Embraer Bags $3 Billion

Order announcements slowed considerably on the second day of the Paris Air Show, with Airbus logging just over 100 sales for its narrowbody A320 family. But if momentum slowed for Seattle and Toulouse, it picked up for Embraer.

The Brazilian plane builder announced orders, options and commitments for 51 aircraft worth US$3 billion, for both the E1 and E2 models of its 70- to 130-passenger airliners.

An Informa Company

NOT UNMANNED AT ALL! General Atomics showed off its next-generation ground control station for UAVs at the Paris Air Show this week. Aviation Week writer Lara Seligman joined many who simulated flying an MQ-9 Reaper from the new, advanced cockpit configuration.

—More on Page 3

Embraer Commercial Aviation President and CEO John Slattery

Boom Times for Boom

Supersonic hopeful Boom Technology says enthusiasm for its Mach 2.2 jetliner plan has boomed, with airlines indicating firm interest in up to 76 faster-than-sound airliners—triple the number from a few months ago. Other than Virgin Atlantic, which has signed for up to 10, a further four unidentified operators have now shown interest in 66 more aircraft.

“They are putting real money against these commitments and a significant amount of cash,” says Blake Scholl, founder and CEO of the Denver-based start-up. “They are not just ‘letters of intent.’”
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Lead the way.
Airbus at the Paris Air Show launched Skywise, a broad initiative to use a lot more data in a much more structured way to make its own and airline operations more efficient.

“We are launching an entirely new phase of aviation,” Airbus CEO Tom Enders said. “When we look back at this event in a few years, we will be able to say that this is where we really launched connected aviation.”

Having been approached by Silicon Valley-based Palantir Technologies, “we very quickly realized the benefits,” he said, of “making much better use of data.”

Airbus Launches Skywise Data Platform

Celebrating here Tuesday are Peach Aviation managing director and CEO Shinichi Inoue, Airbus COO Fabrice Bregier, Palantir Technologies CEO Alex Karp, Airbus DTO Marc Fontaine, Airbus CEO Tom Enders and AirAsia Group CEO Tony Fernandes.

GA Reaper Drone ‘Flies’ au Bourget

GENERAL ATOMICS SHOWED off its next-generation ground control station at the Paris Air Show this week, letting attendes simulate flying an MQ-9 Reaper from a new, advanced cockpit configuration.

GA’s Advanced Cockpit Block 50 ground control station (GCS) is designed to reduce pilot and operator workload with its human-machine interface, which includes 3-D graphics, moving maps and synthetic video on a touchscreen display. The overall six-screen cockpit — compared to the current system’s four screens — includes one “growth screen” that the operator can use for additional capability, for instance email or chat, said Steve De La Cruz, GA project engineer.

The Block 50 has a modular, open architecture, which will allow the air force to replace different components and field new payloads without disturbing the overall design.

“Our Block 50 team is proud of the development effort that addressed more than 700 customer requirements covering all areas of GCS performance,” said David R. Alexander, president, aircraft systems, GA-ASI. “The Block 50 GCS CDR marks the successful completion of requirements established by our air force customer.”

Under GA’s current development contract with the air force, three Block 50 GCSs have been completed and are undergoing initial developmental testing, with four additional ground stations in work including mobile shelter and fixed facility configurations, according to GA. Reaper ground and flight tests are scheduled for next year, following successful completion of the systems integration and ground test phase.

“General Atomics’ MQ-9 Reaper UAV armed with Hellfires

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Despite this, the manufacturer has confirmed several new configuration details for the first time including the use of a fifth-generation composite wing, a “hybrid” composite fuselage, next-generation digital architecture and super-efficient, very-high-bypass turbofans. A conceptual graphic and side-view profile also showed a clear melding of 777 and 787 design features.

Boeing Commercial Airplanes vice president and general manager of airplane development Mike Delaney remains coy about the precise meaning of a “hybrid” fuselage, but it is believed to reflect the proposed geometry of the cross section rather than the choice of structural materials. The cross section is therefore expected to combine the width and profile of the upper lobe of a 787- or 777-like design with the lower lobe of a 737-like ovoid fuselage.

Delaney also outlined a notional timetable for the NMA development program, should it be launched in early 2019. Design would occur around 2020, with fabrication in the 2021-22 period and build would be in 2023. Flight tests and certification would take place in 2024, with entry-into-service in 2025. Using multi-disciplinary design optimization systems and model-based computing, the company is also analyzing the design, construction and testing of the NMA in advance of any formal go-ahead decision.

“Today we are very early in a program that’s not launched, and we already know what the production system looks like,” says Delaney. “We already know what the assembly sequence looks like; we are already starting to build parts in the computer. Because we are trying to build the first couple of hundred in the computer – that’s the power of the digital thread,” he adds.

The work is key to helping Boeing make fundamental changes in its production process to enable the NMA to be built for lower cost than previous twin-aisle designs. “Right now, the price will be set by the market, but my team is working on figuring out the cost that it is sold at to support that price and our company’s vision of the business case in 2025 as laid out by our leadership,” says Delaney.

Depending on the outcome of the business case study, Boeing is expected to decide next year whether to start offering the aircraft to the market. “I’m very optimistic we are going to close out the business case,” he adds. —Guy Norris

SIA Engineering and GE Aviation (Chalet 142) have agreed to establish a new engine overhaul joint venture to be based in Singapore, the companies said at the Paris Air Show on Tuesday. The new entity will provide a full range of engine services for the GE90 and GE9X engines.

GE is to have a 51% equity stake, with SIA Engineering holding the remaining 49%. This partnership “is made possible,” the companies said, by Singapore Airlines’ announcement in February of a letter of intent for 39 Boeing widebody aircraft valued at US$13.8 billion, which includes 20 777-9s powered by GE9X engines. SIA is also a major operator of GE90-powered 777-300ERs.

The GE90 engine exclusively powers the Boeing 777-300ER and 777-200LR, and the GE9X engine is the sole engine selection for the Boeing 777X aircraft.

The partners pledged to establish a state-of-the-art facility, adopting GE’s “Brilliant Factory” concepts, combining advanced technologies and lean practices with digitization and data analytics to enhance productivity.
Choosing ATR’s solutions generates $1 million of savings annually, per aircraft, compared to their direct competitors. This explains the vast success of the program and its leadership in terms of orders, deliveries, backlog, operator base, investor’s opinion and residual value retention.
Not only are threats coming from multiple regions - from Eastern Europe to the Middle East and North Africa and Asia-Pacific - they are presenting themselves in many ways. “It’s suicide bombers all the way to sophisticated hypersonic weapons,” Kennedy told ShowNews in an interview. “That’s what we have to deal with as a nation today.”

That means Kennedy’s company is seeing strong demand for its products - whether they deal with counterinsurgency, deterrence against national-level assets or to counter the advance of capabilities made by peer competitors to the U.S. That includes hypersonics, where China appears to have made great strides relative to the U.S.

This kind of demand lies in Raytheon’s sweet spot across many different product lines. And for the near term, the growth at Raytheon appears to be in line with the level of projected growth within the U.S. Defense Department’s budget, in the low single digits.

“We were first to grow in 2015 at 2%. Last year, we grew 3.5%. Our guidance this year indicates we’ll be growing north of 3.5%,” Kennedy says.

Part of that is being driven by a new decision announced June 21 to reopen Raytheon’s SM-2 missile production line to support the sale of US$650 million worth of missiles to four international customers - Australia, Japan, the Netherlands and South Korea.

The block buy, which will include more than 280 SM-2 Block IIIA and IIIB missiles, comes on the heels of a massive missile defense win – the successful intercept of the Ground-based Midcourse Defense system by the Missile Defense Agency.

Despite its ongoing strength in building missiles and creating a family of missile defense capabilities, Raytheon sees itself as more than just a defense company. Its cybersecurity business is growing even more rapidly.

Since 2007, Raytheon has been building its cybersecurity profile, acquiring 14 cybersecurity companies, Kennedy says.

Its Forcepoint business strategy is modeled on the one Raytheon used back in the 1960s, when it transformed the consumer electronics market by converting microwave radar technology into the Amana radar range. “We’re making significant strides on the commercial side and the government and defense side,” Kennedy says.

Forcepoint, with US$600 million in annual sales, has its own board of directors and is set up to run commercially. It uses Websense’s commercially oriented sales force and its products, combined with Raytheon’s SureView insider-threat solution. The combination is a product that monitors behavior of a network and the people using it for more protection.

Kennedy says he sees double-digit growth in Raytheon’s cybersecurity business on both the commercial and defense sides. It recently received the award of Domino, a US$1 billion homeland security contract that secures the cyber systems of more than 100 federal government agencies - after a contract protest. “Raytheon is not just a defense powerhouse. It’s a defense and cybersecurity powerhouse,” Kennedy concludes.
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**Size Matters to GE
As it Creates a Monster Additive Machine**

The world’s largest laser-powder additive manufacturing machine is being created behind locked doors by GE Additive, the business formed by parent company GE to capitalize on that fast-moving technology.

Tailored for the aerospace industry, the machine will be able to print in a “build envelope” of one meter cubed (1000mm x 1000mm x 1000mm). The development project, announced at the Paris Air Show, will be unveiled in November at the Formnext Show in Frankfurt, Germany.

“The machine will 3-D print aviation parts that are one meter in diameter, suitable for making jet engine structural components and parts for single-aisle aircraft,” said Mohammad Ehteshami, vice president and general manager of GE Additive. “The machine will also be applicable for manufacturers in the automotive, power, and oil and gas industries.”

The initial technology demonstrator machine, called “Atlas,” is a laser/powder machine and will be ‘meter-class’ (1000mm) in at least two directions. The GE team has been developing the machine over the past two years and several proof-of-concept machines have been built.

In the Atlas production version (1000mm x 1000mm x 1000mm), the build geometry will be customizable and scalable for an individual customer’s project. Its feature resolution and build-rate speeds will equal or better today’s additive machines. It is also designed to be used with multiple materials, including non-reactive and reactive materials (such as aluminum and titanium).

“We have customers collaborating with us and they will receive beta versions of the machine by year’s end,” Ehteshami said. “The production version (yet to be named) will be available for purchase next year.” GE is targeting first deliveries of the machine in late 2018.

The technology demonstrator builds upon GE technology, combined with Concept Laser’s expertise in laser additive machines.

**Philippines Wildcats to Be ‘Spiked’**

The Philippines’ forthcoming pair of Leonardo AW159 Wildcat helicopters will be armed with Rafael Advanced Defense Systems Spike NLOS missiles for anti-ship missions. The Philippine navy chose the weapon because of its range of 25 km (15 mi.), says spokesperson Capt. Lued Lincuna. The navy has not identified the type of torpedo that it will buy for the helicopters, however. Wildcats of the Republic of Korea Navy are also armed with the Spike NLOS missile for attacking ships and land targets. The Philippines ordered its Wildcats for $114 million in 2016, with delivery expected in 2018.

