill Marks: "Our tests show that, without heating, the panel still works at low temperatures."

Kymeta mTenna a step closer

The new Kymeta mTenna Ka-band flat-panel antenna, for use with Inmarsat's GX Aviation in-flight connectivity service, is getting closer to production.

Speaking at the congress, Bill Marks, Kymeta's chief commercial officer, said that when it was complete, the mTenna would bring connectivity to platforms that were too small for Honeywell's JetWave fuselage- and tail-mounted antennas, including business jets, small regional aircraft, private aircraft, and unmanned air vehicles (UAVs).

Honeywell and Inmarsat have been working with Kymeta on the small flat-panel thin-film transistor (TFT)-based Ka-band antenna for the latter's new broadband GX Aviation service.

The antenna's TFT technology has been developed by Kymeta and is produced by Sharp in Japan.

So when can we expect to see it launch?

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Marks didn't want to put a date on it, saying Kymeta was working with both Inmarsat and Honeywell and it was the latter that would integrate the Ka-band terminal and, ultimately, gain Federal Aviation Administration supplemental type certifications.

"We haven't decided upon the mTenna's final size, but we do have prototypes," he added.

There had been rumours that Kymeta was having problems getting the antenna to handle the low temperatures found at altitude, but Marks was quick to quash them.

"We can easily embed a 200 Watt heater in the panel that solves any issues with cold," he said.

"Our tests show that, without heating, the panel still works at low temperatures and the performance doesn't degrade much – you certainly wouldn't lose satellite connectivity – but a little heating solves the issue.

"And we can also resolve some of these issues in the software controller," he added.

It is one thing getting it to work at room temperatures but, when they fall down to -30C or -50C at altitude, the characteristics of the TFT semiconductors can change dramatically.

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Marks said interest in the aircraft mTenna is high, and not just from the business aviation community.

The air transport market is also keen to get involved as the mTenna could offer a lower drag footprint than the Honeywell fuselage-mounted steered array.

Two or more mTennas mounted on the fuselage could also be phased together to give more performance.

"As well as lower drag, the mTenna offers lower weight and maintenance needs compared with current aircraft satellite terminals as it has no moving parts," Marks said.

The antenna would only protrude about two inches above the fuselage, making the radome easier to manufacture (and less likely to suffer bird strike damage) and reducing the drag coefficient – helping to reduce additional fuel burn.

Fundamental to the future of humanity

A big question often asked is why should a country have a space industry? What are the benefits to humanity?

Professor Sir Martin Sweeting, executive chairman, Surrey Satellite Technology Ltd (SSTL), said the answer was simple. "Sooner or later, we will have to leave this planet. Space activities are, therefore, fundamental to the future of humanity," he said.

"We need to understand the origins and evolution of our solar system, and then look at the next steps."

He also said we are likely to discover evidence of other life forms somewhere in the universe in the next 10 years.

The first step may be a manned mission to the Moon. The next would be to travel to Mars.

He said watching Neil Armstrong walking on the Moon in 1969 had inspired him and added that we owe it to our future scientists and engineers to inspire them in the same way.

Innovation that is driving down costs

The congress was an opportunity to look at innovation within the space sector.

George Whitesides, chief executive officer, Virgin Galactic, chaired a session that looked at future launch technologies. Virgin Galactic, itself, is planning a spaceplane called Launcher One that could reduce the cost of satellite launchers dramatically.

This is seen as essential if the industry is to grow and become available to more organisations and nations.

Jean Marc Astorg, director of launch, Centre National d'études Spatiales (CNES) in France, said it was working on new designs for the successor to the Ariane-5 launcher. Ariane-6 will be able to operate in two variants – one with two boosters and another with four.

The big game changer is that Ariane-6 will cost around half of Ariane-5, which has now achieved 76 successful launches. Ariane-6 will also reduce the preparation time for launch.

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But CNES hasn't finished there. It plans to develop new engines that could also cost around 50% of existing technology and cut fuel burn costs by 20-25%.

Astorg said that one development was the potential use of methane/liquid oxygen engines.

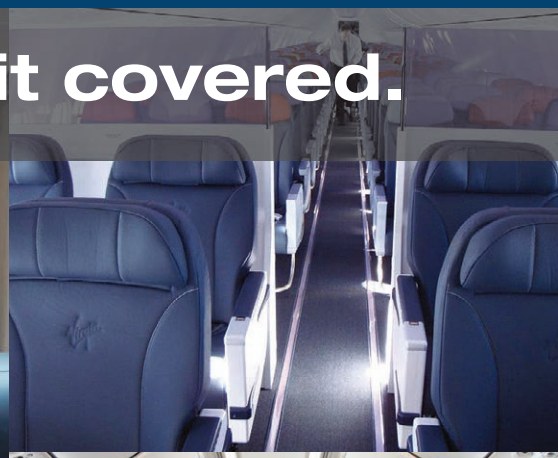
Denis Lyskov, CEO of Russia's Glavkosmos, said the future lies in launching multiple satellites per flight. His organisation has developed new methods of housing many different satellite types on one launch.

He said, with the rise of companies like OneWeb, which plans to introduce global internet services from a myriad of satellites in low-Earth orbit, there was now a big demand for companies that can launch many satellites at once.

Electric propulsion systems that use electric fields to accelerate ionised gas, instead of burning fuel, also allow satellites to have lower mass and be more efficient.

And we may see robotic methods being developed to refuel satellites that have otherwise reached the end of their operational life, so saving millions of pounds on space hardware.

Sabeti Wain: we've got it covered.



LEADERS in passenger seating design and innovation, Sabeti Wain have been making air travel more comfortable for 34 years.

We're preferred suppliers to over 35 major international airlines, as well as delivering design solutions to the top ten seating providers serving the aerospace industry. What makes us special? It could be our people – dedicated workforces at our plants in the UK in Dubai and the USA work to the highest quality standards, so our customers can rely on a unique combination of comfort and durability.

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Aircraft interior companies say that weight saving, passenger comfort, and hygiene are key to the industry's future. **Marcelle Nethersole** *found out more at AIX in April.*

HOT SEATS

Kevin Hwang: "The Pulsating Acoustic (PA) is a truly revolutionary product that enhances a passenger's on-board experience."

As to be expected, seating manufacturers were out in force at the huge Aircraft Interiors Expo (AIX) event in Hamburg in the hope of catching the eye of airlines with their new and latest offerings.

One piece of big news came from international transport design specialist, JPA Design, which will affect the cabin interior for FlyDubai's new fleet of aircraft.

The carrier has partnered with JPA to entirely reimagine a new look for both business and economy class, which will feature on the new 737 MAXs scheduled for delivery from the second half of 2017.

JPA is designing all elements of the two-class cabin interior.

"In business class we are designing a more bespoke seat that will be unique to Flydubai," said John Tighe, JPA's design director. "To seek inspiration that will help inform the final cabin design, we have already spent a good deal of time immersing in the culture, colour and sights of Dubai, which was an important part of the process."

Lift by EnCore, a new aircraft seating company launched in April 2015, was also celebrating. Along with Boeing, it unveiled its new economy-class seat for the 787 Dreamliner, which comes after the successful launch last year of its first seat for the 737.

Designed from scratch, the new wide-body seat is intended to achieve architectural compatibility with Dreamliner cabins.

"Extensive ergonomic testing was conducted on every aspect of the seat in an effort to ensure maximum comfort over long periods of time," said EnCore CEO Tom McFarland.

"The seatback was also designed with intuitive personal stowage options, and a focus on technology and entertainment that are specifically designed for the modern traveller. The seat is also available in a range of colours and material choices – each designed to complement the Boeing Sky Interior."

Development process

Currently still in the design and development process, the seat is due to be delivered to Boeing early next year.

With an on-going race between seating companies to offer the best and latest designs, one UK-based company believes it has one component that sets it apart.

"We introduce and apply our technologies and practices from Formula 1 and the automotive industry," explained Ben McGuire, chief operating officer for Mirus. "We don't use the same suppliers as the seating manufactures – so we use automotive suppliers, which really sets us apart as we are in a totally different supply chain.

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"We can get parts within five days, which vastly reduces the risk of grounded aircraft."

Formed in 2015, the company predominantly manufactures seats for economy class. AirAsia is the launch customer for its Mirus Hawk, a short-range economy seat.

"Our seats are built to last," said McGuire. "Lightweight is the future and if you want the ultimate lightweight it can be done. But being light, comfortable and cost-effective is the challenge.

"I would like to see the future of seats driven by passengers, but it's not; it is driven by the airlines. So we make sure we try and do our best for both."

Another form of seat that is already becoming lighter is the toilet. UK company, MAC Interiors, was introducing its lighter weight lavatory, mocked up on a B767 economy class, as well as its new touchless faucet and touchless soap dispenser.

"We reduced the weight of the toilet by machining the work deck down," explained Matthew Forsbrey, head of sales.

"Our in-house designers developed this using solid surface material Corian. It is machined to a certain thickness to allow LED lights to come through. This offers a greater sense of space to the user.

"The touchless soap dispenser allows for greater levels of hygiene, which is important when on an aircraft with all the germs it can create.

"This has never been done before and we can install it on any aircraft type."

Corian the way forward

Forsbrey said Corian was the way forward as it doesn't stain and is, therefore, more durable.

MAC can reconfigure lavatories to a specification of the airline's choice using its European Aviation Safety Agency (EASA) 21J and 21G certification, along with part 145 approval.

The company has already undertaken the B767 economy-class lavatory refurbishment for its entire fleet. "The lavatories were completed at our facility near Gatwick Airport with the work-scope covering LED lighting, Corian worktop, mirror, faucet, soft close toilet seat, and new vanity units. Feedback from customers has been excellent," said Forsbrey.

While at AIX, the company had interest from a Middle Eastern customer who requested a visit to its facility in Dubai to further discuss lavatory innovations and VIP interiors.

Another company tackling the pesky aircraft germ problem, and overcoming it with great success after being a Crystal Cabin award finalist for its UVC Airplane Sanitising Device, is US-based start-up GermFalcon.

Mark Radford sales and marketing director, shows off the company's lighter weight lavatory, as well as its new touchless faucet and touchless soap dispenser mocked up on a B767 economy class.

"This unique sanitisation system is for the passenger cabin, galleys and lavatories, and uses ultra-violet C light to rid the cabin of germs on the most commonly touched surfaces," explained GermFalcon inventor, Dr Arthur Kreitenberg.

"The ultra-violet C light bulbs are the same as used by hospitals to kill bacteria and viruses. The procedure takes about three minutes to service a narrow-body aircraft."

Comfort also played a big part at the show, with many companies being acutely aware of not just how comfortable a passenger is in his or her seat or, indeed, in the bathroom, but also how to prevent extra discomfort that comes in the form of jetlag.

According to Dr Achim Leder, the co-founder of Jetlite, the use of lighting has been proven to decrease jetlag.

Leder discovered this through his own research and his PhD thesis.

"More than 60% of all passengers on long-haul flights suffer from jetlag," said Leder. "What we offer is a holistic, algorithm-based approach to increase the comfort of passengers, pre flight, during and post. We focus on chronobiologically improved lighting for aircraft, airports and even personalised for passengers before and after the flight.

"This is related to flight times, flight zones and the duration of the flight – so you can change the cabin lighting to reduce the melatonin, the sleeping hormone, which can adapt your inner clock to the new time zone."

Leder also said that jetlag reduction could be improved by customised nutritional concepts for airline catering and airport services, which the company also works on.

Launched last year, the Lufthansa A350 is already using the lighting concept and the company is now aiming to go further.

"We are looking into integrating lighting into the seats," said Leder. "For example, on a business jet, if one person wants to work and one wants to sleep, you can use different lighting situations to suit them, yet they will both feel refreshed upon landing."

Interactive massage

Also looking to offer passengers a relaxed feeling in the air to decrease jetlag, particularly in first class and business jets, is California-based InSeat Solutions, which produces aircraft seating interactive massage systems.

"We are at AIX introducing our new and cool system – the Pulsating Acoustic (PA)," said Kevin Hwang, airline programme manager.

"It is a truly revolutionary product that enhances a passenger's on-board experience."

The PA system features vibration massage with a variety of modes, intensity and speed settings, allowing each passenger to customise their preferred massage level.

"The extra exciting part is that it also features an interactive movie mode in which it responds to the low frequency audio output from the in-flight entertainment system through feedback movements," explained Hwang. "Its purpose is to enhance passenger in-flight experience by simulating a high-end movie theatre."

Qatar Airways' new customisable private suite, QSuite, features the industry's first-ever double bed available in business-class.

Inset: Emirates has enhanced the Onboard Lounge for its flagship Airbus A380.

JOIN THE Q FOR A SUITE

ITB Berlin, the world's largest travel trade show, took place in March and became the launch platform for Qatar Airways to unveil its QSuite, featuring double beds, and Emirates to showcase its new A380 Onboard Lounge. **Marcelle Nethersole** *reports.*

It was two of the Middle East's big carriers that stole everyone's attention at ITB Berlin by unveiling their new interior products, which look set to revolutionise luxury travel.

Qatar Airways' new customisable private suite, QSuite, features the industry's first-ever double bed available in business-class, with privacy panels that stow away, allowing passengers in adjoining seats to create their own private room.

The new seat design was unveiled by Qatar Airways Group chief executive, Akbar Al Baker, who said: "Our unique and patented design is a world first in many ways and challenges industry norms by offering passengers more privacy, more choice and more personalisation.

"With these innovations, Qatar Airways has revolutionised the way we serve our business-class travellers, enabling our passengers to enjoy a first-class experience."

The seat, which is made with hand-stitched Italian leather and has a satin rose gold finishing, also features adjustable panels and movable TV monitors on the centre four, allowing colleagues, friends or families travelling together to transform their space into a private suite so they can work, dine and socialise together.

"On Qatar Airways, you choose when you dine, and the menu options are varied, with something for everyone," said Al Baker. "You choose when you rest, and when you want entertainment; we offer more choices than any other airline. It only makes sense to give you the choice to make your own cabin-within-a-cabin, creating double QSuites or quadrants."

Al Baker added: "To further complement the customisable on-board seating experience that passengers will now enjoy, Qatar Airways is also launching a new food and beverage concept, introducing a menu that offers a host of new dining choices."

The new business-class menu will offer a selection of snack 'sharing dishes' available throughout the flight. A wake-up express breakfast will also be available for those who choose to sleep longer by making the most of the 'do not disturb' option available on the door of their private QSuite.

Meanwhile, Dubai-based Emirates Airlines has spent millions of dollars on its new cabin interiors upgrade programme for its Boeing 777 fleet, and also an enhanced the Onboard Lounge for its flagship Airbus A380.

The A380 fleet is already renowned for its first-class private suites and shower spas. Now, Emirates' latest A380 Onboard Lounge iteration will offer more seating space with a new seating arrangement along the windows on both sides of the bar.

Emirates Airline president, Sir Tim Clark, said: "The A380 Onboard Lounge is hugely popular with our customers. Since we first launched the product in 2008, it has gone through small but successive enhancements in line with customer feedback to increase the amount of space for them to interact.

"In our latest revamp, we have taken inspiration from private yacht cabins and, among other thoughtful touches, we have increased the seating space, and also made it more intimate and conducive for our passengers to socialise or enjoy our lounge service. Each seating area will have a table and window view. Overall, the lounge can comfortably accommodate up to 26 passengers at a time, including eight seated."

Emirates will also introduce soundproof curtains to partition the Onboard Lounge area from the other cabins, put in additional soft ambient lighting options, new window blinds with integrated LED mood lighting, and subwoofers for surround sound.

The lounge also features a 55in LCD screen so customers can view the latest flight information, or enjoy live TV broadcasts of the latest news or sports updates.

All of Emirates' 93 A380s currently in service feature the Onboard Lounge.

RECARO

WE'VE TAKEN THE 'LONG' OUT OF LONG-DISTANCE.

If your long-distance business class flight is over way too soon, it most probably has to do with the RECARO CL6710. Stretch out on its spacious full-flat bed – and experience best-in-class living space and the superb comfort of its direct aisle access suite. Welcome to RECARO.

WAIN'S WORLD

As the only local provider, Sabeti Wain Dubai monopolises the region with its aircraft seating covers. **Marcelle Nethersole** *caught up with director, Paymen Sabeti.*

With its headquarters in the UK, Sabeti-Wain got a request from one of its customers, Emirates Airlines, to open a seating cover facility in Dubai to be closer to the airline.

Sabeti-Wain Dubai opened in 2007 with just one unit at Dubai Free Zone, with the company employing 60 staff. Today it has four units and employs 150 staff. However, that is soon to change as the company further expands.

"We are looking to move the four units to one big unit at the Dubai South Free Zone. It will be much more cost-effective there," explained director Paymen Sabeti.

The company has been servicing Emirates for 19 years. Originally it only expected to have the airline as its sole customer but Sabeti said the customers "just kept coming". The company now produces seat covers for the majority of Middle Eastern airlines.

