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Airbus wins South Pacific A220 boost

WRITER: JORDAN CHONG

Airbus has secured its first A220 customer in the South Pacific with Air Vanuatu to operate the regional jet from 2020.

Air Vanuatu signed a firm order for four A220s and purchase rights for a further four aircraft at the 2019 Avalon Airshow on Tuesday. It is the first time the carrier has purchased Airbus aircraft.

It was expected to receive two A220s in 2020, with the remaining two aircraft to be delivered in 2021 and 2022.

Air Vanuatu chairman CONTINUED PAGE 4

An F/A-18 Hornet struts its stuff in style over Avalon yesterday. MARK JESSOP

PRESENT TENSE, FUTURE TENSE: F-35 FEATURE PAGE 14

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CONTINUED FROM PAGE 1 Joel Lengsau said the aircraft would be used to boost frequencies on existing routes and expand to new domestic and international ports.

"The addition of the A220 into our fleet will give Air Vanuatu flexibility to increase our network and provide additional services to more destinations with a greater level of customer comfort," Lengsau told reporters at the airshow.

"The new aircraft will also mean additional jobs for pilots and cabin crews, together with maintenance and ramp teams at airports.

"Today marks a wonderful beginning for Air Vanuatu and Airbus."

The A220 was formerly known as the CSeries when the program was managed by Bombardier.

However, in October 2017 Airbus struck an agreement with Bombardier to become a partner and 50.01 per cent majority shareholder in the CSeries, with Bombardier and the Quebec government's investment arm, Investissement Québec, owning approximately 34 per cent and 16 per cent, respectively.

The deal was finalised on July 1 2018 and later in the month Airbus officially rebranded the CSeries as the A220 at an event held at its Toulouse headquarters.

Powered by the Pratt & Whitney PW1500G geared turbofans, the A220 family comprises two models – the A220-100 (100-135 seats) and A220-300 (130-160 seats), formerly Bombardier's CS100 and CS300.

The A220-100 has a range of 2,950nm when configured with 116 passengers, while Airbus lists the A220-300's range on its website as 3,200nm with 141 passengers.

Air Vanuatu's order comprised two A220-100s that will feature eight business and 100 economy seats, and two A220-300s with eight business and 125 economy seats.

Airbus executive vice-president for Europe, Africa and the Pacific Christopher Buckley said the A220 would "revolutionise the transport potential for Vanuatu".

New purchase and a new era: Christopher Buckley from Airbus with Prime Minister Charlot Salwai Tabimasmas and Air Vanuatu's Joel Lengsau

"We at Airbus are looking forward to providing all kinds of support, all kinds of training to make this operation a fabulous success," Buckley said.

"We are very proud at Airbus to be a part of all of this."

Buckley said the A220 was well suited to this part of the world given its air field performance, range and operating economics.

"The aircraft can fly for up to seven hours so enormous potential if you like for an area like the Pacific, where the distances are huge," Buckley said.

"For years and years now in the Pacific the staple aircraft have been the A320 or the 737 but for many of the markets the aircraft are just too big. A lot of the frequencies are just two or three times a week.

"With a smaller aircraft you can then up the frequencies."

At January 31 2019, the A220 had secured 532 orders from 20 customers,according to the Airbus website. Of those, 449 were for the larger A220-300 and 83 for the A220-100.

Notable operators include airBaltic, Korean Air and Swiss.

Currently, Air Vanuatu's Australian network comprises Brisbane-Port Vila, Brisbane-Luganville and Sydney-Port Vila. Earlier in 2019, the airline announced it would begin nonstop Port Vila-Melbourne flights from June. Qantas has its QF airline code on Air Vanuatu's services to Australia.

Its other international destinations include Auckland in New Zealand, Nadi in Fiji and Noumea in New Caledonia.

Lengsau said new destinations under consideration with the arrival of the A220 included Papua New Guinea and the Solomon Islands.

Vanuatu Prime Minister Charlot Salwai Tabimasmas said the Air Vanuatu order for A220s was part of the country's "Shared Vision 2030", which brings the national flag carrier, airports and other stakeholders under a united goal of growing the tourism sector.

Big boost for the South Pacific: new routes and more services under consideration. AIR VANUATU

"It is an important sector and we should continue to invest in this sector because we have more potential in tourism to offer and to discover in Vanuatu," Tabimasmas said.

"That's the reason why we decided to renew all of our fleet not just to service regional and international routes but also domestic routes in Vanuatu."

Other tourism infrastructure upgrades included bringing the runway at Port Vila Bauerfield Airport up to Code E standard, meaning it will be able to take widebody aircraft such as the Airbus A330 or Boeing 787 on a regular basis.

Tabimasmas noted tourism represented about 40 per cent of the island nation's gross domestic product (GDP). Vanuatu was also in discussions with Australia regarding an expansion of the current air services agreement to add extra capacity between the two countries.

According to the Australian Department of Infrastructure website, at December 2017 Air Vanuatu was utilising 1,360 of the 4,000 available seats to the four major gateways of Brisbane, Melbourne, Perth and Sydney.

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RAAF embraces Triton partner opportunity

Australia's decision to acquire the Northrop Grumman MQ-4C Triton through a cooperative program with the US Navy means the Royal Australian Air Force will be able to introduce new capabilities sooner and could potentially incorporate Australian-unique requirements into the unmanned aircraft system (UAS).

The federal government announced in June last year that Australia would enter into a $200 million agreement for the development, production and sustainment of Triton, rather than pursuing the acquisition of six of the remotely piloted aircraft through the Foreign Military Sales (FMS) program.

"We've invested early and we're a partner," explained RAAF Group Captain (GPCAPT) Jason Lind, speaking to the media at Avalon yesterday.

"That means that we share risk, but we share reward."

Triton boasts a range of advanced systems that make the aircraft a formidable intelligence, surveillance and reconnaissance (ISR) asset.

But it is the capability that the platform will add in terms of networking, "using the combat cloud and pulling information from other sources at the speed of machines to improve our decision superiority" that the RAAF is focused on exploring, GPCAPT Lind said.

"Triton is really the only high-altitude long-endurance platform that has the endurance, the speed and the sensing suite that can collect that data," said Doug Shaffer, Triton vice-president and program manager at Northrop Grumman.

"And it's really more than just the platform; it's really about the end-users, and the dissemination of that data and how you network that data."

Australia has eight Defence personnel that are working on the cooperative program as part of a US-led team.

The RAAF intends to send officers to the US for conversion training on the Triton from next year. After a number of years of flying the unmanned aircraft with the US Navy, these pilots will return to Australia to form the foundation of the RAAF's Triton squadron.

The total acquisition cost of the Australian program is expected to be in the range of $3 billion to $4 billion.

Meanwhile, the cost of sustaining the Triton over 30 years is anticipated to be more than $2 billion, according to GPCAPT Martin Nussio from Defence's Capability Acquisition and Sustainment Group (CASG).

Following a mishap in September last year that saw an aircraft touch down with its landing gear retracted, the US Navy resumed Triton test flights in mid-December.