**Britain’s Carrier Close to Sea Trials**

Britain’s newest aircraft carrier, the HMS Queen Elizabeth, will put to sea this month or July, Assistant Chief of the Naval Staff, Rear Admiral Keith Blount declared here at the Paris Air Show. The 65,000-ton carrier, which will help the UK re-establish its carrier strike capability, had been expected to sail in April. Despite some technical issues, the Aircraft Carrier Alliance, the ship’s builders and the Navy had decided to conduct de-risking work while still in harbor in Scotland. The HMS Queen Elizabeth will carry B-model F-35 Lightning II fighters.

**UAE Seeks $2 Billion-Worth of Patriot Missiles**

The United Arab Emirates has requested up to 160 new Patriot missiles built by Lockheed Martin and Raytheon in a deal worth up to US$2 billion if finalized. The request has been approved by the U.S. State Department and the deal is now subject to a 30-day congressional review period. In a May 11 notification, the Defense Security Cooperation Agency (DSCA) said the potential foreign military sales include 60 Patriot Advanced Capability 3 (PAC-3) missiles built by Lockheed and another 100 Patriot Guidance Enhanced Missile-Tactical (GEM-T) from Raytheon.

**Airbus Plans Regional Jet-Size E-Fan X**

Airbus has begun planning a regional-airliner-scale electric propulsion flight demonstrator, the E-Fan X, which would fly within three years as a step toward potential development of a hybrid-electric single-aisle airliner. The proposal is to modify a BAE 146/Avro RJ regional jet with a 2-megawatt-class turbogenerator and batteries powering electric propulsors replacing one or two of the aircraft’s four turbofans. The E-Fan X has replaced Airbus’ plan to launch production of an electric-powered two-seat training aircraft, the E-Fan 2.0, as the next step after its E-Fan X technology demonstrator, which flew on battery power in 2014 and hybrid power in 2016.

**Swiss Should Opt for Single Type Fighters**

The Swiss defense ministry has been recommended to purchase a single fleet of new fighter jets and a ground-based air defense system to protect the country’s airspace into the 2030s. Committees examining the options for the country’s future fighter procurement are proposing purchase options of 30, 40, 55-70 aircraft to replace its fleet of F-5 Tigers and F/A-18 Hornets as part of 16 recommendations detailed by the Federal Department of Defense, Civil Protection and Sport on May 30. Depending on the option, the cost of the procurement is between 5 and 15 to 18 billion Swiss francs (US$5.147 billion, $15.44 billion - $18.52 billion), officials say.
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Lockheed Reveals C-130J-SOF for International Partners

Mitsubishi Extra MRJs for Testing

Mitsubishi is considering building one, or perhaps two, extra flight-test aircraft to help it through its certification process for the heavily delayed Mitsubishi Regional Jet.

There are already five MRJ flight-test aircraft, four of which are based at Moses Lake, Washington; the fleet has so far accounted for 940 hr. of flight time, said Mitsubishi Aircraft Corp. program director Alex Bellamy. Those five aircraft, all MRJ 90 models, are being used to close out the various areas that have to be certificated by Japan’s Civil Aviation Bureau. Although a definite decision has not yet been made, “the quickest and easiest way to do that is to build another aircraft,” he said. Building a second new aircraft would give Mitsubishi additional capacity to close out the tests as quickly as possible.

Mitsubishi is keen to get the MRJ into airline service as quickly as possible after a series of delays in the aircraft’s development program. The most recent, announced early this year, pushed back the in-service date by two years, to mid-2020.

The reasons for the delay centered around changes to an avionics bay and the resulting alterations to the aircraft’s wiring system as the various avionics boxes were moved around, said Bellamy. That had been an extremely complicated process, but the revised design was then frozen.

Bellamy said that, after the latest delay was announced, the company brought in several independent consultants from around the world to run the rule over the aircraft’s new technical configuration, “system by system.” The experts gave the go-ahead to the company’s revised plans and it is now “confident and comfortable about the revised schedule.”

—Alan Dron

AVIC Confirms P&WC’s PW150C for Mitsubishi MA700 Turboprop

Pratt & Whitney Canada (P&WC) has signed a definitive agreement to supply its latest PW150 engine family powerplant – the PW150C – for the AVIC Aircraft MA700 aircraft. Since the selection of the PW150C for the new regional turboprop, P&WC has invested significantly in the engine’s development to support its integration into the airframe.

John Saabas (left), president of Pratt & Whitney Canada, and Chen Fusheng (right), president of AVIC Xi’an Aircraft Industry (Group) Company Ltd., signed the agreement.
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Israel Aerospace Industries (IAI) is introducing an export version of the Heron TP that will better compete in the international market, where the company faced export limitations with the original Heron TP, designed from the start to become the strategic drone operated by the Israel Air Force. While IAI saw great demand for this drone, its ability to be exported was limited to only a few countries.

The new version retains the gross takeoff weight (5.4 tons) and strategic capabilities of the TP – operational ceiling of 45,000 ft., mission endurance of 30 hr. – but has a maximum payload capacity of 450 kg – the same as that of Heron I, and half of that of the TP. “Heron TP-XP opens up additional opportunities by allowing us to expand the range of solutions we can offer to our customers,” Shaul Shahar, IAI executive vice president and general manager of the military aircraft group, told ShowNews. Like the original TP, the new Heron TP-XP is larger than Heron I, but it is designed to comply with payload size and weight regulations that would limit the export of heavier drones. “With double the flight speed, cruising at higher altitude and enhanced payload capability, this system expands the availability of the Heron TP, which is already considered to be one of the world’s leading UAVs.”

Among the advantages of Heron TP-XP are its ability to cruise above the commercial traffic, at altitudes of up to 45,000 ft. Like the TP version, Heron TP-XP uses triple-redundant avionics, automatic takeoff and landing and meets NATO and other accepted world standards and complies with STANAG 4671. These capabilities make Heron TP/TP-XP uniquely capable of “coexisting” in crowded, commercial airspace.

Compared to the Heron TP, the TP-XP has a more slender design, with satellite antennae embedded inside the 46-ft.-long (14 meters) fuselage. The fuselage has a large internal payload bay, slightly smaller than the TP’s. The large fuselage and huge wings (85-ft. span) provide more than adequate space for the installation of multiple payloads that may comprise electro-optical, radar and electronic surveillance missions. Since maximum fuel can be carried with full payload, Heron TP-XP can perform all missions with maximum payloads at the greatest endurance.

—Noam Eshel

**C-UAS Systems From Israel in Paris**

Counter-UAS systems developed in Israel are shown here at Le Bourget. The C-UAS products are designed to deal with different aspects of drone threats.

Rafael (Static Display A8) is showing the Drone Dome, a “system of systems” integrated by Rafael’s engineers to provide effective airspace defense against hostile drones at ranges of 1.9 to 3 mi. (3 to 5 km). The solution is focused on the micro- and nano-UAVs, including multirotors, used by terrorists. The system establishes hemispheric coverage for the protected site, as it detects, tracks and neutralizes drones classified as threats flying in no-fly zones. With a very fast response rate, and using “soft kill” electronic attack against drones, the system causes minimal collateral interruptions to the surrounding urban environment, maintaining maximum safety for the protected site.

Rafael is showing a Drone Dome variant with a laser effector capable of defeating small drones and multirotors from a distance of 3.5-4 km. The system uses a 5kW laser that has defeated targets in few seconds in field tests. The same laser can destroy the payload or the complete drone, using 5kW or 10 kW emitters.

The system integrates subsystems from different Israeli specialist manufacturers, including RADA’s RFS-42 radar and communications intercept unit, which provides early warning and target detection, coupled with Controp’s MEOS EO/IR observation, used for target recognition. The electronic attack segment is represented by C-Guard RD, provided by Netline. Rafael’s command and control system integrates these subsystems to enable effective and simple operation by a single user. The Drone Dome is designed to operate autonomously, or from command and control centers.

Elbit Systems (Chalet 200, Static Display A8) is showing the ReDrone – a C-UAS with a compact passive sensor and effector designed to detect, identify, track and neutralize different types of drones that are flown within a range of radio frequency communication protocols. Each ReDrone unit covers a radius of about 0.6 mi (1,000 meters); it automatically detects radio-electronic emissions associated with drones. Where two units are coupled, ReDrone can automatically locate both the drone and operator within the area covered by the systems.

Using passive, spinning direction-finding techniques, ReDrone can detect and track several drones simultaneously, to provide 360-deg. perimeter protection and complete, up-to-the-minute situational awareness of drone activity. After detecting a target, the ReDrone system disrupts the drone’s communication with its operator, blocks its radio and video signals and GPS positioning data, and sends it off track, preventing it from carrying out an attack.

—Noam Eshel
The state that revolutionized the automotive industry has taken to the skies to become one of the top places in the country for aerospace business. Michigan. Home to more than 600 aerospace-related companies, Michigan is ranked among the top 10 states for major new and expanded facilities. To learn more about aerospace opportunities in Michigan, visit the MEDC booth in Hall 3 – E128 at the International Paris Air Show.
Engine, Planform Begin Shaping Anglo-French UCAV

Britain and France have quietly selected Safran’s M88 engine to power the joint unmanned combat air vehicle (UCAV) demonstrators the two countries plan to fly in 2025, officials close to the program have said.

A derivative of the engine will be developed for use inside the aircraft, which will use a double-leading-edge planform similar to that used on Northrop Grumman’s X-47, the design of which is being displayed in model form here at the show.

The decision on the planform and the engine are among the key decisions made as part of the £200 million ($US254 million) joint Future Combat Air System (FCAS) feasibility study, agreed on at the 2014 Farnborough Airshow. The two countries are currently involved in a 12-month complementary phase of study, known internally as Phase 0, which is working to refine the concepts and technologies the air vehicles will use as well as define issues such as work share, as well as how the testing regime may look.

The next step – due to start before the end of 2017, and known as Phase 1 – will be a preliminary design and development phase expected to last three to four years.

Although the demonstrators will use a common airframe, they will each differ in terms of radar, electronic warfare and optronic sensor, depending on the national requirements, similar to the way the Sepecat Jaguar ground attack aircraft was developed.

The demonstrators will be significantly scaled up from the European Neuron and the British Taranis demonstrators that have gone before it, and will be as large as the Dassault Rafale but with a larger wingspan.

The program has now attracted the attention of the French Navy, which joined the program in 2015 with a view that the system could eventually be employed on its Charles de Gaulle aircraft carrier.

Among the areas being explored by the development teams is more extensive use of artificial intelligence to assist the ground operators on mission planning, target acquisition and on-the-fly analysis of threats. However, officials note that the capabilities being developed for the UCAV could also apply to upgrades to the Rafale.

Technologies being developed for the UCAV’s future radar will likely feature in the Rafale’s future development road map.