Secret of success

So what is the secret behind its success?

"Our company has got three things right," said Sabeti. "We have excellent quality with very few rejects from customers; our designs and innovation are top-notch; and we always deliver on time, which is paramount.

Sabeti, who runs Sabeti-Wain along with his sister Mahnoush Sabeti-Wain and her husband Nick Wain, also said it was important to keep the staff happy.

"We have 150 guys working here in Dubai, they are all from Pakistan and fabulous workers," said Sabeti. "We pay for their flights over and a flight home to see families once a year, we also pay their accommodation. We want to keep them happy so they carry on doing such a professional job."

Sabeti-Wain Dubai has four units at Dubai Free Zone and employs 150 staff.

With aircraft seats constantly changing, the company likes to stay on the ball.

"We produce various seat covers, including laminated for a smarter appearance and distinctive corporate branding. The highest standards of workmanship are central to our success, and our seat covers go through a 100% inspection during all stages of manufacture, and on completion," said Sabeti.

"Aircraft seats are always changing and improving. Today, aircraft can have much thinner seats, with a futuristic look. An example is Emirates' Falcon seat, which is flying in business class on the B777 aircraft. It's a slender seat with beautiful leather –the idea is from a Mercedes S class car.

"Airlines want this comfy sofa feel, which is quite difficult as it requires a lot of padding and foam, and at the same time they want it light, which is the number one factor, so this can be quite a challenge. However, it is one that never beats us," said Sabeti.

Converts foam

The company now converts foam at its UK facility. This is something no other local seat cover manufactures does.

"Every seat has a foam bottom that the cover goes on to, so we make those," explained Sabeti.

"The option there is to create different layers of foam of different densities, so you can use memory foam at the top to hug your shape, and then harder foams below to give durability. Something we are looking at working on is where the foam forms a part of the cover – so it's now two separate items that come together.

"We have ergonomics experts in our company and we like to have a say in the shape of the seat as much as the seat manufacturer and the airlines."

The World Travel Catering and Onboard Services Expo (WTCE) took place in Hamburg, Germany in April. The exhibition hall was packed with catering companies from all over the world eager to make a tasty mark on the airline industry. **Marcelle Nethersole** *was there to see what new products might affect the Middle East.*

Catering for the most demanding tastes...

"The sky really is the limit when it comes to cooking on board aircraft now," said Miriam Fontius, project manager at Lufthansa Technik's original equipment innovation division.

The company was at WTCE introducing its recently launched induction cooking platform.

"It allows fresh food to be prepared on board in a safe, clean and economical way that works well with both airlines and passengers," explained Fontius. "Passengers can now be served fresh food, from a perfect fried egg to a juicy steak, in ultra fast time."

The platform fits into any aircraft galley and weighs 13.5kg. It is being offered as an all-in-one solution, including power unit, exhaust fan and special cover and locking systems to ensure that pots and pans remain in place during turbulence.

Interest has already been generated among VIP customers and commercial airlines, and was strengthened by its nomination as a finalist for the Crystal Cabin Award.

Boudewijn van Eeghen, Max van Eeghen, and Erk Veeneman with a selection of FlyFit heathy products.

Cooking platform

"Conversations with potential customers, flight attendants and cooks enabled us to adapt the cooking platform precisely to users' needs," said Fontius. "A number of applications enable not only cooking with pots and pans, but also the use of a special rice cooker with different settings, and a toaster."

Making life simpler for airlines in terms of 'easy food' and packaging seemed to be a trend at the show.

UK company Monty's Bakehouse provides airlines with hand-held snacks and bakery goods. It prides itself on being a one-stop-shop able to "take some of the work away from airlines to make it easier for them".

"We are a market leader in the development and supply of multi-component boxed food solutions to airlines and airline caterers," said Lucy Stowell, senior manager marketing & insight. "We do everything, from product design to recipe design; we have a brand and product and packaging department, where we can offer bespoke packaging for clients through to global logistics. So, if a client is looking for a snack or meal service with a difference, they can either take one of our off-the-peg options, such as a folded pizza or lattice, or we can design something just for them. This certainly makes life easier for airlines, especially used for second service."

The company's baked products include hot wraps, pizza subs, flatbreads, pastries, muffins and a wide range of bakery items, as well as a mixture of ambient boxes, all of which are designed to exacting airline standards and to a wide variety of recipes.

"Any recipe is only as good as its ingredients, which is why we place great store in only using the most natural kitchen cupboard ingredients, while actively pursuing a firm, 'no unnecessary additives' philosophy," said Stowell.

The company started with humble beginnings in 2003 and is now global, manufacturing in Abu Dhabi Europe and the UK.

"Our state-of-the art bakery at Al Wathba, Abu Dhabi is one of most technically advanced in the Middle East," said Stowell. "It is a sleek, free-flowing operation that allows us to produce a diverse assortment of hand-held snacks, bakery items and food-to-go offers.

"Located close to the UAE's most important ports, our new bakery offers a seamless and cost-efficient transfer of goods throughout the Gulf and Asia-Pacific regions. Shipping from Abu Dhabi can reduce transit times by up to two weeks compared with Europe, which means faster response times and reduced costs."

The company's products are on board many of the Middle Eastern carriers,

Matt Penfold, product development manager, shows off some of Monty's Bakehouse treats.

including Etihad Airways, Oman Air and Qatar Airways.

Also at the show were companies offering a taste of their country, something Finnish ice cream maker, Suomisen Maito, has got down to an art form with its bespoke flavours.

"We produce organic ice creams under our Jymy brand," said CEO and partner Horst Neuman. "We can make any signature exclusive ice cream desired by an airline that can represent its country. For example, we are supplying Finnair business class with a speciality pine flavour ice cream, as Finland celebrates its centennial independence. Pine is the national tree of Finland, so it was the perfect choice and works excellently as an ice cream flavour, which may surprise some people."

The company, which sources its milk from a local farm, handpicks the young shoots of local pine trees from its local organically certified forest, which, Neuman said, makes it extra special and free from artificial flavours.

"Finland has the cleanest air, soil and water in the world, which is a strong background to our products," said Neuman.

The company supplies Qatar Airways business class on the Helsinki to Doha route with its vanilla and coffee ice creams but Neuman said: "If they require date flavour – which is regional to them – we can produce that."

Other 'different' flavours include green tea ice cream, made from organic Japanese green tea matcha, and liquorice flavour, using liquorice root extract that is grown in Iran and Egypt, which is a popular flavour in Nordic countries.

As more and more people travel by air, particularly for business, jetlag and fatigue is always part and parcel of the process. Some companies are trying to help combat that by offering airlines vitamin and mineral food boosters.

Vitamin-enhanced

Travel healthy, arrive fit is the slogan of FlyFit, which produces healthy premium food, drinks and vitamin-enhanced supplements, specifically designed to improve the nutritional well-being of people on the move.

The Dutch company was formed in 2009 and has created a range of products that are supplied to airlines, as well as in hotels, airports and other modes of travel, where fatigue can hit.

"We have a brand that helps fight the negative effects of flying," said, co-founder Max van Eeghen. "Our products contain a plethora of vitamins, minerals, and antioxidants that are scientifically proven in the market, that help hydrate the body, boost resistance and reduce fatigue during and after intense travel."

One popular product is its anti-fatigue shot, which is basically a powder you take directly to the mouth without water.

"It is packed with vitamins and minerals, such as B, C and E vitamins, and selenium, zinc and manganese to help tiredness and to nourish the skin, which is perfect for long-haul travellers. It has also been recommended by crew," said van Eeghen. "We have a range of eight flavours and we recommend one shot every three hours for the best results."

Other FlyFit products include nutritional bars, drinks, 100% oat cookies, and chocolate.

"It depends on the region as to what the airlines want," said van Eeghen. "While our anti-fatigue shots are popular, we do a lot of business with US carriers that like our yogurts. Preservative-free, gluten-free, halal-certified and ambient, they are packed with real fruit chunks. What makes them even more attractive to airlines is that they have a shelf-life of nine months, and with a trend on aircraft waste, this really is an answer."

Another company looking to attract airlines with its hydration tablet was UK-based Phizz. Its tablet, by the same name, is made at a Swiss laboratory and promises to combat air fatigue.

"Phizz is an effervescent tablet, which, when dissolved in water, allows for faster absorption," said Daniel Cray, marketing director. "We saw a gap in the market for a product that combined a hydration aid with essential vitamins and minerals."

The company counts Emirates Airlines as one of its customers, with the airline adding Phizz to its amenity kits given to first-class passengers.

New US and British governments' regulations, which prevent passengers carrying electronic devices larger than a cell phone on flights from across the MENA region, may affect the latest in-flight entertainment trend. **Steve Nichols** *investigates.*

WILL WE KEEP ON TAKING THE TABLETS?

Are we poised for a sea-change in the way airlines implement in-flight entertainment (IFE)? Could we see embedded IFE systems being ripped out in favour of passengers using their own devices? What happens if the ban of such devices gets wider traction?

These are questions that many airlines are wrestling with as they weigh up the benefits of adopting a solely 'bring-your-own-device' (BYOD) approach to IFE.

Embedded IFE equipment is heavy, costly and probably out of date before it is even installed. Without the screens, carriers can also install slimmer seats, which means they can accommodate more passengers and generate more revenue.

By streaming content over wireless systems, passengers can have access to a wider array of content and carriers don't have to maintain screens as they bring their own portable devices on board.

Most passengers carry their own devices, such as tablets and laptops, which are normally more advanced than the IFE screens staring at them from the back of the seat.

With BYOD the onus – and expense – is on the passenger to ensure they have the latest equipment.

All airlines need do is install a few Wi-Fi wireless access points and a media server and they are set. Add in a satellite or air-to-ground in-flight connection and passengers get the internet too.

SITAONAIR's 2016 annual passenger IT trends survey found that customers still enjoy their in-flight entertainment experience, but are more likely to connect through the increasing number of devices they have brought with them.

It found passengers, who wanted much more choice and personalisation from their in-flight experience, were increasingly switching to use their own devices during flights.

A trend for a second screen was also emerging, with 10% of passengers who took part in the survey switching between their own devices and seat-back screens during flights.

The survey found 65% of passengers would prefer to access entertainment via their own devices – providing a real opportunity for airlines to increase connectivity with passengers via the medium in which they preferred to communicate.

Bluebox Aviation launched its portable wireless platform, Bluebox Wow, last year. Bluebox Wow helps airlines introduce wirelessly streamed content to passengers in any aircraft cabin, supporting streamed video, audio, moving map, games, digital magazines, and Bluebox's Seat2Seat networked messaging.

Kevin Clark, CEO of Bluebox Aviation Systems, said: "We ship around 4,000 units of tablet-based (iPad) IFE per year. There are a number of iPad platforms up to the 12.9in iPad Pro, which provides a fantastic option for premium cabin.

"An example of this is its deployment in the premium cabin on board the upgraded Hawaiian Airlines A330 fleet. There is still a seat-back system in economy, but the premium cabin offers a custom, reclining seat with the Bluebox tablet placed in a special holder."

Clark said it had deployed its Bluebox Ai product on both Etihad and Oman airlines.

"I think there will always be a role for embedded IFE, but the portables and wireless streaming technology is providing some interesting dynamics.

"Firstly, the systems are much cheaper to deploy than fitted systems and so can be applied to aircraft/routes that would not traditionally offer IFE. The content mix is available to support such deployments, such as more TV/short, "snackable" content than movies.

"Also some of the experiences offered are better from wireless/BYOD systems. For example, games can be much newer and more dynamic when compared with the normal offerings available for seat-back systems."

He added that the systems provide a means of extending the life of aircraft in service while maintaining a high quality IFE experience.

"Why invest in a new embedded system when the airframe may only be in service for another two-three years?"

One issue is that film studios don't allow the streaming of early-window content (also called early release) to a passenger-owned device.

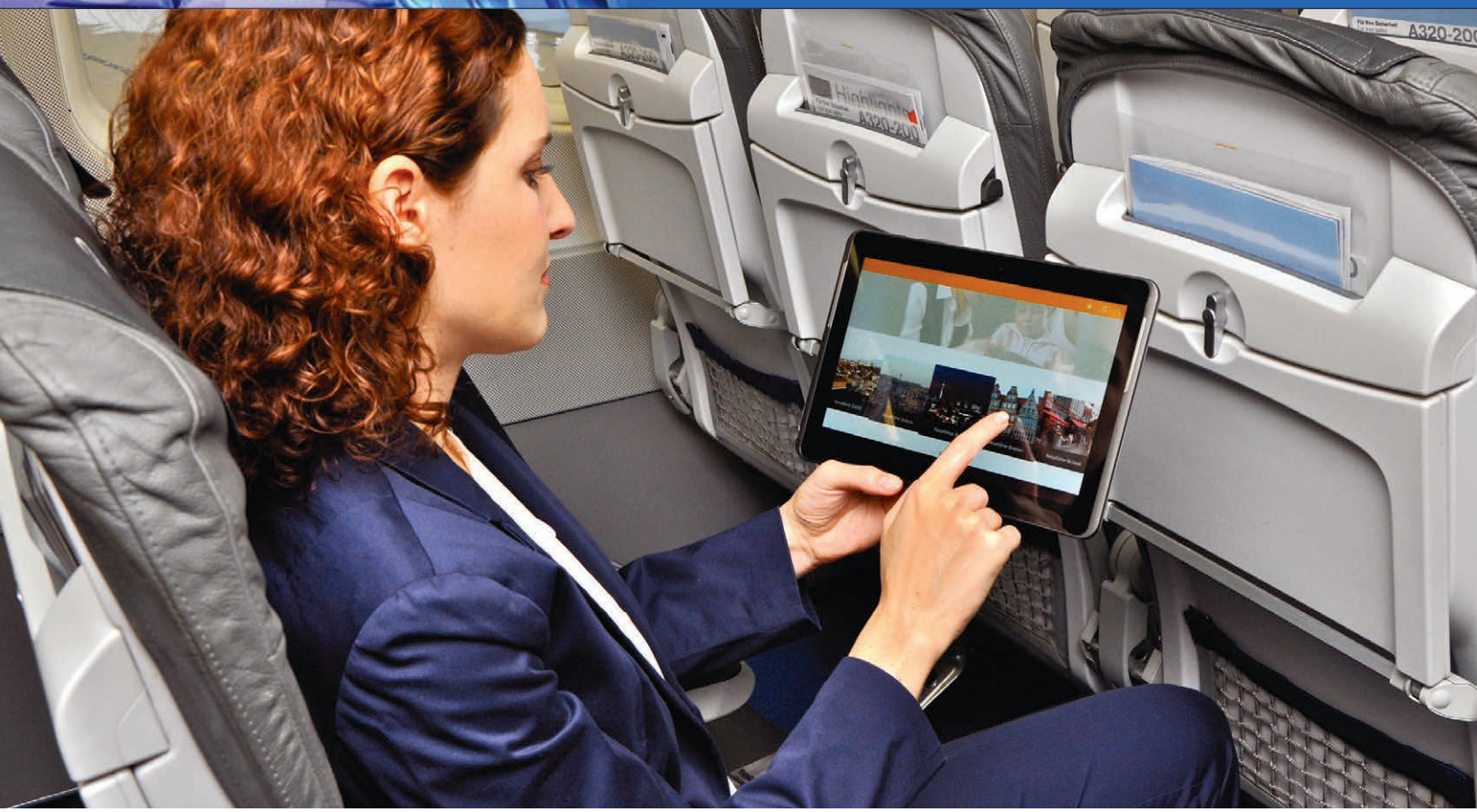
"There are some that will allow streaming of early-window content to an airline-controlled device," said Clark. "But this means that the latest movies are not available to passengers using their own devices.

"We have a version of Bluebox Ai, called Bluebox Hybrid, that is approved for connecting to streaming systems, but that can also host early-window content preloaded to the device.

"This has proven to be very popular where airlines wish to be able to offer the latest movies to some passengers," Clark concluded.

Jan-Peter Gaense, director project and certification at Lufthansa Systems, said it

SITAONAIR found passengers, who wanted much more choice and personalisation from their in-flight experience, were increasingly switching to use their own devices during flights.



had found that BYOD suited airlines that were not yet ready to commit to connectivity. This may be because they have not yet found the right business model or because they want to wait for better technologies, such as flat panel antennas or the availability of an air-to-ground solution.

He said these airlines were likely to go for a portable wireless IFE solution, or for a fixed installed wireless IFE that could later be integrated with IFC.

"It is not a matter of technology, but I don't think we will see any traditional carrier remove an embedded IFE solution from their long-haul aircraft any time soon, said Gaense. "There is an expectation by passengers that they will have an in-seat screen on long-haul flights."

Gaense said that Lufthansa Systems was in discussions with many MENA airlines about fitting a BYOD solution.

