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YEAR OF ZAYED

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Editorial

Armed Forces Excellence and Innovation Award

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The launch of the Armed Forces Excellence and Innovation Award is a clear demonstration of our Armed Forces' firm belief in the importance of spreading the culture of excellence and innovation to enhance overall performance among the Armed Forces' personnel. The increasing importance of this award lies in the fact that it entrenches the general approach adopted by the UAE Armed Forces since its unification on May 6, 1976. It establishes excellence, quality, and innovation as the main criteria in evaluating performance. Therefore, our Armed Forces have been able to, thanks to these criteria, develop and enhance its combat efficiency and readiness and prepare its national cadres to deal with modern technologies and advanced military strategies.

The excellence and innovation awards in the various institutions in the country are aimed at developing the overall performance, instilling the culture of excellence among employees, and motivating them to compete. However, the Armed Forces Excellence and Innovation Award will have a multiple effect. The strategy of modernisation and development of the Armed Forces relies on innovation and rejuvenation. Innovation is an essential element that always leads to aspiration to the newest and best in terms of weapons, training or human qualification. At the same time, the dissemination of innovation in the Armed Forces and its institutions would enhance its efficiency, readiness and ability to keep abreast of what is new in the military sphere, whether it is armament or new scientific and cognitive theories.

While honouring the winners of the first cycle of the Armed Forces Excellence and Innovation Award, His Highness Sheikh Mohamed bin Zayed Al Nahyan, Crown Prince of Abu Dhabi and Deputy Supreme Commander of the UAE Armed Forces, highlighted the promotion of the culture of excellence and innovation in all fields. His Highness Sheikh Mohamed expressed the nation's pride in the top achievers who elevate the performance of the country's civilian and military institutions. "We have unique and innovative national skills that we want to add to the edifice of the nation's unprecedented achievements and achieve its global leadership," he added.

Excellence and innovation have become one of the most important standards for measuring the development of the Armed Forces. These two factors are closely related to the different aspects of development and modernisation of this institution, starting with high standard training and preparation of human capital through defence industries, which depend on innovation and quality, and finally the military institutes and colleges that are working on the promotion of the values of excellence and quality in their teaching courses to keep pace with modern theories in modern military science and strategy.

The Armed Forces Excellence and Innovation Award reinforces the overall approach adopted by the United Arab Emirates under the leadership of His Highness Sheikh Khalifa bin Zayed Al Nahyan, President of the UAE and Supreme Commander of the UAE Armed Forces, and His Highness Sheikh Mohamed bin Zayed Al Nahyan, Crown Prince of Abu Dhabi and Deputy Supreme Commander of the UAE Armed Forces, to disseminate the culture of excellence and creativity as the general approach that governs the work of various institutions in the country. This will help to continue the journey of progress and development in different areas and to reinforce the UAE's leadership and competitiveness at the global level.

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Mohamed bin Zayed Honours Win and Innovation Award

His Highness Sheikh Mohamed bin Zayed Al Nahyan, Crown Prince of Abu Dhabi and Deputy Supreme Commander of the UAE Armed Forces, honoured winners of the UAE Armed Forces' Excellence and Innovation Award.

His Highness Sheikh Mohamed bin Zayed congratulated the winners of the first cycle of the award when he received Lt. General Hamad Mohammed Thani Al Rumaithi, Chief of Staff of the Armed Forces, commanders of the Armed Forces and the higher committee of the award at Al Bateen Palace.

Sheikh Mohamed and the audience exchanged Ramadan greetings and prayed to Allah Almighty to maintain security, safety and stability of the UAE under the leadership of President His Highness Sheikh Khalifa bin Zayed Al Nahyan and to revisit this religious occasion with good health and well-being for His Highness.

His Highness Sheikh Mohamed bin Zayed expressed the nation's pride in the top achievers who elevate the performance of the country's civilian and military institutions.

While urging the winners to pursue their journey towards further excellence and innovation and wishing them more success, Sheikh Mohamed asserted the leadership's determination to instil the culture of excellence and innovation in all walks of life in order to improve performance of institutions and promote the government's approach to create an environment that incubates and encourages creativity and innovation.

The winners were recognised for the 'Best Innovation' and 'Best Scientific Research'. The Award covers a wide range of specialisations, including morale, technical, administrative, and logistic aspects as well as public areas of safety and security, training, IT, weapons and equipment, operation, administration, medical transport and the environment.

The winners were recognised for the 'Best Innovation' and 'Best Scientific Research'

'inners of Armed Forces' Excellence

The Award aims to build and develop creative and scientific research skills among the officers, non-commissioned officers, soldiers, retired personnel and national service recruits so as to raise the combat efficiency and improve performance, administrative and logistic services in a manner that serves the Armed Forces as per international standards.

The award also instils the spirit of competition among the Armed Forces' personnel to come up with creative solutions to challenges they are facing and unlocks potential talents.

SOFEX Ends on a Successful Note

SOFEX JORDAN

With a dramatic display of new Royal Jordanian Air Force (RJAF) air assets as drawcards, alongside the latest technologies and capabilities in special operations and homeland security, the 12th edition of SOFEX was held in Amman, Jordan, from May 8 to 10. SOFEX 2018 was inaugurated by His Majesty King Abdullah II and attended by military delegations from many countries. The three-day event brought together more than 350 companies from 35 Arab and foreign countries.

SOFEX is being organised under the direct supervision of HRH Prince Feisal Bin Al-Hussein since 1996, and is fully supported by the Jordan Armed Forces and security agencies.

"SOFEX represents a global forum for dialogue, linking countries from around the world for international peace and security," said Amer Tabbah, managing director, SOFEX. He noted that more than 400 official delegates representing 53 nations attended the event.

The opening ceremony saw the Special Forces Units of the Jordanian armed forces performing live demonstration with troops and combat helicopters. The demonstration also simulated hostage rescue and evacuation of wounded personnel during anti-terrorist operation. During the live demonstration, visitors had the opportunity to see military equipment used by the Jordanian armed forces' Rapid Response Unit including utility helicopter Black Hawk and Cobra attack helicopter backed by fighter aircraft. Equally impressive were the static displays featuring military and security vehicles, as well as the latest RJAF aircraft acquisitions.

Lebanon's 'Black Panthers' bags 'Warrior' contest

Conducted just prior to SOFEX, the Annual Warrior Competition at the King Abdullah II Special Operations Training Centre (KASOTC) was in its 10th year, and had the largest field of participants yet. Lebanon's 'Black Panthers' SWAT team from the country's internal security forces took overall first place, as they did in 2016. In second place was the 'Snow Leopard' commando team from the Chinese police, which had back-to-back wins in 2013 and 2014. Placed third was a SWAT team from California.

This year's week-long competition featured 40 teams from 25 countries, comprising Austria, Belarus, Brunei, China, Czech Republic, Greece, India, Jordan, Kazakhstan, Kenya, Kosovo, Kuwait, Lebanon, Moldova, Oman, Poland, Portugal, Saudi Arabia, Sudan, Sweden, Turkey, UAE, Ukraine and the U.S.

Teams undertook Special Forces exercises that not only challenged individual capabilities in shooting and other skills, but also rewarded teamwork.

France presents full range of military and security equipment

French defence industry attended SOFEX under the umbrella of the GICAT, a professional group representing the industrial defence and security sectors supplying military equipment to the French Land Forces and exporting Land and Air-land

SOFEX 2018 was inaugurated by His Majesty King Abdullah II (pictured in the centre), and attended by military delegations from many countries

SOFEX is being organised under the direct supervision of HRH Prince Feisal Bin Al-Hussein (pictured on the right) since 1996

equipment all over the world. The French Defense and Security Industry with more than 15 companies presented a full range of military and security equipment.

France is characterised by an extremely sophisticated and competitive defence industry, which includes global players such as Thales, Airbus Group Defence & Space, Dassault, the Safran Group, DCNS, MBDA, and Nexter.

The French defence industry presented latest innovations and technologies of defence products especially designed and manufactured for Special Forces and SWAT teams. France has one of the strongest defence industries in the world.

BAE Systems looks for additional export

Now that production of the M777A2 155mm/39 calibre lightweight towed howitzers is underway again, BAE Systems is looking for additional export opportunities in the Middle East. The M777 was originally developed to meet the requirements of the US Army and Marine Corps to replace their much heavier M198 155mm/39 calibre towed howitzers.

It has also been sold to Australia (54) and Canada (37), with the latest customer being India, which ordered 145 units.

According to BAE Systems, the M198 takes 15 minutes to come into action, carry out a fire mission of firing five 155mm rounds and then being taken out of action. The M777 can carry out the same fire mission in just five minutes. For engaging targets with precision effect, the 155mm Raytheon M982 Excalibur guided projectile is used, with a maximum range of 40km.

LEONARDO's lightweight laser target designator

Leonardo exhibited its Type 163 laser target designator at SOFEX, providing an impressive example of how technology originally developed for combat aircraft is now finding a second life with special operations forces on the ground.

Alberto Pietra, sales and marketing director, Leonardo Airborne and Space Systems, said: "Traditionally, laser target designators have proved too heavy and bulky for ground forces to take into frontline operations, causing problems with target identification in close combat operations. However, the Type 163 laser target designator is a highly portable, less than 2.3kg package. "This draws on experience gained in producing lightweight but powerful laser products for combat jets and attack helicopters, such as the F-35 and Apache, which both carry Leonardo targeting lasers."

AM General brings HMMWV

AM General brought to SOFEX a version of the High Mobility Multi-purpose Wheeled Vehicle (HMMWV) fitted with a 105mm howitzer on the rear. This is referred to as the Enhanced Tactical Indirect (ETI) – HMMWV Hawkeye 105mm Weapon System.

AM General is responsible for the platform and Mandus Group for the weapon system. The weapon is provided with a hybrid special recoil system, which allows it to be installed on light platforms such as the HMMWV. The version on display was fitted with the 105mm M30 barrel from the U.S. Army M119 light towed howitzer.

Upgraded Cobra

The first two AH- 1F Cobras to be upgraded for the Royal Jordanian Air Force were returned from rework at the Science & Engineering Services (SES) facility at Huntsville, Alabama, and one was on show at SOFEX in the outside display area. Following a competitive process, SES was awarded a contract to perform a far-reaching upgrade on 12 of the RJAF's original Cobra fleet.

Three more upgrades have been completed and the aircraft are in the U.S. awaiting the completion of flight tests. All 12 are due to be returned to Jordan before the end of the year. SES's upgrade programme encompasses three areas: airframe, avionics and weapons.

The primary weapon for the unmodified Cobra is the BGM-71 TOW, but the upgraded AH-1Fs have Lockheed Martin M310 launchers for the AGM-114R Hellfire missile. They can also carry standard seven- or 19-round 2.75in (70mm) rocket launchers.

Cubic's training capabilities

Cubic Global Defense (CGD) business division displayed a comprehensive range of industry-leading training capabilities at SOFEX. "Cubic's world-class training technologies accelerate training efficiency and improve overall readiness through individual and collective engagement," said Dave Buss, president of Cubic Global Defense. "We look forward to the opportunity to showcase our innovative training solutions and increase our offerings to our customers in the Middle East region."

Cubic showcased air combat force-on-force training, ground live combat training, fire arms training and cyber security training at SOFEX.

Polaris Defense presents Dagor and MRZR D2

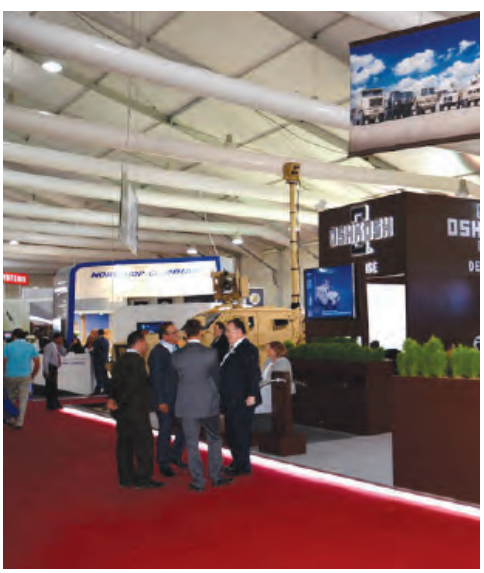
American Company Polaris Government and Defense presented MRZR D2 and Dagor all-terrain vehicles at the show. Polaris Government & Defense develops a range of vehicles to serve the U.S. and allied forces, including the MVRS, MV700, and RZR-SW, to meet the increasing demand for light off-road mobility platforms. The MRZR-D2 all-terrain vehicle is designed to perform a full range of military missions, including rapid deployment of forces in the field, casualty evacuation, and command and control.

The DAGOR has world-class capability in extreme off-road terrain at full payload. The purpose-built vehicle is designed with trophy truck-inspired suspension to carry 3,250 lbs (1,500 kg) of payload or a 9-man infantry squad at a higher rate of speed over terrain usually travelled on foot. This allows the warfighter to move quickly to the objective with mission-critical equipment.

Rosoboronexport highlights arms, equipment and flames

AO Rosoboronexport (Russian state arms trade agency incorporated by Rostec) displayed modern types of arms and military equipment, including those tested during the counter-terrorist operation in Syria.

The pavilion presented Tiger and Typhoon-K motor vehicles, BTR-80/80A/82A armoured personnel carriers, A-220M 57 mm light automatic artillery mount, Kornet-E and Kornet-EM anti-tank guided weapon systems, sights and night vision devices, compact radars, PDM-A Shmel-M reactive flamethrowers, 2B24 82 mm mortars, Bur compact grenade launcher, various examples of grenade launchers and small arms, Igla-S and Verba man-portable antiaircraft systems, antiaircraft ultra-short range antiaircraft missile system derived from Strelets for Igla-type of man-portable SAM, RShG-2 rocket-powered assault grenade, and various munitions.



Also displayed at the exhibition, was the TOS-1A heavy flame-throwing system which has recently become popular in the Middle East due to its excellent performance in large-scale anti-terrorist operations.

KADDB unveils new Al-Mared 8x8

KADDB, King Abdullah II Design and Development Bureau, a Jordanian State Defence Company unveiled its new 8x8 armoured vehicle under the name of Al-Mared during SOFEX 2018. The Al-Mared is fully developed and designed by KADDB based on an 8x8 TATRA truck chassis fitted with a fully protected all-welded steel hull that can provide ballistic protection up to STANG 4569 Level 3, against firing of small arms 7.62×51mm caliber AP (Armor-Piercing) at 30 metres with 930 m/s.

The lower part of the Al-Mared integrates v-shaped armoured hull that protects occupants by deflecting mine blasts anywhere under the vehicle. It protects the crew of the vehicle against mine blast of 8 kg of TNT under any wheels. KADDB presented two variants of its new Al-Mared, the APC and IFV versions.

RJAF's Mi-26T2 heavy-lift helicopter

The Royal Jordanian Air Force displayed for the first time the first Mi-26T2 heavy-lift helicopter it inducted in January 2018. Jordan signed a contract for the purchase of four Mi-26T2 choppers on April 17, 2016. "The first of the four Mi-26T2 heavy lift helicopters ordered for the RJAF has arrived in Jordan," Brigadier General Odeh Shudaifat, a spokesperson for Jordanian military said.

The Mi-26T2 is intended for all sorts of operations: transportation, evacuation, fire fighting etc. Mi-26T2 is capable of carrying up to 82 full armed troopers or up to 20 tonnes of cargo inside the fuselage or on external sling.

MBDA ramps up production of MMP and ATGM

Also at SOFEX was MBDA, the European group capable of designing and producing missiles and missile systems. MBDA is ramping up production of its Missile Moyenne Portée (MMP) anti-tank guided missile (ATGM) system for the French Army, with the first production systems delivered late in 2017.

The first French Army MMP contract covers the supply of 400 firing posts, 2,850 missiles and a simulator developed by GDI Simulation. MBDA classes the MMP as a fifth-generation ATGM and it is fully interoperable with the French Army's FÉLIN future infantry programme. The MMP system consists of the missile in its disposable launch tube and the firing post. The guided missile is fitted with a tandem multipurpose high-explosive anti-tank warhead to defeat targets fitted with explosive reactive armour, and has a range of more than 4,000m, which is twice that of the MILAN it is replacing.

Amer Tabbah, managing director, SOFEX

Global Aerospace Industry Congregates in Berlin for ILA 2018 Air Show

With its focus on current and future technical innovations, ILA Berlin continues to evolve as the aerospace industry's leading trade show, this year selecting France as its partner country

From 25th-29th April, around 1,100 exhibitors and 180,000 visitors from 41 countries presented a wide spectrum of their products, with 200 aircraft on the ground alongside global aviation and space R&D projects.

Franco-German defence projects

German Chancellor Angela Merkel opened ILA 2018, joined by Federal Defence Minister Ursula von der Leyen who confirmed that "The ILA has kept its promises again" with "ultra-modern aircraft and helicopters" as "impressive proof" that, "The ILA is an outstanding exhibition of German products and services, and this year in particular symbolises Franco-German friendship and partnership."

ILA's Franco-German defence programmes included development of next-gen of fighter aircraft, a new long-distance naval reconnaissance aircraft and a new generation of armoured vehicles, all of which bear joint responsibility for a strong Europe "able to defend its citizens and values", said Minister von der Leyen. Visiting French Defence Minister Florence Parly also noted that this "historic agreement" was necessary to make the armed forces of both countries "more powerful, modern and versatile" by 2040, to ensure they had a strategic

advantage and to create a "Europe focused on defence."

Four-engine A400M transportation

The Airbus A400M that brought the two Defence Ministers to the ILA is the first four-engine, strategic and tactical transport to be powered by propellers and jointly built by Germany and France.

Germany's Bundeswehr is gradually replacing the ageing Transall C-160 with significant improvements in capacity, speed, flexibility and range. Carrying a 20 tonne load, the A400M has a non-stop range of 6,400 kilometres, a maximum take-off weight of 141 tonnes, a length of 45 metres and a 42.3 m span to make it smaller than existing transport aircraft, so flying at lower speeds and landing/taking off from 1 kilometre runways. Although delivery of the A400M commenced in 2013, 66 had been delivered to international customers by the end of March.

200 aircraft on display

Alongside aircraft from many epochs of aviation history, there was an unprecedented display of the "giants of the air" such as the 100th A380 to be delivered to Emirates, the modern commercial aircraft A350 and A340 BLADE, the Beluga Super Transporter from Airbus, the Boeing 747-8 of Lufthansa and the largest transport aircraft in existence, the six-engined Antonov 225.

The presentation also featured an impressive and diverse range of military aircraft, including the Eurofighter combat aircraft, the A400M military transport, the Tiger combat helicopter and the French Rafale, the CH-53K (Lockheed Martin) and CH-47 Chinook (Boeing) heavy lift transport helicopters, the Kawasaki P1 marine reconnaissance aircraft from Japan and the ultra-modern multi-role F35 combat aircraft from Lockheed Martin.

Boeing offers H-47 to Germany

The U.S. Department of Defence displayed several Boeing platforms, including the H-47 Chinook heavy lift helicop-

> The Eurofighter Typhoon, A400M, Tiger, French Rafale, CH-53K, CH-47 Chinook, and the multi-role F35 were some of the aircraft on display

Northrop Grumman LITEF presented High Accuracy Attitude sensor


Airbus Defence and Space


Dassault Aviation

ter, the V-22 multirole tiltrotor, the AH-64 Apache attack helicopter, the P-8A Poseidon maritime patrol aircraft and the F-15 fighter.

In answering Germany's requirement for a new heavy lift helicopter, Boeing's H-47 Chinook has provided a modern, proven platform at a very competitive cost, while the exhibit also included Boeing's new commercial airplane programmes and "made in Germany" technology, with special focus on the 777X as the first test airplane in production.

HENSOLDT's first year

Recently taken from the Airbus Group, platform-independent sensor solutions provider HENSOLDT is No. 3 amongst German defence companies, with approx. 4,300 employees and revenues of more than €1bn. HENSOLDT CEO Thomas Müller summarised the first year's achievements while looking at current technology trends, further growth and the development of new markets.

The Antonov An-225

The world's heaviest and largest operational aircraft visited ILA Berlin - the An-225 "Mrija" (Dream) from Ukrainian manufacturer Antonov Airlines. Originally developed to transport the Soviet space shuttle "Buran" on its fuselage, the six-engined jet was re-introduced by Antonov in 2001 to transport extremely heavy loads weighing up to 250 tonnes.

