February 17, 2016
Singapore Airshow

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Says it can provide a geared turbofan for Boeing midsize. PAGE 4

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Whatever the mission – be it medevac, intelligence and surveillance, or search and rescue – Bombardier has an aircraft that can be readily adapted to your needs.
Cutting the ribbon to open the U.S. Pavilion here yesterday are (front row, L to R): Robert Durbin, COO, Aerospace Industries Association; Tom Kallman, president and CEO, Kallman Worldwide; Gen. Lori Robinson, Commander PACAF; Kirk Wagar, U.S. Ambassador to Singapore; Marcus Jadotte, U.S. Assistant Secretary of Commerce, and FAA Administrator Michael Huerta.

**Americans Seek to Capitalize on TPP**

U.S. companies see reinvigorated impetus for Asia-Pacific sales following the 12-nation Trans-Pacific Partnership agreed to this past October, government and industry officials said here Monday. “We are looking to build on a $48 billion annual base,” said Marcus Jadotte, U.S. Assistant Secretary of Commerce for Industry and Analysis. “Obviously this is a region of impressive growth.”

According to Robert Durbin, COO at the Washington, D.C.-based Aerospace Industries Association, the TPP “will help us as we build the cooperative ties that are so important to the peace, stability and prosperity of this region.”

“There’s a big market out here and [now] that market is easier to access,” said Tom Kallman, president and CEO of Kallman Worldwide, organizer of the largest-yet U.S. pavilion at the Singapore Airshow. “We were able to conjure up 27 new exhibitors this year,” he said. “We’re moving in a really, really strong direction.”

“It is in our national interest to be here,” said Kirk Wagar, the U.S. ambassador to Singapore. “There’s a big market out here and [now] that market is easier to access,” said Tom Kallman, president and CEO of Kallman Worldwide, organizer of the largest-yet U.S. pavilion at the Singapore Airshow. “We were able to conjure up 27 new exhibitors this year,” he said. “We’re moving in a really, really strong direction.”

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“...It means a real partnership,” agreed Jadotte. “The partnership extends through the life of the product. That is the value proposition.”

Kallman and AIA signed a new memorandum of agreement on Monday to work together to enhance access and opportunity to regional markets for small and medium-size U.S. aerospace and defense firms to attend shows like the one here this week. They vowed to "encourage greater business-to-business engagement among the companies and their global customers and suppliers, elevate the conversation between U.S. industry and government to strengthen America’s global aerospace and defense competitiveness, and unite U.S. industry to extend America’s global leadership in aerospace and defense.”

—Rich Piellisch
Pratt & Whitney says Boeing has fully embraced the concept of the geared turbofan (GTF), and is in discussion with the engine maker over its potential use for the new middle-of-the-market aircraft now in the early study phase.

“...So many people pooh-poohed it,” says Pratt & Whitney president Bob Leduc of the PurePower Geared Turbofan. “Now virtually every airframer you go to, even Boeing, are all believers.” Pratt is “starting to have middle-of-the-market-airplane discussions,” with Boeing, and sees the project as a rare near-to-midterm opportunity to expand the geared turbofan family into the higher thrust bracket currently occupied by the out-of-production PW2000 and Rolls-Royce RB211-535.

“Right now the only airplane we see out there is Boeing’s middle-of-the-market airplane. The Airbus product line is basically set top to bottom,” says Leduc. Boeing is targeting the 220-seat-class area “...because the Airbus A321 is just killing them, particularly the A321 with the geared turbofan on it - and we have 71% of that market.”

In Leduc’s view, Boeing needs to move sooner rather than later to attack the gap in the Airbus lineup. “Boeing has got to do something, because the 737 cannot compete against it. So the question has got to be, do they do a new airplane, because they have got nothing between the A321 and the A330. Boeing has got a hole and they need to go and figure that out. I know Ray (Conner, Boeing Commercial Airplanes president) is working on it hard. He’d prefer to do a new airplane. We are in conversation with them, as is GE, as is everybody. This is how it works.”

From the engine architecture perspective Pratt is working with Boeing to evaluate whether the upgrade path already planned for the PW1100G, the largest member of the current GTF family, might support a scaled design to power the potential new aircraft development. “Or is it a brand-new core? It is so early they haven’t even defined the thrust requirement, though it is nominally 40,000 lb.,” says Leduc. “It’s all paper and is in their advanced group and in our advanced group. So it is all early days but we will figure it out. I certainly would love to get back on a Boeing airplane.”

While publicly saying nothing new on the middle of the market (MOM), Boeing is believed to be seeing a potential advantage to bringing the development forward. The company, which sees a market for at least 2,000 aircraft in this sector, is studying a 220- to 280-seat product with a range of 4,500 to 5,000 mi. The key question for the development is whether to link the MOM to plans for a successor to the 737 MAX. “That’s a really hard question to answer - obviously, we have got to sort through all of that,” says Scott Fancher, SVP and general manager of airplane development at Boeing Commercial Airplanes. “When we see an opportunity, we will take it.”

—Guy Norris
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Etihad Airways president and CEO James Hogan and IATA CEO and DG Tony Tyler were among those honored Monday at the Air Transport World 42nd annual airline industry achievement awards in Singapore.

Top honors went to Etihad (2016 Airline of the Year) and Tyler (the Leadership Excellence recipient) at a gala dinner in the Singapore Pan Pacific Ballroom Feb. 15. Other top awardees were Alaska Airlines (Airline Market Leader), Budapest-based Wizz Air (Value Airline of the Year), Air New Zealand (Eco-Airline of the Year), Lufthansa Group and Frankfurt Airport operator Fraport (Eco-Partnership), Hong Kong International Airport (Airport of the Year), and the Airbus A350 XWB (Aviation Technology Achievement).

The awards were hosted by ATW editor-in-chief Karen Walker and presented by Walker and colleagues ATW senior editor Aaron Karp, European bureau chief Victoria Moores, Southeast Asia correspondent Jeremy Torr and Aviation Week & Space Technology editor-in-chief Joe Anselmo.

Besides Tyler and Etihad’s Hogan, award recipients included Wizz Air CEO József Váradi, Alaska VP of communications Joe Sprague, Air New Zealand head of sustainability James Gibson and ANZ Capt. Philip Kirk, Alaska Airlines VP communications Joe Sprague and ATW publisher Beth Wagner.

The airline’s unique partnership strategy is paying dividends. For example, Etihad leverages its airline equity partnerships in strategic contracts with suppliers and in common training centers for crew and other employees.

The airline is also a strong code-share partner, with its most recent agreements forged with Air Europa, JetBlue, Philippine Airlines, Gol, SAS, Hong Kong Airlines and Aerolineas Argentinas.

“Etihad is a company that approaches business with individuality and passion; with a leadership that has maintained the high road in a sometimes lowball fight over who and what defines fair competition; and an airline that sets itself apart with unique products and services,” Walker said.

“Twelve years ago we had a clear view of how to build a business and a clear mandate from our shareholder: Build a safe airline and also contribute to UAE society,” Hogan said in his acceptance speech.

He said that Etihad now had “a robust business model and innovative products and superior service delivered by our 27,000 dedicated employees. I am delighted to accept this award on their behalf. As an airline, we have offered a unique proposition to the traveling public and expanded our business to help shape the changing global aviation landscape.”

IATA’s Tyler was recognized for his exceptional leadership and commitment as head of the association. “Tony is someone who has won universal respect for his tireless, ambassador-like advocacy on behalf of the world’s airlines. No matter the frustrations and hurdles, he carries the IATA brand with determination, patience and flair,” Walker said.

Accepting the award, Tyler paid tribute to the IATA staff, thanked the airline CEOs who serve on the board of governors, and said that the ATW awards were the most prestigious in the industry.

Váradi, who created and leads Budapest-based low-cost carrier Wizz Air, remarked that many people said the airline would not survive, but he told them to come back in five years. “We started with $200 million and are now worth $2.2 billion, so that was a good investment. We are the most profitable airline on a per seat basis, that’s the industry," he said.

Alaska’s Sprague noted that 8,000 employees completed the airline’s “Beyond Service” workshop “to make great customer service part of our DNA.”
From January 2016 AgustaWestland has become the new Finmeccanica Helicopter Division; at the leading edge of technological development and innovation in vertical flight.

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Thales Wins Singapore Airlines IFE Deal

French avionics company Thales has scored a major victory at Singapore Airlines, ousting its traditional supplier to equip the carrier’s future fleet of Airbus A350 XWB aircraft with in-flight entertainment and Ka-band connectivity.

“This is a major win for Thales, and a significant step toward us becoming the market leader,” says Dominique Giannoni, CEO of Thales InFlyt Experience. “Fifteen years ago we were nowhere in the IFE market; now we are a very strong second.”

Thales InFlyt Experience will equip Singapore Airlines with its AVANT In-Flight Entertainment system and Ka-band connectivity solution on A350 XWB aircraft configured for medium-haul operations.

The fleet will be equipped with Thales’ latest AVANT monitors, which it says are the most lightweight ever deployed, featuring full high-definition video and integrating Avii, the newest evolution of the Thales Touch Passenger Media Unit, in the premium cabins. Avii provides intuitive navigation and full Android smartphone look and feel, and acts as a second screen. That, Thales says, greatly enhances the cabin experience for premium passengers.

They will have access to a wide selection of connected applications, seamless personal device integration allowing a home experience in the air, high-power USB charging and NFC technology.

The AVANT Android-based system offers a flexible architecture and incorporates a user application portal through which Thales will assist Singapore Airlines to constantly introduce to its passengers the newest and most-sought-after apps present in the consumer market.

Delivery of the system will begin in 2018.

Giannoni says the campaign to win over Singapore Airlines lasted more than a year, with major factors being Thales’ willingness to understand how the airline wants to interface with its passengers and customizing the system accordingly. “Our IFE systems are highly customized and robust, with an architecture-driven approach with a lot of modularization. This made it possible to design the system and evolve the technology with the airline.”

Other factors included Thales’ long history in Singapore, its presence in the region with more than 650 employees, and a local repair hub near Changi Airport to provide customer support.

“Singapore Airlines’ selection is a crucial step in our growth and development. The airline has pioneered IFE and remains at the forefront of innovation in this sector,” says Giannoni.
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Bell Helicopter Upbeat About Asia

Despite plunging oil-and-gas budgets, rotary manufacturer Bell sees significant sales opportunities in developing Asia-Pacific markets.

With one of the most volatile industry sectors – oil-and-gas – seeing plunging profits and investment worldwide, the O&G supply service industries are visibly cutting back on new investments, including across Asia.

However, says Bell Helicopter Asia Pacific managing director Sameer Rehman, this is not leading the company to anticipate shrinking regional sales.

“Ten years ago we as a company took a very distinct decision to establish a diverted and revitalized R&D division to update our products,” he told Aviation Week.

Now, says Rehman, this diversified approach is paying off: Although the O&G slowdown has led to fewer orders for medium- and large-size aircraft for offshore rig supply work, that is only part of Bell’s Asia market.

Rehman says the new range was driven by a recognition that Bell had fallen behind its competitors in terms of models and needed to revitalize its offerings.

“So rather than see the current downturn in O&G markets as a problem, we see our new models like the 505 Jet Ranger X, 525 Relentless and 429 as an opportunity to change the way [Asian] buyers see the helicopter market,” he says.

“Certainly we don’t think we’ll deliver lots of aircraft to O&G, but we are very confident that the effect on our business will be unsubstantial,” he adds.

Rehman says the company is instead pinning its hopes on what it calls a “rising tide” of rotary-wing aircraft usage in Asia.

“Unlike the mature markets in Europe and North America, there is still a huge potential [here] for replacement, refurbishment and training as well as new sales,” he notes.

Bell is confident that its existing footprint in the region will be key to further sales. Rehman says there are still hundreds of decades-old Bell 206 JetRangers flying in many countries across Asia, bringing what he sees as an untapped replacement market in the training, law enforcement and personal transport sectors.

“Incumbency makes a big difference in the replacement market,” he says.

Rehman also asserts that Bell’s 525, currently in final testing (the second test aircraft flew on Dec. 21), will bring “new energy” into the rotary market. He cited its ability to deliver the first ever fly-by-wire capability allied to sophisticated safety and avionics as being key factors to high-end purchasers of a rotary-wing aircraft.

“The 525 is part of our future,” he says, noting that the region holds significant potential for the aircraft to be equipped with VVIP interiors – for which the 525 is particularly suitable, and which has resulted in 70 letters of intent (LOIs) to date.

In the entry-level market, Bell has also put considerable energy into its new Model 505, which made its first flight late in 2014. Since then Bell has taken more than 300 LOIs for the type, to be used for training, personal transport and similar roles.

Rehman says these strong order books are evidence that although the O&G market was not buoyant, the move toward the purchase of new, efficient, low-maintenance and multi-mission-capable aircraft was helping compensate for that across the region.

“Buyers like government agencies and large companies are all looking to stretch their dollar further. One example is the Australian New South Wales Police, which took a Bell 412 for both tactical and response use – policing and lifesaving,” he says.

Rehman also underlines that sale of aircraft is just part of Bell’s operation.

“With our new Singapore Service Center ‘mothership’ serving the region, we have reinvigorated offering. Our main aim is to provide customer satisfaction, and we just happen to sell helicopters,” he says.