"With BoardConnect, we try and make it easy for the airline to make a decision now. Ancillary revenue partners can help them find the right business case, plus our BoardConnect portable system can always be swapped out at any time for a fixed, installed solution," he said.

As an added advantage of BYOD, Lufthansa Systems says that 80 tonnes of jet fuel could be saved annually on a Boeing 767 with 260 seats, thanks to the reduced weight of its wireless technology.

Airlines currently using BoardConnect include Lufthansa and Qantas. Lufthansa Systems says it can serve content to up to 250 passengers at once using just five Wi-Fi access points.

American Airlines (AA) is one of the latest to lead the surge towards BYOD in-flight entertainment. It says its forthcoming new Boeing 737 MAX aircraft will be delivered without seat-back video, leaving passengers to use their own personal devices.

It says it won't feature seat-back video screens on the Boeing aircraft because almost all travellers now carry mobile phones, tablets and laptops. It added that satellite-based systems have improved on-board internet speed and access, which will enhance the viewing experience.

The airline added: "We know in-flight entertainment is important to our customers, which is why we've committed to offering free, streaming high-quality movies and music, and to investing in fast satellite-based internet access and power at every seat across our domestic fleet.

"More than 90% of our passengers already bring a device or screen with them when they fly. Those phones and tablets are continually upgraded, they're easy to use, and most importantly they are the technology that our customers have chosen.

American Airlines says it won't feature seat-back video screens on the Boeing aircraft because almost all travellers now carry mobile phones, tablets and laptops.

"So it makes sense for American to focus on giving customers the best entertainment and fast connection options, rather than installing seat-back monitors that will be obsolete within a few years."

Passengers on American Airlines with personal electronic devices and Wi-Fi will be able to watch free movies and TV shows from an extensive on-board library, as well as free live television channels, without purchasing an in-flight internet connection.

AA says it is committed to seat-back screens on its wide-bodies and some of its narrow-bodies used for specific flights, as well as its Boeing 777s, 787s, Airbus A330s, and A350s, which begin arriving next year.

The airline is also committed to seat-back screens on its three-class A321s, and 40 current-generation B737s, which will be delivered this year with power at every seat.

By the summer of 2018, AA says it will have completed installation of the faster satellite-based Wi-Fi on half of its narrow-bodies, with all completed by the end of 2019.

Europe's largest exhibition for the in-flight entertainment and connectivity (IFEC) industry – Aircraft Interiors Expo (AIX) – didn't disappoint this year. **Steve Nichols** *was there.*

Innovation - now that's

AIX is often the launchpad for many innovative products and a barometer of where the industry is heading.

As well as AIX, the historic German city of Hamburg was also host to the finals of the industry-leading Crystal Cabin Awards.

The award in the electronic systems category was won by Global Eagle Entertainment and its IFEC product that can stream films, offer on-demand platforms for TV series and magazines, and let users surf the internet on their own personal devices.

A finalist in the category was Lufthansa Technik's Niceview mobile product, which offers passengers a way to follow their journey with interactive maps on their personal mobile devices.

In the expo proper, Panasonic Avionics announced its new NEXT IFEC platform, which will power its systems from 2020 onwards.

The company says NEXT is designed to help airlines by transforming "typically rigid entertainment systems into a flexible IFEC platform".

Panasonic says this will help airlines maximise their investment by dramatically extending the lifespan of their IFEC equipment.

Jon Norris, Panasonic's senior director, corporate sales and marketing, said: "The NEXT solution is a business platform that has been built to respond to the trends and challenges that airlines face. The key words are that NEXT is digital, scalable and modular, so airlines can pick and choose what elements they want to include."

He said it would blend the latest and future advances in consumer technology, including 4K screens, light ID, Bluetooth, and more, backed by an intuitive interface that is simple for all passengers to use.

Bigger and better monitors were in evidence on many stands as 4K ultra-high resolution TV and HD audio finds its way into first-class cabins.

Portable on-board Wi-Fi systems were also in abundance. For example, AirFi announced six new airline customers at AIX. The company welcomed Aramco Aviation, Cobalt, Freebird, Salamair, Tailwind, and Yakutia Airlines.

Most-trusted

AirFi CEO, Job Heimerikx, said: "AirFi is the fastest-selling and most-trusted portable wireless IFE solution in the market and we are consistently proving how to deliver a highly cost-effective way to improve the on-board retail and digital passenger experiences.

"AirFi is now flying on more than 300 aircraft worldwide, from regional jets to wide-bodies, serving 30 clients and more than five million happy users have so far enjoyed the experience."

The recent news that the USA and UK have implemented an IT travel ban on some passengers carrying laptops and tablets into an aircraft cabin doesn't seem to have fazed many of the IFEC industry big names.

Dominique Giannoni, CEO at Thales InFlyt Experience, said it hadn't received any phone calls from airlines wanting to switch to embedded IFE systems.

Panasonic's Dave Bruner agreed that the airline industry is not panicking just yet, but everyone wants to see if the IT ban gets extended or withdrawn.

Some airlines have found innovative ways of getting around the ban. Qatar Airways, for example, is offering business-class passengers a laptop loan service.

While there was no obvious sign of panic among exhibitors that only specialise in the bring-your-own-device" (BYOD) IFEC market, it is obvious they are watching developments carefully.

Inflight connectivity solutions were very much front of mind at the show.

Speaking about its new Ka-band GX Aviation product, Inmarsat aviation president, Leo Mondale, said it was now running on more than 60 aircraft in the Lufthansa family, including Eurowings and Austrian Airlines, and was beginning to offer up meaningful data on how passengers were using it.

"Lufthansa is very satisfied with its performance, as are its customers – the net promoter scores from passengers using it are very positive," Mondale said.

"It's a huge pleasure to get some of our milestones behind us. You'll now see us doing very well – we're in a market that is like selling candy to a baby."

entertainment!

Innovators, from the left: Gogo's Blane Boynton, Kevin Clark of Bluebox, and Jon Norris of Panasonic.

Mondale added: "The fact we have more than 1,000 aircraft in backlog at this point is an incredible milestone, given that GX Aviation only went live a few months ago."

SITAONAIR announced that Air Caraïbes and its sister company, French Blue, France's low-cost, long-haul airline, have chosen Inmarsat's GX Aviation IFEC across their fleets.

One or more big Middle Eastern GX contract win announcements were expected at the expo, but an insider revealed they were in the pipeline and could be announced in a few weeks.

Contract announcements

For example, we know that Qatar Airways is having GX fitted to its A350s, even though no formal contract announcement has ever been made.

It must, therefore, be only a matter of time.

Gogo announced it had been selected by Airbus as a lead supplier for its high-bandwidth connectivity (HBC) programme.

This officially enables factory line-fit installation of Gogo's 2Ku global satellite solution on the Airbus A320 family, A330, and A380 aircraft.

Blane Boynton, Gogo's VP product management, said: "Gogo has more than 1,500 aircraft commitments to 2Ku, representing 12 commercial airlines. Most of the aircraft are set to be flying with the technology by the end of 2018."

Saudi Royal Fleet goes for the Wow factor

Bluebox Aviation Systems announced it had been selected by the Saudi Royal Fleet, part of Saudia Airlines, to provide its Bluebox Wow (Walk-on wIFE) portable wireless IFE for seven aircraft.

The agreement will see the system deployed across three main aircraft types – Boeing 747, Boeing 757 and Airbus A340.

Dr Fawzi Alghamdi, Bluebox IFE project manager, Saudi Royal Fleet, said: "We wanted an innovative IFE solution that would allow our VVIPs to use personal devices to access new and exciting content while aboard our aircraft. But, given the nature of the use of our fleet, we needed something that was easy to deploy with no disruption to service."

Kevin Clark, chief executive officer, Bluebox Aviation added: "We are honoured to have been selected to deploy our award-winning portable wireless IFE solution into the Saudi Royal Fleet. And, living up to our claims of 'quick and easy to deploy' we'll have the aircraft set up and flying with Bluebox Wow within a matter of weeks."

The system supports streamed video, audio, moving map, games, digital magazines, and Bluebox's Seat2Seat networked messaging – all contained within a discrete, portable, lunchbox-sized unit.

The advantages are that no supplemental type certificate (STC) is required, there is no long lead time and zero cabin installation costs. The rechargeable battery typically supports up to 50 devices simultaneously for up to 15 hours, and is both easy and quick to replace.

Gogo would love to get the Middle East region on board with 2Ku.

SES and Thales Alenia Space outlined how new functionality aboard the upcoming SES-17h satellite will offer greater efficiency and flexibility for IFEC.

The new satellite, which will help drive Thales' Ka-band FlytLIVE solution, will now include a powerful digital transparent processor (DTP). This will allow the companies to modify their networks in real time in response to changing bandwidth demands, either on a daily schedule or in response to unanticipated changes, such as weather.

Most advanced and efficient

Dominique Giannoni, CEO at Thales InFlyt Experience, said: "Thales FlytLIVE will offer the most advanced and efficient aeronautical solution available in the Americas. Adding the latest generation processor on board SES-17 dramatically increases its coverage, capacity, and redundancy.

"With FlytLIVE, passengers will enjoy full internet connectivity, including the ability to stream internet services for video, games, social media and live television."

Thales says it has a launch customer for the system in 2018, although it cannot name it at the moment.

In all then, AIX 2017 was big on innovation and connectivity, but there were fewer big contract win announcements, which seems to be the way the larger shows are heading.

Aircraft Interiors Middle East and MRO Middle East took place in Dubai in February. The co-located events saw 300 exhibitors and more than 4,500 trade visitors attend over two days. **Marcelle Nethersole, Alan Peaford** *and* **Asma Abdullah** *were there to speak to some of the exhibitors.*

AIME and objectives

FRENCH BUILD ON THEIR CONNECTIONS

With the French aerospace industry particularly active internationally and accounting for 13% of the country's exports, it made sense to have a pavilion at AIME/MRO.

France was the only country to have a pavilion at AIME/MRO. It was being run, for the sixth year in a row, by Business France, the national agency for the international development of the French economy.

Business France said the country's strength is in its ability to take advantage of the growth in air transport, by placing continued emphasis on research and innovation (approximately 14% of the sector's turnover goes into R&D).

Twenty companies, mainly MRO, were located at the French Pavilion – everything from seat manufacturers to toolmakers and including Dedienne Aerospace, which specialises in ground support equipment and precision maintenance tooling for civil and defence markets.

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"OEMs need the tools to remove and assemble the engines and we are able to provide all the cutting-edge equipment they need because we are licenced to work with Rolls-Royce CFM, Pratt & Whitney and Boeing, as well as Airbus and Comac in the field of industrial partnership," said Zaher Elsahili, general manager Dubai.

The company has six facilities around the world, including one at Dubai Airport Free Zone.

"We started in the Middle East in 2013 and we have seen tremendous growth here," said Elsahili. "Here in Dubai we work with all the major airlines, smaller ones and maintenance centres. It is paramount we are in the region to be close to our customers."

While at the show, the company signed an A320neo nacelle tooling licencing agreement. It also has an agreement with UTC Aerospace Systems as the sole provider for the sale and service of the A350XWB Nacelle GSE.

Elsahili said the company has in-house designers and is always looking for future innovation.

"We are constantly looking at maintenance tasks and how we can improve them," he said. "Some of the equipment dates back to the 1960s and 70s – that's old. For example, removing the engine from the aircraft is still done the same way as it was in the 60s, by attaching the engine with a hoist. That is very time consuming. With today's technology we are looking to change that."

The company recently replaced Nitrogen carts, containing heavy bottles, with its recently launched Nitrogen backpack.

"With it safely and comfortably on your back, this innovation makes your aircraft maintenance so much easier," explained Elsahili.

He added that there were some cultural differences in regions, too, which had to be taken in to account.

"In Europe there is a law where you can't carry more than 15kg alone, so they need a lot of carts to help lift heavier parts. Here, one person can carry a heavier load so they don't need the same equipment as in Europe."

Expertise in radio-frequency identification (RFID) and connected products was also on show with Nexess exhibiting in the pavilion.

"We implement RFID solutions for supply chain, manufacturing, maintenance and operations, responding to issues and challenges of people wanting to increase their performance in terms of productivity, quality and security," explained Sylvain Lafoy, product manager.

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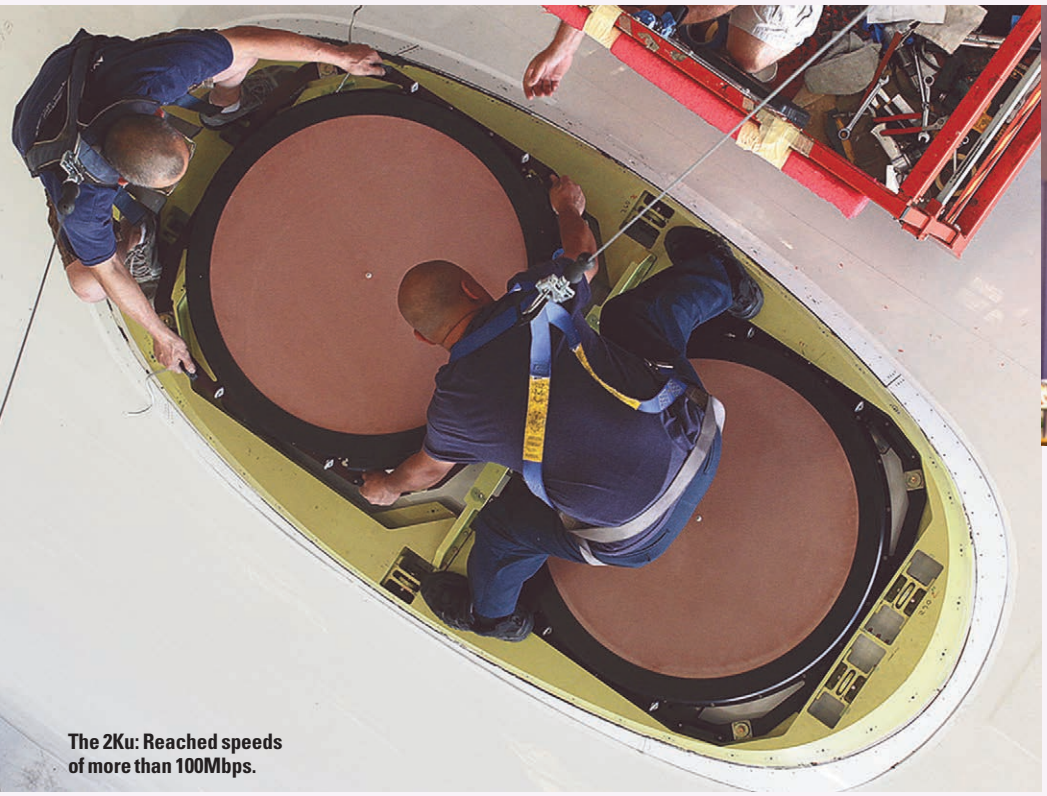
The company was showcasing some of its key products at the show to offer what Lafoy said was a "real taste and clear understanding" of its equipment.

"Our technologies offer more safety and security than others on the market, which is a message we want to emphasise in the Middle East," said Lafoy.

Other companies flying the flag for France included Esterline Sensor Services, which specialises in temperature, pressure and speed sensors for the aerospace industry; ASI Maintenance, which provides base maintenance for regional aircraft, such as the Embraer 135/145 and the ATR; and Stelia Aerospace, which designs and manufactures aerostructures, pilot seats and passenger seats for business and first class.

in the Middle East



The 2Ku: Reached speeds of more than 100Mbps.

The future is fast with Gogo

In-flight internet company, Gogo, is moving on with its next generation technology, the 2Ku.

It has been built to deliver significantly more bandwidth to aircraft, while minimising service disruptions associated with beam switching, allowing faster satellite hand-offs and a more consistent passenger experience.

"The 2Ku features a dual-phased array antenna and our proprietary modem, which provides superior performance, enabling new experiences for flyers and crew. It has antenna speeds of 70+Mbps to the aircraft," said Mihir Thakkar, regional director, global airline business group.

"With an open architecture that can leverage today's Ku satellites, as well as high-throughput satellites and low Earth orbit satellites slated for launch in the near future, 2Ku is the best solution to deliver reliable global coverage to airlines today and in the future."

Thakkar said the company started operations by offering a ground-based cellular network in the US, which had been its "backbone". But, more recently, Gogo had focused on satcom technology with Ku and, now, 2Ku, which allowed it to offer global coverage to its airline partners.

"We also recently reached speeds of more than 100Mbps with our next generation modem and high-throughput satellites on our Boeing 737 test plane, Jimmy Ray. This will be coming to current 2Ku customers in the later half of 2017."

Thakkar added: "Our general approach has been to focus on the best network technologies and products to meet the needs of our global airline partners. The Middle East has a lot of growth, which is why we are investing time in the region and have a team based here in Dubai."

Gogo already has airline customers for 2Ku, with a backlog of more than 1,500 aircraft, mainly in the US, Europe and Latin America. Thakkar hopes the company will add a Middle Eastern carrier soon.