The An-225 has a maximum take-off weight of 640 tonnes, an overall length of 84 metres and a wingspan of 88.40 metres. The horizontal tail surface has a width of 32.65 metres, equivalent to the Airbus A320 wingspan.

Bundeswehr exhibits emergency aircraft

The Bundeswehr used an emergency assistance demonstration to show the NH-90 and CH-53 transporter helicopter, while their cyber-forensic experts demonstrated how data can be read from a destroyed USB stick.

Eurofighters to replace Tornados

Germany's Tornado combat aircraft have been in service since the 1980s but since 2015, the new Typhoon have started to serve as fighter-bombers and for electronic surveillance with over 600 ordered and are already in Luftwaffe. "I am confident that the Eurofighter Typhoon can represent a cost-effective and attractive solution for Germany, satisfying every requirement and capable of fulfilling every mission for the Luftwaffe in Germany", stated Volker Paltzo, the CEO of Eurofighter Jagdflugzeug GmbH.

DLR pilot assistance system

The German Aerospace Centre (DLR) is collaborating with Deutsche Lufthansa to develop the Low Noise Augmentation pilot assistance system to assist pilots with complex low-noise landing. DLR is currently collaborating with the environmental research facility Umwelt- und Nachbarschaftshaus (UNH) in Kelsterbach, and the operator of Frankfurt airport FRAPORT AG in carrying out trials in daily flight operations.

Boeing Chinook heavy loading

Two three-blades rotors mounted in tandem rotating in opposite directions, each with a diameter of more than 18 metres, the Boeing CH-47 Chinook is a unique large helicopter capable of lifting loads up to eleven tonnes. Since its first flight in September 1961, more than 1,200 have been built with the current version in the running to replace the CH-53 as a transport helicopter for the Bundeswehr. ILA 2018 featured one model from the U.S. military and flying displays from the UK's Royal Air Force.

ESA's Copernicus debuts

ILA 2018 introduced the World Space Alliance digital trading platform, offering a range of space-supported data and products from the ESA's Copernicus programmes. The partnership between the ESA and the world market leader for business software facilitates access to business applications based on geodata closing the gap between standard earth observation and the digital business world.

DLR revolutionary rudder

Seen on static display, the DLR and Airbus carried out Europe's first airborne trials over April-May 2018 using an A320 ATRA with a converted vertical control surface and weak, directed suction to

Diehl Defence


Humanoid robot TORO

reduce the fuel consumption of aircraft substantially.

Sikorsky design presentation

Having been responsible for coordinating the Bundeswehr's helicopter procurement programme throughout the last century, Sergei Sergei Igorovich Sikorsky made a remarkable appearance in ILA as an ambassador for the Sikorsky CH-53K helicopter which Lockheed Martin, the parent company of the Sikorsky Aircraft Corporation, aims to market as a heavy transport helicopter.

In Tsarist Russia, Sergei's father Igor Sikorsky designed the world's first large-scale airplane (Le Grand), before emigrating to the U.S. prior to the communist revolution. He successfully designed large seaplanes before devoting himself to his beloved helicopters in 1939.

Nonetheless, each time he was addressed as the "inventor of the helicopter", Sikorsky replied that "the world's first functioning helicopter was the 1936 Focke-Wulf Fw 61" attributed to the German designer Henrich Focke (1890-1979).

Bombardier CSeries debuts

Air Baltic's latest CS300 Bombardier CSeries was on display, of which the Latvian airline has purchased eight and been impressed by the plane's reliability and positive passenger feedback, welcoming its one-millionth passenger on board the aircraft. CEO Martin Gauss praised the aircraft's low fuel consumption, low noise emissions and high comfort level in the spacious passenger cabin. Air Baltic will take delivery of another six CS300s, completely replacing its fleet of Boeings by 2020 and replacing its Q400 turboprops with CSeries aircraft by 2022.

Lockheed Martin F-35A bid

The F-35 Lightning II is a called 5th-generation, multi-role supersonic combat aircraft combining stealth technology, massive computing power, open-systems architecture, powerful sensors and great agility. Intended as a replacement for the F-15/F-16/F/A-18 in service with western European air forces, Lockheed has constructed the majority for all branches of the U.S. military.

Lockheed tendered their billion-dollar bid just prior to ILA, "In response to an enquiry from the German defence ministry", said Jack Crisler, Vice President F-35 Business Development and Strategy Integration at Lockheed Martin, who is contending with competition from Airbus and a more advanced version of the Eurofighter Typhoon. Just under 300 of the F-35 stealth fighters have already been supplied to various customers, with deliveries of a further 91 expected in 2018 at an average cost of around 80 million dollars each.

Self-repairing smart engine

Rolls-Royce presented its vision of an Intelligent Engine at ILA 2018, one envisaging all the engines in an airline's fleet communicating with one another and identifying required maintenance work in advance. This smart engine makes it possible for minor engine repairs to be carried out autonomously in future without human intervention.

Airbus airborne laboratory

Funded by the EU's Clean Sky programme, BLADE, or "Breakthrough Laminar Aircraft Demonstrator in Europe" debuted at ILA 2018. Replacing the external parts of A340 wings with new components whose external shape is designed to moderate the airflow, "Normally turbulence is created at the leading edge of the wing, but in this case, it only occurs in the middle of the wing", explained Alex Flaig, Senior Vice-President Research & Technology.

ATLA marine reconnaissance

Japan's Acquisition, Technology Logistics Agency was set up in 2015 as part of the national Defence Ministry to intensify cooperation in defence equipment and technology. The spectacular presentation of the new Kawasaki P-1 marine reconnaissance aircraft at the ILA Berlin was "to demonstrate to the world our advanced technological capabilities", said Captain Ryota Ishida, P-1 project manager at ATLA. Designed for marine reconnaissance, the P-1 is the world's first aircraft controlled by "fly-by-light"

technology, using light signals to prevent electromagnetic interference to the sensors.

MBDA defence system

MBDA Missile Systems presented the integration air defence, European armaments programmes and new technologies at ILA 2018. Germany's TLVS Tactical Air Defence System has replaced the "Patriot" system as the new, flexible air defence system protecting against tactical ballistic short and medium-range rockets, combat aircraft, helicopters, drones and cruise missiles. "MBDA is the result of 20 years of efforts to integrate former competitors from Germany, France, Italy, the United Kingdom and Spain", explained CEO Antoine Bouvier. "We are proud that MBDA has become like the Airbus of rockets."

International delegations

Many members of parliament from Germany and abroad attended the 9th International Parliamentarians' Day on 25 April.

Air and ground attractions

Of 2018's impressive exhibits, the world's largest passenger aircraft, Emirates' 100th Airbus A380, made an appearance alongside the European aerospace group's most up-to-date long haul aircraft the A350 XWB, the A340BLADE research aircraft and the Beluga transporter. Lufthansa also introduced its Boeing 747-8, the latest version of the jumbo jet, while the CS-300 from Bombardier was also shown to trade visitors.

TORO walking robot

A bipedally-based robot has several advantages over wheel-based movement in occupying a relatively small standing area and climbing over small obstacles, while still having issues with walking stabilisation and balance regulation. The Institute for Robotics and Mechatronics at DLR has thus developed a bipedal humanoid robot known as TORO (TOrque Controlled Humanoid RObot) whose torque-controlled drive unit combines with sensors to deliver flexible movement, robust contact with unknown environments and safe interaction with humans.

Russian high-tech products

Russian manufacturers' combined stand featured many interesting products from the aviation supply industry and advanced drone technology from numerous developers. The Autonomous Aerospace System from Siberia specialises in versatile and powerful unmanned air systems, including a hybrid device that can move at high speed through the air but take off and land vertically like a helicopter. SEL from Samara also specialises in drones while Hydromash from Nischni Novgorod is a specialist in highly robust landing gear systems popular with Russian airliners.

The Moscow-based TFT Thin Film Technology Special provides highly responsive sensor technology for automated applications and the CTP (Centre of Technical Projects) presented its latest construction and structural tests equipment, technical publications and interactive training tools for industry. Aviaexport from Moscow specialises in the import and export of aircraft in marketing and international joint ventures alongside the organisation of mainte-

MTU Aero Engines

ILA Space Pavillion

nance contracts.

Day of the giants

The first public day of ILA 2018 was a veritable Day of the Giants when four record-breaking aircraft were assembled at Schönefeld. The first to arrive were the Lufthansa Boeing 747-8 "Brandenburg" and the Airbus Beluga, a super-freighter with an extra-high and extra-wide fuselage and a 1,820 cubic metre cargo-carrying space. A regular visitor to the ILA, the A380 is the largest Emirates Aircraft with 615 passengers, but saw mid-week competition in the form of the largest and heaviest aircraft to take to the skies, the Antonov An-225 heavy lift freighter (88 x 84 metres, 285 tonnes).

Schturmowik in the skies

The Ilyushin Il-2 ground attack ("Schturmowik") aircraft were an ever-present sight in the Berlin skies during the final days of World War II. Those who built the 36,000 aircraft called it the "Flying Tank", but German soldiers knew it as the "Flying Death".

The Il-2 on show on the ground and in the air at ILA was shot down in northern Russia in November 1943 before making an emergency landing on the frozen Krivoe Lake, where it subsequently sank although the pilot and gunner survived. Some 65 per cent of the material is from the original aircraft as one of only two airworthy examples in the world.

Elfin powered glider

Reiner Stemme.aero GmbH (RS.aero) is currently developing the "Elfin" RS10, a fascinating electric hybrid sports aircraft in the 20 m FAI twin-seater category. Powered by an innovative and "green" electric motor from Siemens, it also has a conventional engine option for greater range and charging the electric motor during flight.

Lockheed Martin and Rheinmetall's CH-53K

The new Sikorsky CH-53K heavy lift helicopter is "the most powerful helicopter ever built in the USA", claimed Sikorsky President Dan Schultz at the ILA Media Briefing. This grey giant is notable for its many improvements, including three external load hooks, fly-by-wire controls, a digital cockpit and the widespread use of carbon fibre compounds.

Together with the Lockheed Martin subsidiary Sikorsky, Rheinmetall is bidding for the "Heavy Lift Transport Helicopter" as a successor to the older CH-53G currently in service with the German armed forces. "We want to keep our German clients happy", said Armin Papperger, CEO of Rheinmetall, who believes his company is well equipped to provide simulation and training services as well as on-site maintenance, so offering Germany's armed forces a comprehensive solution extending beyond helicopter procurement.

ILA Berlin 2020

The next edition of ILA will be held in 2020. Over 300 aircraft of all sizes and categories are expected to be seen on the ground and in the air to make ILA 2020 in April one of the most popular international show for both trade and public.

Space pavillion - Air Cargo Gyrocopter


Thales

Rockwell Collins Demo Airspace Management

Rockwell Collins NASA UTM-concept

Rockwell Collins recently participated in two weeks of critical testing for the NASA Unmanned Aircraft System (UAS) Traffic Management (UTM) programme. As part of the test flights, Rockwell Collins served as the UAS Service Supplier (USS) for the safe management of a UAS flying beyond visual line of sight.

The company demonstrated how its CNPC-1000 Command and Control (C2) data links can be redundantly integrated to provide a fail-safe connection for operating the UAS. For example, if one link gets cut off, the operator still has a connection through another link to assure the safe operation of the UAS. The company also demonstrated how its webUAS service can successfully manage multiple UAS in the air, redirecting aircraft set on conflicting flight paths as needed.

The test event was planned and orchestrated by the Northern Plains UAS Test Site staff under a NASA contract. The University of Iowa Operator Performance Laboratory (OPL), a key partner for Rockwell Collins, supported integration of the CNPC-1000 C2 links into its Pulse Aerospace Vapor 55 unmanned test vehicle and successfully piloted the aircraft throughout the test event.

Boe Svatek, programme director, UAS Strategic Programs for Rockwell Collins said: "These recent test flights demonstrate that we're able to leverage safe and proven flight operations management capabilities from our ARINC heritage to ultimately enable airspace integration of all aircraft, traditional and new."

BAE Systems and Prismatic Develop Solar UAV


Prismatic signs collaboration agreement with BAE Systems

A new solar electric UAV, which has the potential to fly for up to a year before needing maintenance, has become a step closer to reality following an agreement between British companies, BAE Systems and Prismatic.

Engineers from both the firms will collaborate on the development of the new solar powered High Altitude, Long Endurance (HALE) UAV known as PHASA-35 (Persistent High Altitude Solar Aircraft), with work already underway to prepare the first aircraft to be ready for flight tests in 2019.

The technology would offer a year-round, low cost persistent service for a wide range of needs including surveillance and vital communications to remote areas, using only the sun to power the aircraft during the day and recharge the batteries for overnight operation.

Solar HALE vehicles offer a significantly cheaper alternative to conventional satellite technology, with PHASA-35 being a concept solar electric UAV that uses proven, long life battery technology and ultra-lightweight solar cells to potentially maintain flight for up to 12 months.

The PHASA-35 concept has a 35-metre wingspan and weighs just 150kg – its lightweight, efficient build allows it to fly at high altitudes for long periods of time.

A quarter scale model (named PHASE-8) completed a successful maiden flight in 2017, with Prismatic Ltd and BAE Systems now looking to take the technology a step further.

Orbital ATK Showcases Solutions at SOFEX 2018

Orbital ATK, Inc. presented a selection of its products and advanced capabilities at the 12th Special Operations Forces Exhibition and Conference (SOFEX) in Jordan.

SOFEX provided the company a key platform to emphasise multiple products and solutions that enable special operations forces to meet current and future challenges around the globe. Solutions included the AC-208 Eliminator, the latest version of the successful AC-208B Armed Caravan aircraft. The Eliminator is able to find, fix, identify, track, target, and engage emerging and time-sensitive targets with two HELLFIRE missiles per wing or seven 2.75-inch guided rockets per wing, based on mission requirements. The strike capabilities complement a robust suite of sensors and communications equipment for intelligence, surveillance and reconnaissance missions.

Also on display was the fielded AC-235 Light Gunship that provides sustained and precise firepower in a variety of scenarios using HELLFIRE laser-guided missiles, 2.75-inch rockets, and Orbital ATK's side-mounted M230 link-fed 30mm chain gun: all utilising an integrated electro-optical targeting system with a laser designator and a synthetic aperture radar. The company offers self-protection equipment on both the AC-235 and AC-208 aircraft and all its aircraft solutions.

Additional products included the Shot-Finder Acoustic Hostile Fire Detection System that identifies and directionally locates small arms fire, anti-aircraft artillery and rocket-propelled grenade threats and the combat-proven AAR-47 Missile and Laser Warning System with Hostile Fire Indication electronic warfare system designed to protect helicopters and fixed-wing aircraft from surface-to-air threats.

ESA Explores Encryption Technologies

The European Space Agency (ESA) recently signed a contract with SES Techcom S.A. (LU) to develop Quantum Cryptography Telecommunication System (QUARTZ): a platform for quantum key distribution (QKD), a next-generation form of cryptography that can be administered from space.

Classic cryptography concealed messages with ciphering codes and encryption keys generated by hand or early machinery. Today the same principle exists, but the ciphering codes have evolved into modern mathematical algorithms, and 'cryptography keys' can be created by combining algorithms with random number generators.

However, developments such as quantum computers and new code-breaking techniques could leave certain aspects of today's systems vulnerable to attack, which is why ESA is investigating novel encryption technologies like QKD.

QKD is a growing research field that applies security properties based on fundamental physics to potential real-world applications. The result is a system that distributes the key between two parties in a way that is impossible to intercept without detection.

Today's QKD is constrained by the traditional carrier, optical fibre, as this limits the radius that information can be transmitted on the ground to only a few hundred kilometres before the signal fades. Studies by ESA have shown that photons can be collected and distributed in free space, from satellite to satellite, satellite to ground and vice versa. A satellite carrying a key can distribute it to customers anywhere on Earth.

Under QUARTZ and with the help of ESA, SES plans to develop the platform to be a robust, scalable and commercially-viable satellite-based QKD system for use in geographically-dispersed networks.

Saab attends Information Warrior 18

Saab's 9LV Combat Management System (CMS) and TactiCall Integrated Communication System (ICS) were successfully used in the Information Warrior 18 (IW18) event, which was recently led by Britain's Royal Navy and industry. The exercise was held at Royal Marine Barracks Stonehouse and defence technology company QinetiQ's Portsdown Technology Park, and aimed to drive the future development of warfare capabilities, focusing on the computerised side of modern warfare.

"It is encouraging to see major defence contributors such as Saab willing to demonstrate how their CMS and Tactical ICS are able to operate on a Government owned open architecture. I am convinced this will help us to continue the development of an Information Advantage and deliver relevant, cost-effective cutting-edge warfare capabilities," said Commodore Ian Annett, Royal Navy.

Saab's 9LV CMS is open and modular, based on modern IT architecture principles, which increases mission capability by enabling flexible and effective operations. 9LV was also the only CMS participating in IW18 with the open interface standards needed to handle the simulated environment, with the modular and scalable design meaning hardware and software can be adapted to specific requirements. It is in use by the Australian, Canadian and Swedish Navies.

The role of TactiCall at IW18 was to address the needs of modern navy operations, which often consist of joint setups and include a multitude of different frequency bands, networks and radio equipment. It is used by the Norwegian and Australian militaries and has civilian application, including emergency services and the offshore sector.

Embraer and American Airlines Sign Contract for More E175s

Embraer and American Airines Inc. recently signed a firm order for 15 E175 jets with a 76-seat configuration. The contract has a value of US$705 million, based on current list prices, and will be included in Embraer's 2018 second-quarter backlog. Deliveries will take place in 2019 between March and November.

Combined with the airline's three previous orders for the E175, this new contract results in a total of 89 E175s for American Airlines. The most recent order took place in October 2017 for 10 aircraft.

"We are thrilled that the E175 continues to be the right solution for American. This is American's fourth order for the E175 since 2013 and their repeat order demonstrates how well the aircraft serves their business needs and the confidence they have in our platform," said Charlie Hillis, vice president, sales & marketing, North America, Embraer Commercial Aviation.

American Airlines selected Envoy, a wholly owned subsidiary of American Airlines Group, to operate the 15 aircraft, which will be configured with a total of 76 seats, 12 being in First Class and 64 in Main Cabin, including Main Cabin Extra seats.

Including this new contract, Embraer has sold more than 400 E175s to airlines in North America since January 2013, earning more than 80 per cent of all orders in this 76-seat jet segment.

Hensoldt Equips Canadian Airfields With Airport Surveillance Radars

With the Site Accepance Test (SAT) for the last unit in Greenwood, Nova Scotia, completed, HENSOLDT has equipped a total of six military airfields in Canada with state-of-the-art Airport Surveillance Radars. In addition to these, a training system has also been successfully installed in Canada. This successfully completes the installation phase for the €50m order, which was awarded to HENSOLDT in 2013.

The programme comprises the delivery of seven radar systems and two spare parts packages. In a similar way to previous systems, the radar in Greenwood was also handed over to the customer by a team comprising representatives from the Canadian Department of National Defence (DND) and from HENSOLDT's local partner Lockheed Martin Canada (LMC).

The ASR radars consist of an integrated primary and secondary radar system each. The primary radar helps to detect non-cooperative objects such as small aircraft without transponders or hostile aircraft. It is based on a semiconductor transmitter and includes special signal processing techniques for wide-area surveillance and windfarm mitigation.

The secondary radar, MSSR 2000 I, provides automatic identification of cooperative aircraft. It meets the new "Mode S/Mode 5" air traffic control standard, which greatly improves aircraft identification queries and is currently being introduced in all NATO and allied forces.

Different versions of its new ASR-NG radar are under contract by Australia and the UK. While the MSSR 2000 I secondary radar is deployed for military friend-or-foe identification by the naval forces of Germany, France, Norway and Finland.

Airbus and Rolls Royce Collaborate on UltraFan

Airbus and Rolls-Royce have signed a collaboration agreement for the integration of Rolls-Royce's UltraFan demonstrator for flight testing. The integration solutions demonstration will be co-funded by Clean Sky 2, the European Union research programme focused on developing technology to reduce emissions.

UltraFan is a scalable jet engine design suitable for widebody or single-aisle aircraft and offers a 25 per cent fuel efficiency improvement over the first-generation of Rolls-Royce Trent engine.

One element of the UltraFan programme is planning for ground and flight tests, and to support this Rolls-Royce has signed an agreement with Airbus to provide both nacelle and engine/aircraft integration architecture and technology enablers.

Airbus' integration solutions will play an important part in achieving the overall fuel efficiency improvement of higher bypass ratio engines such as UltraFan, through innovative architecture and associated technologies.