It is understood that the incident occurred as a result of a procedural rather than an engineering issue, requiring an update to training but no modification to the UAS itself.

AIR 6500

The F-35 at the heart of AIR 6500. Below: Lockheed Martin's Neale Prescott.

With Defence delaying consideration of a national integrated air and missile defence system for some two years, defence companies are refining their approach to what is perhaps the most complex defence program ever undertaken.

Defence has repeatedly stated that no one company could provide the total solution for AIR 6500.

What's emerging is the prospect that there will be one prime, working with other companies, each contributing their special capabilities.

Under AIR 6500, Defence plans to create a system of systems, incorporating inputs from 5th generation platforms such as F-35 and Triton and other defence capabilities.

Neale Prescott, Lockheed Martin Australia director of business development for rotary and mission systems said the delay would allow the Defence project team to be better informed to take it to the government.

"They are using that period to pretty good effect and are now talking with companies like Lockheed Martin about what sort of acquisition strategy, what are the key requirements, what are the elements will determine the performance that is required," he said.

AIR 6500 reached Gate Zero in February 2017 and was intended to reach Gate 1 just before the pause was announced. Defence is talking to Lockheed Martin, Boeing, General Dynamics and Northrop Grumman about where to go next.

A number of countries have integrated air and missile defence systems but none look like what Australia's system will eventually look like.

Ray Cage, business development for Lockheed Martin integrated C4ISR Systems, said Australia had its own characteristics, its own platforms such as the 5th generation F-35 and relationships with the US.

"You also look at the 5th generation components with the F-35. AIR 6500 is in some people's view is an exemplar for 5th generation. It could be the first cab off the rank in that sense," he said.

Mr Prescott said it was likely there would be one company with overall responsibility.

"CASG hasn't really identified if they have a preference but what we are suggesting is that you need to be able to use technologies from several companies in a quite a major way," he said.

"It's fair to say Defence is talking to industry about what that business model might look like and looking at options to understand what is the best model for AIR 6500," Mr Cage said.

Mr Prescott cites SEA 5000 as an example of how this could work. BAE Systems is the prime, but works with Lockheed, CEA and Saab.

"That's probably an example of this type of sophisticated arrangement," he said.

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Air Marshal Leo Davis AO CSC, Chief Air Force.

Avalon opens, showcasing 'innovation in action'

Robert Scott, Minister for Veterans Affairs, with Air Marshal (Retired) Geoff Shepherd, Master of Ceremonies.

Chief of Air Force (CAF) Air Marshal Leo Davies has welcomed the world to Australia for the 2019 Avalon Airshow, promising visitors the chance to see cutting-edge aircraft and offering a glimpse of how the future force will be networked.

"We are witnessing an extraordinary period in air power history. The array of aircraft and technology on display here is world class; it is diverse and a significant advancement from the airshow we had in 2017," AIRMSHL Davies said, speaking at the formal opening ceremony on Tuesday.

"Not only are all of our newest and most exciting military aircraft here, but this year you will see and feel innovation in action."

Visitors to the Avalon Airshow will learn not only about the capability of the F-35 Lightning II, for example, but also about the information systems that allow platforms to share data, thereby providing the wider force with an enhanced understanding of the battlespace.

CAF made clear that the Australian Defence Force's transformation is not an endeavour being undertaken in isolation. Rather, maintaining strong partnerships between the ADF, industry and academia is central to its ambitious plans.

And while the latest technology inevitably takes centre stage at Avalon, it must not be forgotten that the people of the Royal Australian Air Force (RAAF) remain the key to the service's success, AIRMSHL Davies said.

"Everything you will see here this week is the result of the high quality of our people," CAF told the international audience - including 15 air force chiefs from around the world - at the opening ceremony.

Assistant Minister for Defence Senator David Fawcett, meanwhile, said that the Avalon Airshow is an opportunity to consider the importance of history, as well as present and future activities.

"It brings together the history; it brings together the people who are contributing now to our aviation capability," Senator Fawcett said.

"But equally importantly, it inspires the young men and women who come here and see the possibilities for them to have a career in this industry."

The 2019 Avalon Airshow was officially opened by Victorian state government Minister for Veterans Robin Scott, who highlighted the contribution made by veterans that have transitioned out of the ADF and into the aerospace and defence industry.

"Like many companies represented here today, the Victorian government recognises that with their transferrable skills and experiences veterans are a wonderful asset to the workforce," Minister Scott said.

A record 678 exhibiting companies and organisations are taking part in the event, 450 of them from Australia. As many as 200,000 people are expected to attend the Avalon Airshow over the week.

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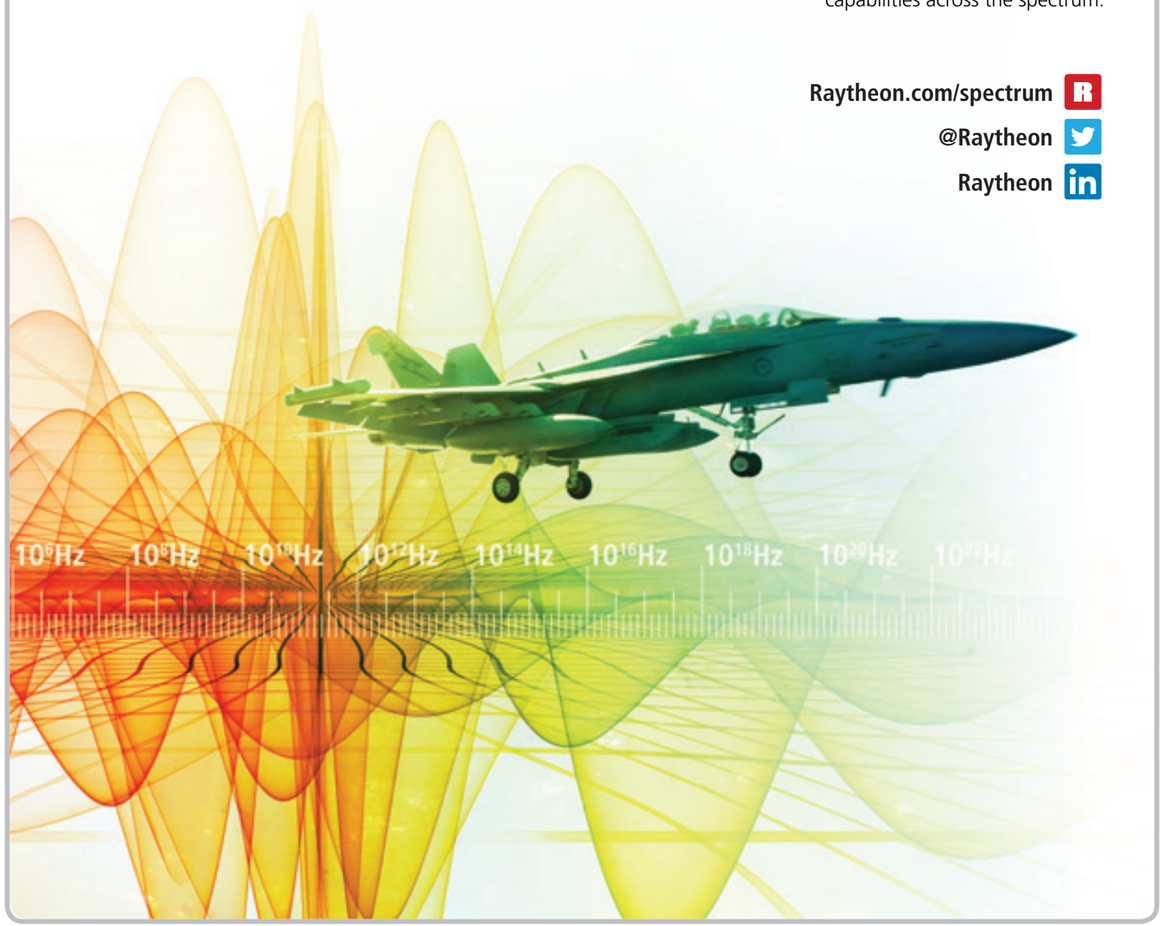