—Jeremy Torr
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The CAE Brunei Multi-Purpose Training Center (MPTC), a joint venture of CAE (Booth 187) and the Ministry of Finance of Brunei Darussalam, a small country in the north of the island of Borneo, brought its CAE 3000 Series S-92 full-flight Level D simulator online with European Aviation Safety Authority (EASA) approval in mid-2014, and has just received that authority’s approval for training with CAE’s in-house instructors.

Next will be the addition of an S-70i Black Hawk simulator, currently under test in Montreal, by the end of October. The center also hopes to find more customers for the Pilatus PC-7 simulator training services it has provided for the Royal Brunei air force since 2014. Courses for disaster response and emergency management training, based on CAE’s experience with simulation training for military scenarios, are also being developed.

The center was initiated with a 25-year contract with the Royal Brunei Air Force and a seven-year contract with Royal Brunei Shell operate four S-92s, the air force a fleet of 12 S-70i’s and four PC-7 turbo-prop trainers.

This multipurpose training center is a shining example of Brunei investing to diversify and grow knowledge-based industries that provide high-quality job opportunities,” notes Kevin Speed, CAE VP of defense and security for Asia and director of the CAE Brunei MPTC. “It will also play a key role as a learning and training hub for the wider Southeast Asian market.”

It is, he notes, the single largest foreign direct investment in Brunei outside the oil and gas industry.

The MPTC is already winning customers among the operators of the fleet of 100 or so S-92s in the region. They include Bristow, CHC and the Aviation Authority of Australia, China Southern, operators in Thailand and Korea, and soon the Royal Thai Air Force, which is transferring its S-92 training from CAE’s S-92 center in Oslo.

The CAE 3000 Series helicopter mission simulator features unprecedented realism for helicopter-specific mission training, including offshore oil and gas, search and rescue (SAR), and other types of operations. The simulator enables pilots to practice – without risk – challenging procedures such as low-level flight, confined-area operations, autorotation and landing on platforms at sea.

The CAE 3000 Series S-92 full-flight simulator features the CAE True 6-deg.-of-freedom electric motion system and high-performance vibration platform to replicate vibration cues critical to helicopter pilots; a high-fidelity CAE Medallion-6000 image generator; and a direct-projection 210 deg. x 80 deg. extreme field-of-view dome display system.

— John Morris

A Flight School With Pipers

CAE IS No stranger to live flight training, operating ab-initio-to-airline-pilot training academies around the world. But there is, notes CAE’s Kevin Speed, VP of defense and security for Asia and director of the CAE Brunei MPTC, a gap in the region surrounding Brunei and Singapore.

Flight training is limited in Malaysia and Indonesia, and impossible in Vietnam, China and other countries where the military owns the airspace. The nearest large-scale training centers are in Australia, where CAE operates two schools.

Brunei, despite its geographically small size, could provide a base, he believes. CAE is already in formal discussions to set up a joint-use military/civil school, he adds, and the curriculum could begin before the end of the year.

As a bonus, the Brunei government has owned Piper Aircraft since 2009, and that manufacturer’s aircraft types are already in widespread use by CAE in its flight academies. It is likely that Piper aircraft would equip a flight school in Brunei, he says.

and the oil-rich nation plans a joint civil-military ab-initio-to-airline flight-training school.

A regional training center for Sikorsky helicopters plans to expand into emergency and crisis management, supporting disaster preparedness for Brunei and neighboring Association of Southeast Asia (Asean) nations. It also plans a joint civil-military ab-initio-to-airline flight-training school.

Haji Omar ‘Ali Saifuddien Sa’adul Khairi Waddien, the Sultan and Yang Di-Pertuan of Brunei Darussalam, lands the CAE Brunei Multi-Purpose Training Center’s S-92 helicopter simulator on an oil rig.

His Majesty Sultan Haji Hassanal Bolkiah Mu’izzaddin Waddaulah ibni Al-Marhum Sultan Haji Omar ‘Ali Saifuddien Sa’adul Khairi Waddien, the Sultan and Yang Di-Pertuan of Brunei Darussalam, lands the CAE Brunei Multi-Purpose Training Center’s S-92 helicopter simulator on an oil rig.
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Counter-Stealth Radar Key to Growing AEW Market

Saab is unveiling the GlobalEye airborne surveillance system here and saying a lot more about its technologies and capabilities than was released at the Dubai Airshow, when the company was declared the winner of a long-running competition to supply the United Arab Emirates with an airborne early warning and control (AEW&C) system. But GlobalEye is a lot more than an AEW&C aircraft, and that is the key to Saab’s strategy.

Saab has sold more than 20 AEW&C systems to eight customers, a respectable share of a small but lucrative market (the UAE deal for two GlobalEyes and upgrades to two Saab 340AEWs was worth US$1.27 billion). The core of the system, the EriEye radar, started development more than 30 years ago. Although it has been upgraded continuously, it was time for a revamp.

The new radar is already running in rooftop tests at Saab’s Gothenburg site, and in Linköping “shortly” for the start of modifications. The system is due for delivery in 2019.

Two years ago, Saab pulled a rabbit out of its hat by announcing that it was on the way to delivering the first production AESA radar based on gallium nitride (GaN) radio-frequency components, the land-mobile Giraffe 4A. GaN radar modules beat gallium arsenide (GaAs) in many ways, but chiefly they are more efficient (so they can produce more power without overheating) and have a wider bandwidth (good for jamming resistance) and lower noise.

That last attribute is important to Saab’s radar development. When Saab unveiled the Giraffe 4A, engineers touted the “purity” of the new radar’s signal - a measure of how much of the energy is concentrated at the nominal wavelength. With a high-purity signal it is possible to measure very small Doppler shifts and pull smaller echoes out of clutter. The radar can detect targets with very small radar-cross section (RCS) measurements, such as micro-drones and stealthy aircraft.

Other counter-stealth technologies in Saab’s new radars include “multiple hypothesis” tracking, in which weak and ambiguous tracks are analyzed over time, and either declared or discarded based on their behavior.

In fact, the EriEye ER’s name is a bit of a misnomer. Like any powerful AEW&C radar, the EriEye can see conventional aircraft at normal cruise altitudes all the way to its radar horizon. The new version restores its range against stealthy targets, against which it offers a 70% range increase or “the same range, against a target one-tenth the size,” a Saab engineer says. “That was a major criterion in the design.”

The radar also works better against small and relatively slow surface targets, which becomes more important when combined with the GlobalEye’s signals intelligence (Sigint) suite. Rather than simply being an AEW&C aircraft, it can surveil the entire area - sea, littoral and air - with radar, fused with a Sigint picture. The aircraft can also carry a belly-mounted, 360 deg.-scan X-band radar - them together via a single data-link to a central ground command and control system.

Saab’s “swing role” philosophy is different: According to Micael Johansson, head of the company’s electronic defense business, the high performance of the Global 6000 platform allows it to carry multiple sensors, quickly reposition itself to make optimum use of its sensors for dedicated missions, and still offer long endurance - up to 11 hr. - at a long distance from its base. For instance, in a counter-drug mission, GlobalEye can maintain an air picture and a sea picture and monitor a transfer taking place onshore.

That in turn could mean a bigger AEW&C market. Some customers, Saab believes, see the advantage of AEW&C but can’t commit that kind of money for a single-mission system. Says Johansson: “With an AEW that has swing-role flexibility, we can capture customers that might be hesitant.”

—Bill Sweetman
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General Electric is gearing up for test runs of the first GE9X turbofan as components of the initial engine come together at its Evendale, Ohio, facility.

The engine is in development for Boeing’s 777X series and in terms of physical dimensions will be largest turbofan ever produced. Overall fan diameter will measure 134 in. compared to 128 in. for the GE90-115B, currently the world’s biggest and most powerful engine. The GE9X will be equipped with only 16 fan blades, with each individual blade measuring more than 5 ft. in length. Ground tests will get underway at the company’s Peebles facility in the second quarter of 2016. Components for the second GE9X engine are also under assembly for tests scheduled to begin in 2017 along with flight testing on GE Aviation’s Boeing 747-400 flying testbed. Engine certification is anticipated in 2018, around the same time as first flight of the 777X. The initial 777-9 variant is scheduled to enter service in 2020.

Final assembly follows successful tests of the high-pressure (HP) core that began in late 2015. The core, which includes the HP compressor, turbine and compressor, also demonstrated operability above the maximum “redline” speeds and achieved compressor pressure ratios over and above the engine’s 27:1 design target, says GE.

Key GE9X core design features include ceramic matrix composites (CMCs) in the outer and inner liners of the low-emission twin-annular pre-swirler (TAPS) combustor, as well as in the HP turbine’s first- and second-stage nozzles and first-stage shroud. The turbine also incorporates blades made from a new manufacturing process that integrates an improved cooling circuit into the airfoil. The performance of the CMC components was verified in 2015 during tests of a modified GE9x-1B engine fitted with scaled GE9X components made from the low-weight, heat-resistant material.

—Guy Norris

Parker China JVs Win Broad Approvals

PARKER AEROSPACE’s two joint ventures with China’s AVIC have received AS9100C certification.

Parker FACRI Actuation Systems is a joint venture between Parker Aerospace and AVIC’s Flight Automated Control Research Institute, located in Xi’an to provide manufacturing and production support of Parker flight control actuation products on the C919 single-aisle transport and ARJ21 turbofan regional jet, both developed and produced by COMAC, the Commercial Aircraft Corporation of China Ltd.

The JV includes the FAA- and CAAC 145-approved MRO customer service center supporting domestic Chinese airline customers for Parker Aerospace, AVIC and third-party products.

NEIAS Parker Aero Systems & Equipment is a joint venture between Parker and AVIC’s Nanjing Engineering Institute of Aircraft Systems to provide manufacturing and production support of Parker components for Parker’s fuel, inerting and hydraulic systems on the C919 and ARJ21. The Nanjing JV supports both manufacturing and assembly and test functions and features a state-of-the-art machining center and special processing line.

“The AS9100C certification of the two joint ventures signifies a high standard of quality of the work done in their facilities, providing assurance to their customers and product end users of superior consistency, reliability, and safety,” Parker says.

“We are committed to providing products and services that meet and surpass the highest standards of the global aerospace community, providing the C919 and ARJ21 with superior equipment and support,” said Parker Aerospace VP and regional Asia GM Pui Ho.

Parker Aerospace’s (Booth D23) researches, designs, manufactures and services flight control, hydraulic, fuel and inerting, fluid conveyance, thermal management, lubrication, and pneumatic systems and components for aerospace and other high-technology markets. Parent Parker Hannifin logged sales of $13 billion in fiscal year 2015.
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UTAS Expands to Meet Demand for Support

Growing airline fleets in Asia-Pacific are prompting UTC Aerospace Systems (UTAS) to expand its already extensive presence in the region to keep up with customer demand to support their aircraft.

Singapore is a major industrial and strategic center for UTAS, with two MRO sites at Changi and Bedok covering nearly one million sq. ft. and 1,500 employees. Now it is adding a parts distribution center (at the show here it signed an exclusive distribution agreement with Satair), and it plans to open another in Beijing in just a few weeks. “They have critical parts and hardware for customers in the region,” says Ajay Agrawal, VP of aftermarket for UTAS.

The US$14 billion-revenue company now generates over US$4 billion from commercial aftermarket parts and services, with more than 40% from long-term contracts with airlines for three to 10 years. “We’re seeing very strong renewal rates and expect that 40% to grow,” says Agrawal.

Driving that growth is UTAS’ higher win rate on new programs, as well as fleet growth. “We have more content on newer programs than retiring ones,” he notes.

To meet demand, UTAS fields 6,000 customer service representatives around the world, including 240 field reps. Its two Singapore MRO shops – covering aerostructures MRO for nacelle system components and airframe composite components; manufacturing for engine controls and drive generators; and manufacturing for aerospace components, gears and gear shafts – are just two of 50-plus MRO sites globally.

“We’re getting closer to customers,” says Agrawal. And that’s necessary because they are becoming ever more demanding when it comes to cost, dispatch reliability and flexibility in their support programs. These include different arrangements tied to utilization of the aircraft, such as nacelle maintenance and cost-per-landing for wheels and brakes.

Extensive work – and investment – says Agrawal, is going into supporting the entry into service of new models, such as the Boeing 787, Airbus A350, A320neo and 737 MAX. A challenge, he adds, is to scale up support ahead of the ramp-up.

Another is to leverage technology as fleets produce more data from the aircraft, and to analyze it to increase dispatch reliability through prognostics and preventive maintenance.

—John Morris
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**NEW AT THE SHOW**

**Gulfstream Debuts the G650ER**

Gulfstream (Chalet CD45) has brought its entire business jet fleet to Singapore, including the extended-range G650ER version of its new flagship – powered by Rolls-Royce BR725 A1 engines and capable of flying 7,000 nm, being shown at the Singapore Airshow for the first time. Also on display: Gulfstream’s G150, G280, G450 and G550 jets.

There are upward of five dozen Gulfstream aircraft based in Southeast Asia.

Gulfstream special-mission aircraft are being promoted at Booth T74.

Nearly 200 of the company’s jets are in service in 37 countries serving as head-of-state transports, carrying airborne early-warning systems and supporting international atmospheric data collection.