"What we want to say to the airlines is, 2Ku will keep you going for a long while. Gogo offers a solution that will easily last for 10 or more years without requiring any major modifications to your aircraft. You can put any provider on your aeroplane, we just say choose your provider wisely."

Angel Hernanz Arbeloa: airlines need high-performance carpets.

CARPETS BAG THE LIMELIGHT

It was the third time at AIME for Spanish company Industrial Neotex.

While it produces seat covers, cushions, manufacturers leather and produces galley equipment for airlines, 50% of its business is manufacturing textiles, mainly carpets and upholstery.

"With our carpets, we need to meet the requirements of our customers, so we manufacture three different types," explained Angel Hernanz Arbeloa, VP commercial. "We offer 100% wool carpets, which are traditionally used in aircraft and currently as a luxury option. We make these carpets from 1,500 grams per square metre to some very heavy and luxurious options for first class. These can be in loop, pile or a combination of both.

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"We also manufacture a blend carpet, which is made of wool and nylon – this type ensures resistance similar to nylon carpets and has resilience properties similar to wool carpets."

The company also produces 100% nylon carpets, which have been certified for B787 aircraft.

"Nowadays, most airlines need high-performance carpets, and only nylon PA 6.6 makes it possible to provide long-lasting products," said Arbeloa. "Our nylon carpets comply with the smoke emission and toxicity specifications of all aircraft manufacturers, and there are various weights to suit the airline. We supply this type to American Airlines, United Airways, and here in the region our biggest customer is Saudi Airlines."

Saudi Airlines also use the company's leather seat covers.

Emmanuel Regnier: "The Middle East is a very important market."

LHT's new base at Dubai South.

Why AIME is the seat of power

Stelia Aerospace was exhibiting the Celeste, its medium-haul seat for single-aisle platforms, at the French pavilion. With customers in three different regions, and deliveries starting early 2017, this futuristic seat offers passenger comfort through its swinging cradle recline motion.

"In addition to the innovative Celeste seat, our engineers are working towards the next generation passenger experience," said Emmanuel Regnier, head of sales, Europe, Middle East and Africa.

"Having been the first to patent the use of vertical space in the cabin with our highly efficiency Equinox family of seats, the engineers are turning towards a more holistic view of the passenger experience. Researching and combining technologies from diverse fields to create a well-being bubble, our SeatZen concept is extended to a fully immersive passenger experience for first-class passengers."

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Opal is the company's latest product. Launched at the Hamburg Expo 2016, it has been designed for efficiency and, through innovative design, can be extensively customised, while meeting customers' programme constraints. Regnier said these could include 3D curves, new technologies – polycarbonate outer skins allowing injected colour and possible Laser printing decoration – and additional 15% weight reduction.

It also provides more revenue-paying passengers (two to four additional PAX).

Regnier said it was always important to exhibit at AIME and be close to some of its big customers, including Etihad Airways, which has been a customer for almost a decade.

"AIME as a show reflects the local spirit very well and is a great environment to meet old friends and make new acquaintances," said Regnier. "The Middle East is a very important market, with very challenging customers who always push us to new heights. This spirit matches our company ethos of 'luxe à la française' and some of our most beautiful and innovative products have gone into service in the region. "

SERVICE CENTRE MARKS ANOTHER MILESTONE FOR LT

Lufthansa Technik came to the MRO Middle East show in celebratory mood, boasting a new milestone. **Asma Abdullah** *explains why.*

The story of Lufthansa in the Middle East began in Dubai in 2005 with its first presence as a sales office.

Five years later, Lufthansa Technik Middle East (LTME) services came into the picture offering logistics and support and, in 2013, the first workshop for composite repairs reversers was opened in Dubai Airport Free Zone (DAFZA).

This was the start of a new era as the German company began to realise its potential, implementing a plan to expand its MRO capabilities and became the first anchor tenant and MRO provider at the new Dubai South.

The move to what was then known as Dubai World Central gave the company the chance to create a bigger facility and, on the eve of the MRO Middle East show, it was handed over.

The facility is almost 2000sqm, with options to grow and expand further.

Many services are offered, starting with repair and maintenance on inlet cowls, reversers, flaps and radomes. Plans to invest on smaller components are also being considered.

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Lufthansa Technik is also offering mobile engine services, where repair of the engine is completed on-wing. This not only saves the customers turnaround time but, most importantly, it reduces the costs of removal and replacement of the engine.

Engine washes are also conducted by LTME using a specialist van that can go to any customer locally and provide its service. Additionally, mechanics at Lufthansa Technik are well trained in working on landing gears; preparing, removing and disassembling them.

The company tries to provide the best to its customers to maintain loyalty and satisfaction, according to Ziad Al Hazmi, LTME's chief executive. And that includes VIP customers. "We do a couple of A-checks for A320 VIP aircraft," Hazmi said. This involves collaboration and the company works alongside DC Aviation and has access to its hangars for maintenance work.

Customers play a very significant role in the progress of an organisation, Hazmi said. LTME sits with its customers to discuss the right solutions for their requirements.

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Some airlines may require warehousing facilities, others engineering support and maintenance as they concentrate on flying only. In this case, LTME provides customised maintenance packages to satisfy customer demand.

LTME's current customers include UAE national carrier, Etihad – the company has already received its first GE-90 engine for repair – and Saudi Arabia's NAS, which has signed a components and engine contract.

Future plans include focusing on building up more on engine capabilities, as well as line maintenance services.

LTME has invested in the local stock of materials being held and this is starting to build up. The firm has critical items in store for B777, B737, A350 and A320. Currently, the inventory contains about 350 parts and more are expected.

The services are offered throughout the Gulf, as well as in Pakistan and Jordan.

Hazmi said: "We are looking forward to cooperating closely with partners and providing full solutions. The idea behind it is to lower the maintenance cost by having more on-wing services, locally, within the Middle East region."

Light entertainment with a touch of glass

David Dicko and Florent Bolzinger had a vision in 2014 to offer passengers an immersive experience akin to sitting in the middle of a cinema for 2D and 3D movie viewing.

SkyLights was born and Dicko, along with VP sales, Dieudonné Kamate, was at AIME to demonstrate the company's cable-free SkyLights Theatre.

"It is a new in-flight entertainment system with immersive cinema glasses," said Dicko. "We developed them specially to satisfy in-flight requirements. We want to provide each passenger with a high-quality immersive viewing experience. Passengers should no longer feel like they are watching movies just to pass time on board. By wearing the SkyLights Theatre, you feel immediately teleported into your own private cinema."

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SkyLights' glasses are especially designed for in-flight use in terms of prolonged comfort level, compliance with aviation authority safety regulations, early-window content security, autonomy, and user-friendliness. The glasses are then built into a full end-to-end service, including content management software (CMS), content licensing, and operations and servicing set-up.

The company, which has offices in Paris, Toulouse and San Francisco, already has its service in use with launch customer XL Airways. It has also deployed its solutions to a business jet company.

SkyLights has also launched its new Bravo headset, offering immersive 2D and 3D cinema, cinematic virtual reality support, a new graphical interface, and multilingual audio and subtitle support.

When combined with either a wireless in-flight entertainment solution or a regular seat-back IFE, the company has solutions for the headset to automatically relay cabin announcements.

"For us, the key message to airlines considering our technology is that it offers a way to upgrade and differentiate their premium cabins on top of and above current seat-back IFE, with a much more compelling experience on a wide angle immersive screen," said Dicko.

"This portable system is also much more flexible and cost-effective than seat-back IFE and offers a great range of content. As for passengers, they can now look forward to a really exciting cinema experience at 30,000 feet."

MRO ROUND-UP

SURFACE-PARTS EXCHANGE PROGRAMME LAUNCHED BY BOEING

Boeing has launched a new nacelle and flight-control surface exchange programme that extends the current exchange programme, which has proved a big hit with airlines.

Speaking at the MRO Middle East show, David Longridge, vice president sales & marketing for Boeing Commercial Aviation Services, said the launch of the new services was customer driven.

"Our materials management group saw a pattern in the way people were requesting these parts in scheduled maintenance and we saw an opportunity that would help our airline customers manage their spares more easily," he said.

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Under the scheme, airlines can exchange nacelle and flight-control surface parts – such as ailerons or thrust reversers – that need repair or overhaul with replacement parts from a certified pool that Boeing maintains throughout its global network.

"This eliminates the need for customers to contract, schedule, manage and own or lease these parts," Longridge explained.

One benefit is that customers only need to take an aircraft out of service once, reducing maintenance needs. When a similar part is leased, the plane must be taken out of service for both removal and installation.

"It is not going to be right for everybody – airlines with large fleets, for example, may manage their own requirements as they have the economies of scale – but it is designed for airlines that are not in this group and they will find this an efficient way to manage the challenge of replacements."

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Parts distributed through the programme represent all Boeing models and are updated to the latest configurations, incorporating all applicable service bulletins and airworthiness directives.

"The beauty of this is that the more airlines that get involved in the programme, the more effective it becomes," Longridge said.

The Middle East is a key element of the Boeing customer service plan with more than 1.7 million spare parts stocked at its Dubai distribution centre at any one time. It is one of eight centres around the globe and ships up to 25,000 parts a year.

Longridge said that exchange programmes, like those offering landing gear, rotables and consumerable parts, were growing. Airlines like Oman Air, Etihad and Royal Jordanian are already making use of the schemes.

Monarch training offer

Monarch Aircraft Engineering, which is a General Civil Aviation Authority (GCAA) civil aviation regulations (CAR) 147-approved organisation, is to launch a series of training programmes so Middle East airlines can train their engineers on the new Airbus A320neo and Boeing 737 MAX aircraft families.

The UK company announced at the show that the courses, which begin in July 2017, would be CAR 147 approved and be run by the Monarch Aircraft Engineering Training Academy.

The courses will be offered both at the academy's main location in Luton, UK or on site, depending on the airline's preference.

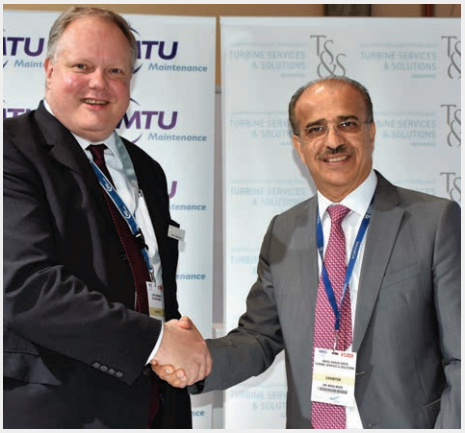
The academy already runs a number of GCAA-approved aircraft type courses for Boeing 787, Boeing 737NG and the Airbus A320 family, delivering to airlines across the globe, including carriers based at Dubai and Sharjah.

AAR plays its parts

AAR announced it has opened a parts warehouse at Dubai World Central (DWC) Airport.

The supply chain hub closes the gap between essential aircraft components and the growing list of commercial and regional carriers operating in the Middle East.

AAR leverages its partnerships with industry-leading OEMs, such as Eaton, Unison, UTAS, Meggitt and Lord, to stock the warehouse with a wide variety of factory-new aircraft components that are powering aircraft in the Middle East today.



Shake on it: Frank Haberkamp (left) VP-Repair Services MTU and Abdul Khaliq Saeed,CEO, TS&S.

TS&S and MTU engine deal

Abu Dhabi-based Turbine Services & Solutions Aerospace (TS&S) signed a long-term V2500 parts repair agreement at the show, finalising an arrangement with MTU Maintenance, the world's largest independent aero engine services provider.

Abdul Khaliq Saeed, CEO of TS&S, a subsidiary of Mubadala, said: "The partnership with MTU Maintenance marks a significant move for us. Partnerships with top-tier companies from around the world, such as MTU Maintenance, help us consistently ensure our level of service."

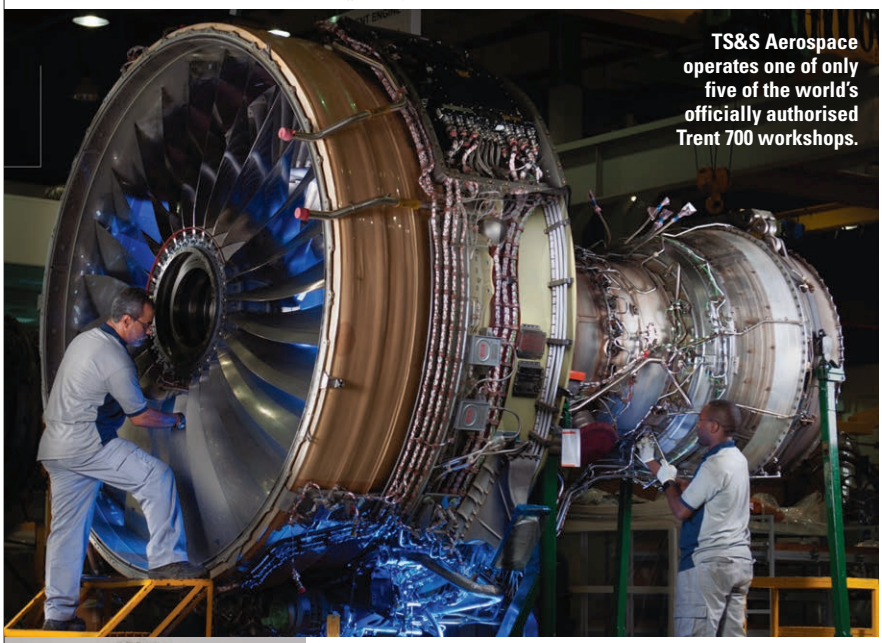
Barbara Saunders *reports from the Airline Engineering & Maintenance Middle East conference at Abu Dhabi's Yas Island.*

HOW TO MAKE MORE OUT OF LESSORS...

Abu Dhabi's Turbine Services & Solutions Aerospace (TS&S Aerospace) is looking to announce three or four lessor-friendly Rolls-Royce Trent 700 MRO package deals by the end of the year.

Delivering the keynote address at the annual Airline Engineering & Maintenance Middle East conference, Ian Taylor, acting vice president, sales and commercial, TS&S said the company is in discussions with several globally positioned leasing companies and will tailor packages for specific needs.

On the conference sidelines, Taylor said the packages would be rolled-out "certainly by the end of the year, but hopefully within six months".



TS&S Aerospace operates one of only five of the world's officially authorised Trent 700 workshops.

He said they were being created via "direct relationships" with the undisclosed lessors, who are seeking an alternative to the Rolls-Royce Trent 700 TotalCare package. "We are talking to these lessors now about how we can support them," he said. "We have got good conversations going but we need to start putting pen to paper now."

The 'bespoke' lessor-friendly packages, said Taylor, would be all-encompassing maintenance packages based on predictive maintenance costs. They would, he said, make lessors "a significant part of our business".

In Abu Dhabi, TS&S Aerospace, part of the Mubadala investment and development group, operates one of only five of the world's officially authorised Trent 700 workshops which, according to Taylor, stand to win a share of a $154 billion MRO spend expected for the 800-strong engine type fleet over the next 23 years.

Significant portion of the market

TS&S, said Taylor, is well placed to take a significant portion of the market, with the Etihad Airways fleet providing load and experience. "We have excellent capabilities in-house, which continue to be built," he added.

Taylor said he hoped more lessors would follow the example of the several the company hopes to package up. "Leasing companies are looking to come out of TotalCare and the percentage of them in the programme will drop over the next 10 years or so. We are an OEM alternative, which gives full transparency on materials for clients to control their costs – an approach which has been well received."

Taylor said the TS&S 'bespoke' packaging approach could prove to be a game-changer. "We have started to change the market; we are a catalyst. We have one package with one airline already in operation and believe we can stimulate competition and unlock the asset value of the A330."

Richard Evans: "Engines are where the opportunities lie."

TWIN-AISLE ENGINE CHOICES TO BE ME BEDROCK

The engines powering the Middle East twin-aisle aircraft fleet will be the bedrock for the region's MRO business for the foreseeable future, according to a leading industry analyst.

Speaking at the Airline Engineering & Maintenance Middle East conference, Richard Evans, senior consultant for the FlightAscend Consultancy, said despite recent challenges, the sector was still "a growth industry".

Evans said the Middle East fleet has been growing at around 8% a year and, while it accounted for 14% of the world's twin-aisle fleet, the region's single-aisle fleet has been increasing faster, at 9% a year, due to the growth of low-cost airlines. However, he added: "The majority of the airlines in the region are still committed to twin-aisle."

Evans said with 66% of Middle East airlines' fleets being less than 10 years old, the youthfulness of the in-service aircraft, which account for 3,200 installed engines, would affect the regional MRO market. "You are probably not going to see the region here, with its young fleets, requiring intensive maintenance."

Other challenges, he said, came from the fact that the region is now facing cost pressures and competition from Turkey, as a Europe-Asia transit hub.