—Tony Osborne

Rosoboronexport’s Backlog Reaches 106 Helicopters

THE BACKLOG OF export helicopters at Rosoboronexport (a subsidiary of Rostec State Corp.) has reached 106 rotorcraft worth US$4.7 billion, the company’s director general and CEO, Alexander Mikheev, said at the Paris Air Show.

“The portfolio is comprised of the Mi-17 medium-utility, the Mi-26 super-heavy transport, the Ka-52 combat-reconnaissance and the Mi-28NE combat helicopters,” Mikheev said, “and we are also considering more requests.” The company will begin market promotion of the militarized Ansat and Ka-226 light utility helicopters within the next two or three years, he added.

Mikheev pointed out that operational experience in Syria can be applied to the modernization of the export-oriented platforms.

“Since 2008, we have annually delivered between US$10 billion and US$12 billion of equipment, with aviation accounting for roughly 50%.

“We have something to offer to potential customers in the area of fixed-wing and rotary-wing aircraft modernization, relating to various support systems, as well as intellectual hardware including electronic warfare systems, guided and non-guided weapons and onboard avionics. We have a relevant program,” Mikheev said.

Rosoboronexport has signed the contracts to the tune of US$8 billion and delivered hardware worth approximately US$3 billion since the beginning of the year, according to the CEO, without providing additional details. Rosoboronexport’s order backlog has reached US$45 billion, with aviation accounting for US$19 billion.

At present, the regions of North Africa and the Middle East are the primary ones for Rosoboronexport; they have taken the place of India and China, which were the primary markets for Rosoboronexport before 2010. These regions account for 70% of Russia’s defense export volume.

Rosoboronexport is at Chalet 369 and Hall 2a, Booth C198.

—Nikolai Novichkov
—Tony Osborne
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**CFM Does Not ‘Rule Out’ Geared Engine Bid for NMA**

As engine makers jostle for position on Boeing’s potential new midsize airplane (NMA), CFM International hints that a new engine architecture with a gear-driven fan is among the various concepts under consideration.

Pratt & Whitney has already confirmed that growth versions of its PW1000G geared fan family are under study for NMA, while Rolls-Royce has also tacitly declared that its geared UltraFan will be its primary approach to the new Boeing airliner. CFM (Chalet 121), which will lead the joint bid from General Electric and Safran under the joint venture banner, has until now remained silent on any potential major architecture considerations for the NMA contest.

CFM executive vice president Allen Paxson says multiple options are being studied to meet the high performance efficiency goals required by Boeing for the 45,000-lb.-thrust NMA engine. “When we launched into the Leap program, we had 18 different architectures we considered, with a variety of technologies. We have run all of the requirements of the customer against what we can have mature and ready. So, rest assured we are doing the same thing this time.”

CFM program executive vice president and general manager Francois Bastin adds, “We are not ruling out any architecture. We have no religion, or have no dogma, against the gear.”

Despite recent comments from Pratt president Bob Leduc that the engine maker will go all out to use legal means to protect the patents covering the GTF family, CFM appears unconcerned by the threat. The engine makers have already exchanged the opening shots in what could turn into a bitter battle over Pratt’s patents for the GTF fan-drive gear system. Despite recent rulings in support of Pratt, CFM maintains that GE’s earlier work on several geared engine concepts – such as the reduction-gear-configured quiet clean short-haul experimental engine (QCSEE) project with NASA in the 1970s – prove the basic technology was already in play.

Rolls-Royce also claims that Pratt & Whitney’s argument is indefensible. The UK engine maker, which is test running a 100,000-hp power gear system in Germany, cites its own geared heritage through several programs, including heritage Allison and Rolls turboprops and turboshafts and the gear-driven lift fan on the Lockheed Martin F-35B.

—Guy Norris

**Saft’s Lithium-Ion Batteries Here on F-35 and A350**

SAFT IS HERE promoting its lightweight lithium-ion (li-ion) batteries, which have been in service on the Airbus A350 since early 2016.

Airbus, which initially planned on li-ion technology for the program, decided to switch to more conventional nickel-cadmium (NiCd) batteries when Boeing suffered safety issues with GS Yuasa li-ion batteries on the 787 in 2013. Airbus also planned to revert to li-ion once certification authorities would have possibly revised rules. The airframer thus quietly started delivering A350s equipped with the newer technology late in 2015. The first one, MSN21, entered into service with Brazil-based carrier Latam (TAM, at the time) in January last year.

There are now approximately 50 Airbus A350 jets flying with lithium-ion batteries, after a program start with nickel-cadmium.

Moreover, scheduled maintenance happens every two years, a much greater time interval than NiCd’s four to six months. Saft says Li-ion batteries can be retrofitted on early-production A350s, if Airbus makes such an offer.

In case of internal short-circuit or overcharge, Saft (Hall 2B, Booth 137B) has designed a system to canalize hot gases toward “burst disks,” located on the skin of the nose section, that act as vents. This avoids the heavy casing Boeing had to add around the 787’s batteries.

Saft Li-ion batteries can also be found on the Lockheed Martin F-35, which is part of the flying display here at the Paris Air Show. —Thierry Dubois

There are now approximately 50 Airbus A350 jets flying with lithium-ion batteries, after a program start with nickel-cadmium.
If you flew into France this year for the 52nd International Paris Air Show, we were likely right there with you. That’s because Ontario, Canada provides landing gear for 75% of Boeing and Airbus commercial aircraft programs. And as you reached for your phone to check your GPS to find your hotel, there’s a good chance we were there too; made-in-Ontario parts are on-board 80% of all commercial communications satellites.

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Inmarsat Launches Satellite Communications for UAS

INMARSAT HAS LAUNCHED a satellite communications service for unmanned aircraft using a small terminal developed by Cobham Satcom (Hall 2b, Booth E156).

Using the 1.45-kg Aviator UAV 200 terminal, the Swift Broadband Class 4 service, called SBB-UAV, provides up to 200 Kbps data for command and control and real-time image and video transfer in parallel.

Satellite communications are of increasing importance as the UAS industry works to enable beyond-visual-line-of-sight operations to increase the efficiency and economic attractiveness of using drones.

Lugano Networks has conducted demonstrations using its hybrid terrestrial/satellite communications network to provide command of control beyond line of sight. The demos used Ligado’s SkyTerra L-band satellite, with its 22-meter reflector, and terrestrial L-band frequencies to communicate with AeroVironment’s Puma UAS using a small ViaSat terminal.

“Unmanned intelligence, surveillance and reconnaissance [ISR] is one of the fastest growing markets for mobile satellite services,” says Shaun Flanagan, sales director at Aerossatcom, a provider of military and government aeronautical satcom that has partnered with Inmarsat to launch the L-band SBB-UAV service.

“The low weight of the [UAV 200] and its resulting applicability on even the smaller long-range UAS means it is a true platform BVLOS capability multiplier,” says Andrew Legg, regional director of sales at Cobham Satcom.

—Graham Warwick

Elbit President and CEO Bezhalel “Butzi” Machlis

Responding to the embargo on arms supplies that followed the Six Day War, Israel was determined to become self-reliant in the acquisition and support of all major weapon systems and platforms – aircraft, naval ships and combat vehicles. This was the reason for the founding in 1967 of the Elbit Company, a private enterprise that developed and built the electronic equipment for those systems. Fifty years later, Elbit Systems is a global defense powerhouse ranked 26th among the world’s defense companies – yet innovation and defense electronics are still its core assets.

With backlog of almost US$7 billion derived mostly from export business (80%), Elbit Systems has demonstrated continuous growth throughout its 50-year history. “Maintaining this growth year after year is a hard work that encompasses all sectors,” president and CEO Bezhalel “Butzi” Machlis told ShowNews. “With ‘multi-domestic’ operation, we position our company to be closer to our strategic markets. We always strive to be leaner, more streamlined, integrating engineering, production, procurement and business lines where possible.”

These include merging several activities under the intelligence, surveillance, target acquisition and reconnaissance (ISTAR) division and the formation of intelligence and cyber specialist subsidiary Cyberbit. More recently, the company’s command, control and communications and data-link activities were also merged under a single division. By implementing modern enterprise resource planning (ERP), the company positioned itself to become more agile and responsive.

“We see a growth in defense spending in most of our strategic markets,” Machlis said. “In many of these countries, the growing demand is providing us, as a ‘multi-domestic’ company, with the opportunity to become a prominent player in such markets, providing relevant solutions, tailor-made to local customers’ requirements, involving local industries and employees.” According to Machlis, this growth is also evident in its home market, Israel, where defense procurement is increasing, based on forward-looking multi-year procurement plans that provide better visibility and planning for the future.

“Our airborne systems capabilities afford us the flexibility to provide a single sensor or an entire cockpit avionics suite,” Machlis explained. “Designed to be net-centric, oriented, intelligent, fast and precise, our high-performance avionic products and systems incorporate a wide range of core technologies. We provide battle-proven electronic and electro-optic combat systems for air forces worldwide – from flight instrumentation to head-up displays [HUD], and from helmet-mounted displays [HMD] to guided weapons.

“Our systems are integrated on fixed- and rotary-wing aircraft, whether they are new or mature, from both Eastern and Western manufacturers. Our airborne systems are installed as original equipment in new aircraft.

“Our products are integrated in most of the combat platforms of the West,” Machlis continued, “from F-35 to F-15, F-16, Gripen-E and many more platforms.”

Communications, electronic warfare systems and self-protection are also part of the company’s portfolio. Elbit Systems’ line of directed infrared countermeasure (DIRCM) systems is one of the world’s most advanced countermeasures, protecting more than 130 military and civilian aircraft and helicopters – among them many VIP aircraft serving heads of states.

Beyond the introduction of new systems and technologies, the company is pursuing major turnkey programs – training and maintenance – that contribute significant cash flow from outsourcing operations. Elbit Systems supplied and operates most of the trainer fleets of the Israel Air Force, and has recently embarked on a similar project in the UK, under its cooperation with KBR, providing training for the Royal Air Force cadets.

“Simulation and training is a US$10 billion market as air forces become increasingly reliant on virtual training and tend to outsource operations,” Machlis noted, adding that some forces already perform half their training flights on the ground. “We delivered and currently operate the Israel Air Force simulator farm, based on our ‘Skybreaker’ networked simulation system and ‘virtual avionics’ integrated in modern training aircraft. We provide air forces the growth in capacity and scale they need to bring cadets up to the flying skills they need to operate fifth-generation combat jets.”

—Noam Eshel
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Qatar Won’t Cancel Orders After Blockade, Firms Up Its Commitment for Boeing 737-8s

Qatar Airways CEO Akbar Al Baker ruled out aircraft cancellations after four Middle Eastern countries blocked the airline from using its airspace but will start redeploying capacity to new destinations.