UltraFan features a new engine core architecture and lean-burn combustion system which will contribute to improved fuel burn efficiency and lower emissions, along with a carbon titanium fan blade system and composite casing which reduce weight.

Driving Innovation in the Mobile Satellite Industry

Dubai-based Thuraya is a leading mobile satellite communications company that offers innovative, flexible and dependable technology facilitating reliable communications where and when it matters most. Thuraya's global customers include industry leaders from a variety of sectors including military, energy, media, marine, government and NGOs. Nation Shield spoke to Thuraya Market Development Director, Fahad Kahoor, on the company's latest launches and its impact across different sectors. Excerpts:

By: Sakha Pramod

Fahad Kahoor, Thuraya Market Development Director

Please tell us about the different functionalities of the Thuraya Tracking and Monitoring (T2M) Dual?

Recently, we launched the T2M service in conjunction with the T2M-DUAL terminal. A mobile, dual-mode device for superior machine-to-machine (M2M) communications and remote asset tracking and monitoring, the T2M-DUAL enables simultaneous collection of data from multiple points including location information, data from external sensors and peripheral devices, and input gathered from vehicle or heavy equipment CANBus. The solution brings ease of integration to applications that are traditionally more complex to manage and monitor, such as vehicle tracking and fuel consumption, thereby resulting in operational efficiency.

A unique feature of the T2M is reading the vehicle CANBus. It is a protocol where you extract the vehicle information such as temperature, engine speed, etc., from the car computer and start sending it or exchanging it with the server. Basically, T2M will collect this information using the CANBus protocol and send the necessary data.

It is designed for multiple sectors such as transportation, logistics, oil and gas, utilities, agriculture, and the mining sector. The device is a means to provide different services; it takes the tracking concept but also analyses it.

We are currently pitching T2M to the government sector, so that its unique features can assist them in providing better services to the community. For example, T2M enables the closest dispatcher to get to an accident or incident site, rather than notifying someone who is five kilometres away.

Today, almost 99 per cent of companies whether they work in agriculture, utilities or even the police departments worldwide use 3G systems. But in some areas of the world 3G is not easily available. That's when T2M comes in handy, as it has GSM and satellite.

The new solution allows for the integration of any third-party applications and has several built-in smart features such as geo-fencing, network selection based on least cost routing, internal battery backup and location and sensor data. It is designed to support on-the-move M2M/IoT applications seamlessly on satellite and GSM networks, allowing for optimised connectivity based on the best available network, and is built to withstand harsh environmental conditions.

In 2017, Thuraya Aero was launched. How was it received in the market?

Thuraya Aero caters to the growing demand for in-flight connectivity. Developed as an in-flight communications system, it supports steady Internet access, voice calls, text messaging, and

real-time, high-speed data applications such as video conferencing and aerial surveillance, on board small to medium-sized planes, as well as rotary wing aircraft.

A few months ago we signed an MoU with a company called SIT Sports to equip their rotary and fixed-wing fleets with Thuraya Aero products. SIT Sports works in the Iberian Peninsula, and provides radio avionics, tracking graphics, as well as aircraft to major sporting events.

Furthermore, in November 2017, the Dutch aerospace services company, NL EASP Air, became the Thuraya Aero launch partner at the Dubai Airshow. Thuraya Aero has witnessed growing success since the announcement last year and multiple customers have already signed on to install and integrate the service on their fleet of fixed and rotary wing aircraft.

Thuraya Aero caters to the growing demand for in-flight connectivity

Thuraya X5-Touch is said to be the smartest satellite phone. Why do you say that?

We recently unveiled the X5-Touch, the world's first satellite smartphone. The device runs on the Android Operating System and has a 5.2" full HD touch-screen. It targets users who frequently move in and out of terrestrial coverage across a range of market sectors including government missions, energy projects, enterprise communications, and NGO deployments. The phone offers fast connectivity on the move, in remote areas normally beyond the reach of smartphones.

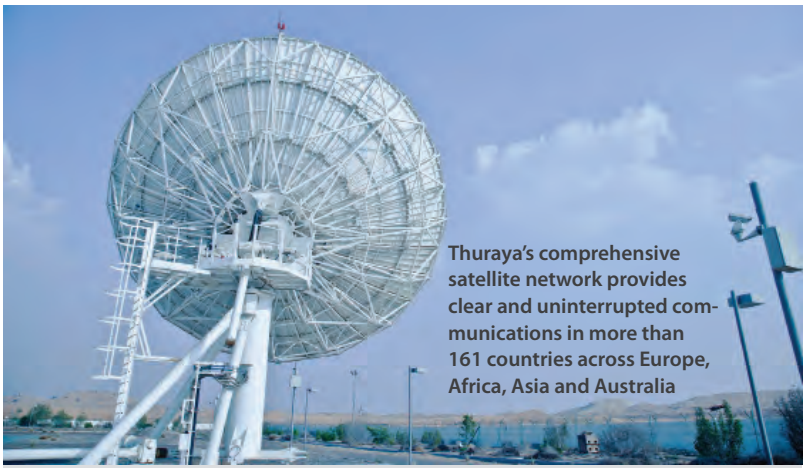
The X5-Touch is a step closer towards complete convergence between terrestrial and satellite communications through its full dual-mode and dual-SIM capability. It has two SIM-card slots for full user flexibility, and with the dual-active mode it has the ability to have both its satellite and GSM (2G, 3G, or 4G) modes 'always on' simultaneously. It is the only satellite phone that runs on the Android operating system in the world. No other satellite phone has such a feature.

To cater for the needs of users in harsh and remote conditions, the X5-Touch comes with a Gorilla glass display and is a rugged phone with full dust and

water protection. It also has a host of advanced functionalities including a high-capacity battery for extended talk time and standby time, a built-in SOS button and a front and rear camera. For a satellite phone to have front and rear camera is very unique. It is the only phone in the market with such capabilities. It will be available from Q4 2018.

Plus, the X5-Touch addresses the government requirements. When there is an opportunity for specific military or defence applications, our products including the X5 Touch can be customised or tailor-made for the customer.

The advanced omnidirectional satellite antenna on the X5 Touch ensures uninterrupted communications, offering seamless walk-and-talk functionality even in satellite mode. Thuraya's comprehensive satellite network provides clear and uninterrupted communications in more than 161 countries across Europe, Africa, Asia and Australia; and in terrestrial mode the Thuraya X5-Touch supports most 2G/3G/4G frequencies across the world.



Thuraya's comprehensive satellite network provides clear and uninterrupted communications in more than 161 countries across Europe, Africa, Asia and Australia

Thuraya offices in the UAE cater to the MENA market

Sometime ago you opened an office in the US. Have you made any forays into other countries since then?

Thuraya is an international company with a strategic presence worldwide. We have 24/7 customer care services, cover 161 countries, but also have presence outside that coverage.

We have international presence that spans most of the globe. Our teams are available in North America, Africa, Asia and Europe as well as MENA. We have no requirements for additional physical offices because we also have a very large network of partners and service providers who represent us in more than 140 countries.

Today, our offices in the UAE cater to the MENA market, and our sales office in Singapore serves APAC and the Australian market. The office in the U.S. caters to the defence sector, and government customers.

Our international offices also have local staff, so that they can communicate in the same language and understand local cultures.

This year Yahsat, the UAE-based satellite operator, acquired majority stake in Thuraya. How will this acquisition help Yahsat?

Yahsat's recent acquisition will significantly expand its current satellite solutions portfolio for commercial and government verticals, as well as its global footprint. The transition is still in the early stages but it is going in the right direction.

Thuraya Aero is a state-of-the-art, high-speed broadband communications system that supports in-cabin access, voice calls, text messaging, and real-time, high-speed data applications such as video conferencing and aerial surveillance on board small to medium planes, as well as rotary wing aircraft.

With its unique design, Thuraya Aero offers a wide choice of terminals with built-in video compression capability that can handle IP BGAN roaming speeds of up to 704 kbps.

Thuraya Aero's robust capabilities are the ideal communication solutions for beyond line of sight (BLOS) flights, as well as high end applications such as search and rescue (SAR), ISR (Intelligence, Surveillance and Reconnaissance), office-in-the-sky, military missions and telemedicine.

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EUROSATORY 2018

Lockheed Martin's Game Changing Hit-to-Kill Missile Technology

Vice Admiral (Ret) Andy Winns

By: Sakha Pramod

A technology leader working around the globe, Lockheed Martin has been a close partner of the Middle East since 1967. Vice Admiral (Ret) Andy Winns, Lockheed Martin's Middle East-Africa Regional Executive spoke with Nation Shield during the recently-concluded SOFEX about the diverse defence capabilities of Lockheed Martin ranging from tactical aircraft to missile defence solutions.

Can you tell us about Lockheed Martin's presence at this year's SOFEX?

SOFEX gave us an opportunity to engage with our local partners and to showcase our latest advanced technologies. Lockheed Martin has been a close partner with Jordan since 1967, with the delivery of the F-104 aircraft. Since then, the partnership has expanded and evolved into robust security and technology solutions to strengthen the Kingdom's sovereignty. We're proud to have participated again this year to build more meaningful partnerships with the Kingdom's leadership and the Royal Jordanian Armed Forces.

What special technologies did you showcase this year?

We showcased a cross section of our latest products and technologies at SOFEX. Among those on display were technologies ranging from tactical aircraft to integrated air and missile defence solutions. One of the key products of special interest was our Miniature Hit-to-Kill (MHTK) missile. Today's warfare demands agile, close-range solutions to combat rocket, artillery and mortar threats, and this technology is really game changing.

Shorter than a yardstick, MHTK retains the range and lethality required of a counter-RAM solution. MHTK uses Hit-to-Kill technology, which destroys threats through an extremely accurate application of kinetic energy in body-to-body contact. Hit-to-Kill technology eliminates the incoming threat while reducing the risk of collateral damage seen in traditional blast-fragmentation interceptors.

The MHTK interceptor is less than 2.5 feet (72 cm) in length and weighs about 5 pounds (2.2 kg) at launch. The mini missile has the potential to bring miniaturised capabilities to the warfighter with lower costs and reduced logistic footprints, while opening a world of opportunities for applications of small interceptors.

UH-60L and UH-60M were both on display at SOFEX. Could you tell us about the missions of Black Hawk and the mission support it does in Jordan?

The BLACK Hawk multirole helicopter serves with the U.S. military and the armed forces of 28 other countries worldwide as a tough, reliable utility helicopter. During the last 40

The BLACK Hawk multi-role helicopter serves with the U.S. military and the armed forces of 28 other countries

The MHTK interceptor is less than 2.5 feet in length and weighs about 5 pounds

years, this remarkable aircraft has fought its way in and out of countless combat zones to deliver and extract troops, save lives as a MEDEVAC or casualty evacuation platform, provide critical supplies to troops, deliver emergency supplies during natural disasters, and perform as an aerial firefighter and border patroller.

The UH-60M is more effective with its integrated digital cockpit, moving map display, enhanced GPS/INS system and fully coupled flight controls. It is more powerful with T700-GE-701D engine and new wide chord blades and more survivable with an enhanced laser warning system (AVR2B), Upturned Exhaust System, and the Common Missile Warning System (CMWS). Now the modern variant of this utility aircraft is taking on a new mission set — as an Armed Helicopter to provide fire suppression when supporting ground troops, as well as armed escort. With digital avionics, powerful GE engines, high strength airframe structures and composite wide chord rotor blades, today's BLACK Hawk platform has better survivability and situational awareness, and can fly higher and carry more than its predecessors ever did. More than 4,000 BLACK Hawk aircraft of all types are in service worldwide today.

Jordan's Black Hawk helicopters serve a diverse range of missions, from combat assault and peacekeeping to disaster relief, medical evacuation and VIP transport. UH-60M VIP Black Hawks transport the Royal family, Jordanian officials, visiting Heads of State and other dignitaries. The Jordanian Special Operations Aviation Brigade flies Black Hawks for special operations and border security, while the Royal Jordanian Air Force operates Black Hawks in its Royal Squadron.

Tell us about your new partnership with King's Academy?

Recently we announced our state-of-the-art "Lockheed Martin Robotics Incubator" to advance STEM education in the Kingdom at King's Academy, a foremost boarding school here in the region.

Cultivating talent at the earliest stages with practical STEM initiatives will ensure that Jordan continues to nurture the brightest minds that will lead their country's quest for innovation and discovery. As a technology leader working around the globe, we understand that the security and progress of a community, business and country is dependent on its next generation.

The 'Lockheed Martin Incubator' research facility supports equipment, technology and software that will complement the institution's science, technology, engineering and mathematics (STEM) curricula. The cutting-edge space will be available for use to all King's Academy students in grades 7 to 12.

Dynamit's RGW 90 Destroys Targets

The modern armed forces of today require handheld weapon systems with less than 10 kg weight, combat ranges of > 300 metres, a weapon length of only one metre and a scalable effect. Scalability should be achievable with a manual setting function, ranging from a minimum to full effect. This puts the soldier in the position to act and if required, to escalate according to the respective situation.

Dynamit Nobel Defences' (DND) weapons of the Recoilless Grenade Weapon (RGW) 90-series, feature multipurpose warheads with adjustable effects. All of the recoilless RGW handheld weapons can be fired from confined spaces.

A low launch signature, a low blast pressure as well as minimum smoke emission distinguish RGW 90 systems. Also, the firmly integrated optical sights and the adaptability of add-on aiming devices such as laser range finders, night vision devices or fire control units are unique features of the RGW family.

This easy and quick upgrading capability increases the capability of a successful first hit for the shooter, particularly at longer ranges under all weather conditions and independent of day or night conditions.

Another important factor for the probability of a successful first hit is the ergonomic balance of the RGW 90-series. This has been tested and proved over many years in field deployment. Due to the identical operability and intuitive handling of these handheld weapons the required training effort is minimised.

Lightweight Multi-purpose Weapon

Today, military tasks no longer request for just a single purpose anti-tank weapon but a portable multi-purpose handheld weapon system, that can also be used against structural targets. Based on these military requirements, the lightweight RGW 90 HH (Heat-Hesh) was developed with an adjustable warhead.

Primarily, the RGW 90 HH is designed to engage main battle tanks and armoured vehicles. As a secondary use, the weapon is effective against bunkers, fixed shelters or built up infrastructures. The compact disposable handheld weapon can be fired safely from confined spaces and has a low launch signature. It has a high hit probability due to the excellent sighting system and the user-friendly ergonomics. The RGW 90 HH is maintenance-free and if needed, it can be equipped with a night vision device or a fire control system.

Breaching of Protective Cover

DND developed the compact RGW 90 Anti Structure (AS) as a breaching device against the cover of bunkers, heavily fortified positions or urban structures. The RGW 90 AS has a two-stage warhead, which allows either to create a major breach in the protective cover or to unfold its full effect behind cover. With its warhead design, RGW90 AS can also engage light armoured vehicles. The adaptation of night vision optics or aiming devices is also possible.

Wall Breacher

The RGW 90 perforates any masonry structure by means of an explosively formed particle ring. Additionally, the excessive pressure of the explosive charge itself finally pushes out the piece of wall.

In this way the building-structure, in contrast to the effect of the squash head, is not damaged by cracks and the risk of collapsing the building is avoided to a large extent.

Experimental proof of this effect against a variety of wall structures has been provided in several test firings. With a second shot it is even possible to remove the reinforcement in double reinforced concrete walls. As all weapons of the RGW 90-series, the RGW 90 WB can be fired safely from confined spaces.

RGW 90 HH is designed to engage main battle tanks and armoured vehicles

Multifunctional Warhead

With RGW 90 LRMP (Long Range Multipurpose Programmable warhead), DND offers a low weight weapon with a programmable warhead fuze, which is very effective against a variety of targets and has an effective range of 1,200 metres. The shoulder launched weapon is effectively used against soft targets, light armoured vehicles, field fortifications and targets behind cover. With its multifunctional warhead, the ease of use and low weight, the RGW 90 LRMP fulfils all military-tactical requirements of infantry units for a truly multi-purpose tactical weapon.

Boeing helps India Expand Aerospace Ecosystem

A look at the decks of both the U.S. Navy's aircraft carriers and the Royal Australian Air Force's fleet showcase advanced, combat-proven strike capability. A new addition to the fleets is the F/A-18 Block III Super Hornet, the newest highly capable, affordable and available tactical aircraft in U.S. Navy inventory. The Super Hornet is the backbone of the U.S. Navy carrier air wing and is a multi-role solution for the Navy as well as international air force customers. The Royal Australian Air Force, on the other hand, operates 24 Super Hornets and 12 Growlers.

Recently, Boeing made an offering of the Super Hornet to India to advance the country's strike capabilities. As a highly advanced multi role fighter, with advanced survivability and room to grow, Boeing has said that the F/A-18 Super Hornet will deliver on India's need for a carrier and land based multi-role fighter.

The Super Hornet does not only have a low acquisition cost, but it costs less per flight hour to operate than any other tactical aircraft in U.S. forces inventory, including single engine fighters. With a plan for constant innovation, the F/A-18 Super Hornet can outpace threats and bolster defence capabilities for decades to come. The Super Hornet is combat proven and defined to meet the U.S. Navy's flight plan so that it continues to evolve to outpace future threats. It will be on the U.S. Navy's carrier decks for decades to come, being three-fourths of the Navy's strike fighter capacity into the 2030's, and no less than half the carriers striking force into the 2040's.

With designed-in stealth and robust capability growth plan, the Super Hornet is well-suited to get to India's Advanced Medium Combat Aircraft (AMCA) programme. The F/A-18 Super Hornet has a long life ahead, with the U.S. Navy making significant investments in the latest evolution, the Block III. Key features of the U.S. Navy Block III Super Hornet include enhanced network capability, longer range and low-drag with conformal fuel tanks, long-range detection with Infrared Search and Track, enhanced situational awareness with a new Advanced Cockpit System, improved signature reduction, and a

The Super Hornet is well-suited for India's AMCA programme

9,000+ hour life.

Ideal for 'Make in India'

The Super Hornet 'Make in India' proposal is to build an entirely new and state-of-the-art production facility that can be utilised for programmes such as AMCA.

Boeing is prepared to bring its global scale and supply chain, its best-in-industry precision manufacturing processes, as well as the company's unrivalled experience designing and optimising aerospace production facilities to both expand India's aerospace ecosystem and help realise the 'Make in India' vision. The approach addresses the infrastructure, personnel training, and operational tools and techniques required to produce a next-gen fighter aircraft right in India.

The firm is committed to expanding its industrial partnership for producing Super Hornets in India, further developing the country's aerospace ecosystem. Boeing will work closely with the Indian industry to ensure they have the very latest technologies, applying lessons learned from the current Super Hornet production line.

India has demonstrated its potential in aerospace platform development and manufacturing and has a base to build upon. Boeing has been working with suppliers in India for over two decades in manufacturing, IT and engineering services and Indian companies are integrated in its global supply chain. Today, more than 160 suppliers provide parts and assemblies covering commodities such as aerostructures, wire harness, composites, forgings, avionics mission systems, and ground support equipment. The programme envisages transitioning airframe and subsystem manufacture to Indian industry in a deliberate way, representing an opportunity for technology insertion and growth within India's aerospace industry.

Boeing will partner with the Indian industry to develop the right capabilities as efficiently and cost effectively as possible to integrate these suppliers into the global supply chain. The company and its current industry partners are having robust discussions with suppliers in India about building Super Hornets. Boeing has talked to over 400 Indian companies as part of their partner evaluation process for various systems and subsystems of Super Hornet.

Joint effort

Boeing has partnered with Hindustan Aeronautics Limited (HAL) and Mahindra Defence Systems (MDS) for manufacturing the F/A-18 Super Hornet in India and pursuing the joint develop-

ment of future technologies.

"Boeing is excited to team up with HAL and Mahindra. This partnership brings the best of Indian public and private enterprises together in partnership with Boeing to accelerate a contemporary 21st century ecosystem for aerospace and defence manufacturing in India," said Pratyush Kumar, president, Boeing India. "Our partnership with HAL and Mahindra will enable us to optimise the full potential of India's public and private sector to deliver next-generation F/A-18 fighter capabilities. Together we can deliver an affordable, combat-proven fighter platform for India, while adding growth momentum to the Indian aerospace ecosystem with manufacturing, skill development, innovation and engineering and job creation."

"HAL has always been at the forefront of aerospace development in India's aerospace sector," said T Suvarna Raju, chairman and managing director, HAL. "This partnership with Boeing and Mahindra Defence Systems will create an opportunity to develop capabilities of the aerospace industry and strengthen indigenous platforms in India thereby contributing to the 'Make in India' activities."