Nevertheless, he pointed out, aircraft utilisation is at a regional high, with the average aircraft now flying more than 4,000 hours a year – an indicator of high demand.

"There's opportunity here," he said. "Engines are where the opportunities lie because the airframe market will go to where labour costs are lower."

He added: "The current twin-aisle engine choices will be the core of regional MRO for many years. The challenge will be how to address the next generation engines."

Leading together

B/E Aerospace is now part of Rockwell Collins

With the acquisition of B/E Aerospace, we're extending our expertise to cabin interiors, offering a full range of products and services from seating and lighting to galleys, oxygen systems and more. Together, we're leading our industry forward – cockpit to cabin interiors, communication to connectivity – providing our customers with unsurpassed innovation, quality and value. It's how we continue to build trust every day.

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Alsalam Aerospace Industries: Probably the best-known military MRO in Saudi Arabia.

SAUDI'S 2020 VISION

Saudi Arabia has successfully built up an impressive indigenous military aerospace engineering capability, making advances, especially in maintenance, repair and overhaul (MRO). **Jon Lake** *discovers that, not satisfied with the progress so far, the country has initiated a national industrial clusters development programme, which aims to double the manufacturing sector's GDP contribution by 2020.*

In many nations, the military engineering progress made to date in Saudi Arabia would be the cause of great celebration, as well as a matter of justifiable pride. However, the Saudi armed forces are extremely secretive, and expect their suppliers to observe similar levels of discretion, so little information leaks out about military contracts.

Details of US-Saudi contracts emerge via the Defense Security Cooperation Agency's statutory notifications to Congress, but the contractors themselves generally remain uncommunicative about work on Saudi programmes.

Local Saudi companies are often even more tight-lipped, and European contractors and governments are frequently even less communicative than their US counterparts.

But, while details of individual programmes, and particulars of the work of specific companies, may be hard to ascertain, there is a greater degree of openness about the broad thrust of strategic direction, and Saudi Arabia has made it clear that it aims to build a local military industry, eventually raising the proportion of military equipment bought from Saudi producers to as much as 50%.

The existing Saudi MRO companies will be vital in achieving the kingdom's lofty aims. The companies have already demonstrated advanced capabilities in the fields of maintenance, repair and overhaul, and increasingly represent a small but strong industrial cadre.

In his 2014 paper, Defense Industrialization in Saudi Arabia and the UAE, Bilal Y Saab, resident senior fellow for Middle East security at the Brent Scowcroft Center on International Security, commented that "the old adage that Arabs don't do maintenance no longer reflects reality".

In some cases, Saudi MRO companies have already moved away from pure MRO activity to encompass limited assembly and manufacturing activities.

Some of the companies are already able to copy and reproduce existing technologies and are starting to be able to manufacture and produce at, or near, the technological frontier, and to be able to adapt existing technology to meet specific Saudi security requirements.

Alsalam Aerospace Industries is already manufacturing the wings, forward fuselages, and pylons and adaptors for the F-15SR (F-15S to

Continued on Page 96

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F-15SA upgrade/conversion) programme in partnership with Boeing, and is undertaking the full conversion programme in-kingdom.

It will be very many years before self-sufficiency is achieved in most areas of military/industrial activity, thanks to Saudi Arabia's still relatively limited technology and skills base. But developing these capabilities is a crucial step in the process of creating a sophisticated military industry that will meet the needs of the kingdom's military forces.

It would be a mistake to view MROs simply as being a useful step towards final assembly, or even whole aircraft manufacturing. The biggest proportion of the cost of modern military aircraft lies in their through life support and sustainment, meaning that MRO can represent a more economically significant activity than manufacturing, as well as providing a greater source of high-value, high-tech employment over a longer period.

Providing this kind of support for an aircraft fleet may not be as 'sexy' as building the same aircraft type under licence, but it is probably more significant, more useful and more valuable.

Saudi Arabia's MROs also help to ensure a greater role for the private sector in military production and industrialisation, and many believe that this will ensure greater efficiency and competitiveness than a wholly state-owned process.

But, while Saudi Arabia has impressive MRO competences, it lacks sufficient capacity to be able to maintain all of the Saudi armed forces modern western-supplied weapons systems without using foreign workers and even foreign companies. Some MRO contracts still go to companies based outside the kingdom, leaving scope for further investment in local MRO capabilities.

Saudi Arabia is not pursuing its drive for greater self-sufficiency alone.

Plan foundered

When it attempted to establish an Arab Organization for Industrialization, it did so in association with Egypt, Qatar, and the United Arab Emirates, though the plan foundered in the wake of Egypt's 1979 peace treaty with Israel, after which Gulf funding for Egyptian production capabilities became problematic.

Since then, Saudi Arabia has established a small arms industry with US and German help, while both Britain and the USA have worked hand-in-hand with local companies and joint ventures to encourage, establish, and enhance local industrial capabilities, and to assist with technical education and technology transfer.

While an expanded Saudi defence industry may provide competition to US contractors, the Obama administration urged Saudi Arabia and other Gulf Cooperation Council members to develop their own defence capabilities rather than depending on the US as much as they have in the past.

Developing local industrial capabilities will also help the nation to achieve the transformation envisaged under the kingdom's Vision 2030 policy. This aims to diversify the Saudi economy by increasing non-oil revenues, while reducing unemployment, raising per capita income levels and increasing women's participation in the labour market.

Vision 2030 aims to stimulate a real expansion of the industrial sector, achieving a historic and ambitious transformation in just 15 years.

Saudi Arabia's nascent aerospace industry will play a vital part in Vision 2030, building on the foundations laid by King Fahd and, subsequently, by Prince Khalid bin Sultan bin Abdulaziz's reforms in the first half of the decade.

In 1985, King Fahd issued the royal decree that led to the creation of the General Organisation of Military Industries to oversee and coordinate the kingdom's existing indigenous defence programmes, acting as an overarching body for long-term defence planning.

The Alsalam hangar in Riyadh.

In 2011, Prince Khalid bin Sultan bin Abdulaziz announced the creation of a new Saudi Armed Forces Command department, which would oversee local industrialisation and the transfer of military technology.

Probably the best-known military MRO in Saudi Arabia is Alsalam Aerospace Industries, previously known as the Alsalam Aircraft Company.

Created as part of the offset programme that accompanied Boeing's sale of the E-3 Sentry airborne warning and control system (AWACS) to the Royal Saudi Air Force (RSAF), Alsalam was a joint venture 50% owned by Boeing Industrial Technology Group, 25% by Saudi Arabian Airlines, 10% by Saudi Advanced Industries Company, 10% by Gulf Investment Corporation, and 5% by the National Industrialisation Company.

Progressively expanded

The company has always operated as an MRO provider for the operators of Boeing commercial airliners and military aircraft, but has progressively expanded, providing in-depth aircraft maintenance and modification and all kinds of technical support services for airliners, military aircraft and business jets.

The company subsequently became a highly regarded VIP completions centre, and offered cargo conversions of a variety of airliners, while also providing MRO services for non-Boeing aircraft types.

It began to perform programmed depot maintenance (PDM) on RSAF Tornados in 1997, and started major checks on Saudi Arabian Airlines' Airbus A300-600s from December 2001.

A marker of the company's capability lies in the fact that Alsalam is, today, the only designated warranty centre for Boeing Business Jets (BBJ) in the MENA region.

More recently, since 2008, the company has established a number of specialised workshops for the design and manufacture of some aircraft parts and components, using locally and globally sourced raw materials, and working with aluminium alloys, carbon fibre composites, fibreglass and plastics.

The company's manufacturing centre is licenced by the Saudi Civil Aviation Authority, and certified by the US Federal Aviation Administration and the British Civil Aviation Authority.

The F-15SR is probably Alsalam's most ambitious programme to date. This designation covers the in-kingdom conversion of 68 existing surviving F-15S aircraft to the same standards as 84 new-build F-15SAs being produced by Boeing at St Louis, as well as the conversion of the second of two 'prototype' conversions in St Louis by an Alsalam team.

The first F-15S-to-SA conversion was undertaken by Boeing. These two conversions, together with two new-build F-15SAs, were delivered to Saudi Arabia on December 13, transiting via RAF Lakenheath in Suffolk on January 10.

The converted aircraft receive a new forward fuselage, new wings, and new outboard underwing pylons, all of which are being manufactured by Alsalam.

The company has already achieved a Saudisation rate of 56% and is working hard to increase the proportion of local employees, with a target of 60% Saudi nationals for all new programmes.

Though it enjoys an enviable reputation and a leading position, Alsalam does not have a monopoly in providing MRO services to the aviation elements of the Royal Saudi Armed Forces.

BAE Systems has helped the RSAF to establish facilities (including a dedicated Typhoon technical zone originally intended for local final assembly) at King Abdulaziz Air Base at Dhahran, and some expect the RSAF to take back Tornado work from both Alsalam and BAE Systems.

Integrated support

The Riyadh-based Al-Raha Group for Technical Services (RGTS) is to provide integrated support services to Saudi Arabia's fleet of F-15S and F-15SA Strike Eagles and will manage unclassified aircraft spares and support equipment, as well as supporting RSAF base stand-ups and F-15 and F-15SA flight operations under a $355.9 million foreign military sales (FMS) contract placed by the US Air Force in 2016.

The Mohawarean International Group (MIG) and subsidiary, the Saudi Aerospace Company (SAC), are increasingly entering the expanding defence, aviation, security, logistics and communication markets, providing professional services for domestic and international clients in both civilian and military sectors.

The company is heavily involved in providing training for the RSAF's F-15 force, as well as employing contiguous United States (CONUS)-based pilots for the F-15SA programme.

Though best known as the leading Saudi civilian MRO operation, Saudia Aerospace Engineering Industries (SAEI) serves both civil and military customers. Its new $1 billion, 1,000,000sqm facility at King Abdul-Aziz Airport in Jeddah will compete with other Saudi MROs for military work.

Interestingly, SAEI is working together with Boeing and Alsalam to create the new Saudi Rotorcraft Support Centre, which will support military and commercial rotorcraft platforms in Saudi Arabia, including Boeing's AH-64 Apache, CH-47 Chinook and AH-6i Little Bird.

Other companies concentrate on providing more specialised support for particular aircraft systems or sub-systems.

The Middle East Propulsion Company (MEPC), in Riyadh, is the sole military engine MRO provider in the kingdom and provides support for the Pratt & Whitney F100 engines used by the RSAF's Boeing F-15 fighter aircraft.

Other specialised equipment support providers include the Advanced Electronics Company, which has teamed up with Lockheed to sustain the Sniper advanced targeting pods, the low altitude navigation and targeting infrared for night (LANTIRN) extended range navigation pods, and the infrared search and track (IRST) systems used on the RSAF's F-15 fleet.

The company also licence-built the Thales Damocles pods used by the RSAF's Tornado and Typhoon fighter-bombers.

As time goes by, many expect an ever-greater domination of the Saudi MRO market by local companies, with an ever-greater proportion of Saudi engineers and technicians. If the Alsalam Aerospace Industries experience is anything to go by, progressively greater local manufacturing capabilities are also likely to emerge.

UAE national carrier Etihad has teamed up with Swiss company Lantal Textiles to create what is believed to be the Middle East's first laboratory specialising in flammability testing of aircraft cabin fabrics and other materials. **Alan Dron** *reports.*

Blazing a trail in flammability testing

A straightforward supplier relationship between Etihad and the company that produces air-filled cushions for its first-class cabins has expanded into new territory, with the opening, last December, of a laboratory dealing with one of the most important safety aspects of aviation.

Etihad approached Lantal with a plan to create a laboratory for flammability certification purposes. Airline interiors have a wide range of safety parameters to meet, one of the most critical being their ability to withstand an outbreak of fire.

Fire in an aircraft's cabin is a critical matter, as has sadly been proven by many incidents in the past. In 1985, for example, a Boeing 737-200 of British Airtours, a subsidiary of British Airways, suffered an uncontained engine failure as it accelerated for take-off at Manchester Airport in the UK.

Fire broke out after a fuel tank was ruptured and thick fumes quickly filled the cabin; of the 137 people on board, most of the 55 people who died did so from the inhalation of toxic smoke from burning seat fabrics and fuselage panels.

That incident led to a major review of cabin interiors, with all seat fabrics, ceiling and sidewall panels, required to meet new standards of fire resistance. It is this type of testing that the new Abu Dhabi laboratory carries out.

"Etihad is a major maintenance organisation, but it also has a design operation, so it is allowed to modify aircraft," explained Heiko Nuessel, managing director of the Abu Dhabi operation and partner in the Switzerland-based parent company, as well as its executive vice-president, compliance and certification. "To do anything with an aircraft, at the end of the modification or certification process, you have to show to the authorities that the aircraft is fully airworthy again."

If, for example, materials are glued or stitched together, it has to be demonstrated that this new combination of materials remains safe. This applies not only to obvious materials, such as cabin furnishings, but virtually everything in the aircraft's interior that is non-metallic, such as cabin 'monuments' and galley structures.

Fire in an aircraft cabin is critical.

Chosen marketplace

Lantal is typical of many Swiss companies in that it has been in its chosen marketplace for a long time. "We're a 131-year-old textile company," said Nuessel.

Founded in 1886, it first became involved in the aircraft industry in 1954 when Dutch national carrier, KLM, ordered seating fabrics from it.

"We're still weaving fabrics, carpets and draperies in Switzerland. Anything you see in cabins with a textile character, we are able to provide," said Nuessel.

As a manufacturer to the aviation industry, one of the most regulated sectors in the world, Lantal has to guarantee that its products fulfil aviation's tough flammability requirements.

As a result, it created its own test laboratory, which it has operated for more than 35 years. In 2008, it established an engineering department, which won authorisation to modify and certify cabin components.

Most of the new lab's initial business stems from Etihad, but Nuessel believes that the new Abu Dhabi facility will find business beyond the emirate, especially as existing labs have heavy workloads: "The problem in Europe at the moment is that people are waiting quite a long time for their [safety] certificates. Due to the fact that we're starting from scratch, our order books are more or less empty, so we can offer very, very short lead times – as little as 24 to 48 hours after we receive the test specimens."

One potential source of business is the Indian sub-continent. "To my knowledge, there are only a few laboratories in Asia; in China, I know of only one and that's a government test laboratory."

The new lab will be spreading its marketing net as far as Australasia. Similarly, it has also noted an absence of such facilities in Africa, added Nuessel.

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The Airport Show 2017 will take place in May with various events running over the three days, including a focus on women in aviation. **Marcelle Nethersole** *caught up with Daniyal Qureshi, group exhibition director with organisers Reed Exhibitions Middle East.*

THE PERFECT PLATFORM FOR PARTNERSHIPS

This year's Airport Show will be the 17th edition; clearly showing how established it is as a top aviation industry event.

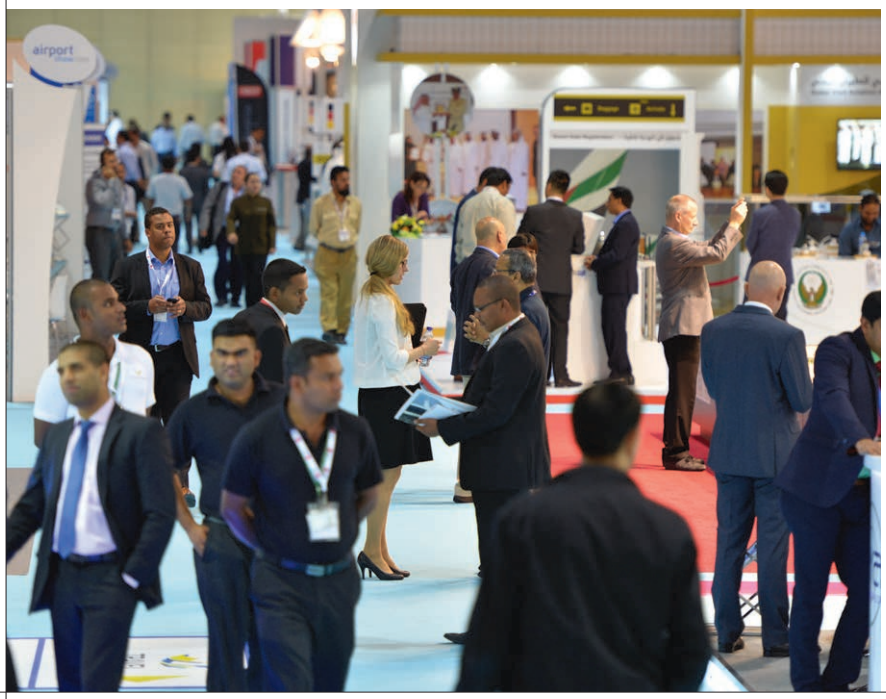
Taking place from May 15-17 at Dubai International Convention and Exhibition Centre (DICEC), the organisers believe the show's on-going success is largely due to the confidence and strong growth of the Middle East's aviation sector.