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**ST ENGINEERING’S TERREX 8x8** amphibious armored vehicle is emerging as an export leader for the Singapore company. Developed by the ST Kinetics unit, the Terrex was selected in November as one of two finalists in the U.S. Marine Corps Amphibious Combat Vehicle (ACV) 1.1 program. ST Kinetics and its U.S. partner, SAIC, will build 16 vehicles that will be tested in comparison with the Iveco/BAE Systems SuperAV. One team will be chosen in 2018 to build 204 vehicles.

Next up is Australia’s Land 400 Phase 2 competition to replace the aging fleet of Australian Light Armored Vehicles, developed from the original Mowag Piranha 8x8, where ST Kinetic is teamed with Elbit Australia for a 200-plus vehicle order, offering the improved and heavier Terrex 2. An award is expected in March.

Human-machine interface design and high mobility on land and water are features that have helped the Terrex stand out in the crowded and competitive market for 8x8 vehicles, according to ST Kinetics chief marketing officer Winston Koh. “We have a conscript army and never have enough training,” Koh says, so Singaporean vehicles are designed to be easy to operate and maintain. The Terrex 2 on show here has a multi-screen driver’s display to facilitate “buttoned-down” operation.

Both the Terrex and the SuperAV surprised the Marine Corps with their swimming speed and agility in demonstrations at Camp Pendleton in 2013, giving an important boost to the ACV program. An ST Kinetics engineer explains that the propeller drive system is an important factor in swimming ability: It needs to extract power efficiently from the drivetrain, without overdriving and cavitating the propellers, despite the fact that the props are running in disturbed water. The Terrex has two independently reversible props, driven by hydraulic motors.

—Bill Sweetman

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**Singapore’s Terrex Makes a Splash**

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—Bill Sweetman

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**You Don’t Need a Drone**

A unique element of ST Kinetics’ infantry equipment suite is the Soldier Parachute Aerial Reconnaissance Camera System (Sparcs). Launched from a rifle-mounted 40mm grenade launcher, Sparcs descends on a parachute and takes a series of still images that are transmitted to the soldier’s handheld computer, where software stitches them together into a wide-angle aerial view. Booth G01.
READY TO MAKE HISTORY. AGAIN.

The wait is over. February 25, 2016, is rollout day for our E190-E2. Giving the world its first glimpse of the second generation of E-Jets. This new family has been reconceived from nose to tail — taking quantum leaps in wing design, power plant, flight control, and cabin ergonomics — all while building upon the historic success of our first generation. Now, we’re ready to roll, and to let E-Jets help airlines make even more history, again.
Simulator, Strike, Surveillance, Satellite: Embraer’s Mix ’n’ Match

Super Tucano is not the half of what Embraer Defense & Security is offering the region’s air forces.

Although outnumbered in the static display by its parent company’s business jets and even an airliner cabin mockup, the EMB-314 Super Tucano outside Chalet CD31 reminds showgoers that Embraer has a thriving military business – on land, as well as in the air. “We are in Singapore because this is the most important air show in the region,” ShowNews was told by Jackson Schneider, president of Embraer Defense & Security.

“Some air forces in the region have made advance appointments to inspect the Super Tucano,” he confided, “and I expect there will be others. Already, 13 air forces have bought the aircraft, and, possibly, more will be announced later this year.”

The turboprop trainer and light attack aircraft has already accumulated 30,000 hr. in combat missions and has just entered service with the Afghan Air Force under a contract administered by the U.S. And when combat is the duty, the Super Tucano is cleared for 150 different combinations of armament to meet almost any situation.

At the other end of the scale, the KC-390 tactical jet tanker-transport has had “lots of countries approaching us for data,” said Schneider. Flight trials began 12 months ago but got off to a slow start because of Brazilian government funding difficulties. “However, we have flown 100 hours since mid-October and the second prototype will follow soon.”

Schneider is “optimistic” that the KC-390 will make its international show debut at Farnborough in July. It is still on target for certification next year and initial deliveries in the first half of 2018. Defense & Security’s purview includes special-missions versions of business jets and even sales of those aircraft to government operators in unmodified form. Great satisfaction is taken at Embraer over the recent contract to provide Britain’s RAF with five Phenom 100s for pilot training – a “stamp of approval” if ever there was one.

Then there’s the conversion of a Legacy 500 for navigation aids inspection by the Brazilian airports authority and the farther-reaching modification of ERJ-145 regional airliners as airborne early-warning platforms for India.

The latter contract epitomizes what Embraer is able to supply, says Schneider: aircraft, system and know-how in an integrated package, worked out in conjunction with the customer. If appropriate, that will include ground radars, data links, ground control centers and airborne radars. From simulators to satellites, says Schneider, Embraer Defense & Security offers “the right-size solution.”

—Paul Jackson
Clock up to 20 percent longer time on wing with a Pratt & Whitney FMP. You’ll see lower total maintenance costs, better performance retention, improved reliability and up to 50 percent higher residual value. We have flexible programs that fit your operation and cost-control goals. Our advances like predictive analytics use big data to monitor your engines’ performance. The best people to keep your engines on wing are the people who make them. After all, it’s our thing. Find out more at www.pw.utc.com.
Satair Expands With UTC Products

At the Singapore Airshow today, Satair Group CEO Mikkel Bardram will sign a contract with UTC Aerospace Systems that will see Satair become the exclusive distributor and aftermarket support provider of a range of UTC products for small and midsize customers.

The deal is part of Satair’s evolving strategy following its absorption by Airbus in 2011. Ahead of the Show, Bardram spoke with ShowNews to discuss the UTC deal, the changing face of aftermarket provision, and how his company manages to combine economies of scale with bespoke customer services.

**ShowNews:** How did the partnership with UTC develop, and what will it bring both to Satair and to both companies’ extant and future customers?

**Mikkel Bardram:** As a distributor, we’re in contact with many different suppliers and are exploring with all of them how they should be approaching the aftermarket, and figuring out where we can add value. UTC has identified that it would make sense that they’d look for an aftermarket service provider for their smaller customers, and that they go directly with large airlines and MROs, so we split the market in that way. We’re already dealing with many of those smaller customers: Adding UTC’s product portfolio on top fits well into our approach to them. It’s a good fit for us, and I think it will help UTC focus on their strategic accounts too.

**ShowNews:** Is splitting the market in this way a type of deal you’ve done before?

**MB:** We have all kinds of different setups with the suppliers we support. It’s unique every time you talk to them. Of course, UTC is a huge company, so it’s a big deal for us. But our operating model is set up in a way where we can take on any angle of a supplier’s aftermarket and split it according to what suits the OEM.

**ShowNews:** What is it that gives you the ability to handle these sectors more efficiently and more profitably than a company such as UTC can manage themselves?

**MB:** We are already present in all the different places around the world, and we have credit lines set up with those customers. That means that we can then give those customers better service. And the fact that we are working very collaboratively with our OEMs, and have a transparency around everything that’s going on in the market, ensures that UTC has a feeling that they are just using our competences without losing control.

**ShowNews:** You’ve outlined a new service-provision model, called Integrated Material Services (IMS), which will see you providing a partsourcing and inventory-management service on top of your usual offering. How has that come about?

**MB:** The concept is not new – it’s a matter of being able to deliver it. Airlines and MROs have been requesting this for a very long time. I think we’ve found a way now to do that. This is very much the essence of why Satair Group was created. Our ownership by Airbus means we can use their technical competences to feed technical knowledge about the aircraft to optimize the planning.

**ShowNews:** When will you be announcing your first IMS contracts?

**MB:** They are quite close. Initially we’re talking to some of the bigger airlines, but I’m pretty sure this model works very well for smaller airlines too, and to some extent also for MROs.

**ShowNews:** Are you confident in your ability to be able to offer both the IMS and traditional business models concurrently?

**MB:** I think the two models strengthen each other. The integrated solution will both mean that we are extending our parts portfolio and ensure we’re going deeper with the customers and extending our services portfolio. So we’re strengthening our offering across both dimensions, really.

**ShowNews:** During the Paris Air Show last year you announced that Eltra Aeronautics Singapore was being absorbed into the Satair Group. How is that working?

**MB:** It’s gone well. We’re exploring how we can expand that business outside Asia – maybe to the Middle East or elsewhere, because we have a global reach that Eltra didn’t have before.

**ShowNews:** As a global business, do you find that regional variations in how the sector operates remain important?

**MB:** What we’ve learned over time is that, yes, we can always integrate this type of business, but the key thing is, how do we make sure we keep the peculiarities that have made this business successful in the past? It’s not just about distributing the parts and executing the order – it’s all the things around it.
Anyway you look at it, you’re ahead on all fronts

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Action movie star Jackie Chan, already the owner of a spectacularly dragon-liveried Embraer Legacy 650, took delivery this month of the first Legacy 500 business jet in China.

“This new aircraft will further facilitate his business development, as well as his humanitarian activities,” says Embraer Executive Jets president & CEO Marco Tulio Pellegrini.

“He is not only a world-renowned star, business elite and philanthropist, but also Embraer’s long-term partner, loyal customer and brand ambassador,” notes Guan Dongyuan, senior VP Embraer and president of Embraer China.

“I believe Jackie Chan’s choice reflects the changing mind-set among Chinese customers that midsize executive jets can fulfill most of their business missions with higher efficiency and greater flexibility,” he says.

The delivery also illustrates the changing mind-set in a different way as Chinese customers try to become more anonymous amid the country’s austerity drive. Gone is Chan’s trademark dragon that distinguished his Legacy 650, even though renderings from two years ago showed the new 500 would be similarly adorned.

Chan took delivery of his Legacy 650 in 2012 and became the Brazilian manufacturer’s brand ambassador.

The super-midsize, eight-passenger Legacy 500 was granted validation of type certificate from CAAC, the Civil Aviation Administration of China, this past July.

List price is US$20 million.

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List price is US$20 million.

Taking off from airfields as short as 4,084 ft., it has a range of 3,125 nm (5,788 km) with four passengers, including NBAA IFR fuel reserves, which enables it to fly nonstop from São Paulo to Caracas, Los Angeles to Honolulu, Teterboro to London, Moscow to New Delhi, Jakarta to Sydney, Dubai to Zurich, and Beijing to New Delhi.

The range of Embraer business jets is on show here at Singapore.

Zhuhai Gets Bizav Customs

AsBAA exults as business aviation operators now have a new gateway, with plenty of ramp space, to the Hong Kong-Macau-Shenzhen-Zhuhai metroplex, aka the PRD, or Pearl River Delta.

The Asian Business Aviation Association (AsBAA) is trumpeting its successful lobbying effort for customs services for business aviation at Zhuhai Airport, near Macau.

AsBAA said last month that its talks with the Zhuhai Municipal Government and Zhuhai Airport Authority, and with the CAAC (Civil Aviation Authority of China) bore fruit as the National Port Administration Office declared a new Zhuhai Airport Temporary Business Aviation Port effective on the first of the year, renewable on a six-month basis.

“This move is very encouraging and is an indicator of increased support from the local authorities for expanding business aviation in the PRD,” the association said.

“This development, in parallel with the Zhuhai Bridge construction/development between Hong Kong, Zhuhai and Macau, is a significant step forward in the enhancement of transport links both in the air and on the ground, which will open up the PRD area to increased commerce and facilitate further growth of the aviation sector in the region.”

AsBAA notes that Hong Kong International and the Macau, Shenzhen and Guangzhou airports are all in close proximity to each other, but “all have recently suffered capacity issues to accommodate business aviation growth” – which is growing at an average annual rate of 14%.

“We’re enormously proud that our hard work lobbying on behalf of our members, related partner associations and wider industry stakeholders has paid off,” said AsBAA chairman Charlie Mularski.

“We expect the changes that will follow this announcement to significantly increase overall efficiency and business opportunities in the region and can be the start of a coordinated approach to the congestion issues we have faced in the PRD...”

“This is good news not just for business aviation, but also for the wider economies and job prospects in the region.”

Besides increasing access for executives, the opening of Zhuhai is expected to “kickstart further investment opportunities in the manufacturing side of business aviation,” AsBAA said.
N219, the most versatile and reliable new generation light class aircraft is designed to be operated economically and safely in the isolated areas and unpaved airfields.

Its capability to reach and connect the remote and isolated areas surely can stimulate economic growth and prosperity distribution in the country.

N219 can be utilized for multiple roles, such as passenger transport, troop/paratroop transport, cargo transport, medevac and maritime surveillance.

Find out more about N219 and other Indonesian Aerospace (IAe) products at Singapore Airshow 2016.

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INDONESIAN AEROSPACE
Rafael’s Tools of War

“In the last few years Rafael has become synonymous with active protection in all domains: land, air and sea,” Brig. General (Ret.) Itzhak Gat, Rafael chairman, told ShowNews.

“From Iron Dome, which has already intercepted 1,500 rockets in combat, with a success rate of 90%, to the now-complete David’s Sling, which will soon become operational, and Trophy APS, which has saved the lives of dozens of Israeli soldiers and protected our tanks.” An Iron Dome spinoff for naval purposes, C-Dome, and a laser system designed to shoot down very-short-range rockets are some of the future spinoffs of Rafael’s (Booth N55) active defense portfolio.