“We still need some time, but we will redeploy very soon,” Al Baker said at the Paris Air Show. The airline plans to bring forward the launch of new destinations such as Skopje, Macedonia; Ljubljana, Slovenia; and Sarajevo, and to open more destinations in Iran to use excess narrowbody capacity freed up as a result of the blockade. The airline will also launch new long-haul destinations in South America – Rio de Janeiro and Santiago de Chile – in January in spite of the much increased flight time. Flights to Brazil now have to take a 2-hr. detour because of the airspace closures.

Earlier this month, Egypt, Saudi Arabia, the United Arab Emirates and Bahrain closed their airspace for Qatar-registered aircraft as part of a diplomatic conflict over Qatar’s alleged support of Islamic terrorism. Al Baker stressed that in his view “no country has the right to block airspace” and that the four are “in violation of the air transport agreement.” He also criticized the International Civil Aviation Organization for not having acted in the past two weeks in spite of what he considers to be a “gross violation of international law” and ICAO’s own rules. The blockade is “an unprecedented illegal act,” Al Baker said.

He conceded that the situation is having a major effect on the airline’s costs, not only because of longer flight times and operational restrictions but also because of a lower level of bookings. A lot of U.S. and European group bookings have been canceled since the ban was announced, Al Baker said. “But people start to realize that it is a diplomatic issue that has nothing to do with the safety of the airline.” Therefore, Qatar Airways is now noticing the booking curve “go back up again.”

Al Baker pointed out that “we will never cancel orders because of the conflict.” The airline is still “short of widebody capacity” because of delayed Airbus A350 deliveries. It will take five more long-haul aircraft this year.

On the narrowbody side, Qatar Airways firmed up an order for 20 Boeing 737-8s that includes 40 options. The carrier plans to take the first three 737-8s in the second half of 2018. Al Baker is also near an agreement with Airbus and CFM International about the conversion of an existing order for A320neo aircraft into A321neos powered by CFM Leap-1A engines. Qatar was originally the launch customer for the Pratt & Whitney PW1000G-powered version of the aircraft but refused to ever take delivery of them because of the issues surrounding the engines.

According to Al Baker, the 737-8s will replace the existing A320 fleet. Qatar Airways could also use the options to start up a planned domestic airline in India. The company has not yet filed a formal application to the Indian authorities to start up the airline but has received “assurances for the launch” from the Indian government.

Al Baker said he has no interest in ordering more A380s even after Airbus proposed the A380plus project. The airline still has outstanding orders for two additional aircraft and options for another three.

Also, Qatar Airways is no fan of the new medium-size airplane (NMA) Boeing has been pitching to customers. “Boeing should fine-tune the 787-8. They don’t have to reinvent the wheel.” Qatar Airways will move the 787-8s in its fleet to NMA-gearied routes once it has taken delivery of 787-9s. The airline operates 30 -8s and has 30 -9s on firm order.

Boeing originally launched a short-to-medium-haul version of the 787, the 787-3, along with Japan Airlines and All Nippon Airways (ANA) as customers, but dropped the version later.

—Jens Flottau

Philippine Airlines Firms Up Q400 Options to Compete With LCCs

PHILIPPINE AIRLINES HAS exercised an option on seven Bombardier Q400 aircraft, bringing its total firm orders to 12 of the turboprops, in a bid to win back market share it has lost to low-cost carriers.

The operator will use the new aircraft, which will be configured with 86 seats across two classes – economy, with a 29-in. seat pitch, and premium economy, with 33 – to replace older Q400s, Philippine Airlines CEO Jaime Bautista said at a joint press conference with Bombardier at the Paris Air Show.

“We think the addition of seven Q400s will allow Philippine Airlines to increase its market share. We used to be the only carrier, the dominant domestic player, but with the entry of low-cost carriers, they were able to get people who used to travel by boat or by bus, and they have grown faster than us,” Bautista said.

The first of the original five aircraft will be delivered in Toronto, Canada, in July, with one per month arriving until November, while deliveries of the latest firm orders will begin from March 2018, with five arriving in 2018 and two in the latter part of 2019.

The Q400 is usually equipped with 70-85 seats, but last year Bombardier introduced a new 90-seat configuration, which involved moving a bulkhead to add an extra emergency door.

Bombardier does not yet have a launch customer for the 90-seat version, said Fred Cromer, president of Bombardier Commercial Aircraft, but the market trend is toward increased capacity, he believes.

“We think the addition of seven Q400s will allow Philippine Airlines to increase its market share,” said carrier CEO Jaime Bautista.

—Helen Massy-Beresford
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Piaggio Steps Up Its Comeback

The plan to relaunch Italy’s Piaggio Aero Industries as a civil and defense aircraft manufacturer is gaining momentum some 20 months after moving production from an aging plant in Genoa to a US$150 million, clean-sheet-design factory in Villanova d’Albenga, about 56 mi. southwest. This past September the firm delivered the first Avanti EVO twin turboprop manufactured there, and since then it has delivered two more.

“Every day we take more steps. We’re still not where I plan to be, but I see significant improvement from a year ago,” says CEO Renato Vaghi, who took that position in late August. And there’s more improvement to come as the factory ramps up toward a target rate of 30 aircraft a year, which represents just half of its actual capacity.

That’s a ways off, he admits. Production plans call for another three P.180 EVOs this year, and four more P.1HH Hammerheads—unmanned aerial systems in addition to the two currently in production. The Hammerhead is based on the P.180 Avanti.

“This has been an incredible effort,” says Vaghi, as Piaggio recovers from the collapse in late 2012 of its largest customer with a fleet of 56 aircraft, the disruption of moving into a new factory and rebuilding a corporate culture, the delayed certification of the P.180 EVO, and the crash last year of a prototype Hammerhead. The company was supported through its darkest days by Abu Dhabi state investment firm Mubadala, which now owns 100% of Piaggio.

“We have very ambitious plans,” says Vaghi. “Our growth potential extends to 60 aircraft a year.” But to get even halfway there, Piaggio must stimulate sales for the latest, third-generation EVO version of the P.180, which still looks futuristic despite the design having flown 30 years ago.

A four-point campaign calls to create awareness worldwide of the EVO and its capabilities; understand markets with the highest growth potential and seek repeat business from existing customers; develop customer support; and utilize a commercial approach through creating mission-derived value packages to entice potential customers. Product development will underpin this strategy, with enhancements such as an upgraded landing gear and a larger fuselage door for medevac missions.

Vaghi notes that Piaggio has a backlog that will allow one and a half years of production at current rates, “and there are still some slots available in 2018.” These could be taken, though, if final negotiations with “at least five or six” customers prove successful.

There are currently some 220 P.180 Avanti aircraft in operation globally. —John Morris

Hammerhead to Return to the Air

Piaggio is preparing to restart flight trials of its P.1HH Hammerhead medium-altitude, long-endurance (MALE) unmanned air system, just over a year since the prototype was lost after crashing in the Mediterranean.

A new prototype of the Hammerhead—a version of Piaggio’s distinctive P.180 Avanti executive turboprop—has been assembled and will “fly within days,” Piaggio CEO Renato Vaghi told Aviation Week in an interview at the Paris Air Show.

The company is in the process of assembling three more Hammerheads and hopes to complete development of the platform and deliver the first batch of aircraft to the launch customer, the United Arab Emirates Air Force, during 2018.

“Today, Piaggio is refocused on the aircraft-related business,” says Vaghi.

“Our priorities are to make sure to accomplish the most strategic program ... get through the development and get them delivered to our customers.”

The company is currently in the process of spinning off its engine manufacturing business and is looking forward to completion by the end of the year.

The loss of the first prototype P.1HH was a significant setback for the program, and came at a difficult time for the company. Within weeks of the crash, the company announced a new industrial plan that resulted in the shuttering of its MRO business. Then, less than a month later, then CEO Carlo Logli resigned. Vaghi, then COO, took the helm, and was later elevated to CEO.

“It’s been an intensive 12 months,” Vaghi explained.

Without a prototype of the Hammerhead, Piaggio was unable to continue test flights, although ground-based development work and simulation has continued. Vaghi would not comment on the direct cause of the accident, but said the issue had related to the integration of the flight control system.

“It is totally resolved and corrective actions have been taken,” he said.

There was no need for a costly salvage operation; the company and the authorities were able to rely on the data collected through telemetry to identify the cause.

Despite the setback, Vaghi says there remains great interest in the platform, which is currently Europe’s only indigenous MALE UAV. He believes that the P.1HH potentially has a decade lead on the planned EuroMALE system under development in France, Germany, Italy and Spain.

With the focus on the development of the Hammerhead, work on Piaggio’s other military product, the multirole patrol aircraft (MPA), has been paused. Test flights of the MPA configuration with its longer wings, canards and vertical stabilizer have exceeded expectations in terms of aircraft performance. There was also great interest in the aircraft from Southeast Asia.

The MPA will return to flight operations in July to support Hammerhead testing activity as the two versions share the same landing gear and several other common systems.

Vaghi says that development of the MPA could be completed and the aircraft brought to market in around 18 months.

—Tony Osborne
Spirit is a trusted partner to the world’s leading OEMs, applying equal parts passion, pride and people to advance the aerospace industry. Our use of cutting-edge technology is just one way we deliver high-precision design and fabrication. Whether we are designing structures for the most sophisticated defense aircraft or fabricating the fuselages of the latest passenger planes, the men and women of Spirit are dedicated to scaling new heights of aerospace performance.
Seeing progress in its Airbus A400M’s capabilities and practically on-time deliveries, the French Air Force has adopted a supportive stance on the program.

“We have a positive perception of how the program has evolved,” chief of staff André Lanata says. He is happy with the six aircraft available, of a total 11. The other five are undergoing routine maintenance or retrofits that will bring them to the tactical initial operational capability (IOC) standard, from a purely logistic standpoint. Airbus had committed that France would have six tactical A400Ms by the end of 2016 and kept its promise, according to Armée de l’Air officials. In fact, they consider early 2017 deliveries were still on time: “We were expecting the delay to be worse,” says a spokesperson.

With the retrofitted aircraft, nine tactical A400Ms will be available by the end of this year. Lanata is confident further deliveries will be on schedule and that the French Air Force will have a total 15 A400Ms by the end of 2018. The fleet is targeted to be 50 strong eventually.

The tone of French Air Force officials is much more supportive than that of their German counterparts. Germany complains about its A400Ms’ lack of availability and tactical capabilities. As a matter of fact, power gearbox (PGB) problems held up deliveries and affected flight operations of the A400M last year. Lanata deems the interim solution workable but a permanent one is expected to be found and implemented later this year. The PGB issue helped compound a torrid 2016 for the program, with delays in developing the aircraft’s tactical capabilities. “This is behind us,” says Lanata.