Multi-role solution

- Every Super Hornet has been delivered on cost and on schedule.
- The Super Hornet is the most cost-effective aircraft in the U.S. tactical aviation fleet, costing less per flight hour than any other tactical aircraft in U.S. forces inventory.
- Australia operates 24 Super Hornets.
- In August 2013, Boeing and Northrop Grumman conducted flight tests with a prototype of an Advanced Super Hornet with conformal fuel tanks, an enclosed weapons pod and signature enhancements. The successful flights proved the Super Hornet can outpace threats through 2040.
- The first successful flight of the Infrared Search and Track sensor system was in February 2014, and the U.S. Navy approved IRST for low-rate initial production in January 2015.
- As part of the FY18 budget was a requirement for 80 Super Hornets over the next five years as part of the Future Years Defense Program, including funding for Research Development, Test and Evaluation for Block III capabilities. The U.S. Navy added an additional 10 Super Hornets into the FY18 budget as its number one unfunded priority.

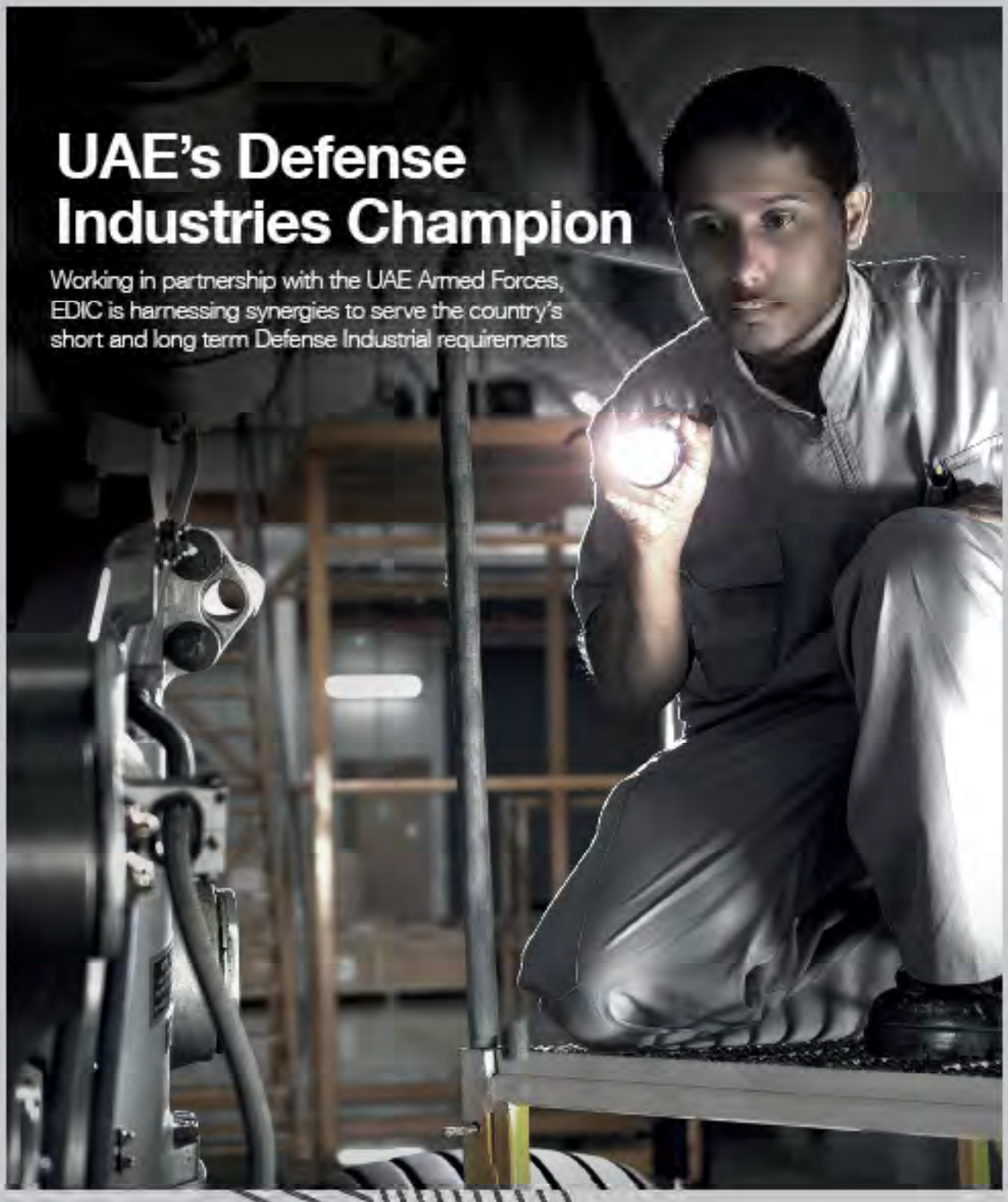
Future production with Indian partners will involve maximising indigenous content and producing the F/A-18 in India for its armed forces.

"We are excited about the opportunities that this partnership with Boeing and HAL will provide for us to contribute further to 'Make in India' for defence," said S. P. Shukla, group president, aerospace & defence, Mahindra Group, and chairman, Mahindra Defence Systems. "As one of the largest private sector defence companies, we look forward to supporting the modernisation effort of our armed forces and achieving economies of scale in the aerospace and defence sector."

This partnership is intended to bring Boeing, HAL and MDS' global scale and supply chain, its best-in-industry precision manufacturing processes, as well as the unrivalled experience of designing and optimising aerospace production facilities.

Reference Text/Photo:
www.boeing.com

F/A-18 Super Hornet will be on the U.S. Navy's carrier decks for decades to come



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Eurofighter Brings True Swing-Role Capability to the Gulf

The Eurofighter Typhoon is known for delivering an enviable level of flexibility and efficiency. It possesses both adequate weapon availability (up to six bombs whilst also carrying six missiles, a cannon and a targeting pod) and sufficient processing power to simultaneously support missile in-flight updates and bomb in-flight targeting.

The Eurofighter has been designed to be upgraded and extended, in order to provide decades of effective use. Combining a proven, agile airframe built from stealth materials with the latest sensor, control and weapons systems, delivers optimum combat capability.

The addition of the deep strike cruise missile Storm Shadow, Beyond Visual Range (BVR) air-to-air missile Meteor, and the precision attack missile Brimstone, will significantly increase the operational performance of the Eurofighter Typhoon as it goes forwards. The weapons systems, navigation technologies and control infrastructure are all designed to be upgraded, to continue to enhance the overall performance of the aircraft.

Kuwait's 28 Eurofighter Typhoons will be the most advanced of the type produced so far. The multi-role fighter aircraft will have a package of capabilities on top of the previous Typhoon's enhancement programmes, such as the Captor-E (E-scan) radar and several novelties in the weapon system that will bring the Kuwait Air Force to the front-line of fighter technology. Delivery of the aircraft will start in 2020 and will be completed in 2023 making Kuwait the aircraft's eighth customer.

Leonardo's role in developing Eurofighter

On April 5, 2016, a contract between the Ministry of Defence of the State of Kuwait and Leonardo (acting as prime contractor organisation) was signed. It was a true success of the Italian Country System, where politics, diplomacy, the Armed Forces and industry worked together, with considerable benefits in terms of know-how and qualified employment.

The work sharing of the complex European partnership programme sees Leonardo in charge of producing all the left wings, complete with installed systems; all the rear sections of the fuselage, designed together with BAE Systems; some mobile surfaces and underwing pylons for loads; wing-fuselage joints and titanium engine fairing.

Leonardo also designed and integrated important on-board systems (store management, navigation, flight controls, cockpit displays) and worked on the integration with the aircraft of the whole weapon and propulsion system.

Leonardo's Airborne & Space Systems Division, with the support of the various production sites in Italy and the UK, contribute significantly to the development and production of the aircraft's avionics and main sensors. In particular, the Captor-E radar, produced by the Euroradar consortium, the passive infrared PIRATE system, produced by the EuroFirst consortium (both consortium led by Leonardo) and the DASS auto-protection system (Defensive Aids Sub-System), and communication and IFF (Identification Friend or Foe) systems. Finally, at the Venegono Superiore plant in the Varese province, Leonardo designs and produces Ground Support Equipment (or AGE), such as air start and auxiliary power units.

Integration of Storm Shadow and Brimstone and other air-to-surface weapons enrich the multi-role characteristics of the Typhoon

Production for Kuwait

Since the second half of 2016, Kuwait's production activities started with details manufacturing, in line with the baseline plan and in some cases even ahead of schedule. The capability packages granted to Kuwait will include the integration of Storm Shadow and Brimstone and other air-to-surface weapons that enrich the multirole characteristics of the aircraft and enhance the weapon system. The first rear fuselage section started the "Stage 2" assembly phase at Leonardo in early 2018, while the "Stage 1" assembly phase is already running in BAE Systems for the first five aircraft. The centre fuselage section, will be produced by Airbus Defence & Space in Germany, and have already commenced the "pre-assy" phase according to the plan.

Eurofighter with the Kuwait Air Force insignia

This configuration foresees the integration of a new advanced laser designator pod (the Lockheed Martin Sniper) that will expand Eurofighter's portfolio of cleared laser designator pods, the introduction of the DRS-Cubic ACMI P5 combat training pod, an enhanced navigation aid (VOR) and the E-Scan radar CAPTOR with its antenna repositioner.

The Captor-E radar provides significantly more power than most competing systems. Combined with the fighter's large nose aperture and the unique ability to move the radar antenna, the Typhoon has a field of view of 200 degrees and the flight tests are confirming the discriminating advantages this will bring. This new radar underpins the Typhoon's current and future capability evolution.

This success in Kuwait is a further confirmation of the growing role that the multi-role aircraft produced by the Eurofighter Consortium plays in the Gulf Region. The latest contract signed is that inked by a Middle East country for 24 Typhoons that sees Eurofighter partner BAE Systems acting as prime contractor. Furthermore the deliveries of all 72 units ordered by Saudi Arabia have been completed, and Oman has already received half of the 12 planned aircraft.

The year 2017 has been the busiest ever for Typhoon forces, clocking up the most combat hours of any new generation swing role aircraft, with air forces taking part in operations and exercises across the globe.

Reference Text/Photo:
www.leonardocompany.com
www.baesystems.com
www.eurofighter.com

Distributed Lethality:
Ability to strike from any ship and any place

In general terms, distributed lethality implies creating small offensive adaptive force packages consisting of surface action groups (SAG) with a variety of support elements that operate across a wide region and under an adversary's anti-access sea denial umbrella. The strategy is to confound the enemy locating and targeting while introducing a threat to their sea control ambitions.

"Potential adversaries, particularly in the Pacific region, have invested in weapons designed to keep naval and U.S. Air Force assets from operating freely," said Tom Copeman, a retired three-star admiral who commanded the Navy's surface ships and is now a Raytheon vice president. "Distributed lethality will help us reverse that."

The Navy defines distributed lethality as the capability to strike from any ship and from any place in the world. Offensive weapons on U.S. ships complicate an enemy's ability to attack.

Raytheon is well positioned to help the Navy put this strategy to work. It already provides a wide range of products such as the Cooperative Engagement Capability integrated information-sharing system, the Phalanx close-in missile defence system, the guided RAM missile, the defensive ESSM guided missile, and SM-2, SM-3 and SM-6 missiles for the U.S. Navy and navies around the globe. These weapons can be adapted to meet various threats.

"Raytheon is on board every U.S. Navy ship that floats today and the majority of our allies' ships, so we have a thorough understanding of the threats, weapons systems, integration and con-ops that are needed to add punch and power to the total fleet," said Ron Jenkins, a retired U.S. Navy guided missile frigate and AEGIS guided missile cruiser captain and a Raytheon director.

One powerful weapon is the SM-6 missile, which demonstrated a new anti-surface capability earlier this year, proving effective against targets on the ocean's surface and enhancing the Navy's ability to strike from any ship and any location. The multi-mission SM-6 missile has executed distance-breaking missions, confirming that it can destroy short-range ballistic missile targets at sea in their final seconds of flight. It can also protect against airborne threats such as helicopters and cruise missiles.

While offensive power is vital, so too is a strong defence. " Unless the Navy also significantly increases the defensive capacity of surface combatants, they will have to retreat from the conflict area once the shooting starts," said Bryan Clark, a military and naval analyst with the Center for Strategic and Budgetary Assessments.

Raytheon is teaming with the U.S. Navy to install SeaRAM anti-ship missile defence systems on four guided missile destroyers stationed in Rota, Spain. The installation is a rapid response to protect naval ships deployed in Europe.

The company's extensive experience and expertise in surface weapons systems also offers the Navy a reliable, affordable at-sea offensive capability.

"Upgrading existing systems is the logical, economical, but effective bridge to where we ultimately need to go — high-speed weapons," said Rick Hunt, a Raytheon vice president and a retired Navy admiral.

After the systems are updated, they will need to be integrated. Much of the weapons integration, including the Tomahawk missile, is already in place with current configurations.

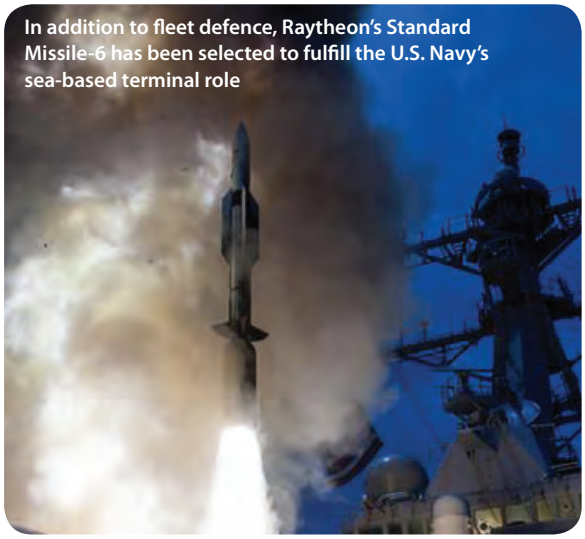
The Naval Strike Missile (NSM) can be immediately added as a standalone capability and readily integrated into the combat management system.

NSM is a fifth generation long range precision strike missile in existence as per today. Already chosen by the Royal Norwegian Navy for its new frigates and new coastal corvettes, the NSM will be fully operational on these ships when they enter service in the near future. The NSM is also selected by the Polish Navy for use on its new coastal artillery installations.

The Kongsberg's NSM is a very flexible system which can be launched from a variety of platforms against a variety of targets. The airframe design and the high thrust to weight ratio gives the NSM extremely good manoeuvrability. The missile is completely pas-

The Standard Missile-3 Block IB is based on the highly successful SM-3 Block IA, which is deployed around the world


The Phalanx close-in missile defence system


In addition to fleet defence, Raytheon's Standard Missile-6 has been selected to fulfill the U.S. Navy's sea-based terminal role

sive, has proven its excellent sea skimming capabilities and with its advance terminal manoeuvres it will survive the enemy air defences. The Autonomous Target Recognition (ATR) of the seeker ensures that the correct target is detected, recognised and hit, at sea or on land.

The NSM warhead effect is given by three main elements; warhead size, warhead fuze and target hitpoint. The NSM has selectable aim point in the target and has proven to hit the target very precisely. This capability enables selection of controlled destruction effect, ranging from maximum damage to controlled/minimum damage. Terminal accuracy has been demonstrated to less than 2 feet (distance between aim point and actual hit point).

The NSM has a 500lbs class warhead with a gross weight of 120 kg and explosive weight of 100 kg (TNT equivalent). The warhead is a combined blast (primary effect) and fragmentation (secondary effect) warhead with insensitive High Explosive (HE) charge. The warhead casing is made of titanium alloy with a steel-grid for fragmentation effect.

The fuze is programmable with custom designed fuze programmes down-loaded prior to launch. The warhead is insensitive munition certified. Raytheon has teamed with Norway's Kongsberg Defence Systems on the NSM missile.

According to Rtd. Rear Adm. Peter Fanta, distributed lethality means everything will be armed.

"If it floats, it fights," said Fanta. "That's distributed lethality: Make every cruiser, destroyer, amphib (amphibious ship), Littoral Combat Ship, a thorn in somebody else's side."

Reference Text/Photo:
www.raytheon.com, www.kongsberg.com


Naval Strike Missile can fly at very low altitudes over water and land

Middle East Militaries Need Proven, Battle-Tested Vehicles

The Middle East operating environment is increasingly complex and dangerous, putting new burdens on land forces. To meet these threats, militaries are deploying a new generation of wheeled armoured vehicles that feature extraordinary levels of protection against kinetic attacks and sophisticated battlefield communications and surveillance systems.

Proven, Built Right, Tailor-Made

One family of vehicles has emerged with an exemplary performance record after years of global combat experience: The Oshkosh M-ATV. The M-ATV is a four-wheeled design based on U.S. Army and Marine Corps global operational requirements and tested under rigorous conditions around the world and especially in the Middle East.

The M-ATV is far more manoeuvrable than prior models of wheeled armoured vehicles due to the vehicle's high-performance suspension. It also features modern armour and crew-safety engineering, which provides better protection than previous generations of MRAP-class vehicles. Crucially, the M-ATV was designed with all of its systems, such as power management and fire suppression, to be fully integrated during production. At the same time the M-ATV affords military customers unmatched vehicle customisation to address specific mission needs, such as optional engine protection, communications equipment, and different weapon systems. To understand more about what this latest generation of vehicles offers, it is worth exploring their successful operational performance, design, and mission-specific features.

Proven

The United States Army selected the Oshkosh M-ATV in 2009 because it is a highly survivable and versatile vehicle. The U.S. military has since purchased over 8,000 vehicles from Oshkosh as the Defence Department retired thousands of other models of MRAP vehicles. More than 2,700 M-ATVs are in service around the world, with many involved in coalition combat operations in the Middle East. The M-ATV has proven itself not only in testing but also in combat. Thousands of soldiers from many countries have survived combat operations around the world, including the Middle East, because they were travelling in an M-ATV.

Built Right

M-ATV safety and survivability features are integral to the vehicle's design; they are not bolt-on armour kits or upgrades to compensate for an outdated design. Oshkosh's protection design philosophy is unique in the land-forces sector because it considers how critical systems will work together to ensure crew survivability, mission effectiveness, and vehicle manoeuvrability. In the era of asymmetric threats, a vehicle crew needs to be defended against blast threats like IEDs as well as ballistic and electronic attacks. Oshkosh is able to combine kinetic protection through features such as integrated fire-suppression systems and blast-resistant seats while ensuring there is adequate electrical power for jammers, communications, and sensors that are important to protecting not just a crew but an entire combat formation. The M-ATV is unique in that it is as suited to combating irregular forces in urban environments as it is in supporting large high-speed armour formations in the desert.

More than 2,700 M-ATVs are in service around the world, with many involved in coalition combat operations in the Middle East

Tailor-Made

Though built to the highest protection and engineering standards, the M-ATV is a customisable platform that can be tailored to a military's specific operational requirements. Defensive modifications requested by customers have included underbody protection kits to increase blast protection against improvised explosive devices (IED) and netting to protect against rocket-propelled grenades (RPG). Offensive capabilities can be integrated into the vehicle to fit the customer's operational concept. To meet customer mission requirements Oshkosh now produces variants of the M-ATV to include assault, command, engineer, and utility roles; Oshkosh has also developed anti-tank, medical, and mortar variants for some customers. The M-ATV can even be customised for missions necessitating a more discreet presence.

It should not be surprising that the M-ATV has emerged as the premier armoured wheeled vehicle for the current and future global threat environment. Yet as modern as the design is, at its foundation is Oshkosh's more than 100-year legacy building vehicles to the toughest military standards in the world. That history of building battle-tested and customisable vehicles that exceed the demanding standards of Oshkosh's customers continues with the M-ATV.

M-ATV is unique in that it is as suited to combating irregular forces in urban environments as it is in supporting large high-speed armour formations in the desert

Dassault Aviation, Airbus, Leonardo Recommit to MALE RPAS

The first full-scale model of the European Medium-Altitude Long-Endurance Remotely Piloted Aircraft (MALE RPAS) was unveiled during a ceremony held at the recently concluded 2018 ILA Berlin Air Show.

The unveiling of the full-scale model and the reaffirmed commitment comes after a nearly two-year definition study launched in September 2016 by the four participating nations Germany, France, Italy and Spain, to define the baseline specifications/design for the future MALE RPAS. It followed the Declaration of Intent to work together on a European MALE unmanned aerial system (UAS) signed by the countries in May 2015.