“The success we had in the latest full system David’s Sling test marks a substantial and final step before becoming operational in the coming year,” Gat added. “We are currently in the process of assessing a number of marketing opportunities, in cooperation with the Israel Ministry of Defense [IMOD] and our partner Raytheon, and we will act in accordance with the specific needs and export and marketing permits we receive from the IMOD. David’s Sling is a state-of-the-art system by all parameters, designed to handle a large variety of threats, with scalability that can address changing requirements and security demands.

“As the need for air superiority continues to play an increasing role in all types of recent military conflicts, the Intelligence, Surveillance and Reconnaissance [ISR] market has experienced simultaneous growth and has accordingly become very vibrant. Recent day developments have led us to the understanding that force build-up should be updated to support both the traditional threat of modern, well-equipped armies and asymmetric threats possessed by non-state actors, or neighbouring countries using means of guerrilla or cyber-attack.

“Effective response to an enemy of this kind relies on the defeat of three central challenges: visibility – to secure continual contact with wide area cells at adequate resolution and frequency; interpretation – to enable use of automated tools in the processing of the large amount of information received; and connectivity – to link between the intelligence and the firing elements as to reduce response time to one single digit,” said Gat.

“Rafael’s most recent ISR developments – RecceLite XR, an extended-range ISR collection pod, and Litening 5, a long-range navigation and targeting pod – both address those challenges. The intelligence collected by those means can be relayed to our precise air-to-ground weapons – the SPICE family of bombs, which have the ability to engage a single pixel from standoff ranges of up to 100 km. This could very well change the way air forces organize their inventory and build their force.”—Noam Eshel

CIDS: Beyond Island Defense

The vast seas surrounding the Southeast Asian nations are a blessing to the regional economy but also cause disputes over national sovereignty, economic development and exploitation of offshore assets. Protecting those assets, particularly along long littorals and archipelagos, becomes an operational burden few countries can bear.

An innovative solution introduced by IMI Systems at the Singapore Airshow (Booth N29) harnesses advanced sensors, command, control and communications with precision guided rockets, to provide such nations with an affordable, effective solution to deter hostile exploitation of their exclusive economic zones (EEZ).

The Coastal and Island Defense System (CIDS) integrates surveillance systems such as coastal radars and other sensors covering wide sea areas and coastal strips to search for surface vessel activity. All sensor data is transmitted to the CIDS command and control center, where a real-time situational picture is created.

When the situation mandates a forceful action, for deterrence or defeat of potential threats, CIDS can launch ballistic rockets that can hit pinpoint targets at sea and on land, at distances of up to 80 nm. The solid propelled rockets used by the system enable coastal defenders to respond rapidly and decisively, engaging multiple moving targets simultaneously. The system already has been deployed as an “anti-landing” defense system by one Southeast Asian country. —Noam Eshel
For registration, sponsorship and information go to
www.aviationweek.com/events
Chinese Airlines See Profits Rise

Chinese carriers are expected to report big profit increases for 2015, mainly due to robust market demand growth and lower fuel prices.

- China Southern Airlines said in a written statement released by the Shanghai Stock Exchange that it estimates its net income to jump 110%-130% for 2015 compared with a net profit of CNY1.77 billion in 2014. The carrier cited the rapid increase of market demand – especially since international routes have become a new growth point – and lower fuel prices as main reasons for the projected profit increase.

- Air China predicted its net profit would jump 60%-80% for 2015 over a net income of CNY3.78 billion in 2014. The Beijing-based carrier also credited fast market demand growth, capacity increases, a boost in the direct sale of air tickets, effective cost-control measures, and lower fuel prices as main contributors.

- Chinese privately run carriers, Spring Airlines and Juneyao Airlines, also made similar predictions.

- Spring Airlines said in a filing that its net income would increase 50%-60% for 2015 over a net profit of CNY884.2 million in 2014. The low-cost carrier also cited lower fuel prices and market demand growth as reasons for the projected results, but also credited international routes revenue improvement and ancillary revenue growth.

- Juneyao also predicts its net income will increase 130%-160% for 2015 compared with a net profit of CNY427.68 million in 2014. The carrier also contributed market demand growth and lower fuel prices for the improvement. —ATW

Dragonair to Become Cathay Dragon

Hong Kong-based Dragonair has revealed a new name and livery in an effort to align itself more closely with parent Cathay Pacific.

The carrier is being renamed Cathay Dragon, and its aircraft will be repainted with a livery design similar to Cathay Pacific’s. The two airlines will continue to be operated separately under their own licenses, however.

Dragonair has been a wholly owned subsidiary of Cathay since 2006, and operates a fleet of 42 Airbus A330 and A320-family aircraft. The first aircraft to be rebranded will be an A330, scheduled for April. The design will be introduced to the rest of the fleet progressively “in accordance with the regular painting schedule.”

The carrier says the new livery will feature a deeper shade of red than the current Dragonair colors. It will use the familiar Cathay “brushwing” on the tail, and the current Dragonair dragon logo will be used on the aircraft nose.

Cathay Pacific revealed an updated livery of its own in November, with a Boeing 777-300ER the first aircraft to feature the new look. These changes include modification to the brushwing, and a simplified color range of green, gray and white.

—Adrian Schofield
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Airliners Will Paint Better Weather Picture

Crowd-sourced information could soon fill the voids in weather grid. Broadband connectivity to and from the cockpit will unlock the door to weather situational awareness across the network.

**Honeywell Moves Ahead**

Before the end of 2016, Honeywell Aerospace plans to release a new software version for its IntuVue RDR-4000 weather radar that will allow an unnamed airline customer to begin downlinking snapshots of weather activity and threats directly from onboard radar to the ground through broadband links.

The action is part of a broader plan by the avionics manufacturer to gather “crowdsourced” weather in order to form a more comprehensive global signature of weather threats.

“We’ll get the data on the ground and mash it together – analogous to what Google does for highway traffic – and then we’ll be able to stitch together vast swatches of airspace with real-time aviation weather that heretofore never existed,” says Carl Esposito, VP of strategy, marketing and product management for Honeywell (Booths 639, 652). Esposito has two U.S. patent applications on file detailing a system that distributes weather radar data, including convective cells, precipitation, hail and turbulence regions, between aircraft and ground stations.

“It lets the aircraft share what it’s seeing with lots of other people – maybe an aircraft 1,000 mi. behind it; maybe a general aviation aircraft that doesn’t have any weather radar,” says Esposito. “Maybe it goes into wind models, or other weather forecasting applications.” Crowd-sourcing holism would occur when fleets of aircraft covering the globe can downlink the weather radar snapshots, most likely on command from a ground station.

Honeywell recently tested a software modification to an RDR-4000 on its Boeing 757 testbed, sending weather radar information to its Global Data Center, where the data was aggregated with other weather and threat information and sent back via broadband data-link to the cockpit using the company’s new subscription-based Weather Information Service. The RDR-4000 stores its computer memory weather information in a 120-deg. wedge of airspace from the surface to 60,000 ft. and outward for 300 nm.

Esposito says Version 1 of the software, which will be released in 6-9 months, provides for exporting the weather radar data, but adds that the company is already working on a Version 2 with additional capabilities.

**Rockwell Collins Aims to Fill Gaps**

Competitor Rockwell Collins is also researching crowd-sourcing for its MultiScan weather radar systems, largely for the same benefits – generating a uniform, comprehensive global weather picture, particularly in remote areas where none exists, and getting that information simultaneously to pilots and dispatchers via nascent broadband links.

“Our air transport customers want that additional information,” says Kevin Kronfeld, principal systems engineer in Rockwell Collins’ Advanced Technology Center. “We know there’s a big gap from a global weather perspective for high quality weather information.”

The company supplies operators with weather information through its ArincDirect service. Rockwell Collins (Booth V77) is a long-time participant in non-radar crowd-sourced “Metcars” and “Amdar” weather data through its Information Management Services arm, formerly Arinc. Approximately 2,000 aircraft capture the in-situ data for the programs through onboard sensors, sending 300,000 wind, temperature, dew point and, in some cases, turbulence, measurements per day through ACARS to airline operations centers and the U.S. National Weather Service. While the raw data is private, the forecast products are public.

“Weather radar is an extension of that type of system,” says Matt Carrico, senior engineering manager and fellow at Rockwell Collins. “It’s a big gap from a global weather perspective for high quality weather information.”

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“Rockwell Collins’ Advanced Technology Center is focused on a “fused” approach, guided by industry protocols, that provides an integrated view of weather and threats based on availability of data, mission phase and planning horizon. Kronfeld says the resulting images should have “high glance value” so that pilots “don’t have to tab through different weather products” to see what’s most important.

Data-linked weather radar will be a key input for remote and oceanic areas with no ground-based radar coverage. Researchers are initially filling the gaps using lightning data from Vaisala’s global lightning data network, correlating the activity with convective weather. The results would be displayed on a tablet or the installed avionics as a “simulated radar” output similar to Nexrad, updating every 5-10 min. Beyond lightning, future inputs are likely to include satellite observations, ground radar and airborne radar compressed and downlinked via broadband links. —John Croft
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Pinpoint accuracy is now a reality with SPICE. RAFAEL’s affordable guidance kit transforms existing general-purpose and penetration warheads into autonomous, stand-off weapons. Using sophisticated proprietary scene-matching algorithms, SPICE overcomes target location errors and GPS jamming to home in and hit targets with unprecedented precision, the first time, every time.
L-3 to Supply Two ISR G550s to Australia

Probably to preserve good relations with its neighbors, especially Indonesia, Australia has avoided public admission that it puts much effort into airborne electronic intelligence. Now it has broken cover. Unexpectedly, Canberra says it is buying two Gulfstream G550s as intelligence and electronic warfare (EW) aircraft from L-3 Communications for US$93.6 million.

The intelligence-gathering aircraft will most likely replace and improve on a low-profile capability currently deployed in maritime patrol aircraft. L-3’s Mission Integration unit, a specialist in manned intelligence, surveillance and reconnaissance (ISR) systems, is to deliver the aircraft through the U.S. Foreign Military Sales process. A need for interoperability with other Australian systems, predominantly sourced from the U.S., has driven the choice of a U.S. contractor for the aircraft, which will be based on G550 business jets.

The aircraft will be modified to provide an airborne intelligence, surveillance, reconnaissance and electronic warfare (ISREW) capability.

The work on the aircraft, to be done at L-3’s Greenville, Texas, site under a fixed-price contract, should be complete by Nov. 30, 2017, the U.S. Defense Department says.

The timing and price suggest that a mature system, or at least one under development for the U.S., will be fitted.

The program will advance Australia’s capabilities by removing the burden of electronic intelligence (elint) and surveillance from the country’s maritime patrol squadrons. Under Project Peacemate, two of the Royal Australian Air Force’s Lockheed Martin P-3C Orion maritime aircraft were reportedly modified in the 1990s for elint, including signals intelligence, the interception of radio communications. Alternatively, Peacemate may have procured elint equipment that could be moved between different Orions.

Either way, Australia now needs a replacement. The country is phasing out the Orion, preparing to replace it with the Boeing P-8 Poseidon and Northrop Grumman MQ-4C Triton in the maritime role. So the G550 looks like the successor for elint operations.

Canberra’s confirmation of the ISREW role of the G550s appears to be the closest it has come to mentioning a specialized airborne elint capability.

The low price leaves room for L-3 to install the ISREW systems only in second-hand business jets.

The high-flying G550s will be able to stand off farther from emitters.

—Bradley Perrett

The S-3 Viking Could Live on in Asia

The last Lockheed Martin S-3B Viking to serve with the U.S. Navy has been retired, ending a 42-year carrier with the service. But the manufacturer has proposed refurbishing some of them for South Korea and other Asian countries.

Although officially decommissioned in 2009, a small group of S-3Bs were retained by Air Test and Evaluation Squadron (VX-30) based at Point Mugu, California, where they were primarily used for local range surveillance and clearance in support of sea test range operations. The S-3B was also used for sonobuoy production lot testing by PMA-264.

Introduced in 1974 as an S-2 Tracker replacement, the S-3B was developed into a multi-role aircraft that included anti-submarine warfare (ASW) as well as tanking, electronic intelligence and carrier onboard delivery.

The final three S-3Bs continued to be flown by VX-30 until, with costly depot-level maintenance looming, it was decided to retire them. The first of the three departed in November 2015 for storage at Davis-Monthan Air Force Base in Arizona. The final aircraft left Naval Base Ventura County, Point Mugu, on Jan. 11 and has been transferred to NASA where it is expected to be used by the agency’s Airborne Science Program. NASA’s Glenn Research Center has been operating an S-3B on science flights for several years, though the aircraft is currently listed as inactive.

Lockheed Martin meanwhile continues to study proposals for renovating up to 12 S-3Bs for possible ASW use by the South Korean Navy. At last year’s Seoul International Aerospace and Defense Exhibition, the company said refurbished and modernized aircraft taken out of storage from Davis-Monthan could be in operation by 2019, assuming sufficient interest materializes in South Korea, or from a number of other Asian and South American nations believed to be reviewing the proposal.