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RAAF trials global-reach remote control tower

The RAAF is trying out a remote airport control tower which will allow air force personnel to control aircraft movements and landings from anywhere in the world.

This is based on technology widely used in Europe but employed for the first time on a Defence establishment in the southern hemisphere.

It could allow RAAF air traffic controllers to remotely direct aircraft movements at one of the remote bare bases on the Australian mainland or even at an overseas location.

The Virtual Control Tower for this trial has been set up next to the main Air Traffic Control Tower at RAAF Base Amberley in Queensland.

This is a joint project with industry partners Indra Australia and Kongsberg Defence and Aerospace who have been working with personnel from the RAAF's Surveillance and Response Group to install a Kongsberg 360 Camera System and integrated inNOVA Air Traffic Management system in the remote facility.

It follows an offer by Indra Australia and Kongsberg to demonstrate remote Air Traffic Control tower capabilities.

The system streams live images to a separate site on RAAF Base Amberley which are then displayed on large monitors, fused through the Air Traffic Management system with radar data and supporting Air Traffic Control information.

The Virtual Control Tower.

Kongsberg's Stig Hallvard Jenssen with the Norwegian Ambassador, Kjetil Reiten Myhra and SQLDR Shepherd and Clarke. PETER CHRISMAS

Kongsberg Defence and Aerospace president Eirik Lie said the camera and associated systems were developed for enhanced security, safety and sustainment of efficient air traffic services.

"Kongsberg is a renowned provider of well-proven military systems, such as the NASAMS Air Defence system, the Joint Strike Missile, Naval Strike Missile and the Remote Weapons Station, and Kongsberg is very proud to demonstrate the Remote Tower System at RAAF Base Amberley," he said.

"The system includes a panoramic out-the-window view, external surveillance feed of augmented reality information on the display screens and an integrated view of Air Traffic Control information for remote control.

"This system features an ultra-high resolution real-time day and infrared camera system capable of detecting, tracking and identifying aircraft and ground objects at military and civilian airfields. The system is now installed on 15 airports in Norway – the largest remote tower program in the world."

For this trial, Indra Australia supplied its inNOVA Advanced Integrated and Remote (AIR) tower and approach automation system.

Company managing director Tehmur Khan Galindo said he was pleased with the progress of this installation which showcases the system's capabilities.

"Indra's inNOVA automation system forms the core for this solution. The inNOVA AIR suite can work with a wide range of camera systems and comprises the latest state-of-the art decision-making tools and safety nets," he said.

"Functionality such as 4D trajectory and time-based separation is included in the system for future integration with OneSky and other platforms."

RAAF 44 Wing staff officer Wing Commander David Shepherd said this demonstration provided important insight and awareness of emerging air traffic systems technology.

"44 Wing's focus is to deliver safe, adaptable capabilities for those who depend on us. Our support of the 'virtual' tower demonstration maintains our culture of technical and professional mastery in the Air Traffic Control discipline by gaining an understanding of future and evolving technologies," he said.

Fundamentally, this technology directly aligns with the Royal Australian Air Force's strategy and vision to transform the organisation into a 5th generation Air Force by capitalising on future high technology systems.

THE SIR RICHARD WILLIAMS FOUNDATION

The Central Blue: call for submissions

The Sir Richard Williams Foundation is calling for submissions for its *The Central Blue* forum.

Designed to promote informed discussion and debate about airpower issues affecting Australia, *The Central Blue* covers topics from tactical integration to strategic theory, and from historical lessons to future capabilities.

The Williams Foundation welcomes submissions from any source, but particularly encourages serving military practitioners to contribute in order to foster a new generation of airpower thinkers.

Posts should be between 500 and 1,000 words long, comply with standard publishing guidelines, and be accompanied by a brief author's bio.

For more information, email thecentralblue@gmail.com, or visit *centralblue.williamsfoundation.org.au*

Elder, Craig Edwards, at the opening ceremony. PETER CHRISMAS

The power of earth and sky

The 2019 Avalon International Aerospace and Defence Exposition truely came alive yesterday. First the solemnity of honouring the traditional owners of the land at the opening ceremony before the sky over the airfield erupted with another awesome display of air power. Exhibition halls were rocked time and again by the thunder roar of the F-35 and EA-18G Growler. Meanwhile, it was down to business for the dozens of trade exhibitors, and the opening of symposiums, forums and seminars on topics as diverse as drones, space, aviation safety and defence science and technology.

Superpower: An F-35 hits the throttle. MARK JESSOP

Growl and grunt: An EA-18G Growler sweeps by. MARK JESSOP

First day practice: A CH-47F Chinook shadowed by an ARH Tiger. PETER CHRISMAS

Two classic Hornets showing refuelling skills from a KC-30A. PETER CHRISMAS

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F-35: from present tense to future tense

WRITER: ANDREW McLAUGHLIN

The AGM-158A JASSM and its derivatives are likely options to arm the F-35A in the future. DEFENCE (Below) JPO continues to look for ways to reduce component costs through Lockheed Martin's global supply chain. LOCKHEED MARTIN

While the operational arm of the RAAF will be working hard to get the F-35 up-to-speed as quickly and efficiently as possible, Lockheed Martin, the Joint Strike Fighter (JSF) Program Office (JPO) and the partner nations are studying where next to take the F-35's capability.

Weapons

One of the key priorities for program planners will be to increase the number of weapons available to JSF operators which have many and varied requirements to meet their air combat needs.

Australia, for example, has a requirement to be able to employ an anti-ship missile from its F-35As, a capability that isn't a requirement for the USAF on their F-35As. To this end, the RAAF is co-funding the development of the Kongsberg/Raytheon Joint Strike Missile (JSM), a development of the surface-launched Naval Strike Missile (NSM). The program promises an advanced internally-carried, air-launched, anti-ship and fixed target missile will be available in the next few years.