The French Air Force is now using the full potential of its Airbus airlifters. “The A400M is a game changer,” a spokesperson says. It can deliver a NH90 multi-role helicopter to Gao, Mali, and fly back to its base in France on the same day, thus illustrating its strategic capability. Recently, an A400M flew alongside the Patrouille de France aerobatics team during its U.S. tour. It was carrying 50 passengers and 25 tons of freight. Using smaller, slower C-160 Transalls, the same mission would have required four aircraft, the spokesperson estimates. “We land in Iraq – if we did not trust the aircraft, we would not land there,” he adds.

The A400 is also, at last, considered as a tactical aircraft – it can use unpaved runways, drop freight and paratroops from its rear ramp and counter electronic jamming. The aircraft is still short of the required full operational capability (FOC), however, which should include better electronic countermeasures. The current standard is deemed below specification and too weak to beat Russian-built ground-to-air missiles.

Also missing is inflight helicopter refueling. Should Airbus fail to deliver this ability, “we would buy more C-130Js,” the spokesperson says. France is scheduled to receive, between 2017 and 2019, the four Lockheed Martin C-130Js it has ordered with rotorcraft inflight refueling capability.

The third and final aspect that still does not meet FOC specifications is in regard to airdrop. Paratroops cannot be dropped from both lateral doors at the same time, which would be useful for a massive assault. Turbulence has thus far been deemed too dangerous, as it would cause paratroops to collide with one another.

Independent of both the IOC and FOC, the French Air Force is striving to keep consistent engine control standards. Software keeps evolving, Lanata says, and he does not want a crew to fly on two different standards when they move from one aircraft to another. “This would be very disturbing for them,” he explains. He is therefore endeavoring to have a consistent engine control standard across the fleet. If this is not possible, a crew used to the most advanced software would be prohibited from flying earlier-standard aircraft.

Airbus Helicopters CEO Guillaume Faury, a French citizen, has been named Airbus Group’s point of contact with the French government, replacing Marwan Lahoud, who has left the company.

—Thierry Dubois
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Safran Has Products, Ideas and Job Opportunities

Here in Hall 2a, Booths A228 and A252, Safran is displaying products representing its entire range of capabilities. Visitors can see engines such as the new-generation CFM Leap turbofan, which powers the Airbus A320neo, the Boeing 737 MAX and the Comac C919; the Silvercrest turbofan, which is to power the Falcon 5X and the Cessna Hemisphere business jets; and the Arrano turboshaft, which equips the in-development Airbus H160 helicopter. Also shown are the Airbus A320neo nacelle, the Patroller multi-sensor tactical drone and the electric taxiing system that was unveiled and demonstrated here at the Paris Air Show in 2013.

Safran can also be found at the Paris Air Lab, a 6,560-sq.-ft. (2,000-sq.-meter) space dedicated to industrial innovation and located in the Concorde Hall of the neighboring Air and Space Museum. Aerospace majors and start-ups are showcasing their current and future innovations. Safran’s exhibit includes a fuel cell, a solution for solid hydrogen storage and hybrid propulsion systems.

The Paris-based company will also be on hand at the Careers Plane - Air Employment/Training Forum, an area of the show devised to provide information on professions, job opportunities and training programs in aero-space. Safran is hiring 5,000 new employees this year, including 1,600 in France.

—Thierry Dubois

Silvercrest on Track for 2018

THE 11,000-TO 12,000-lb.-thrust Safran Silvercrest turbofan is on track for spring 2018 certification, says Aymeric Plantier, product marketing director for Safran Aircraft Engines (Hall 2a, Booths A228 and A252). Infant teething problems are fading memories and the engine is well on its way to becoming a mature adult. The oil/fuel heat exchanger had to be modified to meet revised specifications, the engine case needed upgrading to hold dimensional tolerances with heat loads, and other changes were needed to optimize specific fuel consumption.

Development issues put a two-year delay in the program, resulting in a similar setback for the Falcon 5X, the launch platform for the new engine. Delays are not expected to have an impact on Textron Aviation’s Citation Hemisphere, slated for first flight in 2019.

Silvercrest features a single-piece wide-chord titanium fan and four-stage booster powered by a four-stage low-pressure turbine. The high-pressure section has a four-stage axial compressor and single centrifugal compressor powered by a single-stage high-pressure turbine with active clearance control.

—Fred George

Safran Gets EASA Nod for Ardiden 3G Turboshaft

Safran Helicopter Engines (Hall 2a, Booths A228 and A252) has received EASA certification for its Ardiden 3G helicopter engine, which powers Russian Helicopters’ Ka-62 medium twin. The helicopter hovered in 2016, but the test campaign was interrupted until the “official maiden flight” on May 25, 2017. During its maturation and certification ground trials, the Ardiden 3 has accumulated more than 8,500 hr. of test. Another variant of the 1,700- to 2,000-shp turboshaft, the Ardiden 3C/WZ16, powers the in-development Avicopter AC352, itself the Chinese variant of the Airbus Helicopters H175. The protracted Ka-62 program traces its roots to the 1990s.

—Thierry Dubois

Safran’s Arriel 2L2 Makes Ground Run

Safran’s Arriel 2L2 turboshaft performed its first ground run at the company’s Bordes, France, facility early this month. The engine type will power the new Korean civil and military helicopters, known as the LCH (Light Civil Helicopter) and LAH (Light Armed Helicopter). The Arriel 2L2 is co-developed by Safran and South Korea’s Hanwha Techwin, which will produce it under license. Certification of the 1,024-shp turboshaft is planned for late 2020 and entry into service for 2022. With power outputs ranging from 650 to 1,024 shp, the Arriel family now powers more than 40 different helicopter types, says Safran (Hall 2a, Booths A228 and A252).

—Thierry Dubois
China’s Wing Loong Sneaks Into Paris

China’s growing influence in unmanned aerial systems is being felt at the Paris Air Show with the western debut of its Wing Loong II medium-altitude, long-endurance armed reconnaissance system.

Making its first appearance at a Western air show in full-scale mockup form, the 9,260-lb. (4,200 kg) CATIC Wing Loong II is essentially a copy of the General Atomics MQ-9 Reaper that can be equipped with a wide range of Chinese-produced sensors and weaponry, with a maximum payload of 1,058 lb.

The prototype Wing Loong II flew for the first time in February.

Here at Paris, the aircraft is being displayed with a number of Chinese-produced weapons, including the YJ-9E anti-ship missile, the Blue Arrow 7, TL-2 and AG-300 air-to-ground missiles and the LS-9 small-diameter bomb.

The Wing Loong II is developed from CATIC’s original Wing Loong platform, which reportedly first flew in 2009.

U.S. reluctance to sell advanced unmanned systems to its Middle Eastern allies has proved a blessing for Chinese manufacturers, who have managed to sell their armed UAVs in bulk. The China Aerospace Science & Technology Corp. (CASC) has sold its CH-4 system to Egypt, Iraq and Saudi Arabia. Iraq has used the platforms against the self-proclaimed Islamic State group, while Saudi Arabia has been using them against the Houthi rebels in Yemen. In March, it was announced that CASC could open a factory to build as many as 300 CH-4 systems for the Saudi armed forces over the coming years. CATIC is at Chalet 3; Hall 2a, Booth D252; and Static Display A8.
The clean-sheet design for the RACER - Rapid and Cost-Effective Rotorcraft - unveiled here on June 20 is a larger aircraft than the record-breaking X3 high-speed demonstrator that the company developed back in 2010 to prove its vision for lower-cost high-speed rotorborne flight.

Airbus, which plans to fly the Safran RTM322-powered aircraft in 2020, is hoping to demonstrate a number of new technologies onboard the Racer, including an eco-mode of flight that will allow one engine to be shut down in cruise even at speeds of around 190 kt., some 40 kt. faster than the maximum cruising speed of traditional helicopters. During cruise the engine will be put into a sleep mode and when needed can be spooled up rapidly by high-voltage electric motors when the additional power is needed for the hover.

Airbus' head of research and innovation, Tomasz Krysinski, says that the use of the box wing and the pusher propellers has resulted in a “virtuous circle” of performance benefits, such as improved lift performance in forward flight, as the aircraft now has two wing sets rather than one as on the X3.

The lower wing will also incorporate the Racer’s main landing gear. A pusher propeller also produces more thrust than a puller propeller, resulting in an immediate impact on the Racer's fuel consumption, Krysinski notes. There is also a safety benefit, as the box wing keeps people entering or exiting the aircraft away from the propeller, and opens up the potential technology for missions such as search and rescue.

Krysinski claims that the fuel consumption of the Racer, even when flying at 190 kt. will be lower than that of a similar-size traditional helicopter flying at 140 kt. “When you accelerate a helicopter, the only actuating system is the main rotor, and as you move quickly, your drag increases significantly,” said Krysinski.

“In the hybrid configuration, the rotor is flat, and the propellers are supplying the forward thrust, so the power needed is significantly reduced,” he adds.

Airbus has long said that surveys of its customers have stated that operators are not willing to pay a significantly higher price for speed. It believes the compound solution is a way of making aircraft significantly more productive without paying too high a price in terms of direct operating cost.

Its target is to achieve a 50% increase in speed compared to traditional helicopters with only a 20% increase in cost.

The Racer team has already undergone component testing and has put full-scale propellers through their paces in a British wind tunnel. A preliminary design review will take place this year, with critical design review during 2018.

—Tony Osborne

Airbus has adopted a radical box-wing and pusher propeller configuration for its European Clean Sky 2 high-speed rotorcraft demonstrator.

Box-Wing Design for Airbus Compound Helicopter

Airbus is developing the "RACER" helicopter under the European Clean Sky 2 initiative.

Airbus Launches A320 Airspace Interior

Airbus on Monday launched the “airspace” interior for the A320 family, following the concept’s earlier introduction on the A330.

In addition to design tweaks around lighting and window shades, the main feature of the airspace project are much larger overhead bins. The new bins allow eight bags per four-frame bin, compared to five for the existing storage devices. The bins will also take much heavier bags, according to Airbus vice president, cabin marketing, Ingo Wuggetzer. Airbus claims the A320 offers 40% more volume for baggage than competing aircraft.

With the airspace concept, Airbus tries to bring the A330neo and A320neo cabins feel closer to that of the A350 cabin.

New sidewall panels allow Airbus to increase cabin width by 1 in. at shoulder level, the manufacturer says. Window shades are also more integrated, to increase window space. Other features include new, colored LED lighting, a newly designed entrance area and new lavatory design.

The full airspace package is planned to be available from 2020 and will be retrofittable to in-service aircraft. Earlier cabin initiatives incorporated include the “Smart-Lav” and “Space-Flex” options.

—Jens Flottau
Raytheon Ready to Meet China and Russia Hypersonic Threat

As China and Russia continue to demonstrate rapid progress in development of hypersonic strike weapons, the U.S.’s largest guided-missile company says technology to counter the threat is already achievable but that fielding a system requires sustained funding and a national sense of urgency.