Qureshi said: "Aviation sector growth in the region has outpaced global growth, especially in terms of number of passengers. The show, which has the support of Dubai Civil Aviation Authority, Dubai Airports, Dubai Aviation Engineering Projects, Dnata and a host of regional airport authorities, provides an effective platform for suppliers and buyers to develop new partnerships.

Additional features

"We expect this to continue in the long term and our strategy is to work towards enhancing this show, bringing additional features that can offer a highly rewarding participation to exhibitors, supporters, stakeholders and participants alike."

This year's event expects to see more than 300 leading companies from around the world participating and introducing their latest product and service offerings to a projected 7,500 attendees. More than 200 hosted-buyers and 60 regional aviation authorities are also expected to attend.



This year's event expects to see more than 300 leading companies and 7,500 attendees.

Events taking place over the three days include a strong focus on women in aviation.

"For the second year running we have the Women in Aviation General Assembly, which will take place on the first day," said Qureshi. "The launch event last year was a big success with major participation from women professionals across the aviation sector such as pilots, engineers, managers and training and recruitment professionals."

With women making up more than 60% of Arab countries' science, technology, engineering and mathematics (STEM) graduates, the forum is taking active measures to enhance their participation in the Middle East's robust and rapidly growing aviation sector.

Exemplary initiatives

"Across the GCC, we see exemplary initiatives being taken to encourage the participation of women in aviation," said Qureshi. "The Middle East's aviation and aerospace industries will see a huge boom in job opportunities over the next decade and this is the right time to ensure an equal opportunity for women in this sector.

"There will be aviation experts of international acclaim and more than 200 attendees.

"The forum will help connect government and private companies, which are keen on hiring women, with aspiring professionals in the aviation sector."

Other events taking place over the three days include the global airports leaders' forum, which will brings airports, civil aviation authorities, airlines and industry leaders under one roof to foster partnerships and address global challenges and needs. There will also be the innovation podium, the Huawei summit, a security day involving the security innovation podium, and table discussions.

Also co-located at the Airport Show will be the World Travel Catering & Onboard Services Expo Middle East – the GCC's largest dedicated exhibition for companies to tap into the opportunities presented by its booming aviation catering business.

"The Airport Show really is a packed-out event, making it an unrivalled business platform to exhibit or source the latest technology, learn about emerging trends, network with decision-makers and get first-hand knowledge about the region's $170+ billion airport expansion and modernisation programmes," said Qureshi.

KARBALA PROJECT SET

Work has started to create a new airport at Karbala, southern Iraq, with facilities also due to be improved at nearby Najaf. **Alan Dron** *reports.*

A major addition to the Middle East's portfolio of airports will appear as early as 2018, when the initial phase of the new Karbala International Airport (KIA) becomes operational.

The airport will be situated on the outskirts of Karbala, about 60km southwest of Baghdad and about 40km north of Najaf. It is expected to be particularly used for religious tourism traffic.

Construction of the airport is part of the Iraqi Government's efforts to diversify the economy away from dependence on the oil and gas sector, with considerable employment being generated, both by the construction process and by the airport itself, once it opens.

The project dates back to 2008, when the Iraqi Government, the country's transport ministry and the Iraqi Civil Aviation Authority (ICAA), announced the creation of a new airport in Karbala Governorate, strategically located between the cities of Karbala, Najaf and Al Hillah.

The French company, Aéroports de Paris Ingénierie (ADPI), was contracted by the transport ministry to conduct site selection studies, leading to the development of an airport masterplan.

Detailed design of the facility consists of two runways, taxiways and aprons, three passenger terminal buildings and associated support facilities, such as a fuel farm. There will also be a 62metre air traffic control tower.

The Al Rida Investment Group (RIG) and Khairat Al-Subtain (KAS) are privately financing the project.

Karbala, like Najaf Airport, will act as a gateway to one of the holiest pilgrimage sites for Shia Moslems.

"It's going to open up Iraq," said Miles Roberts, general manager of Copperchase Iraq, which is constructing the new facility.

While the battle to push back Daesh in the north and centre of Iraq continues, security in the south, around the new airport's site, has never been a problem. "Down here, they never really had any issues. People will feel safer here than even flying into Baghdad," Roberts added.

UK-based Copperchase has been involved in more than 150 airport projects worldwide since the 1990s, with the Middle East having been a particular focus for the company.

Miles Roberts: "People will feel safer here than even flying into Baghdad."

The airport is expected to act as a gateway to one of the holiest pilgrimage sites for Shia Moslems.

The new airport will be built in four phases. Phase one will see the creation of a terminal initially capable of handling two million passengers annually, but four million after around a year in service. This is described as a functional airport that will allow operations to get under way.

Revenues from the airport's operation will be reinvested in the facility. The timetable for future expansion is dependent on the level of those revenues, but phase two will see capacity rise to six million, with two further phases possible over the following decade. The initial runway will be 4,500m – the longest in Iraq.

Open countryside

The land for the new airport measures 9km by 6km and is open countryside: "There's been a certain amount of quarrying in one corner, but otherwise it's been used for agriculture."

Building time for the first phase is scheduled as two years, but Copperchase hopes to complete it in 18 months. With that tight schedule in mind, it has employed several extremely experienced senior personnel, who have constructed airports in daunting conditions around the world.

Project manager, Pieter van der Schraaf, for example, has handled more than 20 airport projects in locations as diverse as Bangkok, Rotterdam and Doha, while one of the world's leading authorities on runway design, John Napton, of the UK's Newcastle University, is contracted as a consultant.

In addition to building the airport, Copperchase has also secured the rights to operate it for the next 25 years.

When operational, the airport will ease travel for millions of religious pilgrims, who visit Karbala each year, said Nahidh Mohammed Salih, chairman of Copperchase's Iraqi business.

Salih said the project's three planned phases would cost $2 billion. However, work on the second and third phases would depend on demand, he added.

Meanwhile, Copperchase is also involved in building up maintenance, repair and overhaul (MRO) facilities at Najaf Airport. Currently, there are no third-party major servicing facilities in Iraq. The company's plan is, initially, to develop a line maintenance capability at Najaf, with hangar maintenance being added almost immediately.

"We will focus on A checks for the first four to six months, then build up to 'C' checks by the back end of 2018," said David Plumpton, technical director of Lama Aviation Services, a fully-owned subsidiary of Copperchase.

There is an obvious need for improved maintenance facilities in the country: "For example, Iraq Airways send a lot of their aircraft to other countries, predominantly Turkey," said Plumpton. "There's not enough hangarage in Iraq to support their own requirements, let alone those of the surrounding countries. Iran, we know, has a very strong maintenance requirement. There's hangarage at Baghdad, but no significant third-party maintenance hangars."

The work on building up an MRO capability at Najaf will take place in two phases. "The first will be a two-bay hangar for Airbus A320 or Boeing

TO OPEN UP IRAQ

David Plumpton: MRO capability would boost Najaf Airport's attractiveness.

737-sized aircraft," explained Plumpton. "A second hangar will bring an additional two bays, although this may end up as a single bay big enough for an Airbus A330 or Boeing 777, depending on customer reaction. We know a certain number of A330s and 777s would like to fly into Najaf."

Lama Aviation Services will also operate the new hangar.

That new MRO capability would boost Najaf Airport's attractiveness to foreign carriers, said Plumpton: "We know there have been operators that have resisted flying into Najaf because there's no maintenance capability."

Najaf is a former military airbase that now functions as a small, but expanding, regional airport, with a 3,000metre runway and four departure gates. Opened in 2008, it now handles services from more than 20 airlines. Iranian carriers are prominent, although several Gulf carriers also operate there.

Together, the new and expanded facilities at the two airports will considerably improve transport options in the southern part of Iraq.

Work is under way to establish a new international airport in Taif, Saudi Arabia, to help meet growing demand for haj and umrah flights. **Alan Dron** *reports.*

NEW AIRPORT TO HELP THE PILGRIMS PROGRESS

The existing airport at Taif, some 30km east of the city and 70km from Mecca, dates from 1976 and is a modest facility, with its single terminal capable of handling 550,000 passengers a year.

Officially classed as a regional airport, it nevertheless has several international services.

The new Taif airport is intended to be a gateway for pilgrims arriving in Saudi Arabia. It will help ease pressure on Jeddah's King Abdul Aziz International Airport and Medina's Prince Mohammad Bin Abdulaziz International Airport, especially during the haj and umrah seasons.

Pilgrim numbers are expected to climb towards an estimated 30 million annually by 2030.

Popular summer resort

Apart from its proximity to Mecca, Taif is a popular summer resort destination in the kingdom.

The new Taif airport will be located near Souk Okaz, some 120km from Mecca. When operational in 2020, it will have a capacity for 5 million passengers annually, with this figure increasing to 8 million as further expansion takes place.

The new airport will begin operational life with a single 4,300metre runway (14,100ft) but, during the design process, planners will incorporate the ability to construct a second landing strip to cope with future passenger requirements.

A request for proposals for the new airport is due to be issued this year to determine the group that will win the contract to build, transfer and operate the airport. The Saudi Transport Ministry has already been given the details of the new airport's location so it can start work on designing the surrounding road network to be linked to the national highway system.

The Saudi aviation regulator, the General Authority of Civil Aviation (GACA), has started to calculate the infrastructure demands for the new airport, including its water, electricity and communications requirements.

Meanwhile, GACA is also working on the early stages of a new airport at Qunfuda, on the Red Sea coast south of Jeddah. After studying 14 possible sites, one has been handed over to GACA to enable detailed planning to start.

The planned increase in airport capacity comes about as Saudi Arabia experiences steady growth in passenger traffic at its airports.

Liberalisation of the domestic aviation market has seen new carriers enter the scene and existing ones stepping up their attempts to tap into the largest market in the region. Saudi Arabia, with its 28 million population, constitutes by far the largest national market in the Gulf.

Major fleet modernisation

New carrier, SaudiGulf Airlines, has begun services between Dammam, Riyadh and Jeddah, while national carrier, Saudia, has embarked on a major fleet modernisation and expansion programme. While phasing out 18 older aircraft this year, it plans to take delivery of no fewer than 30, including seven Boeing 787-9s, five 777-300ERs, eight Airbus A320ceos and 10 A330-300s.

Additionally, Saudia is expected to launch its own low-cost carrier (LCC) subsidiary, Flyadeal, later this year.

At the 2015 Paris Air Show, Saudia placed an order for 20 high-density versions of the Airbus A330-300 Regional, which airline sources believe will form the new subsidiary's fleet. They would prove useful on the densely-travelled Riyadh-Jeddah sector.

Saudi hybrid carrier, Flynas, has also recently announced major expansion plans, as it phases out its current fleet of 26 Airbus A320ceos over the next five years and replaces them with an order for 80 A320neo-family aircraft. Twenty of the 80 were converted from a previous order for current A320ceo version.

And another new entrant to the local scene, Saudi-Egyptian carrier Nesma Airlines, has begun services with a combination of ATR 72-600 turboprops and A320-family jets. It operates from several Saudi cities to Cairo, but is also establishing a network of domestic Saudi routes based around a hub at Hail, in the north of the country.

Other carriers, including UAE-based LCCs Air Arabia and Flydubai, have also stepped up services to Saudi Arabia over the past year.

The new airport will be close to Souk Okaz, a popular summer destination.

Emirates A380s are part of the solution for achieving DXBs growth targets.

Dubai's main gateway will see passenger capacity reach 118 million by 2023. But achieving that ambitious target will mean boosting the number of A380 contact stands. **Keith Mwanalushi** *checks in on progress.*

STANDS AND DELIVER

Dubai International Airport (DXB) is getting busier. Last year, the airport handled a record 83.6 million people and, in January 2017 alone, monthly throughput reached an all-time high of eight million passengers, according to the traffic report issued by operator Dubai Airports.

With that backdrop in mind, it is no surprise that Dubai Airports initiated a project to expand the number of code F (A380) contact stands available on concourse C.

The airport and its base carrier, Emirates, were challenged with how to increase capacity without building any additional major infrastructure.

DXB is the world's largest airport in terms of the number of A380 contact stands with a total of 37 code F gates. The number of A380 gates at DXB is set to increase to 47 by 2018 with the start of a project to more than treble the number of code F gates at concourse C (from 3 to 13).

Approximately 800 metres long, concourse C is connected to Terminal 3 through concourse B.

Concourse C, home to flagship carrier Emirates, is undergoing a major upgrade, which is expected to be completed by the end of 2018, and this includes the expansion of code F gates.

Emirates now has 93 A380s in its fleet and a further 49 on order. As such, DXB hosts the largest and one of the fastest-growing A380 fleets in the world. "In order

Continued on Page 106

CONTINUED FROM PAGE 105

to maintain this position, and to accommodate the growth in passenger traffic, we need to expand our capacity for not only A380s but other aircraft in Dubai," explained Bryan Thompson, SVP for development at Dubai Airports.

Upgrade works have been on-going since last year. "The current concourse [C] was not designed for these types of aircraft," Thompson said. In order to accommodate the A380 he pointed out there was a need to change a number of systems.

Starting out on the airfield, larger aircraft needed to be accommodated on the taxiways leading to the concourse. "We have to reconfigure the aircraft parking stand, fuelling system, aircraft parking guidance system and roadways."

Once this is complete, Thompson said the airport would have to replace the passenger loading bridges and gate lounges as the number of passengers were far greater on the 380s. "Together with this, we are changing the shopping and food and beverage outlets inside the terminal. The planning and design for the concourse C refurbishment has taken years to complete; this should assist us in a short execution phase and minimise any disruptions on the airport."

Airside infrastructure

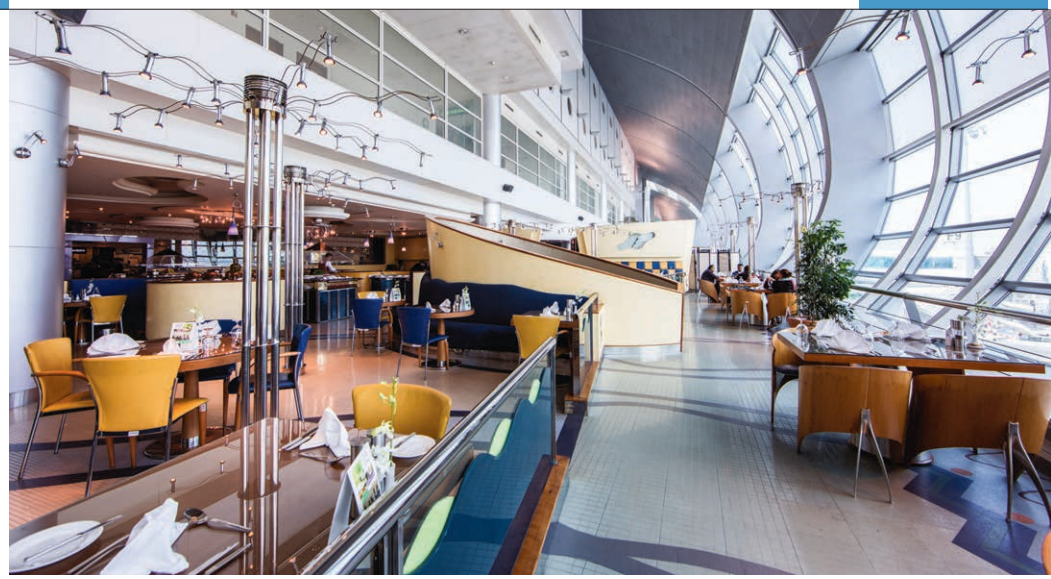
Preparing for the A380 meant airports had to adapt their airside infrastructure. Upgrading runways and taxiways, relocating taxiways and even relocating aircraft stands and buildings to provide sufficient wingtip clearance, are examples of the works that several airports may need to carry out for aircraft of this size.

For airports that will see the A380 frequently, such changes to the infrastructure may be reasonable. When an airport operates close to its full capacity, efficiency of operations is a prime factor as well as safety.

The airside infrastructure requirements for aircraft with a wingspan up to 80 metres (code F) are given by the International Civil Aviation Organisation (ICAO) in Annex 14, Volume 1. These requirements are a sound basis for new airport design or future airport expansion but, in most cases, impractical for determining changes to existing infrastructure.

While ICAO member states are encouraged to fully implement the new code F requirements for the development of their airports, it has also become clear that many countries will have difficulties in complying with the specifications for the upgrade of existing facilities.

Bryan Thompson: The number of A380 gates at DXB is set to increase to 47 by 2018.



Concourse C will see significant upgrades all around.

For this reason, ICAO developed a circular for new larger aeroplane operations (NLAs) at existing aerodromes. It identifies all issues relevant to NLA operations and proposes possible mitigation measures for accommodating them at those airports that are unable to comply with annex 14, code F provisions.

The circular does not specify what is acceptable and what is not; the responsibility remains with the local authority.