Australia will also likely have a requirement in the future to employ a long-range stand-off missile against fixed and mobile targets. The RAAF is already an operator of the 400km range AGM-158A JASSM on its classic Hornets, while the 1,000km range AGM-158B JASSM-ER is likely to also be of interest, as is the AGM-158C LRASM maritime strike version.

Global Supply Chain

The F-35 global supply chain will also be an evolving capability over the life of the aircraft.

Indeed, this evolution has already begun, with Lockheed Martin recompeting the electro-optical distributed aperture systems (EO/DAS) in 2018. Incumbent Northrop Grumman chose not to compete for the new contract as it could not justify the business case, and Raytheon was awarded the supplier contract for this key sensor with claimed savings of 45 per cent in unit acquisition costs, increased reliability, and a 50 per cent saving on sustainment.

Similarly, the aircraft's integrated core processor (ICP) has also been recompeted, with Harris Corp being selected in September last year to become the new supplier of the key component. Savings in the order of 75 per cent per unit are expected, although this claim is in the context of much higher production volumes which have started with multi-year buys of nearly 200 aircraft compared to the previous much lower rate production.

The new ICP will also include open architecture software which will allow for easier integration of new sensors, weapons and other upgrades. Both the new ICP and EO/DAS should be incorporated onto the aircraft from Lot 15 in 2022/23.

At the 2018 Farnborough Airshow, Lockheed Martin's vice president and general manager for the F-35 program, Greg Ulmer, told media that the company is looking to recompete other key elements which should continue to contribute to reduced acquisition costs and greater sustainment savings.

"It's good business for us to continually look at our supply and (ask) should we resource or compete that material? We want best value, so as we produce the aircraft we want to make sure we're producing the material that meets the requirement for the least amount," he said.

Block upgrades

In the early days of the JSF program Lockheed Martin and the JPO planned to have clearly defined Block capability, mainly comprising software but interspersed with hardware technology refreshes.

But as the program has evolved and the number of low rate initial production (LRIP) lots have extended into the teens, the lines between these enhancements has blurred. This has meant there are many sub-blocks being introduced every few months, much the same way as Apple or Samsung sends upgrades out to their phone users. This has had both positive and negative impacts on the program.

On the positive side, the adoption of such a rapid insertion upgrade model has meant the JPO can now prioritise software and firmware enhancements and address deficiency reports without having to wait for a major block upgrades or tech refreshes.

But this also means there are multiple sub-fleets of aircraft with different software configurations on flight lines as aircraft await their latest software upload.

"From the [software engineering directorate's] perspective, we kind of did this big bang approach for this big huge final capability release" for block 3F, Greg Ulmer said at the Farnborough Airshow. "In the future you're going to see rapid insertion spiral development," he said, adding that there will be "a lot of updates" in the lead-up to Lot 14, before there is a major technology refresh on Lot 15.

"In Block 4 you will see different releases of capability to the airplane over that horizon," he said. "We won't wait for the end for all that to be inserted. We will do it in increments as those capabilities come onboard."

Block 4 has been re-defined as a follow-on modernisation program, and is scheduled to start this year. It will include yet-to-be-defined capability enhancements, new weapons, and corrections to deficiencies in nine capabilities that have been carried over from the Block 3 development program. These include improvements to the prognostics health management system down-link to autonomic logistics information system (ALIS), and some communications capabilities.

Engine upgrade

Despite being the most powerful production military engine in service, Pratt & Whitney is also looking to add further power and reliability improvements to the F-35's F135 engine.

The company has articulated a two-staged upgrade path for the F135, labelled Growth Option 1.0 and Growth Option 2.0 which it plans to introduce over the next four years.

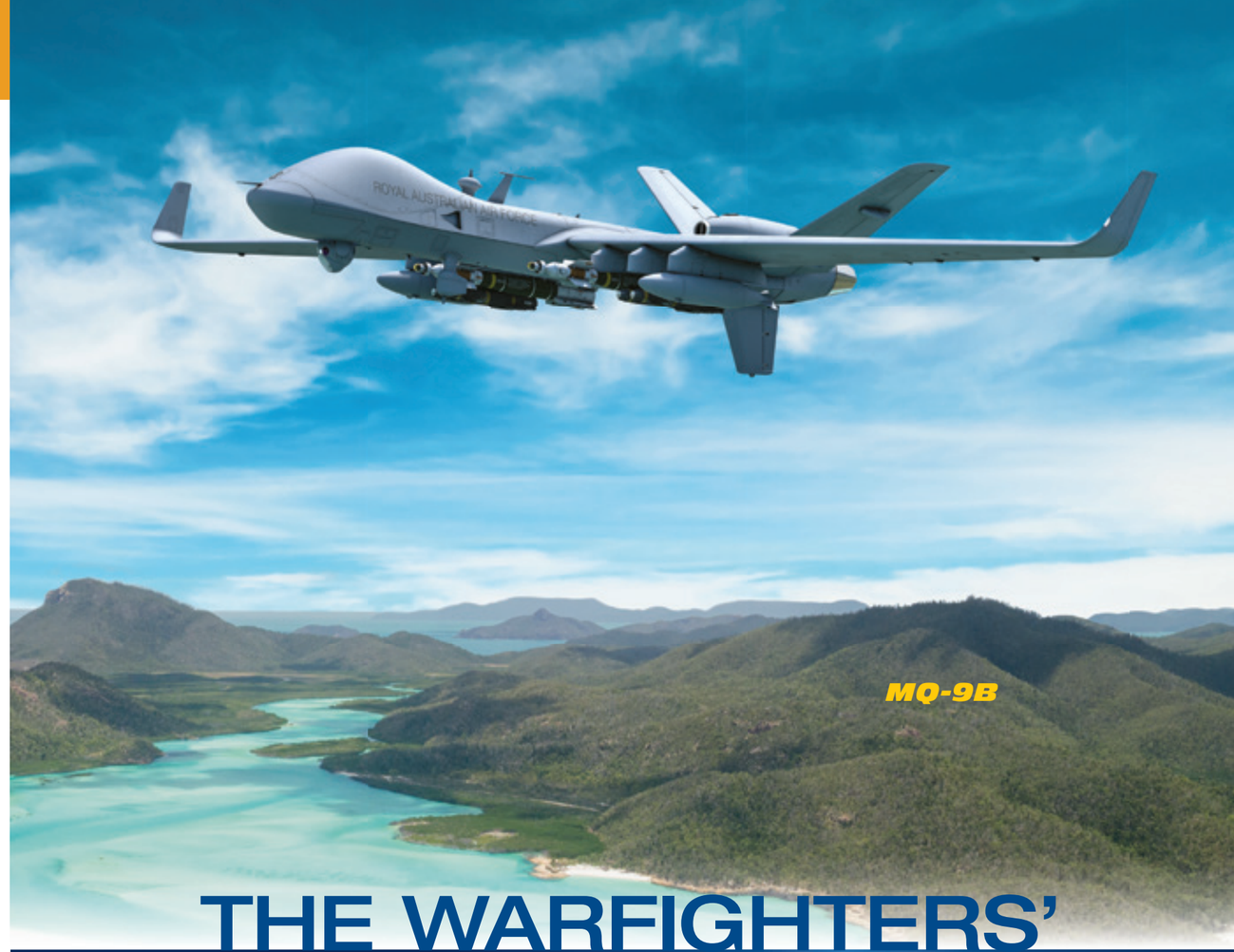
The company says it has combined its planned Growth 1A thrust-increase option for the F-35B's STOVL engine with the Growth Option 1.0 package which will provide a 10 per cent thrust increase and five per cent improved fuel burn.