At the event, the German and French Defence Ministers started their walk around by visiting the European MALE RPAS mock-up. The twin-engine turboprop design is one of the major decision of the programme participating States during the current ongoing definition study phase.

The ceremony, led by Dirk Hoke, Airbus Defence and Space CEO, Eric Trappier, Dassault Aviation Chairman and CEO, and Lucio Valerio Cioffi, Leonardo's Aircraft Division Managing Director, confirms the commitment of the four European States and industrial partners to jointly develop a sovereign solution for European defence and security.

"While still a lot of work lies ahead of us, this full-scale model represents a first milestone of what Europe can achieve in a high-technology sector if it bundles its industrial strength and know-how," said Hoke. "The MALE RPAS will become an integral part in guaranteeing Europe's sovereignty in the future. This programme is ideally suited to meet urgent capability requirements of Europe's armed forces."

"The unveiling reflects our companies' total dedication to the European defence and security sovereignty. Co-operation and high technology legitimate the leadership of the European industry and guarantee the strategic autonomy of Europe," highlighted Trappier. "Innovative programmes through efficient partnerships will serve European competitiveness and will offer new alternatives to the off-the-shelf acquisition of non-European products. Dassault Aviation reaffirms its full support to Airbus Defence and Space as programme leader of the MALE RPAS."

"Unmanned technologies and their applications represent one of the key technological foundations for the future evolution of European Defence Industries," added Cioffi. "The European MALE RPAS is orientated to foster the development of high technologies and will contribute to sustaining key competencies and jobs within Europe providing Armed Forces with a high-performance and sovereign operational system."

Strength in unity

In August 2016, the MALE RPAS Programme was integrated into Organisa-

The first full scale model of the European MALE RPAS was unveiled during a ceremony held at the 2018 ILA Berlin Air Show

tion for Joint Armament Cooperation (OCCAR). The participating States endorsed in July 2017 the baseline configuration "twin-engine turboprop" for the further definition study activities. Furthermore, in December 2017, Belgium obtained the observer status to the MALE RPAS Programme.

The European MALE RPAS will be operated worldwide to especially support Intelligence, Surveillance, Target Acquisition and Reconnaissance (ISTAR) missions, both wide area and in-theatre. It will be the first UAS designed for flight in non-segregated airspace.

The nations' agreement on the air vehicle configuration in mid-2017, selecting a twin-turboprop propulsion system, will supply ample on-board energy for the mission system, and provide proper redundancy to limit restrictions when operating over European densely populated ground and unrestricted airspaces. The design-to-cost activity provided the basis for full development, affordable to the participating States, and optimising operational performance. The two major milestones of the definition study are a System Requirement Review (SRR) and a System Preliminary Design Review (SPDR).

In January 2018, the MALE RPAS successfully passed SRR, which initiated the second phase of the definition study to lead to a SPDR, scheduled for the end of this year.

The SPDR will demonstrate the quality and fitness for the proposed design. Air Traffic Integration (ATI) and certification are key objectives, giving the participating States full confidence that the development step can be launched with acceptable residual risks.

The SPDR will demonstrate the quality and fitness for purpose of the proposed design. Especially, ATI and certification of the MALE RPAS is a key objective of the programme. This will give the participating States full confidence that the development step can be launched with acceptable residual risks.

Strong support system

Four European companies in the area of defence mission systems intend to combine their unique and complementary capabilities to provide the European MALE RPAS with a future-proof ISTAR function.

The four participating nations of European MALE RPAS programme are Germany, France, Italy and Spain

The companies Elettronica, HENSOLDT, Indra and Thales recently signed a memorandum of agreement, confirming their common goal to offer a coherent ISTAR functional chain for the MALE RPAS comprising all elements from sensors and computing through data processing and communications. The team is open to cooperation with other companies.

The four companies will bring their longstanding experience and technology leadership in defence electronics and mission systems into the joint approach, thereby substantially reducing the inherent risk of such a challenging programme. This will safeguard the target-oriented implementation in time and cost while guaranteeing the growth potential required for addressing future tasks.

"The future operating environment of

> The European MALE RPAS will be operated worldwide to especially support ISTAR missions

Air Forces will bring a variety of flying platforms into one force-multiplying network," said HENSOLDT-CEO Thomas Müller. "The close cooperation of the various platforms' mission systems is paramount to leverage the advantage of such highly complex network. Therefore, the architecture of the new RPAS mission system must be in the hands of the subject-matter experts from the start, tailoring its development irrespective of single platform aspects."

"Thales, HENSOLDT, Elettronica and Indra, have big ambitions based on a shared vision of the digital transformation of their industries and customers. Thales will be using its expertise in defence mission systems mastering four key digital technologies of Connectivity, Big Data, AI, and Cybersecurity. We offer clients decisive technologies to take the best decision in real time," said Patrice Caine, Chairman and CEO at Thales.

"We are building industrial cooperation in Europe and preparing for a future in which defence investments will be mainly performed at European level. This alliance will pave the way for future large programmes currently being defined in Europe," said Ignacio Mataix, Executive Director at Indra.

"Our long term experience in collaboration programmes and our mind-set will be beneficial in terms of risk reduction and full capability achievement. The teaming with our historical European partners will lead to a high level of success," said Enzo Benigni, Chairman and CEO of Elettronica.

Preparations for the next stage (development, production and initial in-service support) are already well under way. Entry-into-service of European MALE RPAS is planned for the middle of the next decade. The next stage of the programme is intended to commence during fourth quarter of 2019. To ensure this ambitious goal OCCAR is currently preparing an invitation to tender.

Reference Text/Photo:
www.airbus.com, www.dassault-aviation.com, www.thalesgroup.com, www.leonardocompany.com

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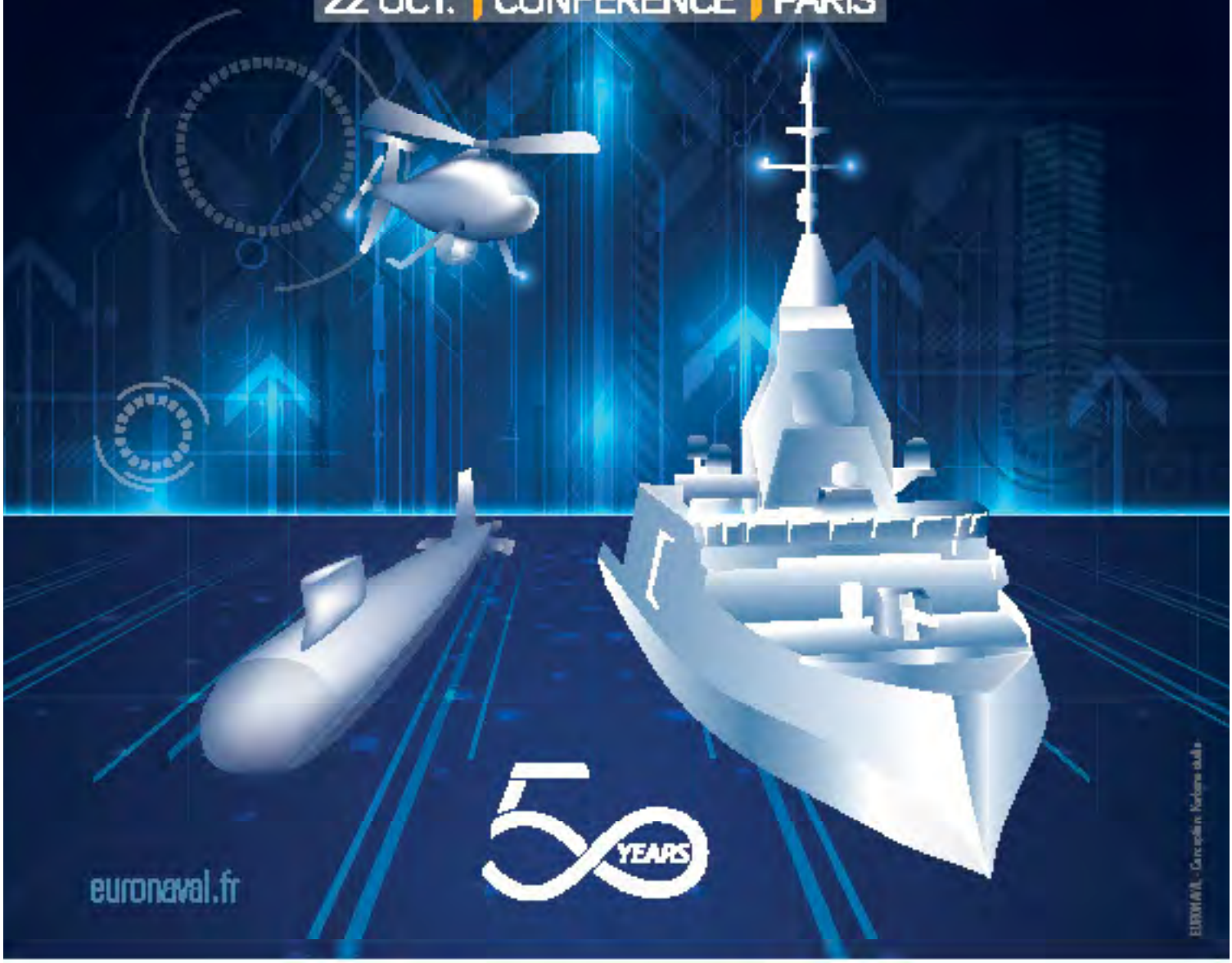

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EmbraerX Launches eVTOL Aircraft Concept

EmbraerX, an Embraer organisation developing disruptive businesses, unveiled its first electrical Vertical Take-Off and Landing (eVTOL) aircraft concept. It was launched recently at Uber Elevate 2018, in Los Angeles, California.

EmbraerX is engaged in several projects, including the development of eVTOL concepts through a cooperation with Uber and other companies to explore business opportunities within the Uber Elevate ecosystem.

Paulo Cesar de Souza e Silva, president and CEO of Embraer said: "We are relentless in our quest for constant growth and through EmbraerX we will drive disruptive innovation and accelerate the creation of new businesses with the potential for exponential growth. Urban mobility is ripe for transformation and we are committed to having a major role in this key market."

The eVTOL concept presented at Uber Elevate 2018 represents an aircraft with a mission to serve passengers in an urban environment, based on the key design drivers of safety, passenger experience, affordability and a low footprint for the community, in terms of noise and emissions.

"We are developing solutions to bring on-demand air transportation to urban areas to improve quality of life for millions of people. Our collaboration with key stakeholders will accelerate the arrival of this new ecosystem," said Antonio Campello, president and CEO of EmbraerX. "This is one example of how EmbraerX is committed to exploring a range of disruptive products and services that could revolutionise the business of air transportation."

The eVTOL concept is the outcome of extensive interaction with potential urban air travellers about their desired experience, combined with the expertise of Embraer's teams and the collaboration with various companies and institutions. EmbraerX will continue to engage with communities to expedite the development of desired solutions for this new market.

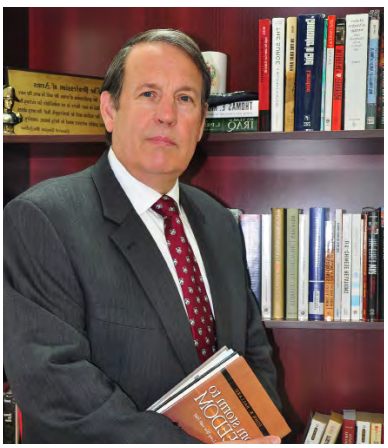
With an inherent startup mentality, EmbraerX has three fundamental pillars, which are the shaping of the future user experience of air transportation, the application of Embraer know-how, as well as the generation of disruptive products, services and business models. EmbraerX is based on Florida's Space Coast in Melbourne, Florida, with innovation teams established in Silicon Valley and Boston that are integrating and collaborating with innovation communities.

Over the last five decades, Embraer has designed, developed and certified close to 50 aircraft models, delivering over 8,000 aircraft to 100 countries. Leveraging Embraer's longstanding relationships with aircraft certification authorities around the globe, EmbraerX will ensure that safety design drivers meet and exceed the highest industry standards.

Reference Text/Photo: www.embraer.com.

Strategic Perspectives

Implementing Strategy: Necessary International Cooperation



By: Dr. John R.Ballard
Former Dean of the National Defense College
john.ballard@msn.com

Modern strategists need to be proficient using the essential capabilities of national power to engage effectively internationally. Having introduced several fundamentals of strategic engagement and outlined the concept of Freedom of Action, it is useful to understand how some of the other concepts work together to develop strategic power on the international scene. A second essential concept that frames strategic options is International Cooperation.

International Cooperation is the art of maintaining alliances and sharing efforts towards common objectives among states, when beneficial. Cooperation is directly related to Freedom of Action–both impact a state's ability to act as desired to achieve national interests. As stated previously, International Cooperation among states can limit Freedom of Action, but if the decision to cooperate is taken in a way to ensure Freedom of Action as well, then both principles are reinforced.

States can be threatened by international organisations, global business conglomerates, non-state actors of significance and even alliance structures, but they can also form relationships among such actors to deter or counter other aggressor states. Some threats (such as refugee relief, illicit drugs, and climate change) are so large that no single nation can manage them alone. The United Nations has developed many capable agencies to help with such instances, but they cannot address all threats. On the other hand, many argue that weakly bound International Cooperation efforts, such as the League of Nations, were more harmful than good. So effective International Cooperation will normally place some constraints on national action.

Once a nation decides to cooperate with another entity and signs an agreement to do so, it is then constrained in its actions by the requirements of the agreement. For example, voluntarily entering into an alliance such as the Gulf Cooperation Council constrains each state to act only after consultation and normally in coordination with other members of the GCC. However, through membership in the GCC each state also benefits from strength in numbers. In many ways, the economic aspects of the GCC could also be restraints, but combining the effects of so many strong economies also adds great bargaining power to the group and each member state. Therefore, the GCC, as a consultative, international cooperation effort, enhances the national power of its individual member states while applying very limited constraints on their Freedom of Action. National economic cooperation efforts such as storing UAE oil in Japan, or South Korean involvement in the construction of the Baraka Nuclear Facility, are also examples of effective cooperation, retaining Freedom of Action while improving national capabilities on both sides.

As our regional security grows ever more complex, strategic leaders must choose among various alliances and trade arrangements to ensure prosperity; each cooperative effort may require different obligations, but they have become a necessary part of global engagement. To play a strong role internationally, states should commit thoughtfully to International Cooperation efforts. When chosen wisely such cooperation can ensure national Freedom of Action without undo restraints or constraints. Thankfully, the UAE is a world leader in prudent International Cooperation.

Aviall Leads the AHRLAC Supply Chain

Boeing has announced the leadership role of its subsidiary Aviall in supply chain management of the Advanced High-Performance Reconnaissance Light Aircraft (AHRLAC) developed by the Paramount Group. Aviall has also joined Bronco Combat Systems to bring the Bronco II aircraft to the U.S. market.

Aviall and Boeing Global Services will support supply chain procurement and management for AHRLAC's militarised variants – Mwari (international) and Bronco II (U.S.) – while taking responsibility for securing and scaling the U.S. production and sustainment supply chain, with Boeing providing software-based solutions for centralised command-and-control of flight operations and total lifecycle support. As Aviall President and CEO, Eric Strafel confirmed, "This industry partnership provides not only a specialised aircraft that meets the U.S. customer's unique mission needs but at a fraction of the procurement and lifecycle cost of similar aircraft."

A versatile, multi-role, rugged and reliable manned platform with a long range and rapid response time, AHRLAC Holding is responsible for the manufacture and support of the aircraft, which can hold in an extended loiter for operational support and operate from primitive forward sites in remote areas. Both variants offer a significant carrying capacity with over 25 hard sensor points located across the fuselage to facilitate real time intelligence gathering and on-board interpretation.

MWARI weaponised variant

The MWARI – the weaponised version of AHRLAC aircraft whose name is 'All-seeing Being' in the African Shona language – is an intelligence-gathering and precision-strike aircraft with the surveillance, targeting, defensive and attack capabilities normally associated with a more expensive, larger-class aircraft. The aircraft's optical and electronic sensors offer a 30,000ft eagle eyed view of the world, combining the technology and capabilities of reconnaissance aircraft and attack helicopters in a single aircraft. The aircraft is a smart, innovative 'command centre in the sky' that integrates some of the world's most advanced Multi-Function-Displays, Electro Optical Systems, Electronic Intelligence gathering and compact sensory equipment. With the capability to carry a range of sophisticated precision strike weapons, MWARI can deliver precisely targeted surgical strikes against targets of opportunity whilst minimising the risk of col-

The MWARI – the weaponised version of AHRLAC aircraft – is an intelligence-gathering and precision-strike aircraft with the surveillance, targeting, defensive and attack capabilities normally associated with a more expensive, larger-class aircraft

lateral damage usually associated with other systems.

The result is a two-seated intelligent aircraft perfectly suited to operating in the Middle East, with missions such as intelligence gathering, border and maritime patrol, policing, internal security and disaster management.

BRONCO precision-strike aircraft

In a move revolutionising the light attack and tactical C4ISR aircraft industry, the BRONCO II aircraft is to be launched by newly-created Bronco Combat Systems (BCS) U.S.

The original Bronco was renowned for its impressive mission capabilities and open-system architecture enabling rapid incorporation and the employment of current and emerging systems. Bronco II is a two-crew precision-strike and C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance) aircraft capable of carrying a wide range of weapons, sensors and systems in extended airborne mission operations.

The Bronco II Interchangeable Multi-Mission Pod System enables a single airframe to be used in multiple roles with nearly zero down-time between role changes. The interchangeable pod will allow users to buy one airframe and multiple pods used for different operational requirements.

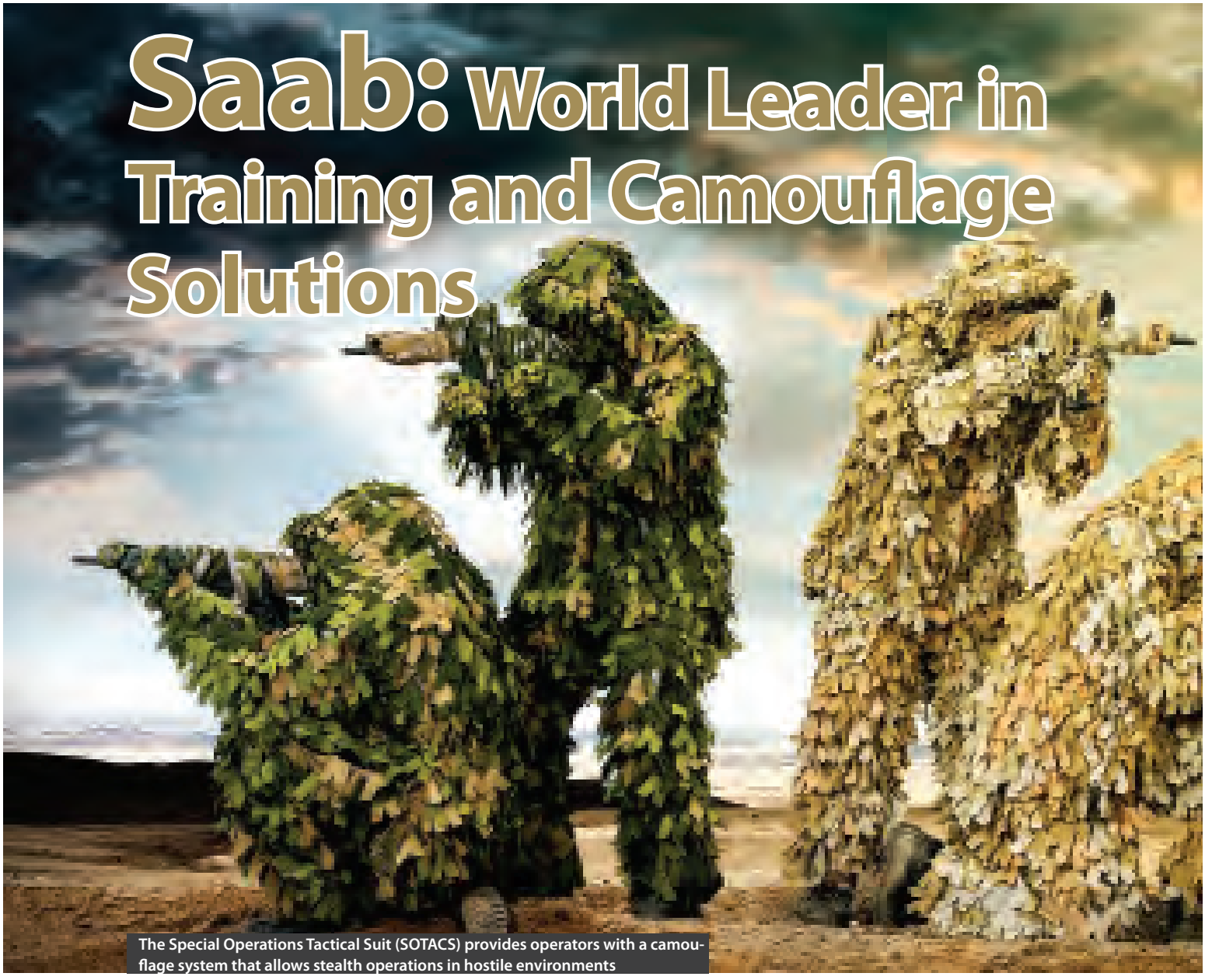
As Ivor Ichikowitz, Paramount Group chairman verifies, the Pod can carry various systems ranging from ELINT, COMINT, SAR and FLIR: "The strengthening of our relationship with Boeing Global Services is a key milestone in the introduction of Bronco II into the U.S. market. Aviall will help the programme scale rapidly in production, as well as help reduce operating costs in an aircraft of this type. Our collaboration with Boeing leverages the strong design and mission capabilities of both companies and for the kind of asymmetrical warfare required by sophisticated military forces. These missions demand rapidly deployable, hybrid ISR and close air support capabilities for which no other platform has been specifically designed."