“We are at a tipping point in hypersonics. It is the number one game changer today, and it’s a huge discriminator,” says Tom Bussing, vice president of Raytheon’s Advanced Missile Systems.

Commenting to ShowNews on the eve of the Paris Air Show, Bussing says the relatively sudden rise of hypersonic strike capability in China and Russia “is a remarkable thing that has occurred, and it has fundamentally changed the nature of warfare.”

By developing a combination of boost-glide and air-breathing hypersonic weapons that can effectively defeat today’s strategic air and space defense systems, he says, China and Russia’s move is “destroying the triad-based” deterrence balance of power. The “triad” is the ability to deliver strategic nuclear weapons via land-based intercontinental ballistic missiles (ICBMs), bombers, and submarine-launched ballistic missiles (SLBMs). The triple delivery method increases deterrence by ensuring the survival of sufficient forces to launch a second strike.

Citing China’s recent DF-ZF and Russia’s Yu-71/74 boost-glide vehicle developments, as well as various air-breathing waverider demonstrations in these countries, Bussing says, “I don’t think in my lifetime I have experienced anything quite like this number of adversaries that have tried to develop technologies designed to change another country’s behavior. China’s anti-ship developments are forcing us to move carrier strike groups farther back, while the Russians are more opportunistic with the Yu-71 boost-glide weapon, which we believe to be nuclear.”

Both systems fly with depressed trajectories, “which are very difficult to engage,” he adds. “A typical ICBM flies a predictable trajectory, but boost-glide and air-breathing hypersonic weapons leverage aerodynamic forces and can hold an entire region at risk. There seems to be a rapid acceleration, and our peer adversaries have recognized the value of this and pushed forward.”

Raytheon is pouring its own resources into hypersonic weapons development as part of a broader portfolio-wide technology investment. Over the past four years US$500 million has been spent on a variety of technologies ranging from propulsion and sensor to advanced processors.

“Of that investment, a significant fraction is being applied to hypersonics,” says Bussing. “But the entire portfolio is playing in future hypersonic weapons as well as backward playing into existing systems.”

Although Raytheon is already known to be competing against Lockheed Martin under the joint DARPA/U.S. Air Force Research Laboratory Hypersonic Air-breathing Weapon Concept (HAWC) research program, the company “also has a number of efforts ongoing in both boost-glide and air-breathing areas,” says Bussing. Hinting at the existence of other, classified, hypersonic weapon development efforts, he adds that Raytheon is active in a large number of programs, “99% of which we can’t talk about today. But in the last five years the air force has been proactively involved, as have the Navy and Army. In our case, we leverage Raytheon’s experience across many programs, and the assets are combined for different purposes.”

Technology that could be applicable to a variety of hypersonic weapons, and vice-versa, is being developed by Raytheon across a wide range of programs, says Bussing. These include the U.S. Army’s Long-Range Precision Fires (LRPF) program to develop a long-range surface-to-surface weapon to replace the Army Tactical Missile System. Named DeepStrike, the three-year development will culminate in flight tests in 2020. The LRPF mission is “partially flown hypersonically, so a large part of our hypersonic work on TGB and HAWC can be applied to a program like this,” he adds.

Other, perhaps less obvious programs, like Raytheon’s Coyote UAV, are also helping future high-speed system developments through areas such as high-speed processing and autonomous networking. According to Bussing, other relevant technologies can be leveraged from Raytheon’s ballistic-missile kill-vehicle programs: sensing know-how from the Space Enabled Effects for Military Engagements (SeeMe) small-sat effort, and thermal management, propulsion and control from its high-speed missiles work.

“In the area of advanced weapons systems development, our nation has to stand up and continue to develop and transition these technologies to the combatant services. Given the progress being made elsewhere, it will be in our best interest to move forward rapidly with these systems,” he adds. Raytheon is at Chalet 294 and Static Display B8.

—Guy Norris
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Do Pilots Need Cyber Warnings?

If the pilots of a widebody aircraft midway across the Atlantic Ocean receive an engine fire alert, should their problem resolution process include the possibility of a false alarm due to a cyber-intrusion?

Flight critical systems are purposefully protected from hackers, but if someone was to get through the many layers of security, pilots may want to know about it in their tactical response to an anomaly.

It’s a question the industry is grappling with as connectivity becomes the norm and the traditional boundaries of aircraft systems become blurred, particularly with the installation of routers that can connect internal avionics buses to the outside world via Wi-Fi.

Airframers largely have one position – eliminate the threat before it gets to the aircraft so pilots don’t need to know – while at least one system integrator, Raytheon (Chalet 294), is actively building a “cyber-intrusion” detection system to help pilots distinguish a real problem from fake news.

“There are lots of places where someone can put malware into the system,” says Bob Delorge, transportation and support services VP for Raytheon IIS, a company whose work spans both military and civilian aircraft. Raytheon used internal funding to build a laboratory version of a “cyber-intrusion” system that monitors bus activity and alerts pilots to cyber threats.

“We know it can happen,” he says. “Now it’s a question of how do you look for it.”

Jens Hennig, operations VP for GAMA, the General Aviation Manufacturers Association, says that threats can be mitigated before anyone boards an aircraft and that pilots should focus on flying.

His position is based on what he learned as co-chairman of the FAA’s Aircraft Systems Information Security and Protection (ASISP) working group. Formed in late 2014, the advisory group of government and industry participants, including Boeing and Airbus, were tasked with coming up with recommendations for updating FAA regulations, policies and guidance to deal with cybersecurity. The group’s final report, issued in August, contains 30 recommendations, 29 of which deal with cybersecurity.

“I’m not staying up late at night worrying about the aircraft systems,” Hennig says. “We have long had very stringent requirements from the FAA to make sure the aircraft is safe.”

His polar opposite opinion from Delorge highlights the complexity of the issues, and perhaps the optics of viewing the problem from a military or civilian perspective.

—John Croft

IFEs Systems Are Another Cybersecurity Concern

Thales Inflyt is concerned that IFE products tailored to individual passengers could expose those passengers to cyberthreats.

Raytheon has developed cockpit instrumentation to alert pilots to a cyber-intrusion. Shown here is an engine fire that may be a false alarm.

Cybersecurity is a growing concern for airlines as evolving inflight entertainment (IFE) systems start using more-sensitive passenger data.

IFE systems under development could target content to passengers based on their booking information, Dominque Giannoni, CEO of Thales Inflyt Experience, said at the company’s integration and testing facility in Irvine, California. In other words, a passenger traveling to London could get maps and tourist information about that city on the seatback IFE, while a passenger on the same flight connecting on to another city would get targeted content on the final destination. IFEs could eventually target movies and audio based on a passenger’s preferences or social media accounts and could allow more purchasing options beyond movies and food and drink.

These developments raise the question of cybersecurity, however. Although data such as credit card numbers are captured and encrypted by IFE systems now, adding more personal details from reservation information complicates the picture and makes the systems more attractive targets for cyber-criminals, said Sam Miller, Thales Inflyt Experience director of product cybersecurity.

Five years ago, airline IFE systems were rarely targeted, but this has changed, Miller said. The threats come from three types of actors: individual hackers, organized crime and state-sponsored hacking.

Individual hackers and state-sponsored hackers have not seriously targeted IFEs, he said. But cybersecurity experts have detected attempts by organized crime.

However, no aircraft has thus far been successfully hacked, Miller said.

Particularly attractive to organized crime are credit card information and the theft of copyrighted material, such as movies, television shows and music, Miller said.

Thales last year bought Vormetric, a data security and encryption company, and is folding it into its E-Security division, a spokesman for the company said. Vormetric’s technology tokenizes and encrypts credit card data, Miller said.

—Madhu Unnikrishnan
Militaries and Industry Seek to Solve Cybersecurity Riddle

For at least the whole of the present century, militaries have understood the critical role cyber defense plays in every aspect of operations. Yet most military organizations appear reluctant to train network defense outside specialist cyber units.

Unlike with land, sea and air space, cyber warfare cannot be conducted only by specialists. Mistakes in configuration or operation of any device connected to a military network could allow an adversary to gain access. The whole force has to be trained in cyber defense – yet this wider training, for the most part, does not take place. The result is widespread vulnerability in military systems.

In the 2017 edition of his annual report, J. Michael Gilmore, the Pentagon’s then director of operational test and evaluation (DOT&E), painted a bleak picture of the U.S. military’s cyber readiness. “Red Teams emulating a moderate-level adversary – or below – routinely demonstrate the ability to intrude DoD networks and operate undetected within them for extended periods of time,” he wrote.

These problems derive, in part, from a reluctance to allow a cyber element to be included in major exercises. “Exercise and network authorities seldom allow fully representative cyberattacks and complete assessments of protection, detection and response capabilities,” the DOT&E noted. This reluctance stems from a fear that a successful cyber attack on the first day will bring a two-week exercise to a halt.

Militaries are beginning to develop ways of integrating cyber into joint exercises, but initial results have succeeded mainly in highlighting the scale of the security-skills problem.

ShowNews has learned of one experiment conducted by a military organization during an exercise involving some 200 experienced service personnel in 2015. Trainees were subjected to four simulated “phishing” attacks, in which bogus emails were sent in an attempt to persuade recipients to click on a link contained in them. Anyone clicking on the links was directed to a page telling them that, had this been a real attack, the network could have been compromised.

The first wave of emails purported to be from a bank, urging recipients to revalidate their password. The second appeared to come from the business-oriented social network LinkedIn. The third contained an invitation to attend a talk on Daesh. The fourth notified of a false change of arrangements for lunch during the exercise.

Around 5% of recipients clicked on the link in the banking email, and – as the organizers expected – the numbers caught out by the next two emails were lower. But a worrying 49% were fooled by the lunch email, even though it spelled the name of the exercise incorrectly. Worst of all, a very small number of people – a little under 2% of the training audience – not only clicked on every link but did so multiple times.

“As one customer told me, there’s no patch for stupidity,” says Yochai Corem, vice president for EMEA at Cyberbit, the cybersecurity division of Israeli defense contractor Elbit. “But even if you can improve awareness by 10% it’s important. I know of an organization where 20 people were targeted by this kind of scam, but two of them phoned their central security office [to report the suspected attack], and that was enough to stop it affecting the rest.”

The temptation to blame the untrainable 2% should be avoided, though, lest it lead to institutional and structural vulnerabilities being ignored. That, at least, is the view of Emma W., lead for people-centered security at the UK’s National Cyber Security Centre. (The NCSC is a division of GCHQ, the country’s communications-intelligence agency, whose staff cannot be identified publicly for security reasons).

“We need to make security that works for people, because that’s the only way that security works,” Emma said during a presentation given during the InfoSecurity Europe 2017 event in London earlier this month. “Shape the environment – don’t fix the people.”

Emma argues that security failures are the responsibility not of individuals but of organizations that put processes and policies in place that allow those failures to occur. From requirements to generate, memorize and never write down multiple strong passwords, to policies that often mean someone who reports making a security error will be disciplined, organizations often set up unintended barriers to good security.