For Growth Option 2.0, the company will offer an all-new production engine that will incorporate elements of its adaptive-cycle technology developed through the USAF Research Laboratory Advanced Engine Transition Program (AETP). It has been reported that Growth Option 2.0 will provide a significant increase in power and thermal management system (PTMS) capability.

The adaptive-cycle technology focuses on third-airstream capability, adaptive-cycle controls, and new materials, with the company planning to "take the technologies as they mature and insert them into existing engines," president of P&W Military Engines, Matthew Bromberg told AIN News in September. "It's a whole suite of technologies; we will look at everything. We're leveraging the bleed systems, the integration system, and the control system."

Bromberg also said the company is "...looking at adaptive elements in the controls, the components, and the core".

Despite losing the original F-35 engine contract to P&W, GE Aviation has also been awarded a contract by USAF to develop its own adaptive-cycle engine. If successful, its XA100 demonstrator or its production development could be a candidate for an F-35 engine recompete contract in the mid-2020s.



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Northrop Grumman 500 up, and destined for RAAF

Northrop Grumman Corporation has completed the 500th centre fuselage for the F-35 Lightning II – and it is destined for the RAAF.

Designated AU-18, the centre fuselage is for the RAAF's conventional takeoff and landing variant. Northrop Grumman began production on the AU-18 centre fuselage in June 2018 and completed work on Feb. 21.

It has been producing centre fuselages for all three F-35 variants since May 2004.

"We deliver an F-35 centre fuselage every 36 hours and I am very proud to say we have made all our deliveries since the inception of the program," said Northrop Grumman vice-president and F-35 program manager, Frank Carus. "Our dedicated team works closely with the customer and suppliers to improve quality and affordability in support of the warfighter."

An F-35 technician performs a skin assembly process with work instructions projected on the structure as one of the innovative solutions for high rate military aircraft production. A core structure of the F-35 Lightning II aircraft, the center fuselage is produced on Northrop Grumman's integrated assembly line at its Palmdale Aircraft Integration Center of Excellence.

"We have set the standard for the production of military aircraft," said Kevin Mickey, sector vice-president and general manager, military aircraft systems. "Our teams and suppliers are constantly finding better, more affordable ways to deliver a superior product on-time, at-cost. When you couple this level of commitment with advanced manufacturing technologies, it's just a win-win situation for us, our customer and the warfighter."

A core structure of the F-35 aircraft, the centre fuselage is designed and produced on Northrop Grumman's integrated assembly line, a state-of-the-art facility bringing together robotics, autonomous systems, virtual 3D and predictive automation to the forefront of centre fuselage production.

In addition to producing the centre fuselage and wing skins for the aircraft, Northrop Grumman develops, produces and maintains several sensor systems, avionics, mission systems and mission-planning software, pilot and maintainer training systems courseware, electronic warfare simulation test capability, and low-observable technologies.

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Rheinmetall's 25 mm FAP (frangible armour piercing) round is a highly effective new multipurpose round designed specifically for the F-35 Joint Strike Fighter.

The 25 mm FAP ammunition is already in service with the United States Air Force.

FAP ammunition was developed to provide the F-35 with superior lethality against modern infantry fighting vehicles (IFVs) and enemy aircraft in air-to-air engagements. The FAP technology contains no explosives ensuring maximum safety in the aircraft or in storage and transportation, as well as enabling it to be used in training.

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Rafael puts some SPICE into weapons guidance

No longer will the RAAF be able to rely on GPS for delivery of precision weapons in any future conflict.

The proliferation of inexpensive and readily available GPS jammers means any future adversary will be able to block or spoof GPS signals, thwarting attacks by weapons such the US GPS-guided JDAM.

Already the Israeli Air Force routinely encounters GPS jamming in missions over Syria.

It's fielding the latest generation of precision guided weapons which employ an electro-optic seeker for terminal guidance, totally independent of GPS.

Israel defence company Rafael is pitching this technology to the US military and Australian Defence Force and has teamed up with Lockheed Martin.

This is called SPICE and comes in the form of guidance kits able to be bolted on to widely available bombs such as the Mark 83 and Mark 84.

Rafael business development manager for its air systems division Gideon Weiss said they had to come up with a solution that was not based on GPS.

"Electro-optic is our way to go to use scene-matching technology and algorithms to navigate, target and perform the final terminal homing onto the target," he said.

SPICE comes in three variants for 2000, 1000 and 250 pound bombs. As a glide weapon, it can be launched at stand-off ranges, reaching the target either autonomously or by man in the loop.

With its electro-optic guidance, SPICE has demonstrated spectacular one-hole accuracy. Rafael says it can strike within a metre of the aiming point, hitting fixed, moving and also maritime targets.

It can also be readily integrated onto a wide range of aircraft including F-35.

GPS guidance revolutionised delivery of precision weapons. Bolt-on JDAM kits were inexpensive, accurate and reliable and were used in large numbers in Iraq and Afghanistan.

But Moshe B, business development manager for Rafael's air to surface systems directorate, said GPS could not be relied on in future conflicts.

"In Syria we know that GPS is jammed all the time," he said.

Weiss said the enemy of the future would possess very capable air defences and effective GPS jamming.

GPS can be jammed either by jamming the satellite signal completely or by spoofing – altering the signal enough to make the bomb miss but not enough to alert the attacking aircraft that anything is amiss.

"We need to rely less on laser-guided bombs, less on GPS and more on electro-optic. That is really a trend. It changes the stockpile mix," he said.

"GPS spoofing and jamming also deteriorates navigation and targeting.

The RAAF possesses a substantial inventory of laser and GPS-guided bombs but nothing with electro-optic guidance.

"When we talk about introducing SPICE to the Australian customer, we understand that it's a long term process," he said.

"It has to do with the stockpile. The important things is not only can we build this in-country, when we do so we will transfer all that technology, the image processing, the database management not only to the user but to industry here."

Should the RAAF decide to acquire SPICE, the kits and enabling technology would be be produced through their joint venture partner Varley Rafael Australia.

Airbus completes A400M A2A refuelling certification trials

Airbus has successfully completed the certification flight tests for the A400M Cargo Hold Tanks (CHT) refuelling unit, taking a new step towards the full certification of the aircraft for air-to-air (A2A) refuelling operations as a tanker.