—Guy Norris
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ST Aero Joins the Space Race

Singapore-based aircraft maintenance and modification company ST Aerospace has lent its weight to the space race, signing up to engineer the latest launch platform for Virgin Galactic, the world’s first commercial spaceline. ST Aero’s U.S. subsidiary VT San Antonio Aerospace will convert a Virgin Atlantic Boeing 747-400, which was already named Cosmic Girl in airline service. As the first stage in the small-satellite air-launched rocket system LauncherOne, Cosmic Girl will carry the rocket to altitude under its port wing. LauncherOne rockets are designed and manufactured in Long Beach, California, and launches will be conducted by the dedicated 747-400 carrier from various locations.

Last September, Virgin Galactic announced that in response to customer demand, it had doubled LauncherOne’s performance to 200 kg into standard Sun-Synchronous Orbit for a price below US$10 million, with the option to purchase further increases in performance to the same orbit and for launches that reach other altitudes or inclinations. The launch system is capable of lofting over 400 kg of payload to other orbits. ST Aero is due to finish initial heavy maintenance on Cosmic Girl early this year.

ST Aerospace Adds Aircraft Leasing

Singapore Technologies Aerospace (ST Aero) is moving into the aircraft leasing business because it sees that owning aircraft on lease to airlines may help it to sell its maintenance and aircraft modification services.

Singapore-based MRO provider Singapore Technologies Aerospace (ST Aero) has established Keystone Leasing, a subsidiary in Singapore with paid-up capital of $10 million. Keystone itself has subsidiaries incorporated in the UK and Ireland.

Singapore is the leading location in the Asia-Pacific region for aircraft leasing companies to be based, thanks to its favorable double-taxation treaties with other countries as well as tax incentives afforded to aircraft lessors. But Ireland is arguably the world’s leading center for aircraft leasing.

ST Aero had earlier planned to team in this initiative with Wings Capital Partners Holdings, a U.S. company led by the former head of Aviation Capital Group, Stephen Hannahs. But it has since decided to establish the aircraft leasing company on its own.

ST Aero president Lim Serh Ghee says the company parted ways with Wings Capital Partners because after further discussions, it became clear that the two parties had different views on what the new venture should do.

Lim says ST Aero wants to make sure the aircraft leasing company remains focused on its original plan, which is to invest in Airbus A320 and Boeing 737 midlife aircraft. “This is not a financial play,” he says, adding that ST Aero wants to own aircraft to which it can add value through its maintenance and modification work.

Sometimes aircraft owners employ an aircraft leasing company to manage aircraft on their behalf, but Lim confirms that Keystone will have its own team of people in place to manage its lease portfolio.

Normally, when an airline leases aircraft it also chooses which MRO company will provide heavy maintenance checks and handle component support.

Because it owns the aircraft it leases, ST Aero is hoping that it can persuade lessees to use it for heavy maintenance and component support as well. The company also hopes to provide additional lease transition and modification work when aircraft move between airlines.

“We also have an ‘end-of-life solution’ for the aircraft, which is a passenger-to-freighter conversion,” says Lim, referring to the fact that ST Aero has supplemental type certificates for converting narrowbody passenger aircraft into dedicated freighters.

ST Aero is not new to the leasing business. Since June 2011 it has had an aircraft engine leasing arm called TEAM, which is a joint venture with Japanese trading house Marubeni. This joint venture specializes in leasing CFM56 engines that power the 737 and A320. ST Aero is an approved MRO shop for CFM engines.

Also in 2003, ST Aero leased two 737-300s to Biman Bangladesh Airlines on a wet-lease basis, but the airline a year later returned the aircraft, arguing it needed to streamline its operations. Lim says because ST Aero was responsible for maintaining the 737-300s, it achieved very high dispatch reliability for the airline.

One challenge ST Aero may face with its new leasing company is that, because it wants to specialize in older aircraft, it may find itself having to lease to second- and third-tier airlines in developing countries. Top-tier airlines in the Asia-Pacific region tend to operate newer narrowbodies and in more recent times have found it relatively easy to source newer A320s and 737s from the lease market.
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Airlines Get Jump on Tracking Mandates

Options increase for airline tracking solutions as European mandates drive an evolution in surveillance technologies and create new solutions.

The new rules, approved by the European Commission in mid-December, generally follow International Civil Aviation Organization (ICAO) proposed standards for tracking and alerting developed in response to the disappearance of MH370 in March 2014. While Europe may have been first to roll out new rules, other countries are likely to follow suit.

Included in the multi-tiered ICAO global aeronautical distress safety system will be normal mode tracking updates every 15 min.; an abnormal mode with 1 min.

Europe, through the European Aviation Safety Agency (EASA), will require airlines by December 2018 to have a tracking system for aircraft with more than 19 seats on routes that are more than 180 nm from shorelines, and by January 2019 to equip those aircraft with an 8.8 kHz underwater locator device (ULD) to augment the existing 37.5 kHz “pingers” on the flight data recorder and cockpit voice recorder.

EASA however will waive the ULD if the aircraft has a “robust and automatic” distress mode that can pinpoint the end point of a crashed flight to within 6 nm, a number that requires position updates every 1 min. or faster.

While airlines had largely committed voluntarily to implementing a 15-min. position update rate through existing equipage after the MH370 disappearance, carriers are now analyzing how to deliver everyday value from the upgrades. “Now therefore a better choice. Two unnamed small airline customers are already signed up to equip their fleets with SATMs starting in March.

Along with 15-min. position updates over Iridium, airlines can program SATM to send more frequent data for abnormal and distress modes.

In addition to the installation costs, airlines pay a monthly fee of US$100-$150 for the basic ICAO 15-min. tracking outputs per each aircraft, with fees increasing as trending or other data is sent.

Rockwell Collins Has a Solution

Rather than adding new technologies, Rockwell Collins Information Management Services (IMS) is focusing on diversification of position information of legacy links to meet the upcoming EASA and ICAO normal and abnormal mode tracking mandates. It is looking to adapt its MultiLink flight tracking service, which fuses legacy surveillance technologies already onboard for more frequent tracking updates.

“We’re trying to use information the airlines are already receiving,” says Yuri Maslov, senior program manager at Rockwell Collins IMS (Booth V77). “Any additional data they have to generate will bring additional costs.”

The company’s new MultiLink service, now in use by launch customer Aeromexico, combines surveillance information already carried over legacy Arinc networks – ADS-C and ACARS position reports – with air navigation service provider radar feeds, ADS-B from third-party providers and Rockwell Collins’ proprietary HFDL-based position reports to give airlines multiple options for position reporting.

“If tracking is dependent on a single data source or a single piece of equipment, the likelihood that tracking could be disrupted is quite high,” says Rockwell Collins in its MultiLink sales materials. The company converts all tracking “feeds” to the same format and provides the information to airline customers either through a streaming data feed or as an integrated aircraft situational display with its WebASD or Hermes SkyView platforms. Approximately 30 airlines are customers for the two platforms.

———John Croft
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Airbus Focuses on A350 Dispatch Reliability

The introduction of the Airbus A350 into revenue service has not been without challenges, but major disruptions have been rare. Now Airbus targets 98.5% dispatch reliability two years after its entry into service.

The very beginning was about considerable drama. Airbus absolutely wanted to deliver the first A350 in the 2014 calendar year to show that it could stick to a schedule. But it still had to convince launch operator Qatar Airways and in particular its CEO Akbar Al Baker that the aircraft was indeed ready to be accepted.

When Al Baker refused to take the aircraft on the original date, Airbus had to cancel the event (and an already ordered buffet lunch for hundreds of guests) at the last moment. Then, when the last of what was described as “cosmetic” issues had been resolved, the airline finally agreed to take the aircraft – still in 2014, days before Christmas. It counted.

What has followed since has little to do with drama, at least not with public drama. Airbus delivered 14 aircraft to four customers during 2015, one less than promised. And CEO Fabrice Bregier clearly blames Zodiac, the manufacturer of seats and lavatories, for the delay of the 15th aircraft.

Four airlines are flying the A350 in revenue service – Qatar, Vietnam Airlines and Finnair, while TAM Brazil (or now LATAM Airlines) followed early this year once initial crew familiarization flying was complete.

Little has so far been revealed about the initial operating performance of Airbus’ latest design – and Qatar Airways refused to contribute to this report. But the data and information available suggests that an enormous people and technical effort mainly by Airbus and intense preparation by the airlines have proven successful in limiting early operational issues to the extent possible. While far from the extensive software and hardware issues that made the introduction of the Boeing 787 such a long challenge both for the manufacturer and airlines, the A350 has not been without some teething problems, too.

The A350 fleet had accumulated 3,000 cycles and around 16,000 flight hours between the start of commercial flights on Jan. 15, 2015, on the Doha-Frankfurt route and the end of November. The average daily utilization reached a relatively low 11.4 hr. Average sectors were a relatively short 5.2 hr. The figures are driven partly by the relatively short stage lengths particularly in Vietnam Airlines and partly in the Qatar Airways network plus the extensive crew familiarization flying that requires the aircraft to be deployed on more short-haul flights initially.

Neither Airbus nor the three airlines using the aircraft in program, Customer Services. Bregier says a dispatch reliability of 98.5% could be reached by the end of 2016.

Finnair, meanwhile, is flying its A350s 15-20 hr. daily, taking them out of service every other week for a day of maintenance. “We are flying our long-haul aircraft more than any other airline in the world,” says Finnair Chief Operating Officer Ville Iho. “For the A350 there is no extra buffer built into the operation.”

In spite of the ambitious schedule, Finnair has not yet had to cancel an A350 service. It has experienced some level of departure delays, but Iho points at the fact that the A350 is a relatively fast aircraft and can recover time lost at the departure airport en route and in many cases has actually arrived early back in Helsinki in spite of a later than planned takeoff in Asia.

Iho points out that the customer feedback has been “amazing” so far.

For Airbus, the challenge is not yet overcome. In some way 2016 will be even more difficult as a total of eight new customers plan to take their first A350s, including Singapore Airlines, Cathay Pacific, Thai, China Airlines and SriLankan, two European carriers (Air Caraibes and Lufthansa) and one African airline (Ethiopian). Delivering so many of the so-called “heads of versions” puts enormous strain on the organization during final assembly. Seat and lavatory supplier Zodiac has also not yet recovered A350-related production, which may cause disruption and delays. For example, Singapore Airlines now expects to take delivery of its first A350 on March 2, some weeks later than initially planned.

—Jens Flottau
AAC Delivers First Head-of-State 787-8

Associated Air Center has re-delivered the industry’s first Boeing 787-8 outfitted for a head of state. The VVIP aircraft departed from the company’s facility at Dallas Love Field in Texas following a celebration ceremony on Feb. 2.

The project marked the firm’s eighth widebody completion job. AAC’s head-of-state configuration features 2,404 sq. ft. of cabin space. It can comfortably accommodate 82 VIP passengers separated in three cabin zones, while the office, bedroom and lavatory suite comprise the additional fourth, presidential zone.

AAC’s in-house team designed the 787-8 aircraft interior, which when completed was 20% lighter than initially projected, “allowing the customer to carry additional fuel to fly longer, nonstop missions.”

In addition to the latest data, entertainment and lighting equipment, the interior configuration features eight passenger lavatories, and both forward and aft cabin overhead flight crew rest areas.

AAC designed, engineered and manufactured the bulkheads, monuments, furnishings and headliner grid system for the interior configuration prior to the green aircraft’s arrival.

AAC’s in-house team designed the 787-8 aircraft interior, which when completed was 20% lighter than initially projected, “allowing the customer to carry additional fuel to fly longer, nonstop missions.” AAC was also able to achieve “unprecedented” (44 dB SIL) cabin sound readings for a quiet environment in the presidential bedroom.

“We overcame significant new engineering challenges during this project and maintained our goal of providing the safest and highest-quality completion services in the world,” said AAC president James Colleary.

AAC said further that it expects to soon redeliver a Boeing 747-8 widebody aircraft and “anticipates winning additional wide- and narrowbody completion programs during 2016 with full capacity to accommodate additional customers for both aircraft completions and MRO services.”

AAC notes that in cooperation with Boeing, its was the first in the industry to complete a 757-200 head-of-state customer interior configuration - in 1989.

Associated Air Center is a unit of StandardAero (Booth U96).
New Birds of Prey From IAI MBT

Israel Aerospace Industries (IAI) is expanding the range of loitering weapons offered by its MBT Missiles and Space Group, with the introduction of a modernized suppression/destruction air defense loitering weapon and smaller variants of the EO guided Harop loitering weapons.

The Next Generation Harpy NG uses a new platform based on the Harop suicide drone. Harpy NG retains the original 15-kg warhead but has an improved RF seeker covering a wider frequency range, meeting the “migration” of modern target acquisition and fire control radars to the lower frequency bands.

Using a common platform, Harpy NG will use modern subsystems and components manufactured for the mass-produced Harop, thus offering the commonality and improved life cycle support for the system. Harpy NG has a loitering endurance of 6 hr. and retains the Harpy’s autonomous operation, with the introduction of advanced, mission optimization capabilities adapting the mission scenario to the assigned search, mobility and operational capability of expected threats, number of vehicles assigned to each area, etc.

Harpy can loiter at a high altitude, maximizing search area and avoiding enemy fire. At high altitude it is also out of the threat’s acoustic detection range. Once threat radar is located, Harpy rapidly engages the radar entering a steep dive.