“If you really want to call your users the weakest link, I guess I’ll let you,” she says. “But first of all you have to have invested in technology and systems to make your users’ lives more manageable day to day, and not just pile all the burden on the end-users.”

—Emma W.

“We need to make security that works for people, because that’s the only way that security works...first of all you have to have invested in technology and systems to make your users’ lives more manageable day to day, and not just pile all the burden on the end-users.”

—Emma W.
One of Israel Aerospace Industries’ areas of cyber expertise is the development and provision of cybersecurity solutions tailored to the needs of the aviation sector. “Today’s aircraft are practically flying data centers,” Esti Peshin, general manager of IAI’s cyber division, says. “As such, [they are] vulnerable to attack and require security just like any other data center.” Unlike conventional computerized systems, aviation is highly regulated, and therefore only a few companies can meet certifications and requirement for aviation systems.

Aviation business is also highly exposed – cyber attacks on airports and airlines quickly reverberate worldwide, causing significant losses, even if security is not compromised. “That’s why manufacturers, airlines and airports require the foresight and means for early warning, rapid response and efficient recovery, to mitigate cyber attacks,” Peshin says. “As a leading player in this field, with a legacy in avionics, computing and information systems, we are best positioned to provide the cybersecurity solutions addressing different players in the aviation market.”

When it comes to cybersecurity, IAI promises “a holistic approach that provides defense forces, governments, critical infrastructures and large enterprises with end-to-end cybersecurity and monitoring tools,” addressing intelligence, protection, monitoring, identification and accessibility.

The training facility will be powered by the Cyberbit Range, the most widely deployed cybersecurity training and simulation platform. The Cyberbit Range enables trainees to practice responding to attacks in real-life settings, and includes security tools, network architecture and traffic that reflect trainees’ actual work environment. The platform provides a rich and up-to-date catalog of simulated attack scenarios, including ransomware, enabling cybersecurity experts trainees to improve their skills and accelerating the onboarding process for new team members. The Cyberbit Range powers cybersecurity training centers in North America, Asia and Europe.

“We invite Japanese enterprises and government agencies to experience a new way to train cybersecurity professionals and improve their skills,” said Takeshi Mitsuishi, president and CEO of Ni Cybersecurity. “This is another milestone in establishing Ni Cybersecurity as an innovative provider of cybersecurity services in our region, bringing the most relevant and up-to-date technologies to organizations in Japan.”
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Bird’s DIRCMs Offer VIP Treatment

The proliferation of MANPADS – man-portable air defense systems – increased dramatically in recent years, leaking from collapsed nations (Libya, for example) and from radicals sponsored by rough nations (Iran and North Korea, to mention a few of the most obvious). As MANPADS are available for sale on the black market, they appear in conflict zones throughout the world, as well as in the hands of criminal organizations. The growing threat drives military and government agencies to turn to proven countermeasures to protect their air.

Flares are the most common, but are not as effective against modern threats, which require more complex and expensive systems, integrating early warning sensors and flare dispensers.

Such systems were developed by the Israeli company Bird Aerosystems (Hall 3, Booth E30), which has teamed with Airbus to develop and field the AMPS-MV on helicopters and aircraft. Airbus is marketing the systems to its customers in Europe and the Middle East, while Bird is responsible for sales to the rest of the world, including the U.S. government and the United Nations, which have integrated this missile protection system and countermeasures in non-U.S. aircraft (such as the Mi-8 and other Russian planes), where original U.S. technology cannot be used.

The system also includes the Missile Approach Confirmation Sensor (MACS) – a dome-shaped active (radar) sensor that is activated instantly upon any detection of the Airbus MILDS missile warning sensor. The radar detects and tracks the incoming missile, providing verification that the threat is real. Only then are flares released to defeat the threat. In the future, Bird plans to integrate a laser beam to defeat the target by IR deception. The system has demonstrated its reliability and low false alarm rate, recording thousands of flight hours without any false alarms. Such reliability known as Aeroshield that comprises AMPS-MV and a choice of flares and/or SPREOS directional infrared countermeasures (DIRCM) made by Bird, making Aeroshield the only pod solution that supports protection by both DIRCM and flares. The pod is attached to the belly of civil aircraft or helicopters, providing countermeasure capabilities to VIP airplanes. Bird has recently completed the testing and certification of the pod, which is currently used on a presidential VIP Boeing 737 belonging to an African nation.

The growing demand for DIRCM is evident especially in the VIP sector, where business jets and other VIP airplanes and helicopters are equipped with these countermeasures to mitigate potential threats they may face on domestic or international flights. Transport planes and tankers operating from forward locations are also becoming popular platforms, particularly where nonflammable, nonexplosive solutions are required.

Another system developed in Israel is MUSIC, from Elbit Systems. MUSIC also comes in several sizes and shapes, variously adapted to military fixed-wing and rotor-wing aircraft as well as to civilian planes such as airliners, cargo planes and business aircraft used for VIP transport.

Elbit Systems developed its countermeasures using cutting-edge laser-based DIRCM technology. The system is integrated permanently on aircraft or used on demand, utilizing a fully enclosed, pod-type installation that operates automatically throughout the flight.

For use on civilian (and VIP) aircraft, DIRCM systems must be certified to civilian standards for each specific model, thus enabling VIPs to fly from and to every destination they want. While heads of state and other statespersons can relax with such sophisticated countermeasures on their airplanes, ordinary rich people can’t obtain these VIP devices, which are exportable only to approved government users.

According to Elbit Systems, MUSIC is certified on 24 different platforms, serving a global fleet of 130 aircraft, operated by 16 customers. These systems have accumulated more than 30,000 operating hours, some on civilian aircraft, protecting commercial airlines and VIP planes.

—Noam Eshel
GKN Aerospace Pivots to Asia

Aerospace and structures manufacturer GKN (Chalette 395) is setting its sights on expansion in Asia as it seeks out new acquisitions.

With the integration of Fokker Technologies now complete following its purchase from owners Arle Capital in 2015, GKN Aerospace CEO Kevin Cummings is now keen to increase the company’s operations in the Asia-Pacific region.

“We truly have a global presence, with 55 manufacturing sites around the world . . . but we are underrepresented in Asia and we have to be there,” Cummings told ShowNews in London.

“If you look and see that 40% of all new aircraft will be purchased there, then there becomes a certain need to manufacture there.”

The company currently has around 10% of its people in Asia, and Cummings said he would like to see more balance in the company’s activities in the region. He cites the growing number of ambitious indigenous aircraft programs in the region, such as China’s C919 narrowbody airliner, which took to the air in May.

“India will likely have its own aspirations,” he added.

GKN’s pivot to Asia may already be paying dividends. Here at the Paris Air Show the company has announced that its Fokker has signed a contract with the Honda Aircraft Co. to manufacture the electrical wiring and interconnection system for the HondaJet light-weight business jet and has signed a long-term agreement with Japan’s Kawasaki Heavy Industries to produce low-pressure compressor (LPC) cases for the PW1100G-JM and PW1400G-JM geared turbofan engines.

The deal covers work out to 2027.

“The push to find new opportunities in Asia comes as the company moves to integrate GKN operations and those of Fokker into one company, a process expected to be complete by the beginning of 2018.

Through the acquisition of Fokker, GKN has become the global No. 2 in aerostructures and the No. 3 in electrical wiring systems; it has also put the company in a strong place to increase its capabilities on thermoplastics and the electrification of aircraft. Additionally, the acquisition increased the company’s workload on the F-35 Joint Strike Fighter, the Airbus A350 and Gulfstream business jets.

“If Fokker is the company we thought it was: It has the technology we anticipated we were going to get, the infrastructure that we thought it had, and the customer relationships we believed it had and equal to or better than the talent we expected,” said Cummings.

“Culturally, it fits very well,” he added.

Expansion has also been taking place in the U.S. The company has recently opened new facilities in Orangeburg, South Carolina, to support Boeing 787 work in Charleston, and at Sumner, Washington, to assist with the 737 MAX program. Cummings also revealed that the company will open a plant in Bay County, Florida, for work on a U.S. government program.

No more detail has been disclosed; however, as GKN was named last year as a supplier for the B-21 Raider bomber program, it seems likely that the facility will support that program.

As part of its research and development efforts, GKN has begun working with the U.S. Department of Energy’s Oak Ridge National Laboratory in Tennessee on studies around additive manufacturing, in particular regarding two different additive-manufacturing methods.

The first, laser metal deposition with wire (LMD-w), builds structures using a laser layer by layer and offers the potential of producing complex medium- and large-scale aircraft structures from titanium. The second involves using electron beam welding to produce precise small and medium-size components with the aim of producing them at a high volume.

GKN is also continuing to seek additional work with Boeing, but with many of the company’s program supply chains now sourced, Cummings admitted that “everyone is waiting around to see what comes next,” as the aerospace giant ponders its so-called new midsize airplane concept.

But GKN is also reviewing its own businesses. Rapid expansion in recent years has meant it has picked elements of different businesses it increasingly considers noncore.

“Through GKN’s history we have grown very, very quickly through acquisition, but we have never in our aerospace component of our business sold anything,” said Cummings.

“Now we are looking at our size and look where we are going forward,” he added.

GKN has set its sights on becoming the global No. 1, No. 2 or No. 3 provider in key market segments, or where it believes it can become a market leader: If it can’t achieve that position or deems a market no longer worth investing in, it plans to exit.

“We will look to exit some noncore business in the next year or two,” said Cummings.

—Tony Osborne
Singapore Airshow Aims to Grow in 2018; Adds New Features

More attendees, more exhibitors and representatives from more countries are just some of the goals for the next Singapore Airshow, says Leck Chet Lam, managing director of its organizer, Experia Events.

The last show, in February 2016, set new records as Asia’s markets continue to expand and more companies there participate in the global aerospace arena.

“It ended on a very high note,” says Leck. Trade visitors were up 7% to more than 48,000 from 143 countries and regions. Some 1,040 companies from 48 countries and regions were represented, including 65 of the top 100 global aerospace companies. A strong point of the Singapore Airshow (Chalet 58), VIP delegations, rose 5% to 286 VIPs from 90 countries and regions.

Leck is working to make 2018 even bigger and better. It is presently 80% sold out, which puts it on track with the last show, he says.

In broadening its reach, the 2018 show will bring a greater focus on emerging and disruptive technologies. They include Connectivity, Big Data/Predictive Analysis and Cybersecurity. “We plan to create events around them, such as conferences,” Leck explains.

He acknowledges that smaller players often cannot afford to exhibit, so Experia is exploring ways to bring them in, from sponsorships to helping raise funds. One feature will be a Singapore pavilion that will emphasize local companies, especially smaller ones.

The island nation is a center in Asia for education, technology and innovation. “We plan to create events around them, such as conferences,” Leck explains.