The campaign was performed with the Spanish Air Force Test Centre (CLAEX), and comprised a total of nine flights. About 90 tonnes of fuel was offloaded to Spanish Air Force EF-18 Hornet receivers and to another A400M prototype as a representative heavy aircraft receiver.

The test campaign included the development and certification of the CHTs with the latest Fuel Quantity Management System software, to be certified during 2019, enhancement of the night refuelling vision system and preliminary testing of helicopter air-to-air refuelling capabilities.

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Making inroads with bumper lineup

The Bell 407 and Bell 409.
HAWKER PACIFIC

Hawker Pacific has a bumper aircraft lineup at the 2019 Australian International Airshow.

The aircraft sales and support company has brought a Beechcraft King Air 350, Bell 407 and Bell 409 helicopters, as well as single engine Diamond DA40NG and twin engine Diamond DA42 on display at the week-long event that kicked off yesterday.

Hawker Pacific said it planned to put forward the two Bell helicopters as part of its response to the Australian government's evolving project LAND 2097/4 special operations helicopter (SOH) requirements.

"Hawker Pacific as a proven solutions provider, confirms that it is leading the development of a response to the Australian Defence Force's (ADF) forthcoming Special Operations Helicopter (SOH) acquisition project," the company said in a statement.

Meanwhile, the King Air 350 has come to Avalon to showcase the company's work with the Royal New Zealand Air Force (RNZAF), which is leasing four of the type for pilot training and air warfare officer training.

"The range of capabilities we will have on display at this year's Defence Expo and Air Show reflects growth in the sophistication of our business in recent years," Hawker Pacific senior vice president for government business Asia Pacific Craig Purry said in a statement.

Purry said this included the "ability to design and project manage Special Mission System installations in several aircraft types, as well as new investment to expand Hawker Pacific MRO facilities in Cairns".

In addition to the aircraft on display, Hawker Pacific also has a booth inside Hall 3, while a number of its suppliers such as Marops, CartNav and Collins Aerospace were also at Avalon in 2019.

"Successful local and international collaboration pursued with sub-contractors has provided Hawker Pacific with new competencies to deliver high-level national security and defence capabilities within an overall commercial-based airframe that can guarantee affordability, effectiveness and mission success for regional customers," Purry said.

Hawker Pacific offers sales and support services for the Diamond Aircraft range – as well as Textron's Beechcraft, Cessna and Bell Helicopter range – in various markets across the Asia Pacific and Middle East.

Meanwhile its workshop in Cairns, Queensland performs heavy maintenance checks on commercial passenger turboprops from Bombardier and ATR, as well as Beechcraft aircraft.

And its Bankstown facility in south-west Sydney also specialises in Beechcraft King Air and Beech 1900s, along with Dassault Falcon business jets.

The company also has workshops throughout Asia in key locations such as Kuala Lumpur, Manila, Shanghai and Singapore.

Business aviation services company Jet Aviation acquired Hawker Pacific in for US$250 million in 2018.

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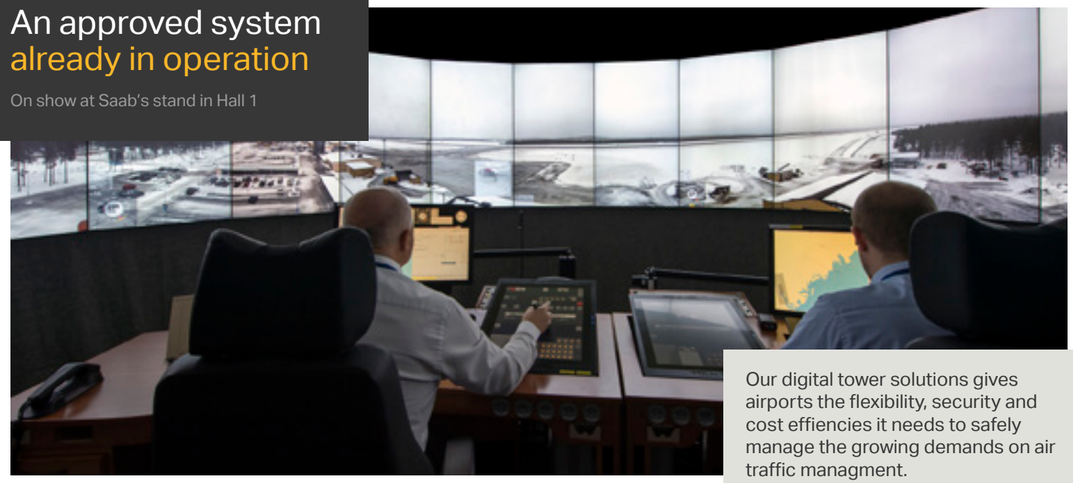

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The Embraer E190-E2. Australia remains a key target market. EMBRAER

'Smooth operator' Embraer has eyes on the prize

WRITER: JORDAN CHONG

The smooth introduction of the E190-E2 gives Embraer Commercial Aviation head of Asia Pacific Cesar Pereira every confidence the next generation regional jet will thrive in this part of the world.

The E190-E2 began commercial flights with Norwegian launch customer Wideroe in 2018 and Pereira says the aircraft could not have performed any better.

"It was one of the best entry-into-service in the industry I daresay, definitely the best entry-into-service for Embraer of all time," Pereira said.

Looking ahead, Embraer will soon have its first E2 operator in the Pacific with Air Kiribati set to receive its first E190-E2 regional jets by the end of calendar 2019.

The order for two E190-E2s - and purchase rights for two more - represents a beachhead in the region for the Brazil-based manufacturer.

And the aircraft will certainly be put through its paces, with the central Pacific island nation's population of 110,000 people spread out across 22 coral islands that are 3,900km apart from east to west.

The longest route is from Tarawa to Kiritimati (Christmas) Island at 1,773nm. It is a similar distance to Sydney-Perth, except the flight takes place completely over water.

With the E190-E2, Air Kiribati will be able to operate the route nonstop thanks to the aircraft's 2,850nm range, rather than make an international stopover in Fiji as it does currently.

Pereira described the Air Kiribati order as very significant one for Embraer.

Roll-out of the Embraer E190-E2 for launch customer Wideroe of Norway. EMBRAER

Further, Embraer stood ready to support the introduction into service in challenging operating conditions given the distances involved, the demands for cargo, and the nature of the route network.

"We are up for this challenge and we are happy to take this challenge and we are going to succeed of course. And this will be a showcase for any airline," Pereira said.

"I doubt something can be more challenging than this one.

"By succeeding with this operation we can prove to the world that the E190-E2 is really a state-of-the-art and best product for many airlines around the globe, not only in Australia and Pacific."

While the E190-E2 is capable of operating every required route in the Air Kiribati network, Pereira said the company was working on receiving 120-minute extended operations (ETOPS) certification from regulators.

The E2 improves on the current generation E-jets with new aerodynamically advanced, high-aspect ratio, distinctively shaped wings, improved systems and avionics, including fourth generation full fly-by-wire flight controls.

This has led to double-digit reductions in fuel and maintenance costs compared with the current E-jet family, as well as reduced emissions and less noise.