Enter the Green Dragon

Another new member of IAI’s loitering weapons group is the Green Dragon, a compact, electrically powered loitering missile weighing only 15 kg (one-tenth of the weight of an armed Harop). Like its bigger brother, Green Dragon uses a small EO payload for a seeker. Its warhead weighs only 2.5 kg. Despite its small size, the Green Dragon can sustain a mission endurance of 1.5 hr. and is able to operate at a distance of 40 km from the launch point. The weapon is carried inside a launch tube that can be carried in a backpack or on vehicular 12-18 launcher stacks. Unlike the Harop system that relies on a mobile shelter for control, Green Dragon uses a tablet computer to control the entire mission, maintaining a single active unit conducting surveillance and attack with multiple drones airborne and ready to strike.

—Noam Eshel

Taking Charge of UAV Operations

ISRAEL AEROSPACE INDUSTRIES (IAI) is unveiling at the Singapore Airshow a Mission Operational and Intelligence Center (MOIC) for unmanned aerial systems (UAS). The center allows efficient, centralized command and control of UAV missions by placing pilots, mission operators, ISR analysts and decision makers at a central location, instead of using separate facilities for each mission.

“MOIC represents another step forward in the development of IAI’s leading UAV capabilities,” says Joseph Weiss, IAI’s president and CEO. “This unique solution addresses the needs of the advanced battlefield and adheres to customer requirements.”

Through a modular layout MOIC allocates independent operational cells to different users, enabling optimal utilization of available assets. MOIC also has an integral exploitation center, command and control cell, satellite communications, data storage and support facilities, with the upper commander cell supervising all missions. The facility integrates a full mission trainer, supporting operator training and realistic exercises.

The all-inclusive headquarters generates an efficient mission flow, which includes command and control, planning and monitoring of mission performance, interpretation of offline and online sensor data, archiving raw and processed information, and reporting to high command. This mission flow provides a full operational picture of UAVs and maximizes the fleet throughput by allocating assets according to operational priorities; enhances coordination of UAV fleet and manned platforms; improves safety; protects ground assets; and saves manpower and resources by centralizing and automating operations and maintenance.

—Noam Eshel
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Elbit’s New Skylark Spotted at Singapore

Skylark 3, a new member of Elbit Systems’ autonomous mini-unmanned aircraft system (UAS) family, is making its debut at the Singapore Airshow.

Leveraging the proven technology and operational experience of the Skylark 1 LEX I family of mini-UASs, Elbit’s (Booth N65) electrically powered Skylark 3 provides high-resolution, high-quality real-time ground imagery from within enemy territories or hostile areas without being detected. The electric propulsion system reduces sound signature and enables operating over long distances and at high altitudes.

“Skylark 3 delivers brigade-level and division-level units an ideal solution for carrying out complex ISTAR missions in a truly organic network-centric manner,” says Elad Aharonson, general manager of Elbit’s ISTAR division.

“Skylark 3 brings greater endurance and range, and a bigger payload. Takeoffs and landings are automated and simplified through specially adapted mechanisms. The drone is launched via a pneumatic launcher that can be mounted on a trailer. Soft landing uses a unique “pillow-cushioning” retrieval system, which allows operators to easily land and redeploy the UAS within a matter of minutes. The aerial vehicle has a 4.8-meter wingspan and a maximum takeoff weight of 45 kg. It has a service ceiling of 15,000 ft.

To support interoperability, the Skylark 3 uses the same advanced technologies and know-how found in other Elbit UASs, including the Hermes family of larger UASs, Skylark 1 LEX I mini-UAS and Skylark II battalion-level UAS. All Skylark systems share a common ground control station and the same inertial sensors and navigation systems. —Noam Eshel

Controp’s Bird-Spotting Sensor Improves Safety

The Interceptor’s display can be integrated into the air traffic control system, providing automatic alerts on bird activity along the exit and approach flight paths. Unlike the radar that displays “blips” representing targets, the Interceptor displays true visual images of the targets themselves, enabling operators to easily assess the type of alert, number of birds, their location and their altitude, without the need for extensive training, enabling the airfield to increase its operational tempo.

The sensor is based on the Spider persistent surveillance system developed by Controp for military and homeland security applications. The Interceptor implements special bird detection algorithms and tracks average birds in day and at night, from a distance of 4-5 km. The system also can spot bird flock activity on the ground at a longer distance.

Looking beyond birds, Controp (Booth N39) and Pharovision use a derivative of the system to detect unmanned aerial vehicles in the vicinity of airports. Further development of the system also will enable it to detect foreign object debris along the runways. —Noam Eshel
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Contracts announced on Feb. 2 cover the purchase of 38 new training aircraft and the cost of running the Elementary Flying Training, Multi-Engine Training and Basic Flying Training elements of the UK Military Flight Training System (MFTS) until 2033.

Half of the money has been contracted to the Affinity consortium of Elbit Systems and Kellogg, Root and Brown (KBR), who will provide and maintain the new fleet of aircraft, which includes 23 Grob 120TPs – to be known as Prefects, 10 Beechcraft T-6C Texan IIs and five Embraer Phenom 100 very light business jets.

Contracts have also been awarded to Lockheed Martin and Babcock, who run the Ascent consortium that runs the MFTS program. They will be charged with the delivery of ground-based training equipment and infrastructure to support the fixed-wing training capability.

The Grob 120TP will be used for elementary or ab-initio flight training at Barkston Heath and RAF Cranwell, replacing the Grob 115E Tutor aircraft currently in service. Multiengine training will be carried out on the Embraer Phenom 100 at RAF Cranwell, replacing the Beechcraft King Air 200, while basic flight training, currently carried out on the Shorts Tucano, will be completed on the Beechcraft T-6C Texan II.

According to the UK defense ministry, the multiengine pilot training element will be in place from mid-2018 while basic flying training is expected to be operational by early 2019.

The program aims to train 230 students a year using a mix of military and civilian instructors.

The Ascent program has already introduced 28 BAE Systems Hawk T2s for advanced jet training. The consortium has also introduced a modernized observer training program for the Royal Navy using the Hawker Beechcraft King Air 350ER, which is known as the Avenger in Royal Navy service.

Ascent is also competing provision of a new helicopter training fleet expected to become operational in 2018 replacing the privately owned fleet of Airbus Helicopters AS350 Squirrels and Bell 412 Griffins.

What is unclear is how just 10 T-6s will cover the basic flight training needs and feed a fleet of 28 Hawk T2 advanced jet trainers when the UK is looking to increase the tempo of its fast jet operations. The 2015 Strategic Defense and Security Review announced plans to form additional fast jet squadrons using early model Typhoon Tranche 1s. The UK will also introduce the F-35B Joint Strike Fighter at a faster rate.

—Tony Osborne

### Malaysia Orders MD530G Light Attack Helicopters

The new MD530G gunship features guided weapons for the first time.

The Malaysian government has selected MD Helicopters’ new MD530G as the country’s attack helicopter in competition with Airbus, Bell, Boeing and Turkish Aerospace Industries for the long-running requirement.

MD will deliver six MD530Gs to Malaysian Army Aviation. Deliveries are expected to start toward the end of this year, while the full complement will arrive in country during the first quarter of 2017.

The MD530G is a new development of the MD530F lightweight single-engine helicopter, itself derived from the Hughes 500 or OH-6 Loach. Malaysia will be the launch customer for the aircraft.

The aircraft has been given a higher maximum takeoff weight of 3,350 lb. compared to 3,100 lb. on the standard MD530F, thanks to an upgraded landing gear skid system. The aircraft also has a Moog mission computer that allows the crew to manage the weapons on the pylons, and Garmin G500 avionics. The new aircraft is also configured to fire 70mm laser-guided rockets from an M260 rocket pod.

Previous versions of MD530 gunships have only been able to fire unguided weapons.

MD Helicopters says the Malaysian aircraft will include a custom weapons package, advanced communications capabilities and an electro-optical camera system to detect, “identify and engage a wide range of threats.”

The company says it also plans to help advance local indigenous capabilities for long-term aircraft servicing and support.

“MDHI will work with Bumiputera partners in all phases of the program, from defining requirements to a comprehensive CLS [Contractor Logistics Support] package that includes initial entry, transition and combat pilot training; maintenance training for both the airframe and mission equipment; and the development of a spare parts program with dedicated and ongoing OEM support,” the company said in a Feb. 1 press release.

—T.O.
In 2016, the Aviation Week Network celebrates Aviation Week & Space Technology’s centennial milestone. Join us as we look at how the past century has shaped the future of aerospace.

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Roketsan, which designs, develops and manufactures rockets and missiles, is a key player in its native Turkey and is offering its wares to the world at Singapore 2016.

Since its establishment in 1988, Roketsan has improved its infrastructure and extended its product range. In addition to being a key indigenous supplier to the Turkish Armed Forces, Roketsan participates in NATO programs and supplies equipment to friendly export customers.

Roketsan is showing its combat-proven 2.75-in. CIRIT laser-guided missile, said to be the first of its caliber to be delivered to different Allied Armed Forces inventory under serial production contracts. It is described as “a unique all-up round missile designed to eliminate light armored, stationary/moving opportunity targets with high precision and affordable cost.” CIRIT missiles were delivered to the Turkish Armed Forces in 2012 and UAE Armed Forces in 2014. There is also a pedestal-mounted version.

The “UMTAS” long-range antitank missile system, designed to arm attack helicopters against modern main battle tanks with heavy armor penetration, is also on show. UMTAS can operate in all weather and day/night conditions with both fire-and-forget and fire-and-update modes, with a maximum range of 8 km. Also being promoted is Roketsan’s laser-guided L-UMTAS variant.

Roketsan’s SOM comprises a family of stand-off missiles with guidance technologies and warheads designed to enhance the air-to-surface warfare capabilities of fighter aircraft. SOM is an autonomous, long-range (250 km), low observable, high-precision, all-weather, next-generation air-to-surface cruise missile intended for use against highly defended, anti-access and high value, stationary and moving land/surface targets. Under serial production, SOM is already in the inventory of the Turkish Air Force, integrated and certified on the F-4E/2020 and F-16 Block40 fighter aircraft, while the SOM-J variant has been offered as an anti-surface cruise missile for newly developed F-35 JSF fighter aircraft.

Roketsan is also exhibiting TEBER, a new generation INS- and GPS-aided Laser Guided Kit consisting of a semi-active laser seeker (SAL) located as a body/strake kit in the front section. The tail section includes aerodynamic control surfaces, inertial guidance system combined with GPS/GNSS receiver, guidance computer, control actuation system and thermal battery.

Roketsan’s TEBER system is designed to increase the probability of hits against moving targets. It is compatible with Mk-81 and Mk-82 general purpose bombs.

Roketsan says it aims to grow by having a strong financial structure and to sustain profitability via a strong competitive position internationally gained via innovation and creativity. The company plans to continue to develop advanced products for its home market, at the same time conducting effective foreign marketing activities.

The firm emphasizes its young, growing and dynamic staff, which retains a spirit of entrepreneurship.

—Rich Piellisch

ST Aero Buys Dresden MRO

ST Aero has boosted its capabilities in passenger-to-cargo jet conversions — and its role as a supplier of composite panels to Airbus — by taking a majority interest in Dresden, Germany-based EFW — Elbe Flugzeugwerke GmbH.

ST Aero took a 35% stake in EFW in 2012, with Airbus holding the majority interest. The Singapore company said this month that it had completed its purchase of another 20%, making it a 55% owner and rendering EFW an ST Aero subsidiary. Airbus Defence and Space holds the remaining 45%.

Plans for the additional investment were announced this past June, when an ST Aero-Airbus-EFW project to convert A320 family passenger jets to cargo jets — the A320/A321P2F — was likewise disclosed.

The A320 work follows a similar collaboration for the A330P2F conversion programs launched in 2013.

EFW employs more than 1,000 people and has annual revenues of better than 200 million euros (US$225 million).

The Dresden entity is the exclusive supplier of composite flat panels to Airbus for all Airbus aircraft and “will serve as ST Aerospace’s center for passenger-to-freighter conversions; aircraft maintenance, repair and overhaul (MRO); as well as engineering services in Europe, leveraging ST Aerospace’s global network, track record and expertise in aircraft MRO and engineering,” ST Aero said.

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CFM International president Jean-Paul Ebanga has three reasons to be cheerful as the General Electric and Snecma joint venture enters the second month of what promises to be another record-breaking year for engine production and deliveries.

“For CFM life is really good, and there are three main reasons,” says Ebanga. “First, on the commercial front, we have already sold around 10,000 LEAP engines, and that’s six months before the first even enters service.” The order tally, which includes more than 6,000 LEAP-1B engines for the Boeing 737 MAX, over 3,000 LEAP-1As for the Airbus A320neo and the remainder for the LEAP-1C powered Comac C919, is seen as a resounding endorsement by many of the world’s airlines. It also breaks all previous records for a commercial engine that has yet to power a revenue flight.

“It means a lot to see the confidence of the market in a new product,” he adds. The orders also continue to flow in, with 2,154 new engine orders booked in 2015. Of these, 1,418 were for LEAPs and 736 for the CFM56, of which 1,638 were produced last year. Asia-Pacific remains a key market for CFM, which has 2,736 engines in service in the region and 2,442 on order — some 436 of which are for the CFM56. As Ebanga notes, “the CFM56 is still a ‘hot’ product in terms of sales.”