The aircraft is 100 per cent digitally designed in order to industrialise the BRONCO II in its totality in the United States, while the promised manufacturing base will enable the full production of the airframe and mission systems integration in the United States. Ichikowitz notes that, "BRONCO II was designed with the US market in mind; it contains significant American content and we are now excited to be able to commit to bringing full production of the aircraft home to the U.S."

Fulcrum Concepts LLC will lead weapons and system integration for BRONCO II whose airborne Find/Fix/Finish/Exploit/Analyse (F3EA) system operates for extended periods in remote theaters with minimal infrastructure and a small logistics/maintenance footprint at a fraction of the procurement cost of similar aircraft. As Ichikowitz concludes, "This is a very exciting time for us, our partners and future U.S. customers will benefit from the rapid fielding of the Bronco II. Discussions are underway with highly respected and experienced U.S. suppliers for total supply chain management, mission software and mission training."

Reference Text/Photo:
www.aviall.com, www.paramountgroup.com.

Saab: World Leader in Training and Camouflage Solutions



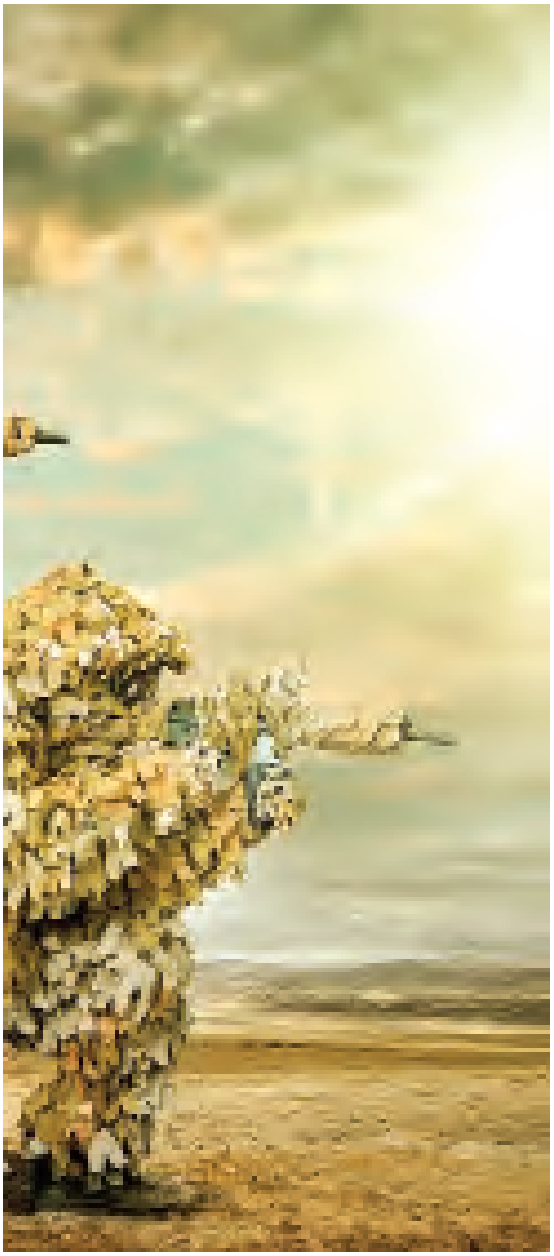
The Special Operations Tactical Suit (SOTACS) provides operators with a camouflage system that allows stealth operations in hostile environments

The individual, a soldier or a commanding officer, is the centrepiece in a modern force and consequently, in all modern training too. Live training is all about experiencing the elements of combat, in advance. And camouflage is what protects the troops in highly dangerous conflict theatres.

A training system needs to be flexible, efficient, and most importantly, as realistic as possible. Saab believes that the most essential prerequisite for training efficiency is realism that makes it possible to train just the way you operate in your mission, getting instant and correct feedback that is fundamentally important for the learning process. This makes the soldier feel confident in the tasks they are about to enter, and this can only be done with scenarios as close to the real operation as possible.

Saab's training systems are used for training at all levels, from individual, squad or platoon level right up to and beyond brigade combat team level.

Training and simulation solution is an ideal example where Saab has



world-leading technology and competence. Another area is camouflage systems where Saab offers a range of solutions for vehicles, facilities, and individuals.

Having the ability to conceal armed forces in the field provides major tactical advantages. This facilitates keeping troops and assets safe from attack by the enemy, and allows them to draw close enough to the target to launch their own highly effective attacks.

Far more than just camouflage nets, the Saab product range includes everything from camouflage suits for individuals, mobile camouflage solutions for vehicles, and complete solutions to protect static camps from enemy detection. These solutions offer protection from ultra-violet, visual, near infrared and thermal sensors as well as radar. In-built thermal radiation protection, meanwhile, reduces the operating temperature inside vehicles, increasing crew comfort, firing accuracy, and fuel efficiency.

Some situations require extreme measures of signature protection. For special operations forces, snipers and forward observers operating in high risk areas, remaining undetected can spell the difference between mission success and failure.

SOTACS – The Tactical Suit

Highly trained snipers and special operators are invaluable resources. SOTACS – the Special Operations Tactical Suit – provides such operators with a camouflage system that allows stealth operations in hostile environments. The suit is customisable, has multispectral characteristics and offers exceptional cover from a wide range of reconnaissance systems. Saab has developed a series of lightweight personal camouflage solutions capable of protecting soldiers in all types of operations.

Colours used in the SOTACS are designed to imitate the colour scheme of each intended environment, making the suit blend in perfectly with its surroundings. The texture of the suit also disrupts the revealing contours of the human body and creates a shape that resembles the environment. SOTACS colours can be adapted to match any environment.

The Thermal Infrared properties of the SOTACS are adapted to obstruct thermal reconnaissance and reduce the risk of detection in all climate conditions. The suit blocks 80 per cent of the thermal energy emitted by the soldier and enables emitted body heat to be cooled down by the ambient air, making the thermal signature blend in perfectly with the surroundings.

Saab Barracuda SOTACS is ultra-light, weighing no more than 2.9 kg. The 'non-snagging' construction ensures easy handling and allows a long service life for the system. The fabric is water repellent and maintains its light

Saab's training systems are used for training at all levels

Saab Camouflage system ULCAS

weight even in humid or wet weather conditions. The SOTACS can be delivered with a variety of complementary accessories such as gloves, hats and weapon camouflage.

Ultra-Lightweight Camouflage Screen

The Ultra-Lightweight Camouflage Screen (ULCAS) is an advanced multispectral camouflage net that provides unrivalled signature protection for vehicles and other objects in static positions. Being multispectral, the screen makes multiple or single layers of conventional camouflage products for different requirements virtually redundant. Due to its non-snagging properties, its service life is increased substantially in comparison with conventional nets.

ULCAS weighs no more than 250 g/m^2 and operational temperatures are in the range of –20°C – +80°C for both storage and use. The camouflage net has high chemical resistance and withstands exposure to petroleum, oil and lubricants. The thermal infrared properties are adapted to obstruct thermal reconnaissance and reduce the risk of detection in all climate conditions. ULCAS thermal properties also provide protection against other threats such as target acquisition systems and heat seeking missiles. Pigments used in the ULCAS pattern are carefully chosen and adapted to match the near-infrared reflection of vegetation, rocks and soil in the intended environment. ULCAS near-infrared capabilities significantly reduce the risk of being detected by sensors such as night vision devices.

> ULCAS is an advanced multispectral camouflage net that provides unrivalled signature protection

ULCAS has radar properties not seen in any other camouflage net and provides protection against radar reconnaissance and homing missiles in the range of 1–100 GHz.

Saab's mission is to make people safe by pushing intellectual and technological boundaries. The company serves the global market with world-leading products, services and solutions from military defence to civil security. With operations on every continent, Saab continuously develops, adapts and improves new technology to meet customers' changing needs.

Saab has around 16,000 employees. Annual sales amount to around SEK 31 billion, of which about 23 per cent is re-invested in research and development.

Strategic Perspectives

Planning to Win

By: Dr. Thomas A. Drohan
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Winning complex wars, not just battles, requires persistent effects that fit the context at hand. In this sense, "winning" is a continual process of seeking relative advantage. Combined effects are blends of diplomatic, informational, military, economic and social (DIMES) effects. Planning to win is not easy, but it combines these interactive effects.

Consider the Korean security predicament. At the inter-Korean Summit in April 2018, Kim Jong-un spoke of a new history of peace, prosperity and better inter-Korean ties. With that future in mind, what will be the North Korean strategy? Let's assume the following strategic-level ends, ways and means. Desired effects are marked in bold. They reinforce one another:

• **Diplomatic:** normalised relations with the U.S. to persuade or compel acceptance of North Korea as a sovereign state, and to induce North Korean political influence in re-unified Korea

• **Informational:** national narrative of self-reliance and main power victimisation to induce social control, and to persuade or compel diplomatic effects

• **Military:** capability to deter and defend against external powers, to compel or coerce diplomatic effects, to secure or coerce economic effects, and to compel or coerce social effects

• **Economic:** domestic reforms to persuade and induce investment, trade, and economic aid

• **Social:** ethnic exceptionalism and personal loyalty to secure the regime against subversion, and to induce external acceptance

Pyongyang's strategies employ confrontation and cooperation — persuasion, compellence, inducement, deterrence, defence, and coercion. Historically, Koreans — South and North — have sought any available means to eke out sovereignty among predatory powers. Thus it is prudent to assume that North Korea is planning to win every relative advantage it can. It follows that operational-level planning will pursue these conditions:

• Information campaigns to leverage diplomatic recognition, external political influence, and internal control

• Military activities that enhance diplomacy and generate or attract financial resources

• Reforms that grow the economy and complement social control

Uncertainties abound. Domestic propaganda can backfire in the international market or persuade some audiences through Internet trolls. Stopping nuclear and missile tests generates sparse global support while illicit operations continue, and risks internal military opposition. Foreign investment or social media can destroy national myths.

Given such risks, we should expect flexibility in North Korean strategy. A unified Korea could be (another) framework of vague principles, or a commonwealth of sorts. Pyongyang's domestic narrative could shift to Korean territorial disputes with China and Japan. Military deterrence and defence do not require nuclear weapons. Economic and social controls will adapt over time with threat perceptions.

At the tactical level, we should also anticipate a mix of ways and means. First, old promises such as the 1992 agreements on denuclearisation and reconciliation, which were unfulfilled. Second, new promises such as halting missile firings and nuclear tests, perhaps demonstrating a restart.

Third, old tactics such as treating reciprocal South Korean or American concessions as bargaining baselines for further North Korean demands. Fourth, new tactics, such as risking unconditional return to the Non-Proliferation Treaty plus its nuclear safeguards (special inspections).

Security strategists plan to win relative advantage, such as the conditional peace of legitimate competition. To protect the nation, strategists have a responsibility to verify the absence of predatory intent and capabilities. This requires recognising the full range of combined effects, and preparing plans.

Kärcher Futuretech's Mobile Solutions Provide Relief in Crisis Areas

MPDS 2 is a universal decontamination system specially designed for the decontamination of material and vehicles

With more than 30 years of experience, Kärcher Futuretech offers state-of-the-art products. It is an internationally recognised specialist for innovative decontamination and supply systems designed for use in crisis and disaster areas. Its mobile, compact and modular solutions enable it to perform a variety of CBRN decontamination tasks, set up field camps and provide large numbers of people with clean drinking water and food. At Eurosatory in Paris, taking place from June 11 to 15, the company will present new products in the areas of decontamination, water supply, catering and field camps.

Complete and Compact

The MPDS 2 is a universal decontamination system specially designed for the decontamination of material and vehicles. The MPDS 2 allows a 3-lance operation making pre-, main-, and post-treatment simultaneously possible. Without the additional accessories a simultaneous 2-lance operation can be carried out. An integrated power generator, an optional pump (removable) for non-aqueous agents and a dosage for two-component chemicals make the multifuel driven MPDS 2 a self-sufficient, independently usable decontamination unit. It is ideal for the application of the complete spectrum of cleaning and decontamination agents offered by Kärcher Futuretech. This decontamination system stands out for its universality and the optional accessories provide the possibility to use nearly all kinds of decontamination and standard cleaning agents available on the market. In addition, the MPDS 2 is simple to operate and maintain and can be easily transported.

All-Rounder in Water Purification

The portable water purification system WTC 500 produces up to 500-litres of drinking water within an hour while purifying fresh, salt or chemically contaminated water. According to the principle of reverse osmosis even invisible chemical contaminants, including salts dissolved in water, can be removed. All surfaces, which come into contact with drinking water, have been selected conforming to internationally accepted regulations (e.g., DVGW, NSF), enabling the treatment of drinking water according to the WHO quality guidelines. The system is built using the highest quality materials and industry approved components, resulting in its extreme reliability.

The user interface stands out due to its clear and systematic set-up, which allows faster and intuitive operation. Thanks to its integrated handles, six persons can manually carry the system through rough terrain to the water source. The WTC 500 is also available as a self-sufficient system with a generator and trailer. At a practical test, a team of helpers needed less than 10 minutes to lift the system from the loading area, set it up and prepare for operation.

Configurable Field Kitchen

The MFK 2 with its modular design on an off-road trailer is a kitchen system that can be customised to the cooking styles of users worldwide. The MFK 2 has four free module slots that can be configured on an off-road single-axle trailer. Furthermore, a wide selection of cooking and frying modules as well as the combi streamer and the function modules "cooling" and "freezing" are available. In addition to existing cooking modules with diesel or gas burners, the MFK 2 can also be configured with the new closed combustion modules. Depending on the configuration, it can prepare complete meals for up to 250 persons or 600 simple dishes. Power and fuel are supplied centrally in a side

Kärcher Futuretech offers the diesel-powered hot water module with buffer tank HWM 100B

The portable water purification system WTC 500 produces up to 500-litres of drinking water within an hour

storage box for all modules. The system is produced from high-quality, corrosion-resistant stainless steel and meets the highest hygiene standards. These characteristics ensure convenient, time and resource-saving cleaning according to the HACCP concept. Special features of the new MFK 2 are a sturdy axle as well as a parallel height-adjustable drawbar, which allows uncomplicated transport using different vehicles.

Hot Running Water on Demand

In larger field camps a lot of energy is needed, even more when it comes to the cooking and heating of water for hygiene measures. Therefore, Kärcher Futuretech offers the diesel-powered hot water module with buffer tank HWM 100 B. This new compact module was specially created for scenarios where a highly flexible volumetric flow rate is needed. It allows a continuous and adjustable flow rate even at fluctuating incoming water temperatures: from very low (e.g. hand wash basins) to very high (e.g. showers) water volume flow rates (up to 3000 l/h).

The 100 kW diesel burner with a diesel consumption of less than 10 l per hour makes it up to five times more energy efficient than heating the water with electricity. This leads to considerably lower operating costs. The HWM 100 B runs in accordance with international standards for materials, which come into contact with drinking water and is designed for complete thermal self-disinfection of all internal drinking water components. This guarantees complete hygiene in the field and the transport of special cleaning agents is not necessary.

BSDA Showcases Naval Group's Defence Innovations

The Scorpène 2000 is equipped with six bow-located 21in torpedo tubes providing salvo launch capability

Naval Group proved to be one of the foremost participants in this year's Black Sea Defense and Aerospace exhibition (BSDA), which took place in Bucharest over 16th-18th May. Its state-of-the-art naval technology demonstrated capabilities in modern military ship and submarine building, alongside high-tech system solutions and expertise as a leading naval integrator.

Amulti-mission corvette designed for 21st-century security and defence challenges, Naval Group showcased its Gowind 2500. A sea-proven platform combining unrivalled stealth features, resilience and high availability with MU90 and CANTO-V armament, the Gowind provides outstanding anti-air (AW), anti-surface (ASW) and anti-submarine warfare (ASuW) performance.

A new lightweight torpedo, the MU90 is capable of countering any type of nuclear or conventional submarine, even acoustically coated, deep-diving, evasive vessels deploying anti-torpedo effectors or bottomed in littoral areas. Based on a dilution/confusion concept, the CANTO-V represents a breakthrough in anti-torpedo defence, acting against advanced and previous-generation torpedoes.

Naval Group-SNC's exclusive partnership

On 20th April 2018, Constanța Shipyard (SNC) and Naval Group signed an exclusive partnership to deliver four Gowind 2500 corvettes to the Romanian Navy.

SNC will benefit from centuries-long expertise in military shipbuilding and ensure the Romanian industry is implicated in ship design, construction and maintenance to preserve national sovereignty and create long-term high added-value jobs.

Stealthy steel corvette

With a low-acoustic signature and radar cross-section making the corvette stealthier than other class vessels, the Gowind 2500 is a steel mono-hull vessel avoiding easy detection by hostile

platforms.

The Gowind 2500 is powered by combined diesel and electric propulsion system, while the power-plant provides a maximum speed of 25kt-plus and the corvette a range of 4,000 nautical miles (nm) at 15kt speeds. The corvette has a 102m length, 16m beam, 5.4m depth and 2,500t displacement, complementing a crew of 65 and 15 Special Forces.

Utilising the SETIS system, the vessel integrates multiple mission modules for operational requirements combat-proven on the French Navy's FREMM frigates and interoperable with NATO systems. The intuitive man-machine interface and integrated command prompts enable significant data analysis via onboard sensors, alongside quick counteractions against wide-ranging threats.

Through integration of an unmanned aircraft system (UAS) for extended detection and threat response, SETIS can conduct surface vessel engagement, detection/tracking of submarine and aerial platform defence. It also utilises interoperable data links to share an accurate tactical picture with other vessels in the task group.

The corvette is armed with an OTO Melara 76mm main gun, two Nexter Narwhal 20mm cannons, a vertical launch system (VLS) for 16 VL Mica surface-to-air missiles, eight MBDA MM40 Exocet anti-ship missile launchers and two triple-torpedo launchers. Amongst the onboard sensors are a 3D radar, electronic support measures (ESM) suite and a hull-mounted variable depth sonar (VDS), while the vessel features a helicopter deck for permanent deployment of a 10-tonne heavy-lift helicopter, unmanned aerial vehicles (UAVs) and a helicopter hangar facility.

Scorpène 2000 submarine

Naval Group's Scorpène 2000 is a submarine well-placed for operational effectiveness, with a comprehensive mission scope including: anti-surface and anti-submarine warfare, strikes against land-based objectives, naval force or joint-NATO operational integration, special operations, offensive minelaying, area surveillance/blockade and intelligence gathering. Integrating the Barracuda's improvements, it can carry 18 torpedoes/missiles or 30 mines.

The Scorpène 2000 is equipped with six bow-located 21in torpedo tubes providing salvo launch capability, with an air turbine pump launching positive discharges. Weaponry includes anti-ship/-submarine torpedoes and anti-surface missiles with automated weapon handling and loading, while the SUBTICS combat management system has six multifunction common consoles and a centrally-located tactical table collocated to platform-control facilities.