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The island nation is a center in Asia for education, technology and innovation, so universities and local high-tech companies will also play a greater role. The show will be a focus for many students who could be attracted into aerospace as a career, he notes.

Visitors will see many changes in 2018 as development of Changi Airport continues around the show site, with a brand-new Terminal 3 and conversion of the existing third runway from military to dual use. The construction is aimed at increasing Changi’s capacity to 24 million passengers a year from 17.7 million.

But the show will remain where it is. “The venue is there to stay,” says Leck.—John Morris

AirAsia X Sticks With A350 Order

AirAsia X will not cancel its order for 10 Airbus A350-900s in spite of this week’s decision to forgo true long-haul flying and focus on the sector of up to around 8 hr. “The A350s are not due until 2021 anyway,” AirAsia CEO Tony Fernandes said. “We will see how the market evolves.” In addition to the A350s, AirAsia X has 66 A330-900s on firm order. It currently operates 30 A330-300s. Fernandes said there is too much capacity already between Asia and Europe — “people are killing each other. We would much rather fly more to India.”

Al Baker Wants Audits to End Electronics Ban

Qatar Airways CEO Akbar Al Baker wants the Department of Homeland Security to audit security standards of Middle Eastern airports including Doha/Qatar. “The ban will not last very long,” Al Baker said on the sidelines of the Paris Air Show. The necessary security technology for Doha airport to be able to pass any audit has long been installed, he said. If there is “intelligence chatter” that explosives are hidden inside battery packs powering laptops or tablets, “why not ask people to switch them on [at airport security checks],” Al Baker asks. “We have done this in the past already. There are 100 ways to skin the cat.”

Qatar is in the process of formally asking for the audit, Al Baker said.

Airbus Gets State Loans for X6 Development

The European Commission has given the green light to the German and French governments to provide Airbus with loans worth €377 million (US$420 million) to develop the X6 helicopter. The X6, the subject of an ongoing feasibility study, is envisioned as the company’s next-generation large helicopter that would eventually replace the company’s Super Puma and H225 family of helicopters during the 2020s. The commission said the program would “significantly contribute to research and innovation in the EU without unduly distorting competition in the Single Market.” Some €330 million will come from France, while Germany will contribute €47.25 million.

Sukhoi T-50 Purchase Slips Beyond 2018

The Russian air force will continue to purchase advanced Sukhoi heavy jets this year. But procurement of the next-generation T-50 fighter, also developed by Sukhoi, is slipping beyond 2018, deputy defense minister Yury Borisov has revealed. The air force is expecting more T-50 prototypes this year from the Sukhoi facility in Komsomolsk-on-Amur. “Three new aircraft that this facility will deliver in 2017 will join the first stage of [evaluation] trials,” he said. According to Borisov, the first stage is expected to end in 2018. After that the military may approve the fighter’s serial production and place the first order.

U.S. Navy OKs Boeing’s New Super Hornet

In a victory for Boeing’s fighter shop, the U.S. Navy has opted to fund the company’s upgraded F/A-18 Super Hornet “Block III” and plans to begin fielding the capability in fiscal 2019. In a detailed blueprint laid out in the Navy’s most recent budget request, the service revealed it plans to invest US$264.9 million through fiscal 2022 in upgrading the Super Hornet fleet to Boeing’s proposed Block III configuration. Starting in fiscal 2019, the 1990s-era F/A-18E/Fs will get a series of modifications designed to keep the fleet relevant and effective against advanced threats well into the 21st century.
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Domes on the Range: F-35 Training Takes Off

Everything about the F-35 program requires new ways of thinking for the air forces that will operate the aircraft, and the industrial entities that are supplying them. Training and simulation are no exception.

At Rockwell Collins’ simulation center in Burgess Hill, Sussex, UK, some of the challenges involved in providing a fifth-generation training capability are brought into focus. The company’s Griffin Dome is the solution selected by platform prime contractor Lockheed Martin to provide the required level of fidelity – but designing and delivering it has meant overcoming several high hurdles.

The dome itself is made from three pieces of acrylic sheeting, which are shaped before being baked in an autoclave, then painted on a robotic jig to ensure the surface is free of any defects that could cause errors in the visual simulation. The dome is surrounded by towers carrying 25 specially designed projectors.

“People look at us and go, ‘Why did you build your own projector?’” says Mike Blackford, RC’s training and simulation program manager. “Trust me: Rockwell Collins has no ambition – no ambition! – to be a projector manufacturer. We made it because we needed the features of it, not because we wanted to build projectors.”

To ensure the 25 devices project a consistent picture onto the dome, with no visible joins and with no variation in brightness between one part of the scene and another, the image processing needs to be on a different order of magnitude better than on commodity products. Blackford points to the contrast ratio of the projector to illustrate the concept.

“In a very good COTS [commercial off-the-shelf] projector, you might have something like a 20,000:1 contrast ratio,” he says. “This is 1,000,000:1 out of the lens. That means we can electronically blend two projector images, so you can have continuity of time of day, you can go from full day to full night, and all the blends stay working.”

High-fidelity simulation is the key objective, and even touching the inside of the dome can degrade visual performance. To minimize the chances of damaging it, the cockpit is moved in and out of the dome on rails, and raised to the right point inside the dome with a scissor lift.

Generic but accurately mapped global imagery is supplied by RC, and customers have the option of requesting detailed inserts. Major airports and some military air bases are already included in the company’s simulation products. During a demonstration “flight” at Burgess Hill, ShowNews took off from Nellis AFB, Nevada, and headed about 80 mi. northwest: Air Force Flight Test Center, Detachment 3, was where we expected it to be, though sadly – if understandable – had not been modeled in detail.

There are other aspects of the F-35 simulation solution that similarly require going a considerable distance farther than on legacy aircraft. The jet does not have a head-up display, meaning that the helmet-mounted display – available on other platforms but not generally in their simulators – is going to be an essential part of the training system.

RC is part of the consortium that produces the F-35 helmet, and is offering two solutions for the simulator. One is based around the actual flight helmet, while the other is less representative of the real device. The two alternatives are currently being evaluated by LM.

“In the aircraft, the optics are focused to infinity, but for a sim, where the screen is only about 6 ft. away, you need a different focal length,” Blackford says, explaining why a standard flight helmet cannot be used in the simulator. “The simulation-type version has a different look and feel to it.”

A simulator variant would be cheaper, yet that may not be an advisable option on the F-35. Unlike with the vast majority of earlier fighters, there is no two-seat variant, so the first flight in the aircraft for every pilot will be solo. Similarly, the combination of sensors, weapons and electronic warfare systems on board mean that some capabilities will likely never be used during live training. The Royal Air Force has said it expects to do 50% of its F-35 training in the simulator – more than on any other fighter. Other nations appear to be following this lead.

“There are certainly things you can only train in the sim, and there are efficiencies of doing things in the sim,” Blackford says. “To get to that 50-50 ambition, you really do need high fidelity, so introducing a weak link would be a false economy.”

—Angus Batey

The Griffin Dome screen is surrounded by towers containing 25 projectors, each with a system of mirrors to ensure the correct focal length is achieved within a small footprint.
Upcoming MRO Events

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Airline Engineering & Maintenance: North America  
October 18-19, 2017  |  Miami, FL

MRO Asia-Pacific  
October 31-November 2, 2017  |  Singapore

Aerospace Manufacturing Asia-Pacific  
November 1-2, 2017  |  Singapore

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The defense deals announced during President Donald Trump’s visit to Saudi Arabia underscore how the structure of the global defense market is changing. The announcements of cooperation with Lockheed Martin and Raytheon put some teeth into Saudi Arabia’s “Vision 2030” for national transformation, which includes creation of an indigenous defense sector that can meet the kingdom’s security needs.

While it’s a long, long road from agreement announcements to developing and producing globally competitive defense products and services, the deals underscore how defense may be less export-led in the future for U.S. and European firms as other countries develop their own defense sectors. They also point to the potential for more global competition.

Saudi Arabia is embarking on a path other countries have taken – some successfully and others, not so well. Licensed production of aircraft and vehicles is a typical first step that will impart engineering and management skills. China and India have done this with Russian aircraft and Turkey, South Korea and Japan with U.S. equipment. Brazil, which has a globally competitive commercial aerospace business, will assemble Saab Gripen fighter aircraft in Brazil.

However, other aspirants have not been able to move beyond this first step to the next, which is the design and production of their own unique products.

U.S. and European managements of major defense firms today talk optimistically about international growth prospects and there are plenty of reasons to see the bright side of this over the balance of the decade. But defense is not different from other global capital goods sectors that are experiencing new competition, particularly from enterprises in developing countries.

Looking a decade ahead, there will be more competitors in markets that have mainly been dominated by U.S., European and Russian enterprises. China may have the most far-reaching consequences given the size of its economy and the breadth of its technical and industrial skills. So far, its exports have been limited, but its HQ-9 air defense system caught the initial attention of Turkey and, more recently, it signed a deal with Saudi Arabia for licensed production of CH-series unmanned vehicles.

The number of countries that are pursuing advanced combat aircraft designs is another factor to weigh. Not all these will likely succeed, but Japan has its F-3 Future Fighter Program, Turkey has the TF-X and South Korea the KFX. All are aiming for production by the end of the next decade. U.S. and European firms will play a role in development of these aircraft. BAE Systems has an agreement with TAI on the TF-X and Lockheed Martin is supporting the KFX. The programs that do succeed will compete against the F-35 and possibly Russian and Chinese aircraft designs in some global markets.

Besides increased competition from new products and services, there are other changes to consider in how the global defense sector now operates and how it is structured.

The first change is that defense may move away from export-based organizational structures where equipment is designed and built in the U.S. and Europe and then sold abroad to more of a multi-domestic model where firms have operations in different countries – not just sales and support offices. General Dynamics’ Land Systems Europe is one example. The Ajax vehicle the UK is procuring was initially supported from its operations in Spain, though it will be built in a UK facility. BAE Systems’ large U.S. footprint is another example.

The second change is that U.S. and European public firms may be facing more competition from enterprises and firms with different business models and behaviors. Major Korean defense firms are public as are some Turkish ones. Managements will have to keep shareholders content. But in other instances, global competitors may take different views on what’s considered an appropriate return on sales or capital or be willing to take on more risk.

The third change is the global diffusion of technologies that are relevant to defense. U.S. Defense Department leadership has talked openly of the erosion of U.S. defense technology leadership. The whole system of controls on export of sensitive technologies will have to be reviewed or simply overtaken by these trends. China, Japan and South Korea are global commercial technology leaders in their own right and enterprises in those countries involved in defense also generally have commercial operations as well. Globally competitive defense firms should be willing and able to take advantage of these diverse sources of technology.

Contributing columnist Byron Callan is a director at Capital Alpha Partners. The views expressed are not necessarily those of Aviation Week.
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