Embraer is in its fifth decade in Australia, having celebrated its 40th anniversary of operations in this country in 2018.

Over those four decades, its commercial jets and turboprops have featured the liveries of airlines such as Airnorth, Aeropelican, Cobham Aviation Services, Hardy Aviation, King Island Airlines, Jetgo, Skippers Aviation, and Virgin Australia.

And the company is continuing to target the replacement market in Australia, where Fokker 70s, Fokker 100s, BAe 146s, Avro RJs and Boeing 717s will eventually reach the end of their operating lives.

"At a certain point in time these aircraft must be replaced, not because only they are inefficient and old but also because they start having problems with parts and support," Pereira said.

"The more they delay this process, the harder it will be for them to do a proper replacement.

"The time is coming."

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CAE RPAS sim enters service in Italy, selected for UK

The high-fidelity Predator mission trainer.
CAE

A CAE-built Predator Mission Trainer entered service with the Italian Air Force on February 5.

Installed at Amendola Air Base in Italy, the Predator Mission Trainer (PMT) is the highest fidelity simulator ever developed and fielded for the General Atomics Aeronautical Systems, Inc (GA-ASI) Predator family of remotely piloted aircraft (RPA) systems.

"The incredible realism of the Predator Mission Trainer gives us a critical training capability to efficiently produce the highly skilled Predator crews we need to conduct a range of operational missions," an Italian Air Staff representative said in a statement.

"Having the world's highest fidelity Predator Mission Trainer as part of our unmanned systems centre of excellence in Italy gives us unmatched training flexibility and the ability to leverage simulation-based virtual training throughout our curriculum."

Group President Defence & Security CAE, Gene Colabatistto added, "The development of the Predator Mission Trainer for the Italian Air Force represents a new level of fidelity and capability in the use of simulation-based training for remotely piloted aircraft pilots and sensor operators.

"We believe this Predator Mission Trainer is the first Level D equivalent simulator for an unmanned aircraft."

The Italian milestone follows the award to CAE by GA-ASI to develop a synthetic training system for the UK's Protector RG Mk1 remotely piloted aircraft system (RPAS) program, a UK-specific variant of GA-ASI's certifiable MQ-9B SkyGuardian RPAS.

CAE will design and develop a comprehensive synthetic training system that will include desktop and high-fidelity mission trainers specific for the Protector. The company says the high-fidelity Protector mission trainers will be based on GA-ASI's certifiable ground control station (CGCS), and will be the first simulators developed for this advanced CGCS.

CAE is a key member of the Team Reaper Australian consortium which was down-selected last November to provide a to-be-selected variant of the MQ-9 family to the RAAF under Project AIR 7003.

Varley CTSi to upgrade Air Affairs LearJets

Line-up of Air Affairs LearJets set for upgrade.
AIR AFFAIRS

Air Affairs, Varley Group & CTSi and have announced a strategic 'Mudbucket Partnership' to upgrade the mission capabilities of Air Affairs' Bombardier LearJets.

Air Affairs provides red air support and target towing services for the ADF, and the upgrades will provide increased situational awareness during exercises.

CTSi is a part-owned US division of Varley Group, and specialises in integrated solutions to challenging technical problems. The company will design and install an avionics upgrade package, based on the proven Mudbucket technology that will display the position of other aircraft in the vicinity so the pilots will be able engage with those aircraft in a more realistic scenario.

"We at Air Affairs will now be able provide a level of training for our customers that we've not been able to before," Air Affairs CEO Chris Sievers said in a statement. "We will still provide a reliable, low-cost platform for the ADF, but now with a capability that will take training to a whole new level."

CEO of CTSi Tom Sanders added, "We are thrilled to be a member of this 'US – AU' team that brings our US-based avionics experience to bear for our key allies here in Australia."

SPONSORED CONTENT

HENSOLDT shows off counter-UAV system

The XSingle Mast Solution (SMS).
HENSOLDT

Sensor solutions provider HENSOLDT is showcasing its counter-unmanned aerial vehicle system Xpeller at the Australian International Airshow and Aerospace and Defence Exposition.

Xpeller detects illicit intrusions of (UAVs) over critical areas, even at long ranges, and offers countermeasures minimising the risk of collateral damage.

"Globally, incidents with universally available small drones have revealed a security gap with regards to critical installations such as military barracks, airports or events", says Nathan Manzi, head of Asia Pacific at HENSOLDT.

"As a specialist in defence electronics, we have designed and provided a technical solution that meets the customer need: an integrated CONOPS; interfacing to other operational systems; lowest false alarms; no compromise to existing available spectrum, and most importantly discretion.

The modular Xpeller product family includes various sensors such as radar systems and cameras as well as direction finders and jammers. Xpeller uses the sensors to rapidly detect and identify a drone and assess its threat potential at ranges from a few hundred metres up to several kilometres. This enables the operator to take timely and appropriate action against a possible threat.

The modular Xpeller system concept allows customised solutions to be created by combining individual devices from the product family depending on customer requirements and the local conditions.

More information is available at the HENSHOLDT booth.

HENSOLDT is a market leader in the field of civil and military sensor solutions. The company develops new products based on innovative approaches for data management, robotics and cyber security to combat a wide range of threats. With a workforce of about 4,300, it generates revenues of about one billion euros per year.

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REACH FOR THE STARS

Shared vision for our place in space

Lockheed Martin Australia has signed an agreement with the Australian Space Agency (ASA).

Signed at the Australian Space Industry Conference 2019 being held on the sidelines of the 2019 Avalon Airshow, the Lockheed Martin Statement of Strategic Intent and Cooperation is the formalisation of a strategic relationship between the two organisations.

Lockheed Martin says the agreement is a shared vision for enabling and supporting the Australian space sector through investment in space systems and services, technological capabilities, and Science, Technology, Engineering and Maths (STEM) education initiatives.

"As the world's largest space business, Lockheed Martin is proud to partner with the researchers and entrepreneurs responsible for the innovative technologies driving the development of Australia's space sector," Managing Director, Australia and New Zealand Lockheed Martin Space, Rod Drury said in a statement.

"The relationship with the Australian Space Agency further underscores our ongoing commitment to supporting the development of this exciting sector, which is rapidly emerging as a key enabler of Australia's national security interests and the economy as a whole."

The company says the agreement highlights Lockheed Martin Australia's commitment to investing in partnerships with Australia's research and industry communities while providing opportunities for technology transfer, innovation, local skilled jobs and sustainable business growth.

"The Australian Space Agency is committed to open, transparent and significant engagement with industry," head of the ASA, Dr Megan Clark said.

"We welcome Lockheed Martin Australia's continued support to grow the space sector in Australia and for its broad engagement with the Australian economy. We support Lockheed Martin Australia's commitment to advanced space technology research and development here in Australia, and for its efforts to export Australian technology to the world."

Rod Drury, Managing Director, Australia and New Zealand, Lockheed Martin Space (left) and Anthony Murfett, Acting Head, Australian Space Agex.