Secondly, Ebanga says the ongoing success of the two LEAP flight test efforts marks the culmination of a “textbook development program that has so far been on time or ahead of time.” The extensive test program that has so far been on time or ahead of schedule is a further demonstration of our commitment to provide flexible services to our customers across the engine life cycle.”

Singapore Extends TotalCare for Trents

Singapore Airlines has extended its TotalCare service agreement with Rolls-Royce for the Trent 800 engines that power its Boeing 777 aircraft. TotalCare enables the business models of the aircraft owner and Rolls-Royce to be fully aligned to improve engine reliability, increase time on wing and maximize the engine services contribution to customer business performance. Dominic Horwood, Rolls-Royce’s chief customer officer – civil large engines, said “Singapore Airlines is an extremely valued customer and we are proud that TotalCare will continue to support these engines. This is a further demonstration of our commitment to provide flexible services to our customers across the engine life cycle.”

Emirates Auckland Flight to Be World’s Longest

Emirates plans to launch its first direct service to New Zealand in March. It will be, at least temporarily, the world’s longest flight. The Auckland-Dubai flight using a Boeing 777-200LR will be longer in distance and duration than the Qantas Airbus A380 service between Dallas and Sydney, which is the current title-holder. The new Emirates flight is expected to be 15 hr., 55 min. eastbound from Dubai and 17 hr., 15 min. westbound from Auckland. Emirates already has extensive service to New Zealand, but all of its current flights are via Australian stopovers in Sydney, Melbourne or Brisbane.

Korean Air Outlines 2016 Aircraft Deliveries

Korean Air expects to take delivery of 16 aircraft this year to support its plans to increase capacity and meet profit growth projections. In a presentation released with its fourth-quarter earnings, the airline said it will receive three Boeing 747-8Is, two 777-300ERs and two 737s that will be operated by low-cost carrier subsidiary Jin Air. All of these deliveries are scheduled through June. In the second half of the year, Korean expects to receive five freighter aircraft, comprising four 777Fs and a 747-8F. These will add to the airline’s current fleet of 133 passenger and 28 cargo aircraft.

West Air Launches Flights to Singapore

West Air has inaugurated service between Singapore and Chongqing, China, on an Airbus A320-200. The arrival of Chongqing-based West Air strengthens Singapore’s connectivity to Western China, opening up more opportunities for both trade and leisure travel between the two destinations. The thrice-weekly flights, which come on the heels of a bilateral pledge to grow air connectivity between Singapore and Chongqing, inked through a Memorandum of Strategic Cooperation signed on Jan. 8.

Thai Airways to Sell Assets, Defer Aircraft

Thai flag carrier Thai Airways will pursue a far-reaching cost-cutting program from 1Q2016 to realize up to THB1 billion (US$28 million) in savings. Thai management said it would seek to defer deliveries of up to 14 aircraft on order from Airbus and Boeing, including four purchased and eight leased Airbus A350 XWBs, and the remainder of its eight-strong 787 order. The move came following Thai’s inclusion on a list of operations being audited by the Thai government’s State Enterprises Policy Commission (SEPC) as part of a Thai government push to improve the performance of a number of quasi-government companies.

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China Enigmatic, North Korea Unnerving

The horizon-scanning staffs of the region’s defense ministries continue to have their work cut out for them.

China remains an enigma, reconfiguring its military while strengthening trading links with the West; indications from inside the increasingly insular and bellicose North Korea continue to unnerve; and Japan is maintaining the military modernization and consolidation promised under Prime Minister Shinzo Abe’s policy of “proactive pacifism.”

North Korea’s intentions are the most difficult to read, and the country’s actions are almost impossible to predict. The nation has a huge military and is believed to have access to a range of biological and chemical weapons as well as to possibly as many as 27 nuclear warheads. Its state-run defense industry may not match the competence of its neighbors’, and claims of successful detonation of a hydrogen bomb in January are not considered credible. However, it appears increasingly feasible that the underground test firing was of components that could form part of such a weapon system.

It is perhaps therefore a relief that the only strikes North Korea has been credited with making on foreign targets were embarrassing and expensive but ultimately non-kinetic cyberattacks on South Korean TV stations and banks, and the American film studio, Sony. Pyongyang has denied involvement with the Sony hackers, who identified themselves as a group called the Guardians with the Sony hackers, Pyongyang has denied involvement with the Sony hackers, who identified themselves as a group called the Guardians.

earlier this year suggest this unusually speedy and forthright accusation (cyber attacks are generally difficult to trace back to an identifiable source) was made because the U.S.’s National Security Agency had successfully placed a series of “beacons” on servers used by North Korea’s intelligence military, meaning they are indeed looking at cyberspace as an operational domain, both to defend and go on the offensive,” says Bill Hagestad, a retired U.S. Marine Corps lieutenant colonel and Mandarin speaker who writes and consults on Chinese cyber warfare. “The bottom line is that this makes the PLA more able to win future wars.”

China continues to claim sovereignty of the Paracel and Spratly islands in the South China Sea; Taiwan, Vietnam, the Philippines and Malaysia also claim some of the islands. China has built extensively on Mischief Reef, only 140 nm from the Philippine coast.

The island-building may not, however, be primarily intended to further regional goals so much as to distract from farther-flung Chinese aspirations. The country is pursuing a strategy Xi unveiled in 2013 known as One Belt, One Road: This consists of a reinvigoration of historic Silk Road trade routes over land between China and Europe, and a so-called Maritime Silk Road linking the South China Sea, the South Pacific and the Indian Ocean. The PLA has a presence in territories along this new Silk Road, where Chinese interests need to be protected.

“T was the only foreigner at an economic conference in Beijing last September,” says Hagestad. “There was much talk and some laughter about the way the United States has its so-called Asian Pivot policy. Those artificial islands are merely a distraction to keep the U.S. Navy’s Seventh Fleet fixed in place so they [China] can focus on building the One Belt, One Road maritime strategy.”

Given such compelling local reasons, it is easy to see why Abe has continued to pursue a more militarized path for Japan. Article Nine of the nation’s constitution, which forbade Japan from maintaining standing forces or fighting wars as a means of resolving international issues, was reinterpreted by the Diet in 2014. The reinterpretation remains controversial, as it bypassed mechanisms to adapt the constitution, but the current government believes it allows Japan to act militarily in defense of allies, and the nation can deploy forces overseas.

—Angus Batey
South Korea Prepares for F-35s

A claimed satellite launch by North Korea earlier this month earned condemnation in capitals as far away from the peninsula as Washington, D.C., Moscow and London. The political impact of the event would obviously have been all the more greater in Seoul.

Although an object was put into orbit, the rest of the globe seems united in interpreting Pyongyang’s launch as a long-range ballistic missile test rather than a genuine attempt at advancing a non-military space capability. North Korea’s neighbors have every right to feel deeply concerned.

Countering the almost entirely unquantifiable threat from an unpredictable and increasingly belligerent North Korea has been Seoul’s primary preoccupation since the end of the Korean War 53 years ago, but it is difficult to argue that the situation has ever been more precariously balanced than it is now. Diplomacy is intensifying around efforts to build a coalition strong enough to rein in the North, and with the February launch following January’s claimed hydrogen bomb test, even nations previously reluctant to line up against Pyongyang are starting to come around.

China, traditionally the nearest the North Koreans could call an ally, joined Russia in condemning the launch before it took place. South Korea’s president, Park Guen-Hye, has made it a priority to build a strong working relationship with her Chinese counterpart, Xi Jinping, and was the only leader from any of the major allies of the U.S. to attend a Beijing military parade marking 70 years since the end of World War II.

In January, the director of the Chinese defense ministry’s Foreign Affairs Office, Rear Admiral Guan Youfei, visited Seoul for annual talks with the South Korean defense ministry’s director-general for international policy, Yoon Soon-Gu. The summit is an annual event, but South Korea will have used the occasion to increase pressure on China to apply sanctions on Pyongyang. The key difficulty for the South is to reassure China that a destabilized North Korea will not lead to a reunified and America-allied peninsula, while China also fears a refugee crisis should the North Korean economy deteriorate further.

Those ties to Washington remain strong, with approval granted by the Pentagon’s Defense and Security Cooperation Agency for a Lockheed Martin-led upgrade program for Seoul’s F-16 fleet following the termination of a previous contract with BAE Systems. The US$2.5 billion package includes active, electronically scanned array (AESA) radars, new mission computers, radar warning receivers, electronic warfare management units and embedded GPS/inertial navigation systems.

South Korea is also a customer for the F-35, with the first of a planned 40 jets scheduled to be delivered in 2018. The KF-X program, to develop an indigenous fighter in collaboration with Indonesia, is also proceeding, though funding for it is minimal, and there remain serious doubts over whether U.S. radar technology will be approved for the proposed jet.

Seoul has also reviewed its position on a possible deployment of the Lockheed-built THAAD (Terminal High Altitude Area Defense) antiballistic missile system. South Korea had initially requested information on THAAD with an apparent view to procuring the system; the U.S. Army revealed plans in 2014 to potentially deploy American THAAD batteries to South Korea, a move that led to Chinese protests, and the plan appeared to have stalled. But in an announcement on Feb. 7, just hours after the North’s rocket launch, South Korean and U.S. Army officials confirmed that “official discussion” on THAAD deployment has been initiated.

Another Lockheed contract approved for South Korea is a US$1.9 billion program to supply three additional Aegis combat systems to the Republic of Korea Navy. The service currently operates three KDX-III-class destroyers with Aegis on board. The export approval followed a December 2013 announcement by South Korea’s Joint Chiefs of Staff that they intended to double the size of the current fleet of three of the 7,600-ton destroyers by 2027.

The Republic also has been beefing up its cyber capabilities. With well over 80% of its population using the Internet, South Korea has a potentially greater threat surface than other nations. Attacks in 2013 and 2014 on banks and utilities companies, as well as TV stations, which were attributed to North Korea, underlined this vulnerability, though they also emphasized the resilience of South Korea’s digital infrastructure as the attack vectors were promptly patched and services restored.

Last April, the government announced the creation of a new presidential post with responsibility for national cybersecurity. Reports in 2014 suggest that the South has also been developing an offensive cyberweapon for possible use against North Korea’s nuclear programs.

—Angus Batey
THROUGH THE REPUBLIC

of Singapore Air Force’s Basic Wings Course program (BWC), Lockheed Martin and teammates Pilatus Aircraft and Hawker Pacific have delivered 50,000 flying hours and trained more than 300 pilots since 2008.

“The Basic Wings Course is a critical segment of the RSAF’s pilot-generation pipeline,” said RSAF training chief Col. Tan Yik.

“A key enabler for us to achieve this 50,000-accident-free-flying-hours milestone is the strong partnership between the RSAF and Lockheed Martin,” he said. “Reaching this milestone also reflects our common emphasis on training excellence and safety. I congratulate 130 Squadron and Lockheed Martin on this occasion, and look forward to the team achieving the next 50,000 hours.”

As the training systems integrator for BWC, Lockheed Martin (Chalet CS02) delivers a turnkey training system comprised of aircraft, maintenance, simulators, training and logistics management systems, courseware and instructors. The program is operated at the Republic of Singapore’s 130 Squadron at the Royal Australian Air Force Base Pearce. Additional instructors at the Paya Lebar Air Base in Singapore teach the Basic Aviation Ground School under the authority of the Flying Training Institute.

“Reaching this 50,000-flying-hour milestone demonstrates the exceptional partnership we share with the RSAF and our team’s dedication to deliver an efficient, seamless and safe flying training environment,” said Lockheed Martin training and logistics solutions VP Jon Rambeau. “We are honored to assist the RSAF in training their next generation of pilots and look forward to delivering valued capability for decades to come.”

As part of Team 21, Pilatus Aircraft is the original aircraft manufacturer for the PC-21 turboprop trainer and provides engineering and logistics support for the platform. Pilatus describes the Pratt & Whitney Canada PT6A-68B-powered airplane as “as a completely new training system [designed] with the objective of meeting the expectations of modern air forces over the next 30 years, both in terms of capability and life-cycle cost.”

Pilatus confirmed in December that the ADF, the Australian Defence Force, signed a contract for the purchase of 49 PC-21 training aircraft for Team 21 training. Australia will be the sixth country to operate the PC-21 trainer.

Hawker Pacific (Booth F75) provides aircraft maintenance for Team 21.

O n the one hand, international responses to these events tend to be negative, so there might be a reluctance to proceed with arms deals. On the other, when the military is running the government, there ought to be few arguments over the defense budget.

In May 2014, following widespread demonstrations against Yingluck Shinawatra’s government, the Thai military took control and installed a junta, the National Council for Peace and Order, to run the country under the leadership of Gen. Prayut Chan-o-cha. As well as holding the post of prime minister, the general is also commander of Thailand’s police and intelligence agencies, the justice ministry, and the office of the attorney general and heads the National Budget Bureau. International reaction was negative, but muted; and the defense budget for fiscal 2016 rose to 207 billion baht (US$5.9 billion). This has enabled some long-awaited procurements to proceed, though others remain unconfirmed aspirations.