On aircraft stands along concourses, there are sometimes difficulties if they are equipped with fixed installations like passenger bridges and light poles. It is sometimes easier to park the A380 on a remote apron, or even the cargo apron, as these have fewer restrictions on aircraft size.

Thompson said the airport operator follows a stringent master planning process, which is conducted by Dubai Airports Engineering Projects (DAEP) – an engineering organisation responsible for the design, master planning, infrastructure development and construction of Dubai's aviation sector.

"The foresight in the plan has allowed for a seamless expansion of the concourse," he said.

The DXB plus programme, as it's formally known, ties in directly with the gate expansion project. The focus of DXB plus is to integrate the sector's efforts to meet airline demand and ensure a world-class customer experience from 'cloud to curb' – vital for delivering unconstrained sector growth.

For the next 10 years, as Dubai's aviation hub, DXB needs to meet rising customer expectations and growing demand for capacity.

With little room for any further major infrastructure on the airport, Dubai Airports is joining forces with its key stakeholders to design product innovation and operational improvements that will deliver on the sector's ambition and ensure on-going contributions to Dubai's economy.

"DXB plus as a programme of work is a very challenging opportunity to make sure that we can continue to grow at the forecast rate to 2025," Thompson explained.

He said the programme focuses on a limited amount of infrastructure projects, which will allow for the demand to be met. "It is, however, more focused on how we become more productive and innovative with the assets which we have. It relies on better performance across the board at all our touch-points, not only to improve our throughput, but also and more importantly to improve the experience of our customers at the same time."

Future growth

The A380 remains central to Emirates' future growth. To that effect, the newly updated signature Emirates A380 on-board lounge made its first public appearance at ITB Berlin 2017.

In March, the carrier celebrated a successful first year on the world's longest A380 non-stop route – connecting Dubai and Auckland in New Zealand.

The route was first flown with a 266-seat Boeing 777-200LR and then, since October last year, the service switched to the A380, providing up to 491 seats.

Back firmly on the ground and when complete, concourse C will be able to accommodate 13 code F (A380) aircraft and 10 code E (B777) type aircraft – but that's just one facet of the project.

Thompson said: "Concourse C is not only an upgrade of our stand capacity and gate capacity, we are also changing the duty free, specialty retail and food and beverage offers. The project is also focused on improving the customer experience with improved seating and toilet designs."

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WHY POLITICS AND TECHNOLOGY

Alan Dron *learns about five global 'drivers of change' in the air traffic management sector.*

Electronic systems giant Thales estimates that, worldwide, around two-thirds of all flights have some sort of involvement with the company through its navigational, communication and air traffic control (ATC) products.

It has a team based in the UAE; its primary presence is in Abu Dhabi and it sees good prospects for business in the area in the coming years.

One major trend over the past decade, according to Todd Donovan, Thales' vice-president strategy & marketing – air traffic management (ATM), has been the very rapid growth in air travel in the Middle East, with airlines using their hubs to connect Europe, Africa and Asia. "Something like 80% of the world's population is within flying distance of the Middle East," he said.

Speaking at a Thales briefing session in France, he noted that in the Middle East: "We've seen a huge growth in traffic and with that comes congestion. In our business, politics is as important as technology. Technology is readily available to solve many of our problems, but politics is much more complicated – national sovereignty, countries that aren't too friendly with each other etc.

"There's been a great effort around this in the Gulf Cooperation Council (GCC) and they do seem to be progressing. I don't think it's going to change overnight but I think there's a recognition that working together is the only way they can have efficient [ATM] operations.

Huge incentive

"The Gulf carriers give [countries] a huge incentive. If they don't solve the problem of congestion in the Middle East it will only hurt their own economic prospects."

A long-standing obstacle to the free flow of airline traffic in the Gulf has been the presence of large areas of airspace blocked off for military use. Todd said he was seeing greater cooperation between military and civilian ATM authorities in this field.

One possible solution, used elsewhere in the world, is that blocks of military airspace can be made available for civilian use when they are not required for training or exercises by the military.

Donovan added that there were five 'drivers of change' for the ATM sector globally:

- The growth of civil aviation, mentioned above;
- Military ATM, which, in recent years, had increasingly been buying civilian equipment as it modernised its systems, but looked for higher capabilities in areas such as Mode 5, an encrypted equivalent of the civilian Mode S, which enables automatic collision avoidance systems;
- Drones, whose explosion in numbers has triggered worldwide efforts to find ways in which they can safely co-exist with manned air traffic;
- The trend for air navigation service providers to move from being government agencies to quasi-privatised operations;

MUST WORK TOGETHER...

■ The evolution of technology and the increasing need to be aware of cyber-security, particularly as more and more systems are connected to the internet and each other.

One new ATM technology being shown by Thales at its Innov'Days exhibition in Paris in February was a system that extends the use of 'remote towers'. Scandinavian countries are already using the remote towers system, where an air traffic controller handles traffic at an airfield despite being based many miles away at another airport or ATM facility.

The system uses video cameras posted around the airfield; it is said to be a good solution to the problem and expense of providing ATC officers at small facilities with low traffic levels.

The next stage is to train ATC officers in handling traffic at the remote airfield using a virtual reality (VR) headset, in case the on-site cameras fail. The VR headset is loaded with imagery of the airfield, with the scene moving appropriately as the ATC officer moves his head. Images of aircraft on approach or taxiing on the ground can also be injected into his headset.

"Lots of countries are interested in it for small or medium-sized airports with small amounts of traffic," said innovation laboratory manager Cyril Layes. "You don't want to have 12 ATC officers on staff and only have 20 flights a day."

One potential problem, he conceded, was that this could lead to job losses, but these would be offset by new jobs being created elsewhere by the new system.

Stacking the odds in controllers' favour

Alan Dron *looks at new technology, being developed by Thales, to help cut out traffic jams in the air.*

It's a familiar problem to air traffic controllers and passengers in busy airspace sectors around the world. Aircraft coming from multiple destinations all arrive at the same place – an airport's approach path, for example – at the same time.

The usual result is that aircraft have to be 'stacked', flying in huge circles around a waypoint beacon that they can only leave one-by-one as space becomes available on the final approach. It delays flights, irritates pilots and passengers, and results in airlines burning thousands of litres of fuel unnecessarily every day, adding to emissions.

In the Gulf, the sheer volume of airliners using the three main hubs of Dubai, Abu Dhabi and Doha (with more operating in and out of Kuwait, Muharraq and Muscat) often leads to congestion where flight information regions (FIRs) meet and aircraft have to be handed off from one controller to another.

This is particularly severe in the Gulf, which 30 years ago was a single FIR, but which has now been split into six as traffic levels increase rapidly.

Flow management is crucial, which is where a new system from Thales may be of use. It is developing 'Eco System', a new flow management system that aims to predict locations where aircraft numbers are likely to pose a problem as long as three hours in the future.

The new system will bring together data sources from around the world, project the flight paths of airliners – some of which may not even have taken off yet – and predict where log-jams may occur several hours ahead.

This could lead to an air traffic control (ATC) flow manager contacting an airline to ask that the crew of a flight that is still on the ground alter their flight plan to avoid the predicted area of congestion. That will ease the workload for the controllers and potentially reduce the amount of fuel an aircraft burns if fewer diversions around weather can be calculated.

❑❑❑❑❑

Alternatively, the system will be able to predict if aircraft will have to alter their flightpaths to avoid bad weather, for example, and start to work out what that will mean for an ATC centre in terms of workload a few hours in the future.

Typically, an air traffic control officer (ATCO) can handle 10 to 15 aircraft at any one time. If an ATC centre sees a high number of aircraft converging on one patch of airspace it can split that sector into two smaller sections and assign an extra ATCO to handle one of the two sections.

However, more sectors mean more workload, as controllers have to coordinate with their colleagues when handing over an aircraft from one section of airspace to another.

The first user of Eco System is likely to be Azerbaijan, where the new technology is due to go active later this year.

Thales is also working on an even newer technology, where ATCOs will use eye movements rather than a computer mouse to operate their computer screens.

The company stresses that this remains at the concept stage at present, but sees potential in the idea.

"Air traffic control organisations are very conservative, so it will probably take a new generation of ATCOs to be comfortable with eye trackers," commented Todd Donovan, Thales vice-president, strategy & marketing – air traffic management.

"In many cases technology assists, but it will take some time to incorporate [into ATC systems] because you need to check human beings can use it safely. You would use a touchpad for commands through gestures, so the ATCO doesn't have to take their eyes off the screen," he added.

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In the decade since it was first launched, the multi-crew pilot licence (MPL) has courted its fair share of scepticism and criticism. But **Victor Brandao**, *general manager, Alpha Aviation Academy in Sharjah, argues that, at a time when the demand for new pilots is more pressing than ever before, the success of the MPL could be integral to the future of the commercial aviation industry.*

Industry must embrace MPL's innovative experience

We have been big advocates of the MPL at Alpha Aviation Academy and have found it to be a hit with both cadets and airlines alike.

Since we started using it as one of our training methods of choice in 2010, we have placed more than 200 pilots with leading low-cost airline Air Arabia.

The main criticism aimed at the MPL since its inception is that it represents a reduction in practical flight time compared to the traditional training methods. There is an argument that MPL cadets do not gain enough practical flying experience and are, subsequently, lacking in the skill, experience and decision-making that are invaluable when problems arise in the cockpit.

But, in reality, the MPL is offering the sort of innovation that the wider industry should be striving to promote. By taking advantage of technological advancements to train fully capable pilots in less time, the MPL offers a path for continued adaptation and optimisation of pilot training processes – while still ensuring pilots are fully equipped with the specific skills they need.

Simulators and training technology are growing more sophisticated and opening up ever-increasing possibilities. Utilising this technology to improve the training experience is a necessary step for sustained improvement.

Technology is constantly changing the world around us, and is something the industry should embrace, rather than shy away from.

Other arguments against the MPL stem from its shorter length (it can take as little as 18 months to learn to fly via the MPL route), something that seems to unsettle some aviation professionals, particularly the old guard. Yet safety will always be the highest priority in air travel, and the MPL actually prioritises specific safety measures to mitigate the risk of human factor errors in a flight, including threat and error management (TEM) and crew resource management (CRM) at every phase of training.

The reality is that, if we are overly cautious in developing new training methods, then we risk stunting the opportunity for industry progress.

The increased specialisation the MPL allows for has, doubtless, played a part in its success. As cadets are trained according to the requirements of specific airlines, they are ready to hit the ground running when they graduate. The whole transition from cadet to pilot is more seamless.

The MPL is offering the sort of innovation that the wider industry should be striving to promote.

Building their experience

Some in the industry have raised doubts over the value of teaching pilots to work in a multi-crew environment, rather than focusing on building their experience from a more singular perspective. This is something of a straw man. Airlines need first and second officers in the cockpit and, if the MPL is supplying them, then it is doing what it is supposed to do. The licence exists to create capable pilots for commercial airlines, and if it is achieving this, then clearly it is serving its purpose.

One of the biggest success stories for Alpha Aviation Group has been a young female Emirati pilot, Ghada Al Rousi.

Ghada trained at our Sharjah facility on the MPL programme and, upon completing it, was placed with Air Arabia as a second officer. She has now achieved the rank of first officer, is breaking down boundaries, challenging perceptions, and is a passionate advocate of encouraging more women to pursue a career in the cockpit.

Someone like Ghada is having a tangible impact on the industry. By showing talented young women that they can have a career in aviation, she is inspiring the next generation of female pilots – something that everyone in the industry would like to see.

That is not to say that the MPL is without fault. It has evolved and improved over the last decade, and as with anything, we must continue to look for ways to keep fine-tuning it so that we give pilots the best possible start to their careers.

Pilot training will be more crucial than ever over the decades to come, with demand for airline pilots on an upward trajectory, and licences like the MPL could have a central role to play in finding a sustainable long-term answer.

The pace of new aircraft development and booming airliner sales worldwide is creating growing demand for flight training simulators. As **Dave Calderwood** *finds, TRU Simulation + Training is more than keeping up.*

TRU GRIT...

Two of Oman Air's new simulators.

The booming market for new airliners around the world – and especially in the Middle East – is creating challenges for cadet pilots coming through and also existing pilots needing type rating and refresher training.

For TRU Simulation + Training, a maker and supplier of flight simulators, it's an opportunity the company is relishing in the region.

TRU's latest development is with Oman Air, which has opened a new training centre in Muscat equipped with new flight simulators from the Textron subsidiary.

The two full flight simulators (FFS) are for Boeing 737 and Airbus A330 airliners operated by Oman Air. TRU is also supplying a flight training device and virtual cockpit classroom for the latest B737 MAX aircraft.

"We are honoured to work hand-in-hand with Oman Air to support the set-up and operation of the flight training centre in Muscat," said George Karam, VP and general manager of TRU's air transport simulation division. "Oman Air joins a number of other fast-growing airlines around the globe that have opted to train their pilots and aircrews at home."

It's an important point. The number of aircrew required to meet future demand is staggering, and airlines are increasingly looking to train pilots locally rather than send them halfway around the world. Even qualified airline pilots must take a check flight in the simulator every six months, so investment in local facilities is essential.

"The Middle East is an important and growing market and a large number of aircraft orders are for carriers in the region, said Karam. "The simulator market follows the aircraft market closely.

"TRU is Boeing's chosen supplier for the 737 MAX [simulator]. Boeing chose us after a dedicated examination," added Karam.

The first FFS for the recently rolled out B737 MAX is already up and running in Miami, USA and "receiving excellent feedback from the FAA and Boeing".

Boeing also confirmed orders for the first two simulators for the new generation 777-9 in March from TRU, further expanding the relationship between the two US companies.

The 777-9 is scheduled for delivery in 2020 and both Emirates and Qatar Airways have placed huge orders for the aircraft.

These first two FFS suites will be delivered and installed in Boeing training campuses in Singapore and the UK, becoming operational in the second half of 2019.

It's not just Boeing that has turned to TRU. Airbus has also worked with the company on full-flight simulators for the A350, the A330 – one delivered to Oman Air – and the ubiquitous A320, of course. The A380 is the only Airbus airliner for which TRU does not have a simulator.

There's more to a flight simulator than just the hardware. For Oman Air's new training centre, TRU supplied a suite of training products for the B737 MAX, all sharing the same software. TRU will also be providing maintenance for the devices and is responsible for the full operation of the centre, located adjacent to the Oman Air's headquarters in Muscat.

Highest safety standards

Captain Ali Hassan Sulaiman, executive vice president & chief operations officer, Oman Air, said: "The Oman Air Flight Training Centre will enable us to continue operating to the highest safety standards and with absolute professionalism. Furthermore, our investment in this training facility – the first of its kind in Oman – will add an important milestone in the airline's contribution towards the development of the sultanate."

It's not just airliners that TRU supports with simulators. Being part of the Textron Group, TRU has developed simulators for a whole range of Textron Aviation aircraft, including being first to market with the Beechcraft King Air Fusion cockpit 250/350.

Other Textron aircraft supported include the latest business jet from Cessna, the Citation Latitude.

A simulator for the Longitude, still in flight-testing, is under development.

Other Cessna simulators are the CJ series, Sovereign, Caravan turboprop and 172 and 206 single-engine piston aircraft.

Recently, the Citation CJ3+ training programme, available at the TRU ProFlight Pilot Training Centre in Tampa, Florida, successfully received full certification and is currently accepting customers.