The SUBTICS system is composed of a command and tactical data-handling system, a weapon control system, a suite of acoustic sensors with an interface accessing air surface detection sensors and an integrated navigation system. The system can download data from external sources while the integrated navigation system combines data from global positioning systems, depth measurement and the ship's trim/list monitoring system, enabling the Scorpene to monitor seawater density/temperature and the submarine's own noise signature.

The structure of the submarine uses high-yield stress-specific steel, enabling dives to maximum depths. The low-acoustic signature and hydrodynamic shock-resistance give the Scorpene the capability to carry out anti-submarine and anti-surface ship warfare operations in closed or open sea conditions, enabling the vessel to work with special forces in coastal waters.

The Scorpene has been planned and designed to achieve an extremely quiet vessel with great detection capability and offensive power thanks to its elastically-supported 2,900kW electronic engine. It has two diesel generation sets providing 1,250kW of power with a Dutch Breach machinery shipping hatch on top of the hull above the diesel generator sets.

The Scorpene has two variants: the CM-2000 with the conventional propulsion system and the AM-2000 equipped with air-independent propulsion. The AM-2000 is capable of remaining submerged on underwater patrol for three times longer than the CM-2000.

Gowind 2500 is a sea-proven platform combining unrivalled stealth features, resilience and high availability with MU90 and CANTO®-V armament


RAAF Hawk FMS Formation


Hawk Mk127 simulator replicates the new LIFCAP Hawk cockpit

RAAF's Hawk Mk127 Lead-in Fighter Training System Upgrade

RAAF Williamtown, located just north of Newcastle in the Hunter Region of New South Wales, is Australia's primary fighter pilot training a base and also a base in transition. Home to Air Combat Group headquarters as well as 78 Wing, the Royal Australian Air Force's operational training wing, the base is undergoing a major redevelopment of infrastructure as it prepares for the introduction of the F-35. According to the RAAF, improvements to Williamtown include an extension of its runway, new Air Combat Group headquarters building, and other redevelopment projects.

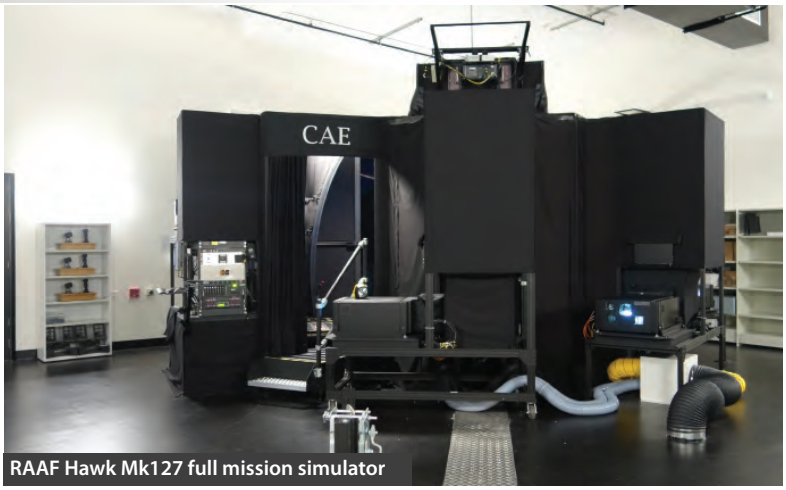
The runway extension will be an improvement to the base's airfield to reduce necessary speed for takeoff and mitigate noise pollution caused by the takeoff of fighter jets to the neighbouring communities. Before any RAAF pilots fly the frontline combat aircraft, however, they must progress through the lead-in fighter training system. As part of the significant work underway at RAAF Williamtown there has been a major overhaul to the RAAF's Hawk Mk127 lead-in fighter trainer fleet.

The BAE Systems Hawk Mk127 lead-in fighter trainer is a two-seat jet aircraft used to prepare the RAAF's fast jet aircrew for operational conversion to the F/A-18F Super Hornet, EA-18G Growler and ultimately the F-35A Joint Strike Fighter. The RAAF currently possess a fleet of 33 Hawk aircraft that are undergoing a major upgrade as part of the Air 5438 Lead-In Fighter Capability Assurance Program (LIFCAP).

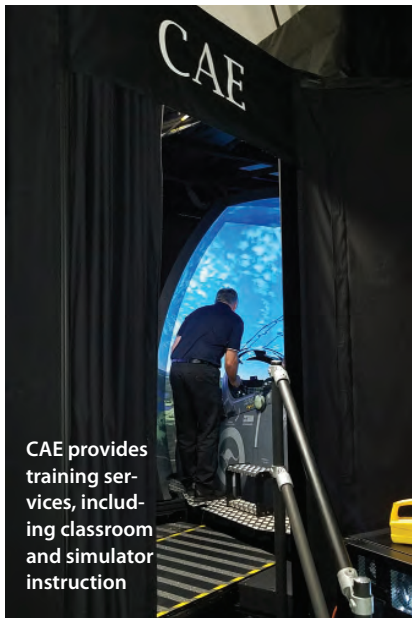
The LIFCAP upgrades include avionics and other modifications to the entire aircraft fleet, the installation of three new advanced CAE-built Hawk Mk127 full-mission simulators, and other operational support systems. By 2019, the RAAF and BAE Systems expect the LIFCAP upgrades to be completed on all 33 aircraft which will bring an enhanced training capability to support the progression to more advanced fighter fleets.

Embedded into the LIFCAP programme and an updating of the lead-in fighter training syllabus was the addition of three new Hawk Mk127 full-mission simulators developed by CAE, one of which is now located at RAAF Base Pearce and the other two at RAAF Base Williamtown. CAE is also providing training services, including classroom and simulator instruction, to support No. 79 Squadron at RAAF Pearce where pilots learn how to fly a jet, and No. 76 Squadron at RAAF Williamtown where the weapons and tactics training for future fighter pilots takes place.

"There are no easy flying jobs on the frontline," said Group Captain Chris Hake, Officer Commanding 78 Wing for the Royal Australian Air Force. "In the lead-in fighter training programme, we want to find areas needed for improvement and remediate them early, which is a benefit of our new simulation systems. We have no choice but to use advanced simulation to produce our next fighter pilots, and our new simulators allow students to learn much more when airborne."



RAAF Hawk Mk127 full mission simulator



CAE provides training services, including classroom and simulator instruction

Williamtown houses two of the RAAF's three Hawk Mk127 full-mission simulators developed by CAE. Each simulator replicates the new LIFCAP Hawk cockpit and features an 11-foot projection dome display based on Boeing's Constant Resolution Visual System being driven by CAE's Medallion-6000 image generator. The realistic and highly immersive virtual environment is enabling the RAAF to shift some training tasks to the simulators.

"I can't overemphasise how important simulator training is to efficiency in support of live flying," said Wing Commander Neville O'Donnell, Commanding Officer 76 Squadron for the RAAF.

Part of the overall learning environment includes debriefing after each simulator session is completed, thus giving instructors and trainee pilots the ability to review every detail of their virtual mission.

"You can't really hide in the full-mission simulator," said Tim Twelvetree, one of CAE's Hawk Simulator Flying Instructors. "The simulator is a fantastic learning environment and an invaluable training tool, but at the same time I'm glad I'm not as scrutinised in my job as these pilots are. That's how they learn, though."

Reference Text/Photo: Chris Stellwag

CAE bags deal to support RAAF's fighter training programme

Following delivery of the three CAE-built Hawk Mk127 full-mission simulators – one to RAAF Base Pearce and two to RAAF Base Williamtown – CAE was awarded a contract by Australia's Capability Acquisition and Sustainment Group to provide comprehensive support and training services for the Royal Australian Air Force. Under terms of the long-term contract, CAE is providing classroom and simulator instructors in addition to providing maintenance and support services on the Hawk Mk127 full-mission simulators.

"The Hawk programme is a great example of how the Australian Defence Force are embracing modern simulation technologies and investing in a cost-effective training solution to prepare students to fly fast jet aircraft," said Ian Bell, CAE's Vice President and General Manager, Middle East/Asia-Pacific.

"We are pleased to support the RAAF's lead-in fighter training programme that plays a vital role in preparing aircrews for the RAAF's next-generation fighter aircraft such as the F/A-18 Super Hornet and F-35 Lightning. Our instructors are integrated with the active-duty RAAF instructors so they work in partnership to deliver high-quality academic and simulator training, which is exactly the sort of relationship we aim to achieve with our defence customers."

The RAAF Hawk Mk127 training programme is also a good example of CAE serving as a training systems integrator. Being a training systems integrator means developing a higher-level partnership with governments and militaries to look at their training enterprise holistically. The Australian Defence Force is a leader in this type of partnering approach with industry, and many global militaries are increasingly adopting this approach to public/private partnership for the delivery of training.

As a company entirely focused on training, CAE's product and service offerings are ideally suited to helping military customers with their proficiency and basic training all the way to operational and mission training.

Indago UAS for Day or Night Operations

Lockheed Martin's Indago 3, a small quadrotor unmanned aerial system (UAS) has been upgraded with high-resolution infrared sensors capable of day or night operations.

"Providing an infrared capability for Indago further enhances the uses for this small but powerful system," said Rich Bonnett, Indago programme manager with Lockheed Martin Procerus Technologies. "With its endurance and quick deployment ability, Indago can be used for tasks ranging from surveillance to supporting fire fighting operations to search and rescue."

Indago's infrared system, Noctis, consists of dual FLIR infrared cameras that provide real time streaming video and still imagery. Noctis uses wide and narrow fields of view with a digital zoom field of view from 32 degrees to 2 degrees, with seamless transition between cameras. Its vision processing provides feature tracking of objects, reducing operator workload. It is offered in two variants, laser equipped, or non-laser equipped.

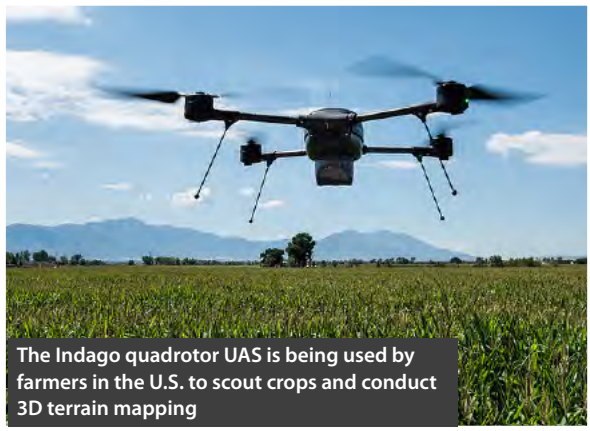
The Indago 3 quadrotor UAS weighs less than five pounds and can be airborne in less than three minutes. Along with a low acoustic and visual signature during start up and flight, the platform's haze grey colour minimises visual detection during missions. Depending on payloads, Indago 3 can fly up to 50 minutes at a cruise speed of 25 mph and can operate at temperatures as low as 30-degrees below zero, and as high as 120 degrees. The collapsible UAS folds into a man-packable unit that requires no tools for assembly and can be unfolded in 60 seconds.

Ready For Civil, Military Applications

The Indago goes beyond the stable, capable design of the UAS. Its features include an extended hover and fast forward flight capability that provides military, civil and commercial customers with a quick aerial reconnaissance capability in crowded areas unreachable by fixed-wing unmanned aircraft. The Indago's payload system provides additional capability that separates it from the average drone. Featuring a quick disconnect adapter, Indago allows the operator to choose an appropriate payload that suits the mission. There are payloads available for a variety of different applications including: precision agriculture, mapping, surveying and inspection, and reconnaissance. Additional payloads are in development.

The proven and reliable system has an industry-leading flight time surpassing 45 minutes, and provides high quality

Indago can be used for tasks ranging from surveillance to supporting fire fighting operations to search and rescue



The Indago quadrotor UAS is being used by farmers in the U.S. to scout crops and conduct 3D terrain mapping

Controlling the Indago

data with an electro-optic infrared gimbaled imager to enhance situational awareness and enable real-time decision-making.

Saving Lives

The UAS assists fire fighters in maximising the effectiveness of night time operations. Indago can stream live video from its thermal sensor to the operators on the ground, who will use the data to identify hot spots, fire location and intensity, and people and property that were at risk. The Indago has helped save an estimated 100 homes, worth more than $50 million in U.S. The video from Indago can be disseminated locally through a WiFi connection, or streamed over a data connection that can be viewed on any computer or personal electronic device.

Using the Indago, fire fighters are able to reduce the size and duration of the fire, reduce the impact on the community, and realise cost savings in managing the response.

Eye-in-the-sky

Lives are at stake when individuals with Alzheimer's disease, Autism and Down syndrome wander from their homes. Project Lifesaver International is a public safety non-profit organisation that works with first responders to return these individuals to their homes or facilities, and the organisation has conducted more than 3,000 rescues in the past 16 years. Time is critical when people are missing, and airborne search and rescue can be costly and time consuming.

Lockheed Martin integrated an antenna and receiver with the Indago quadrotor UAS, which can be stored in any squad car and deployed in less than five minutes. Using Indago extends Project Lifesaver agencies' search areas from one and a half miles to well over seven miles.

The vertical take-off and landing UAS provides an eye-in-the-sky that is suited for urban or heavily forested areas because it does not require a large space to take-off or land. Indago is a safe and effective airborne search and rescue tool that can be used in all weather, even when manned aircraft are grounded.

Disaster Relief

Following the devastation of Cyclone Pam in Vanuatu, the United National World Bank and the Vanuatu government required rapid damage assessments of the country's infrastructure, without putting further strain on the limited ground and aviation assets available to the response effort.

The Heliwest Group deployed the Indago quadrotor UAS to survey 50 sites

Indago provides high quality imaging. There is a 30x payload camera or Duo+ day/night/thermal camera on Indago UAS.

Assembling the Indago

across nine remote islands. The team conducted 126 separate missions over 12 days to capture oblique imagery, video, and ortho-mapping. The Indago's flexibility and small logistics footprint allowed Heliwest to deploy a full system while remaining mobile on police patrol boats, zodiacs, quadbikes, cars, and regional flights and light helicopters.

Indago provided the capability of several different systems in one package: the team fielded a mapping capability, stable high-resolution video, and oblique imaging. The UAS was able to operate in extreme weather conditions, even when other aircraft were grounded

Precision Agriculture

Farmers use precision agriculture to produce food, fuel, and fibre and land reclamation, which requires gathering accurate data that affects yields, environmental impact and the economic viability of farms. Currently, farmers spend hours walking through acres of farmland to obtain effective information and identify potential threats to their farms – including insect infestations and potential nutrient shortages – and potential threats to the environment.

The Indago quadrotor UAS is being used by farmers in the U.S. to scout crops and conduct 3D terrain mapping. Its electro-optic/infrared gimbaled imager has capabilities that monitor plant size and leaf counts, as well as multi-spectral imaging to monitor parasite infestations and possible effects of drought.

First Response and Inspections

After a fire, an accident or in hazardous search-and-rescue operations, first responders need to quickly assess the situation and determine how to assist or find people in dangerous situations. The need to rapidly capture evidence, record accident and crime scenes, search the area for evidence, and provide first responder safety. The various payloads available with UAS can expedite the search process based on mission requirements.

There is a 30x payload camera or Duo+ day/night/thermal camera on Indago UAS. This payload can not only gather thermal images, it also has a built in laser illuminator which are crucial in search and rescue operations in rugged terrain such as with missing hunters or hikers.

Oil and gas inspections are dangerous, costly and lengthy. To maintain compliance with government regulations, these inspections must occur regularly. Implementing UAS technology to gather imagery and data means inspections can occur with less human risk, less cost and more often.

Indago quadrotor UAS camera captures high-resolution inspection images and video with 30x optical zoom and enhanced digital zoom. It can be used during normal refinery operations, meaning the systems don't have to be shut down during inspections. Indago can capture these detailed images from 300 feet away and can be used in all weather.

The same case applies to high voltage transmission towers, antenna towers, wind turbines/wind mills, train tracks, bridges, oil pipelines, oil rigs/platforms, and any other dangerous or inspection activity.

Reference Text/Photo:
www.lockheedmartin.com

Augmented reality to support military decision makers

Holographic Tactical Sandbox is designed for use in mission preparation and briefing, based on a 3D holographic map viewable in an augmented reality helmet

Anticipating and deciding quickly are major concerns for military decision-makers. This requires extensive training, well in advance of interventions and far from theatres of operation.

To meet this challenge, Airbus Defence and Space has developed a solution using augmented reality – the 'Holographic Tactical Sandbox'. This highly innovative tool is designed for use in mission preparation and briefing, based on a 3D holographic map viewable in an augmented reality helmet.

Integrated into the chain of command, this tool provides an accurate 3D representation of the battlefield using information supplied by Airbus' Fortion TacticalC2 application. Operators can view and create information, which is then shared with higher decision-making levels.

By facilitating operations planning and decision-making, this innovation shortens the observation and decision-making loop. In addition to its operational benefits, this lightweight, ergonomic and compact technology offers many other advantages.

These include a 'remote' function that allows operators to connect and take part in mission preparation by viewing and interacting on the same map with the same data from a remote location, such as a command centre for example.

At the same time, augmented reality allows 'augmented' decision-makers to continue interacting with their environment and staff, which would be impossible with virtual reality.

In addition, operators no longer need to process the data and information they receive, thereby saving precious time that is freed up for more value-added tasks. Plus, savings are generated by cutting the logistics costs necessary to implement complex, heavy data sets, or an expensive and cumbersome interactive table.

The Intelligence Programme Line of Airbus Defence and Space is recognised as a world leader in geospatial data. It is a global supplier of commercial satellite imagery; the number one European supplier of land command and control solutions as well as a lead supplier of ISR and air defence solutions to France, Germany and NATO.

Based upon proprietary commercial access to the Pléiades, SPOT, DMC and TripleSat Constellations, TerraSAR-X, TanDEM-X and PAZ satellites, combined with comprehensive applications experience, Airbus Defence and Space delivers a broad product and services portfolio spanning the entire geo-information value chain.

With more than 30 years experience in data acquisition, processing, data management and hosting, the company delivers sustainable solutions that provide exactly what customers need, when and where they need it, across a comprehensive range of markets, addressing defence and security, commercial and civil institutional customers.

Airbus Defence and Space supports decision makers worldwide to increase security, optimise mission planning and operations, boost performance, improve management of natural resources, and protect the environment.

Addressing today's need for actionable information and more efficient combination and dissemination of geospatial data, Airbus Defence and Space delivers its customers in the defence and security domain tailor-made solutions for ISR applications, for the support of strategic and tactical mission requirements as well as for the generation and dissemination of command information for commanders at all levels.

Airbus Helicopters, Schiebel

Airbus Helicopters and Schiebel recently tested Manned Unmanned Teaming (MUM-T) capabilities between an H145 platform and a CAMCOPTER S-100 Unmanned Air System (UAS), thus becoming the first European helicopter manufacturers to demonstrate this technology with the highest level of interoperability (LOI 5). The companies carried out test flights with the support of the Austrian Armaments and Defence Technology Agency. The two aircraft jointly flew different scenarios including the detection of objects hidden in places not accessible by traditional helicopters. The S-100 was controlled and piloted by an operator sitting in the helicopter. During the flights, the control was also temporarily handed over to a ground-based control station by the pilot in order to simulate the return of the manned helicopter for refuelling.

The trials carried out by Airbus Helicopters and Schiebel went up to MUM-T LOI 5. This allows the manned platform to exercise full control of the UAS including its take-off and landing. LOI 1, the lowest level, is the indirect receipt and/or transmission of sensor data obtained by the UAS to the manned aircraft.

"MUMT-T multiplies the capabilities of both systems," said Mark R. Henning, Program Manager at Airbus Helicopters. "Smaller UAS with vertical take-off and landing capabilities can, for example, fly around obstacles as trees or buildings closer than a helicopter could. They are able to explore unknown territory and deliver information to the helicopter crew, which is operating from a safe position and can then step in with the helicopter's superior effects, having received a clear picture from the UAS. Our airborne MUM-T management system will become a highly attractive feature for our entire product range including the NH90, NFH, and the Tiger together with the H145, as it adds a valuable operational capability. MUM-T can be implemented in any kind of helicopter and can interact with all types of unmanned systems, in particular Airbus Helicopters' new VSR 700 UAS."

In the framework of the test, the challenges of data transfer interference and electromagnetic compatibility of the UAS with the helicopter as well as the integration of a complete UAS mission planning and control system into the helicopter's architecture were successfully managed. The S-100 mission planning and control system was provided by Schiebel. The next step will be to optimise the human machine interface based on a thorough analysis of the

Exhibit MUM-T Capabilities

The Schiebel S-100 can be controlled and piloted by an operator sitting in the helicopter

crew workload using the results of the flight tests.