Shortly after the coup, the Royal Thai Navy opened a 540 million baht submarine headquarters and training center, despite not having operated a submarine since 1951. As a statement of intent, this was hard to misread, and offers came in from Russian, South Korean and Chinese manufacturers. Last July, the RTN announced it had selected the Chinese Type 041 Yuan class, and had placed an order for three of an export variant, at a price of 36 billion baht. The first boat is expected to be delivered in 2022/3.

Saab remains a key supplier of the Thai military, though an expected order for another six Gripen fighters has not yet materialized. The Thai Air Force announced in September 2015 that it had flown 5,000 hr. in its mixed fleet of eight C and four D models, and in 2014 demonstrated datalinked interoperability between Gripen, a Saab 340 airborne early warning aircraft, and the aircraft carrier Chakri Naruebet. —Angus Batey

Lockheed ‘Team 21’ for RSAF

The Thai Air Force’s 12-strong fleet of Saab Gripens had jointly flown 5,000 hr. by September 2015.

One might expect a military coup to bring both setbacks and benefits for a nation’s defense institutions.
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Ameco Beijing Has Restructured
‘New’ Ameco Will Keep Focus on International Business

The restructuring of one of the world’s leading maintenance, repair and overhaul (MRO) organizations, Ameco Beijing, will increase its competitiveness at home and overseas, and bring new capabilities to its customers.

“New Ameco” – still known to the trade as Ameco Beijing – was created last year by merging Air China’s in-house MRO arm Air China Technics into the former Ameco Beijing (Booth H65), itself a joint venture between Air China and Lufthansa German Airlines formed in 1989. While the German shareholding in new Ameco Beijing has been reduced from 40% to 25%, the amount of its investment remains the same, says Chai Weixi, VP of Air China and CEO of new Ameco.

“In the new structure, Air China and Lufthansa will continue their cooperation,” he says. “Lufthansa’s vision of Ameco’s successful development remains unchanged, while Air China still regards Lufthansa as a very important partnership for the development of New Ameco.”

“New Ameco and Lufthansa Technik will continue to cooperate on large-scale projects such as landing gear overhaul, as well as MRO industry development. Transfer of technology will be unchanged, and sharing of experience and know-how will continue,” he told ShowNews.

The merging of Air China Technics and Ameco will reduce duplication of resources while adding to the capabilities offered to customers. It also aligns MRO activities at nine branches – Chengdu, Chongqing, Hangzhou, Tianjin, Hohhot, Shanghai, Guiyang, Wuhan and Guangzhou with the Beijing base. Together they hold maintenance licenses from almost 30 countries or regions, including CAAC, FAA and EASA.

While its prime role is to maintain and service Air China’s growing fleet, “New Ameco will establish multi-bases and network services, committing to providing third-party customers with high quality and comprehensive services,” Chai says. And while integration is underway, Ameco will continue to pursue international business even more strongly than before.

Lufthansa Technik and Ameco will continue to have their own sales teams to look after their own customers separately. But the new Ameco, with greater capabilities than before, expects to be even busier.

For example, Chai says, Ameco is developing an aircraft-related components repair capability coupled with composite repair. It is also focusing on new aircraft types, such as aircraft overhaul of Boeing 747-8Is, and line maintenance on Boeing 787s and Airbus A350s. And it has just added V2500 engine overhaul capability.

“After integration, new Ameco is much stronger in its capabilities, output and network than before,” says Chai. “It also has sufficient resources, assets and channels, which bring a stronger ability to serve customers in overseas markets. We believe our products are more competitive than ever before.”

Ameco added seven international customers for line maintenance, bringing its total to more than 70.

According to Johannes Bussmann, who became chairman of Lufthansa Technik’s executive board in April, “This is a partnership we have [been involved in] for many years and we want to keep it like that. The investment that Lufthansa has there didn’t change on an absolute basis, but by the integration of Air China Technics a lot of line maintenance capabilities came to the new Ameco.”

—John Morris

Ameco has added V2500 engine overhaul to its capability repertoire, bringing in the second unit to be completed last month. Ameco was authorized by CAAC, FAA and EASA to provide overhaul and modification on V2500-A5 series last year. In November 2015, Ameco and Pratt & Whitney signed a standard maintenance contract, making Ameco an approved repair station for V2500 engine services worldwide.

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—John Morris

Passenger-to-Freight Conversions

AMECO HAS COMPLETED four Boeing 757-200 freighter conversions in its Chengdu facility at Shuangliu International Airport. The fifth freighter was finished in December 2015; it also was the third aircraft from SF Airlines, a subsidiary of SF Express.

Ameco projects that while world air cargo traffic will grow at 4.7% per year over the next 20 years, the domestic market in China will expand at an annual rate of 6.7%.

Ameco Chengdu completed its first passenger-to-cargo conversion of a Boeing 757-200 in 2014.
New World Ordnance

To understand the future of air-to-air warfare in Asia, take a careful look at the flying and static displays here. The Malaysian air force’s Su-30MKM is putting on a show that reminds you that the jet was impressive before the astonishing Su-35S – coming to local theaters soon – joined the show circuit. The Rafale is back. On the ground, Singapore’s F-15SG and F-16D are familiar, but some of their features bear a second look.

It’s been a while since anyone claimed in public that the Lockheed Martin F-35 Joint Strike Fighter would have a 6:1 air combat advantage over any not-as-stealthy competitor. I don’t know whether the U.S. Air Force ever believed this, but if they still did, they would not be spending billions on upgrades to their 30-to-35-year-old F-15Cs.

It will be some time, in any scenario, before stealthy aircraft are a big part of the Asia-Pacific fighter inventory, but the Sukhoi family also forces adversaries to look at two other aspects of fighter capability: electronic warfare and weapons.

In October 2012, the supercarrier USS George Washington paid a visit to Malaysia that included a photo-op formation of Super Hornets and Su-30MKMs. Hanging on the wingtips of the Sukhois were fat cylindrical pods – Russian-made KNIRTI SAP-518 active jamming systems. The SAP-518 is not only big and powerful, but it also uses state-of-the-art digital radio-frequency memory (DRFM) technology. Maybe it can beat an attack by an AIM-120C advanced medium air-to-air missile (AMRAAM) and maybe it can’t, but... . Do you feel lucky today?

The proliferation of DRFM jamming – the Russians design the DRFM chips but have them made in foreign foundries, which are where you’d expect them to be – triggered renewed U.S. attention to EW self-protection systems after decades of neglect: Aside from the Super Hornet’s ALQ-214, the Pentagon hadn’t sponsored a new active jamming system for a fighter since the 1980s.

Israel, Singapore and others had seen that gap earlier, which is why the various warts and excrescences on the Singapore air force fighters here bear examination. The F-16D has a self-protection suite by Elbit’s Elisra subsidiary. The F-15SG’s digital electronic warfare system is also reportedly from Israel.

The F-15SG has a more jamming-resistant active electronically scanned array (AESA) radar and, if the adversary’s EW is still a problem, an infrared search and track (IRST) system. The U.S. Air Force is now funding AESAs, IRST and new EW for its F-15s. The Rafale’s presence is a reminder, too, that Dassault, Saab and the Typhoon partners addressed the EW issue from the outset.

The Sukhoi fighter’s agility challenges weapon design. That the jet is a difficult target for AMRAAM is beyond serious dispute. The range at which AMRAAM has a high kill probability declines sharply as targets become more evasive. It was why the MBDA Meteor was developed in the first place.

All the Euro-canards are getting Meteor (it will be fully operational this year on Gripen). Other recent AAM disclosures and program starts include Rafael’s I-Derby Extended Range – which, among other things, buries Derby’s low-key reputation as an AMRAAM substitute – and the new-build version of the MBDA Advanced Short-Range AAM. The new Asraam takes a leaf out of Rafael’s strategy book by using commonality with land- and sealaunched missiles to reduce cost.

The U.S. AAM program, by contrast, seems disorganized. The fundamental limitation on AMRAAM is motor size, because the weapon was designed to fit the F-16’s wingtip mounts. The same applies to the AIM-9X, designed around old Sidewinder motors – the fatter Asraam has 70% more volume per unit length. Management is split between the air force (AMRAAM) and the navy (AIM-9X), with some work being done by the Defense Advanced Research Projects Agency, and it seems likely that a further complication is the presence of black programs.

The result is that projects like the longer-range AIM-9X Block III and Joint Dual Role Air Dominance Missile have come and gone, and minimally funded studies proliferate (Raytheon got US$14 million in January for two self-defense-missile concepts), but nothing beyond the AIM-120D is in sight. Black-world miracle missiles will not be available to allies, and neither will foreign missiles on U.S. aircraft: It literally took an act of Congress to get money in the 2017 budget to test the MBDA Brimstone on the Super Hornet.

F-16 operators may elect to live with these limitations as they upgrade their aircraft, but in the mid-term, EW and weapon considerations could work to the benefit of the European fighters, with sensor fusion, IRST, built-in EW and a wider choice of weapons.

—Bill Sweetman
Singapore's Missing Puzzle Piece

It isn't always easy to identify pressing national military aviation requirements. Most countries struggle with the usual budget limitations and a broad array of fleet replacement and new addition needs. But in the case of Singapore, there's a very interesting capabilities gap that implies a significant short-term requirement.

The country has five of these Fokker 50 turboprop MPAs, armed with Harpoon missiles or EuroTorp A244 torpedoes. But these aircraft were acquired in the early 1990s, and while they are capable MPAs, they are hardly the kind of blue water long-range anti-submarine warfare-capable models deployed by even medium maritime powers. Considering the resources lavished on the rest of the country's military air capabilities, and taking into account the country's strong interest in maintaining freedom of the seas, this represents a notable gap in Singapore's defense procurement pattern.

By contrast, Singapore's rotorcraft MPA capability is far more modern, with six Sikorsky S-70B Seahawks acquired in 2011, and another two due for delivery this year. But these are short-range platforms lacking the range and speed of a fixed-wing MPA.

As a response to this need, the country has been looking at maritime patrol aircraft options since 2011. There is a broad array of options, from MPA versions of business jets to MPA regional turboprops (a newer Fokker 50 equivalent, such as Bombardier's Dash 8 Q400). Singapore has also considered used ex-U.S. Navy Lockheed Martin P-3Cs, but the youngest of these are about three decades old, and Singapore hasn't purchased used defense platforms in decades.

And given Singapore's preference for high-end equipment (F-15s, high-end AEW models and jet tankers), and given its demonstrated interest in long-range maritime safety, a large jet-based choice is likeliest. This means Boeing's P-8 Poseidon, or just possibly Kawasaki's new P-1 quadjet.

For Boeing's P-8 program, a Singapore order would be a valuable addition to its relatively limited export order book. So far, despite its high-profile presence around the world, only Australia and India have signed on as international customers. Its U.S. Navy MPA/ASW predecessor, the P-3, was exported to over 15 countries.

A P-1 selection would be much less likely, but given Japan's 2014 decision to overturn a law banning weapons exports, and a growing interest by the nation's large defense industry to pursue export contracts, it can't be ruled out.

And for Singapore, a P-8 or P-1 acquisition would represent the final step in creating a remarkably well-equipped regional military force. And it would give the country a much more robust presence in some of the most highly trafficked shipping routes in the world.

There are fewer than six million Singaporean citizens, crammed onto an island measuring roughly 20 mi. by 10 mi. But as a world military aviation power, Singapore punches well above its weight. The Republic of Singapore Air Force (RSAF) has about 100 modern fighters, including 40 new F-15SGs and 60 F-16C/Ds. It also has a few dozen older F-5s, and as an F-35 Security Cooperative Participant (SCP) it will likely be an early F-35 user in the region. These fighters are supported by a robust airborne early warning (AEW) capability. A legacy force of Northrop Grumman E-2Cs is being replaced by four Gulfstream 550-based models using Elta's EL/W-2085 Conformal AEW system.

It is said that Singapore is like a large shopping mall with a large and capable military. But this remarkable force is understandable. While Singapore's per capita national income is greater than that of the U.S., it is surrounded by poorer states, which are poorly governed and prone to instability. There are also various non-governmental threats to the country's economic livelihood.

Given this reality, the first defense priority is simply self-preservation. As one local saying goes, "We are going to make sure that anybody who tries to swallow us is going to get a fishbone that will penetrate their throat." As a result, it isn't likely that Malaysia, Indonesia or any other nearby power could mobilize a force large and capable enough to actually threaten Singapore.

But Singapore's military capabilities clearly extend beyond the preservation of national sovereignty. Singapore is one of the few small powers to field a jet tanker force, with decades of experience using KC-135Rs. In March 2014, it selected Airbus' A330 Multi-Role Tanker Transport aircraft as replacements for these, with a purchase of six aircraft. The RSAF also operated Lockheed Martin KC-130 tankers.

But most of all, the country's heavy reliance on global trade also means that it needs to keep an eye on maritime threats. In 2011, Singapore conducted its first overseas maritime patrol aircraft (MPA) deployment, sending a single Fokker 50 and 38 personnel to the Gulf of Aden to assist with international counter-piracy operations. It also conducts ongoing security operations in the Malacca Straits, often in conjunction with its neighbors.

The republic pursues international security cooperation, including participation in the Malacca Strait Patrol, a mission to counter piracy activities in the region. It also conducts ongoing security operations in the Malacca Straits, often in conjunction with its neighbors. Singapore punches well above its weight.
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