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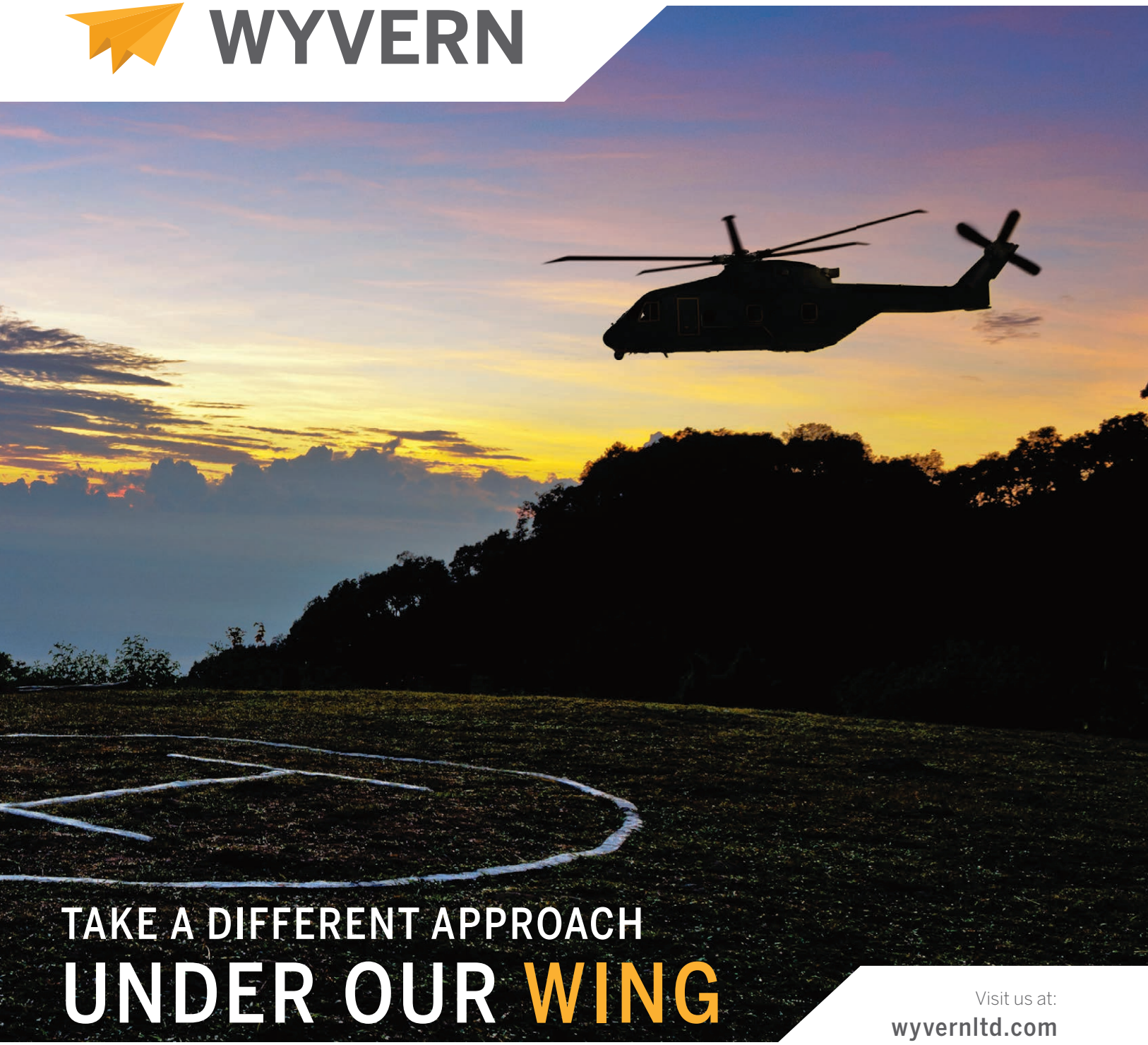

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New flightpath for Gulf's aspiring airline pilots

Prospective airline pilots in the GCC states have a new training option. **Dave Calderwood** *reports.*

The UK's Airways Aviation and Dubai-based Emirates Aviation Services have formed a partnership to offer a direct route to a private pilot licence (PPL) in the UAE.

Emirates Aviation Services will deliver the Airways Aviation core multi-crew pilot licence (MPL) training programme in Dubai.

This concept of local foundation course and initial training follows the model created by Airways Aviation. It helps student pilots through the early stages because they can usually stay at home, reducing costs, and they also have the support of family and friends. And, if they decide during the training that a career as a professional pilot isn't for them, then the financial outlay isn't huge.

However, if the student pilot does make it through to achieve the PPL, then he or she has the option of further training with Airways Aviation, either at its European flying base at Huesca, Spain, or at one of three locations in Australia.

The student will undertake a course for the MPL, the latest route through to an airline pilot's licence.

Local students

"The UAE is an important region for Airways Aviation," explained CEO Ian Cooper. "Middle Eastern airlines are highly desired by prospective pilots, so it makes complete sense for us to partner with Emirates Aviation Services, an established training provider in the UAE. We are now working together to provide high-quality airline pilot training for local students and a direct pathway on to the flight line.

"We already have one of our foundation schools in Dubai and this adds a flying base to feed through to one of our hubs."

Abdullah Al Ansari, director, Emirates Aviation Services, said: "This partnership with Airways Aviation will enable us to achieve our vision of being a leading training provider of airline pilots. Utilising the company's exceptional quality of training programmes and senior teaching staff, we're confident that we will produce some of the best pilots in the UAE."

Airways Aviation is continuing to expand its network of foundation schools, with two more due to open this year – one in Europe and the other in Kuwait, at the College of Aviation Technology.

It's also pursuing relationships with airlines, as it is important for students to feel confident about gaining employment as a first officer once they've completed training.

"We have more agreements with airlines coming on line in 2017," said Cooper. "There are four agreements, with both Middle Eastern and European airlines, which we will announce soon."

The company, headquartered at London Oxford Airport, UK, is also rolling out an ambitious set of sponsorship packages for student pilots. These were launched in Paris, France in February, the initial stop in an international recruitment roadshow, the first staged by Airways Aviation. The roadshow visits five other European countries, finishing in Prague, in the Czech Republic, on May 13.

The sponsorship is for €40,000 ($43,460) towards the cost of a European Aviation Safety Agency (EASA) integrated pilot training course starting later in 2017. The company intends to follow this first roadshow with others in countries where it has foundation schools, including the Middle East.

"These scholarships form part of Airways Aviation's commitment to creating equal opportunities and reducing barriers to entering the pilot profession," said Cooper. "We will extend this programme beyond the initial locations to offer financial scholarships to potential aviators in a bid to encourage both domestic and international students to pursue their career goals to the highest level."

At each of the roadshow events, would-be airline pilots will be able to take an aptitude assessment, using the industry-standard COMPASS test, for which they will need to pay a €50 ($54) administration fee. Only the top-scoring candidates will be invited to apply for the scholarship programme. The application process will be rigorous, involving a strict English test and a panel interview in Oxford.

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Cobham Helicopter Academy has landed.

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ABOVE AND BEYOND

Abu Dhabi staged the opening round of the Red Bull Air Race series for the 10th time and there was a new winner. But what's it like to be the new boy in the series? Mikael 'Mika' Brageot talks to **Dave Calderwood**.

Brageot takes the Bull by the horns

There was a brand new winner at the opening round of the 2017 Red Bull Air Race World Championship, held over the bay at Abu Dhabi in February.

Czech racer Martin Sonka, in his fifth year competing in the speed-plus-aerobatics series, not only won the event but blew the competition into the weeds with a best time more than a second faster than his rivals.

Strong winds affected some of the racers but Sonka overcame mistakes made during practice the week before to come good on the day.

Reigning champion Matthias Dolderer, of Germany, could only manage fourth after incurring a penalty, while last year's runner-up, Australian Matt Hall, slipped to 10th.

"I've finally won my first race. I feel good in my race plane and this, of course, gives me confidence for the future," said Sonka. "This was a totally different start compared to last season and, hopefully, it will continue this way."

Long-time competitor, Nigel Lamb, stepped down from the races after last year's series and his place has been taken by Frenchman Mika Brageot.

Top category

Brageot has been competing in the Challenger category, which was started in 2014 to train pilots up to the standard required in the headline Master Class. In Abu Dhabi, his first race in the top category, he scored a respectable ninth.

Brageot admitted the step up from Challenger to Master Class is a big one. "It's faster and more difficult," he said. "One lap in the Master Class is 45 to 50 seconds faster than in the Challenger. You have to be a second quicker at every single gate (plastic pylons filled with air, which mark out the course).

"Not only that, but I jumped from being just a pilot to team manager as well. I have an amazing team but there is an added responsibility. The days are much busier than they were before, having to coordinate the tech side, the tactics and tackle all the elements."

This is despite Brageot spending all of 2016 under Lamb's wing, being mentored for the step up into the Master Class. He has also taken over Lamb's aircraft, the only MXS-R in the series – most of the other racers fly an Edge 540.

"We've made some small adjustments to the aircraft," said Brageot. "New paint has contributed to reducing the weight. I'm a bit heavier than Nigel so that was necessary."

Brageot also really enjoyed flying in Abu Dhabi. "Nice weather! We were a bit worried about engine temperatures but in the end, there was no problem," he said.

"It's a nice city and I like the location; it's a dream for a pilot to fly. The buildings are so big that they look really close. If the wind is from the northwest, there's no rotor effect from the buildings, but if it switches around, it's much bumpier. We have to take a lot of care in windy conditions.

"My goal is to win; to win every round, every race, and to be at the top of my performance. It's vital not to be blocked by lack of ambition."

Breitling pilot Mika Brageot and his Skyracer aircraft.

"My goal is to win; to win every round, every race, and to be at the top of my performance. It's vital not to be blocked by lack of ambition."
MIKA BRAGEOT

Brageot flies for the Breitling Race Team, as did Lamb, and works with the same team members – technician Mark Hensman, tactician Max Lamb and team coordinator Victoria Griffiths. He won the Challenger Cup in 2015, which earned his chance at the Master Class.

But Brageot is no newcomer to flying. Born in the southwest Aquitaine region of France, he took his first flying lesson at the age of 11 and, by 21, he was a member of France's national aerobatic team, the youngest pilot ever to represent France on the international stage.

Since then, he's earned two team gold medals as well as gold, silver and bronze medals in both team and individual competition at the World and European Aerobatic Championships.

Away from competitions, Brageot is also an aerobatic flight instructor and a display pilot, with a total of more than 3,000 hours in the air.

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Hogan to leave Etihad

The Etihad Aviation Group has said that James Hogan will step down as president and chief executive officer in the second half of 2017.

The board and Hogan first initiated the transition process last year with the formation, in May, of the Etihad Aviation Group, a diversified global aviation and travel organisation.

Hogan said: "Along with the board and my 26,000 colleagues, I am very proud of what we have built together at Etihad and of the company's substantial contribution to the UAE and to the development of Abu Dhabi."

AJW Group boosts senior team

AJW Group, which has an office in Dubai, has appointed Sam Rice as sales and business development director of engines, and Mike Swann as the head of quality and safety.

Rice previously served as director of EMEA sales at AeroTurbine.

Swann was previously compliance director at Cobham Helicopter Services.

Amalfitano jets in for Embraer

Embraer has appointed Michael Amalfitano as the president and CEO of its executive jets business unit.

He succeeds Marco Tulio Pellegrini, who switches to CEO of OGMA – Indústria Aeronáutica de Portugal.

Amalfitano brings 35 years of experience in corporate aircraft finance, having held several global leadership positions with equipment leasing companies such as Stonebriar Commercial Finance, Bank of America Leasing, Fleet Capital, and GE Capital.

RAMACHANDRAN JOINS JAZEERA AS CEO

Rohit Ramachandran joined Jazeera Airways as its new CEO in January.

Ramachandran is an industry veteran, bringing with him more than 20 years of aviation experience in both the commercial and operational side of the business.

He has worked at global and regional airlines, including KLM, Singapore Airlines, and, more recently, Air Arabia and its joint ventures and subsidiaries, where he was responsible for the commercial organisation.

Ramachandran said: "Kuwait has a dynamic travel market that presents interesting and unique opportunities for Jazeera Airways as it embarks on ambitious new ventures both on the ground, in terms of facilities, and in the air. I look forward to working with the management team and everyone at Jazeera Airways on realising these opportunities."

Houari steps up at Airbus

Airbus has appointed Mikail Houari, as president for Africa and the Middle East region. Houari, 50, brings more than 25 years of experience within the industry at a global level. He previously served as deputy president for Africa and the Middle East.

In his new role, he will lead the team to drive operations and future business across the region.

NAFL targets UAE

The National Association of Freight and Logistics (NAFL) has appointed Abdullah bin Khediya as the general coordinator to support its aim of promoting the importance of the UAE as a global hub for the cargo and logistics sector.

NEW ROLE FOR ALNAQBI

Ali Ahmed Alnaqbi, founding chairman of the Middle East and North Africa Business Aviation Association (MEBAA), has been elected vice chairman of the International Business Aviation Council (IBAC) governing board.

The three-year appointment began in January following his election in December last year.

"I am honoured to have been elected to the vice chairman position," he said.

OMAN POST FOR LANE

Ian Lane has been appointed general manager of BAE Systems Oman, based in Muscat.

Lane was previously the vice president of offset and industrialisation, a post he held since joining BAE Systems in 2011.

He succeeds Matthew Foster, who moved to the UK Defence Solutions Centre in the UK.

Rockwell Collins leadership revamp

Rockwell Collins has revamped its Middle East leadership to head an expansion programme.

As the new MD for the Middle East, Turkey and North Africa, Talel Kamel leads the company's commercial and government systems business interests in the region. Bernard Bouillaud is now sales director for the Middle East and Africa, leading a new team dedicated to the defence market and based in the Middle East.

Cargo challenge

Emirates SkyCargo has appointed Ross Barnett as cargo manager in the UK. He will oversee the 45 staff employed there.

Barnett will oversee the cargo operations for the 18 daily passenger flights that travel between the UK and Dubai each day, alongside the two additional freighter services from Heathrow.

Savin appointed

Olivier Savin has been appointed as Safran Nacelles' vice president - customer support & services, heading the company's global network for airlines and aircraft operators using the company's jet engine nacelles.

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Dr Mark Hiller

Marcelle Nethersole *speaks to the managing director and chief operations officer at Recaro Aircraft Seating.*

1

What new innovations does Recaro have on offer?

We have several, such as our new business class seat for single-aisle aircraft, the CL4710. This has an advanced ergonomic design that not only invites passengers to relax, but also offers everything a passenger needs to work undisturbed.

We also have a new five-star package, where airlines can offer passengers added value in terms of comfort, while working efficiently and economically. Customer service, flex seat, wellbeing, I-Seat, and antibacterial solutions are the five new stars above the clouds.

For example, we want to make sure passengers aren't just comfortable in our seats but also as germ-free as possible. Our antibacterial solutions have specially coated surfaces on the frequently touched plastic parts of our aircraft seats, which offer passengers increased protection from bacteria. After three hours, 99% of the bacteria have disappeared. The application coating is possible on tray tables, armrests and seat backs.

2

Recaro won a Crystal Cabin award for its Smart Cabin Reconfiguration. Can you tell me about it?

Yes, we were very excited to win this award in Hamburg. The Smart Cabin Reconfiguration concept was a collaborative research effort together with Airbus and THK.

Within the smart cabin, we have developed the flex seat. With a simple sliding seat concept, seat pitch can be increased for passengers when flights are not fully occupied. To this end, the proven and award-winning SL3510 economy-class seat for short- and medium-haul flights is simply folded up, and the front seat rows are then pulled apart like an accordion to increase the seat pitch. This results in significantly more space for passengers, and more added value for airlines.

3

Who are your customers?

Today, we have 200,000 seats used by more than 30 airlines. We have most customers for Boeing and Airbus aircraft for economy and business-class seats. Normally, we have the more premium customers in our industry. But we also have low-cost carriers, such as EasyJet, and legacy carriers, including Qatar Airways; where we provide our CL3710 seat, one of the lightest on the market.

4

Middle East airlines have high standards. Are they tough customers?

Well, they like to pay a lot of attention to high-end products, so I guess they expect high standards too.

But we like to provide these high standards and are happy to carry on with existing customers, such as Qatar Airways and FlyDubai, which has just added new orders.

Also, at the Aircraft Interiors Expo in Hamburg, we signed a new contract with Gulf Air to supply our CL3710 economy-class seat for 10 of its new Boeing 787-9 aircraft and 29 Airbus 320/321neo aircraft.

5

How do you see the future of aircraft seats?

Focus on the cabin and interior will play a vital role, as this will be the area where the airlines can really differentiate.

The cost of fuel and C02 emissions will also play an important role going forward, as will connectivity and power supply.

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What does a typical day involve for you?

I have been CEO for five years and I spend 50% of my time travelling to see customers and our international sites.

I really enjoy the travel part, as it allows me to observe passengers and speak to them to find a new demand.

Storage is always one big comment, as is more room for comfort – such as seat heating.

For a business-class seat we want to provide a 'hotel room in the sky' feel.

> "For a business-class seat we want to provide a 'hotel room in the sky' feel."

Fokker introduces
Electronically Dimmable Window

Last year Fokker Services proudly announced the new Electronically Dimmable Window (EDW) concept at the AIX in Hamburg. The innovative EDW is able to block out 99.95% of light coming through, and can generate all types of intermediate dimming modes, such as opaque windows.

We have teamed up with GKN and partners to bring the Electronically Dimmable Window technology as a retrofit solution to the aftermarket. Fokker Services, member of GKN Aerospace since 2015, is always pushing the boundaries by applying new technologies on all aircraft types. As an experienced aircraft MRO re-delivery and engineering company we have performed large modification projects for Special Mission Aircraft and VIP conversions. Besides that, through continuous innovation we introduce solutions to improve operator revenue potential, decrease operating cost and increase passenger appeal for all commercial aircraft. Recent examples of our innovations are the Skyview Panoramic Window™, lightweight passenger seats, LED lighting, WIFI in the cabin and avionics upgrades, such as the ADS-B out system which is mandated by 2020 in Europe and the US. We are part of the GKN Aerospace family since 2015, which opened a whole new world of exciting technologies that we have added to our aftermarket product portfolio.

For more information please contact Fokker Services +31 88 6280000 or email info.fokkerservices@fokker.com

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