It's rocket science for STEM students

Victorian school students will learn how to make rockets and to code robots at Avalon this week as part of an initiative by BAE Systems Australia.

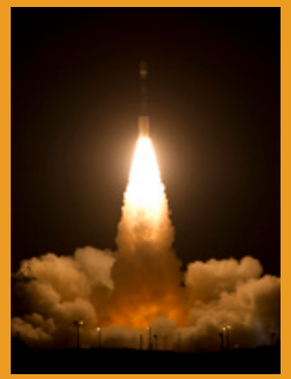
More than 1,200 students will have the chance to learn more about what it takes to become BAE's next generation of innovators, and will be exposed to technologies they could work on if they pursue a career in Science, Technology, Engineering or Maths (STEM).

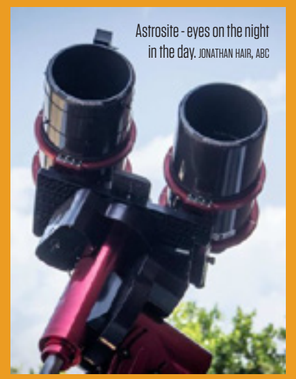
All of the activities, from learning aerodynamic principles through building and testing rocket models, coding a robot to complete challenges. and taking part in virtual reality experiences, allow students to understand the diverse career paths within BAE Systems and elsewhere in the defence industry.

BAE Systems Australia's activities are part of the broader AstroStem AIR4 tent which aims to introduce students to career opportunities in a fun and interactive way.

"It is important that the defence industry steps up to do more to inspire the next generation of Australian scientists, engineers and innovators," BAE Systems Australia Chief Executive Gabby Costigan said in a statement. "We are building capacity in the jobs of the future through partnering with programs to help Australia keep pace with growing demand for skills in STEM."

Costigan said STEM-based roles make up 60 per cent of the workforce in Australia and maintenance and growth of the talent pool requires development.





Astrosite - eyes on the night in the day. JONATHAN HAIR, ABC

Camera eyes on the night during the day

A high-resolution space camera developed by Western Sydney University (WSU) has been unveiled at the Avalon Airshow.

The Astrosite camera is capable of tracking objects in space in the daytime as well as at night, and is designed to help avoid collisions between satellites in orbit. Such collisions can not only disable satellites, but can increase the amount of space debris which can go on to damage other satellites.

Astrosite can be mounted on a vehicle, a train, a ship, or an aircraft, and will allow the RAAF to see objects in orbit in the daytime.

"It's modelled off the human eye," WSU Associate Professor Greg Cohen said in a segment on the ABC. "The actual photo receptors in the retina and the way they send information out, because they don't take frames, they don't take pictures, they send out just the changes."

For the demonstration at Avalon, the Astrosite has been mounted in a shipping container.

"It's really hard to track objects in space," Prof Cohen said. "There's a lot of space junk up there. There are a lot of satellites up there already, and we're launching more every day. So it's become a matter of national and international importance to make sure that things don't collide."

Astrosite was developed as part of the RAAF's Plan Jericho. "It will allow us to see into space during the day, and during low observable periods," Plan Jericho director GPCAPT Jerome Reid said. "And that is a huge game changer for how we will do space situation awareness in the future.

"It can go on an aircraft. It can go on a vehicle. It could be a telescope in a traditional observatory. It doesn't matter. It's what it does."

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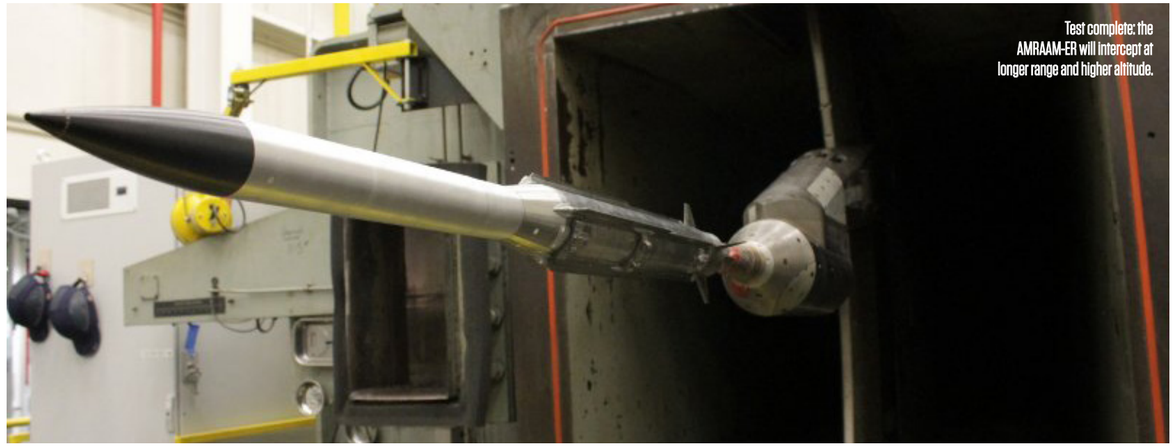

Test complete: the AMRAAM-ER will intercept at longer range and higher altitude.

New missile wind tunnel testing complete

Raytheon has announced it has completed wind tunnel testing of the new extended-range version of the AIM-120 AMRAAM missile.

The AMRAAM-ER is designed for combat aircraft air-to-air or surface-to-air launched applications on the NASAMS air defence system jointly developed with Kongsberg. The new missile will intercept targets at longer ranges and higher altitudes than the current AIM-120C and D versions of the missile by using a bigger rocket motor and new flight control algorithms.

"During these tests, we put AMRAAM-ER through a full range of potential flight conditions to validate the missile's future performance on the battlefield," Raytheon Air Warfare Systems vice-president Kim Ernzen said in a statement. "Raytheon is developing this missile to enhance ground-based air defense for our customers worldwide."

The RAAF operates the AIM-120C5, C7 and AIM-120D versions of the AMRAAM, and the Australian Army will employ the missile from the NASAMS system it is currently procuring through Project LAND 19 Phase 7B.

The RMIT's Black Kite - at the forefront of waterproof drone innovation. RMIT

Waterproof drone nominated for innovation prize

A drone designed by RMIT University engineers in conjunction with Defence Science & Technology (DST) Group has been nominated for a National Defence Innovation Award at the airshow.

Known as Black Kite, it represents a successful "world first" drone for maritime applications. The air vehicle is waterproof and can land and takeoff on water in low swells and in "all-weather conditions."

RMIT University's project lead, Dr Abdulghani Mohamed said the system "would enhance abilities to investigate or meet incoming vessels or divers. Sending a drone to perform this task is quicker and safer than sending people into potential danger - also easier as it completes the mission with high levels of autonomy."

That autonomy includes taking off, intercepting and tracking targets, returning to base and landing. It has an operating range of up to three kilometres with a three kilogram payload. Planned payloads include a wide range of sensors and onboard speaker and mic system for two-way communication with vessels.

The drone is on display during the airshow.

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