Tried and tested

The H145 is a twin-engine H145 civil helicopter that was first delivered in 2014. Designed to deliver excellent performance throughout the flight envelope, Airbus' H145 is the latest member of its four-tonne-class twin-engine rotorcraft product range, with designed-in mission capability and flexibility, especially in high and hot operating conditions. Compact in size, this helicopter's small footprint and large flexible cabin makes it the aircraft of choice for a variety of civil missions. It is best in its class for rough EMS and police missions. The H145M is the helicopter's military version.

The H145's enhanced Arriel 2E power plant and dual full-authority digital engine control (FADEC), along with the helicopter's upgraded main and tail rotor systems, guarantee an unprecedented level of performance in both hover and one-engine inoperative (OEI) conditions.

The Fenestron technology brings to the H145 benefits such as improved flight and ground safety, enhanced anti-torque control efficiency, reduced power demand in forward flight, and lower noise and vibration levels. The best-selling H145 family (BK117, EC145 and H145) has close to 1,300 helicopters in service around the world and has clocked in approximately five million flight hours.

Unparalleled performance

The S-100 UAS is a proven capability for military and civilian applications. The Vertical Takeoff and Landing (VTOL) UAS needs no prepared area or supporting launch or recovery equipment. It operates day and night, under adverse weather conditions, with a range out to 200 km, both on land and at sea. It navigates automatically via pre-programmed GPS waypoints or can be operated directly with a pilot control unit. Missions are planned and controlled via a simple point-and-click graphical user interface. High-definition payload imagery is transmitted to the control station in real time. Using "fly-by-wire" technology controlled by redundant flight computers, the UAS can complete its mission automatically in complex electromagnetic environments. Its carbon fibre and titanium fuselage provide capacity for a wide range of payload/endurance combinations.

> Airbus' H145 is the latest member of its four-tonne-class twin-engine rotorcraft product range

Recently, Schiebel and Overwatch Imaging successfully integrated PT-8 Oceanwatch, a small target detection payload, on the S-100 UAS. The PT-8 Oceanwatch delivers an image-based wide area maritime search capability that significantly extends the coverage area and makes the S-100 an even more powerful naval patrol solution. Oceanwatch autonomously detects small targets on the ocean surface, solving the challenge of searching for small objects over vast areas and outperforming conventional cameras that face insurmountably large areas when zoomed in and invisible targets when zoomed out.

Reference Text/Photo:
www.airbus.com
www.schiebel.net

Revolutionary Guard:

The Arm of Iran to Spread Chaos, Unrest,

The economic sanctions imposed by several countries against the Iranian Revolutionary Guards were only a reflection of the role of this militia. U.S. President Donald Trump described it last October as a "corrupt terrorist force" working on the implementation of the Iranian regime's agenda by penetrating many Arab countries directly or through agents. In this issue, Nation Shield sheds light on this militia, its objectives, strategy, tactics, and the impact of its malicious intervention in neighbouring countries.

The Revolutionary Guard (IRGC) is not only the most important player in Iran's domestic and foreign policy, it is also the main arm of its expansionist project in the region. It adopts a military doctrine based on ideology, sectarianism and exporting the revolution to the countries of the region.

The Revolutionary Guard – From Defending the Khomeini Revolution to Seeking to Export it to Regional Countries

After the success of the Iranian revolution in 1979, the Revolutionary Guard Corps (PASDARAN) was established by Khomeini's decision to protect the

and Threaten Neighbourhood Security

then emerging regime and create a balance of power with the regular Armed Forces. The Revolutionary Guard played a major role during the period of divisions that accompanied the establishment of the revolution. It managed to impose Khomeini's visions in adopting the principle of Wilayat al Faqih (Rule or guardianship by a jurist) as an approach in administration and governance. The Revolutionary Guard's threat lies in the circumstances of its inception, and its literature – it is a doctrinal and ideological organisation that believes in the mandate of the Faqih and the export of the revolution, as well as exporting it as laid down by the leader of the Iranian revolution, Imam Khomeini.

Article 150 of Iran's Constitution details the tasks of the Revolution Guards Corps: "The Islamic Revolution Guards Corps is to be maintained so that it may continue in its role of guarding the Revolution and its achievements. The scope of the duties of this Corps, and its areas of responsibility, in relation to the duties and areas of responsibility of the other Armed Forces, are to be determined by law with emphasis on brotherly cooperation and harmony among them."

The IRGC is the strongest arm that makes and carries out the Iranian foreign policy. Experts and researchers agree that the Iranian revolution would not have achieved its objectives without having a strategic military arm defending it and working on exporting it at a later stage.

The Qods Force, led by Qassim Soleimani, is the most important unit of the Revolutionary Guard and the most important Iranian arm operating outside the borders. It is responsible for the formation,

training and directing of various militias linked to Iran, especially in Lebanon (Hezbollah) and Yemen (Houthi coup). Its Commander, General Qassem Soleimani, who is named by the Supreme Leader Ali Khamenei as the "Living Martyr", built a wide network of relations in the region stretching from Yemen to Syria, Iraq and other countries, thus becoming the most prominent face of the Iranian influence in these countries.

Why Does the Revolutionary Guard Constitute the Most Influential Force in the Iranian Political Regime?

Over the past years, the IRGC has continued its adverse interference in the GCC countries

Iran's Supreme Commander of the Armed Forces is also the Supreme Leader of the Revolutionary Guard. The Revolutionary Guard is the most influential force in the Iranian political system, so much so that it has been described as a state within the state, given the following considerations:

The generals of the Iranian Revolutionary Guard are appointed by the Supreme Leader, not by the civilian government. Therefore, the Revolutionary Guard is the arm of the Supreme Leader of the Revolution, who controls everything in the style of a modern religious tyranny.

This expansion and distribution of the structures of the Revolutionary Guard has extended its influence to other state institutions, such as the regular army, the classical armed forces, various religious institutions, the executive authority, The Ministry of National Security and Intelligence. In recent years, the IRGC has expanded its influence, and in some cases its control, into the bodies of law enforcement, foreign intelligence operations, strategic military command and national economy.

The Revolutionary Guard is the most influential player in Iranian politics. It has a strong and active presence in civilian institutions and bodies. It controls the Basij forces, which take to the streets in times of crisis to disperse dissidents or demonstrators.

The Commander-in-Chief of the Iranian Revolutionary Guard, Major General Mohammad Ali Jafari, has become one of the most influential leaders in the Iranian political system. He plays a major role in the implementation of the tasks assigned by the Supreme Leader of the Revolution, Ali Khamenei.

The IRGC controls about a third of the Iranian economy, through its control of many charities, foundations and companies operating in various fields.

The IRGC possesses all types of weapons,

and has a specialised command of land, sea and air forces, along with a specialised unit in space science, and a special intelligence body led by the leadership of the IRGC and the office of the Supreme Leader.

IRGC's Project is to Spread Chaos, Sectarianism and Terrorism in the Region

It is clear that the expansionist Iranian project in the region is linked primarily to the military and strategic doctrine of the Revolutionary Guard, which seeks to dominate and maximise Tehran's influence in its wider regional environment.

The past years have revealed that the IRGC's destructive and subversive project in the region depends mainly on the dissemination of sectarianism and the establishment of armed ideological militias linked to Iran. The task of these militias is to achieve the ultimate goal, namely to impose the "indirect" Iranian control on these target countries. The activities and practices carried out by the Revolutionary Guard to implement this project include the following:

• Trying to replicate Hezbollah's experience in many countries in the region, including Bahrain, Saudi Arabia, Kuwait, Iraq, Syria and Yemen.

• Converting Iran-connected military militias into a model of the Iranian Revolutionary Guards in the countries of these militias.

• The use of armed militias to maximise Iranian influence and strengthen its hegemony over the countries of the region.

The Revolutionary Guard's Hostile Attitudes Towards the GCC Countries

Over the past years, the Iranian Revolutionary Guard has continued its adverse interference in the GCC countries. It has been involved in many activities aimed at destabilising these countries and threatening their security. The following Iranian activities can be highlighted in this regard:

The use of armed militias linked to the Revolutionary Guards (Hezbollah-Houthi) to threaten the security of the Gulf. For example, the continued support by the Revolutionary Guards of the Houthi terrorist militia is aimed not only at strengthening Iranian influence in Yemen, but also at exerting pressure on the GCC states, especially Saudi Arabia.

The establishment of spy cells targeting the Gulf States: The Iranian Revolutionary Guard is expanding its intelligence activities throughout the region, and has established many intelligence centres in a number of countries in the region, in-

Revolutionary Guard relies on terrorist cells to upset the security and stability of the GCC countries

cluding the GCC countries.

The establishment of sleeper terrorist cells : It has become clear that the Revolutionary Guard relies on terrorist cells to upset the security and stability of the GCC countries, especially the Kingdom of Bahrain and Kingdom of Saudi Arabia.

Conducting periodic manoeuvres and exercises and demonstrating the military force in the waters of the Arabian Gulf involves clear and deliberate threats to the GCC countries.

The Withdrawal of the United States from the Nuclear Agreement and the Exacerbation of the Predicament of the Revolutionary Guard

The withdrawal of U.S. President Donald Trump from the Iranian nuclear agreement on May 8, 2018, has launched a new phase in the U.S. dealing with Iran. This new policy does not only address the gaps involved in this agreement and impose more restrictions and sanctions to prevent the possession of nuclear weapons, but also involves countering Iran's policies that undermine security and stability in the region and the world at large.

One of the main reasons for the U.S. withdrawal from the nuclear agreement was because Iran and its military arm, the Revolutionary Guards, were involved in disrupting security and stability in the region. In President Trump's Nowruz message marking the start of the spring New Year's festival, in March 2018, he specifically attacked Iran's Revolutionary Guard Corps, saying it had engaged in corruption and mismanagement of the Iranian economy. "Twenty-five centuries ago, Darius the Great asked God to protect Iran from three dangers: hostile armies, drought, and falsehood," the President said in the statement. "Today, the Iranian regime's Islamic Revolutionary Guard Corps represents all three."

This may explain the sanctions imposed by the United States, days after the withdrawal from the nuclear deal, on Iranian persons and companies that have helped the Iranian Revolutionary Guard, transferred millions of dollars to it and helped finance its malicious activities in the region. In the same context, sanctions were imposed by the United States and the GCC countries in May 2018 on the leaders of the Lebanese Hezbollah, including its Secretary General Hassan Nasrallah and members of the Shura Council in the party, because of its close ties with the Revolutionary Guard, and its role in prolonging the suffering in Syria, exacerbating violence in Iraq and Yemen, endangering Lebanon and its people and threatening security and stability in the region.

It is clear that the United States will step up its pressure on the Revolutionary Guard in the coming months, after being confirmed that it is Iran's instrument to spread chaos, sectarianism and terrorism in the region. After the United States withdraws from the nuclear deal, Iran will have a date with unprecedented sanctions to be especially imposed on the armaments sector, leaders and prominent figures in the Revolutionary Guard who are working on the development of the missile programme.

Conclusion

The developments and data revealed during the past years indicate that the Revolutionary Guard (IRGC) was the arm on which Iran relied in exporting the revolution abroad. It granted IRGC many powers until it became a state within the state and the most influential actor in the domestic and foreign policies. It has engaged Iran in a number of conflicts in the region in the hope of reviving the Iranian empire. The statements of the Revolutionary Guard's leaders made this clear.

The Commander-in-Chief of the Iranian Revolutionary Guards, Major General Mohammad Ali Jafari said that, "Faith in Wilayat al Faqih has exceeded the borders of Iran today." General Hussein Hamdani added, "The Iranian influence today extends to Baghdad, Samarra and even the shores of the Mediterranean." These statements reflect the sectarian and military doctrine that drives the Revolutionary Guard, while revealing its expansionist project aimed at achieving Iran's dominance over the region. Therefore, the Revolutionary Guard is the head of the snake that is behind the chaos, instability and escalation of terrorism in many countries in the region.

HELD UNDER THE PATRONAGE OF HIS EXCELLENCY, PRESIDENT ABDEL FATTAH EL-SISI
THE PRESIDENT OF THE ARAB REPUBLIC OF EGYPT, THE SUPREME COMMANDER OF THE EGYPTIAN ARMED FORCES

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Boeing's Ballistic Missile System Hits a Bullet with a Bullet

A Boeing-led team has received a six-year, $6.56 billion contract modification from the U.S. Missile Defense Agency to continue the production and sustainment of the Ground-Based Midcourse Defense (GMD) ballistic missile defence system. With Boeing serving as prime contractor and Northrop Grumman, OrbitalATK and Raytheon as subcontractors, the extended contract covers the delivery of a new missile field with 20 additional silos, including two additional silos in an existing missile field at Fort Greely, Alaska, and 20 additional Ground Based Interceptors.

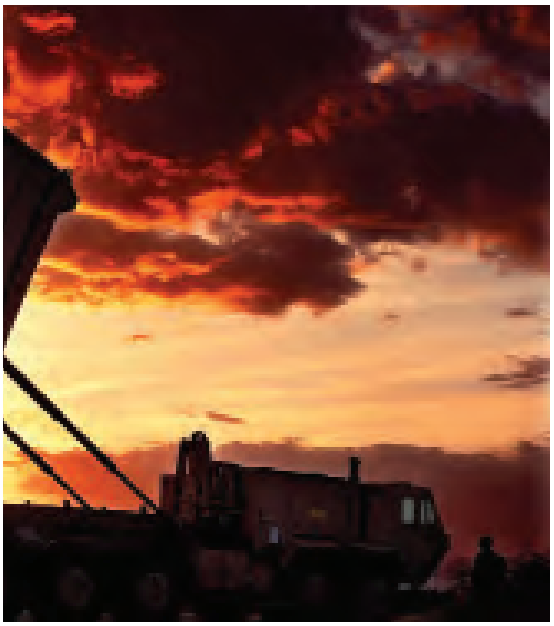
The system works to detect, intercept and destroy long-range ballistic missiles in the middle of their flight path and when its Interceptor destroyed an intercontinental ballistic missile-range target, 2017 saw Boeing's GMD team and its U.S. Missile Defense Agency customer receive two awards for "hitting a bullet with a bullet". The flight test honour topped off a year of successful programme milestones, including the delivery of the 44th Ground Based Interceptor to the Missile Defense Agency at Fort Greely, Alaska in November 2017.

The Boeing-led group will now develop a boost vehicle and integrate it with a redesigned kill vehicle, while supplying GBI assets for laboratories and tests, developing, integrating, testing and deploying ground systems software, alongside provision of cybersecurity and logistics support.

Work will take place in government and contractor locations in Alabama, Alaska, Arizona, California, and Colorado through to December 2023, with the award raising the contract's total potential value to $12.6 billion. MDA obligated $213.8 million to the programme in fiscal 2017, while fiscal 2018 research, development, test and evaluation funds will be made available at the time of award.

Ground-based Midcourse Defence

Faced with ever-evolving long-range threats, GMD is the backbone of the United States' homeland ballistic missile



defense system, with Boeing as the system's prime contractor since 1998, partnering with its Missile Defense Agency customer in the design, development, integration, test and sustainment of all GMD components across fifteen time zones. These including Ground-based Interceptors (GBIs) at two locations (Ft. Greely, Alaska and Vandenberg AFB, CA), alongside seven types of land, sea and space sensors and multiple distributed fire control systems; indeed, this year sees 44 deployed GBIs, 40 based at Ft. Greely and four at Vandenberg AFB.

When ballistic missile defence sensors detect a missile launch, data is fused and fed into the GMD fire control system, which is used to launch one or more GBIs to fly into the path of an incoming missile. They then release an Exo-atmospheric Kill Vehicle (EKV) using onboard sensors to hunt down and physically collide with the warhead, destroying it upon impact.

Using a three-stage booster to perform intercepts over great distances, GMD is specifically designed to counter long-range ballistic missiles threatening the U.S. homeland. This range gives GMD the greatest coverage area of any U.S. missile defense system, defending all fifty states and Canada.

Other missile defence systems, including Aegis, THAAD and Patriot, are generally classified as 'regional' systems, being geared towards short to intermediate range ballistic missile threats. Some such systems may have homeland defense applications in certain circumstances, but they generally have much smaller coverage areas compared to GMD and much less capability, against ICBMs.

Key GMD System Elements

• AN/SPY-1 Radar

As a key component of Aegis Ballistic Missile Defense System on land and at sea, the AN/SPY-1 Radar is critical for the U.S. Navy's aerial radar infrastructure. U.S. Navy cruisers and destroyers employ SPY-1 for Aegis Sea-based BMD, while on land the radar system is utilised by Aegis Ashore missile defence sites.

Developed by Lockheed Martin, the SPY-1 radar was originally designed as an air defense system, but has been upgraded to include a ballistic missile defense (BMD) capability. SPY-1's passive electronic scanning system is computer controlled using four complementary antennas to provide full 360-degree coverage, while operating in S-band as a multifunction phased-array radar capable of search, automatic detection, transition-to-track, air and surface target tracking and missile engagement support.

• Cobra Dane radar

Cobra Dane serves multiple roles in the BMD system, detecting both Intercontinental Ballistic Missiles and sea-launched missiles in its coverage area while, upon detection, it can classify re-entry vehicles and other objects in space. The GMD's Fire and Mission Control system may then use the Cobra Dane for real-time information as the radar tracks ballistic missiles accurately to commit the launch of Ground-Based Interceptor missiles. Cobra Dane also provides information to update ballistic missile tracking after the launch of the interceptor.

• C2BMC capabilities

To test various aspects of the regional/theatre Ballistic Missile Defense System, multiple operational and developmental tests are conducted each year by the Missile Defense Agency. The BMDS has a layered architecture comprised of boost, mid-course and terminal domains designed to provide global protection against all ranges of ballistic missile threats.

Instrumental to the success of BMDS tests is the Command and Control, Battle Management and Communications integrating system (C2BMC) linking the wide array of space-based, terrestrial and sea-based sensors and weapons systems to enable the successful intercept. As the "S" in the Ballistic Missile Defense System, C2BMC interconnects the disparate BMDS elements into an integrated system-of-systems able to engage and intercept missiles by leveraging launch-on-remote sensor data capability to increase the defended area significantly and enable the weapon system to negate a missile threat.

• Defence Support Programme

The Defence Support Program (DSP) is a constellation of satellites in geosynchronous orbit (GEO) detecting the launch of strategic and tactical missiles, space launches and nuclear detonations with infrared heat sensors. DSP satellites are operated by the U.S. Air Force Space Command and, since the programme's first satellite launch in 1970, DSP has been a critical component of the North American Aerospace Defense Command's (NORAD) Integrated Tactical Warning and Attack Assessment (ITW/AA) system.

• Ground-based Interceptor (GBI)

The Ground-based Interceptors (GBIs) are silo-launched intercept ballistic missiles in their mid-course, while remaining out-

Raytheon's Exoatomospheric Kill Vehicle is the intercept component of the Ground-Based Interceptor

side of the atmosphere at their highest trajectory. The GBI consists of a multi-stage rocket booster (Boost Vehicle [BV]) and a kinetic kill vehicle (Exoatmospheric Kill Vehicle [EKV]), enabling interception of ballistic missile warheads via hit-to-kill technology.

• Fire Control and Communication

As the software used to manage the Ground-based Midcourse Defense system, Fire Control and Communication (GFC) receives data from various sensors across the globe via the Defense Satellite Communication System and compiles this information to create a picture of the battlespace. Moreover, it updates the warfighter on the status of the GBI fleet, which facilitates engagement planning and launch decisions.

Upon GBI launch, the GFC relays real time in-flight targeting data through one of the six operational In-Flight Data Terminals to the exo-atmospheric kill vehicle. GMD Fire Control is also configured to receive information via C2BMC, allowing sensors such as Aegis SPY-1, TPY-2 to contribute to its homeland defence mission.

• Long Range Discrimination Radar

The Long-Range Discrimination Radar (LRDR) is a ground-breaking midcourse tracking radar that will provide continuous coverage and improved discrimination capabilities for CONUS. Under development at Clear Air Force Station in Alaska since 2016, initial operating capability is expected by 2020. The radar will support the layered U.S. BMD defence system against threats emanating from the Pacific where it will provide more deployment flexibility for the Sea-Based X-band radar.

The radar will consist of a solid-state, active electronically-scanned antenna, operating in the S-band frequency where it will be ground-based and use gallium nitride (GaN) technology enabling continuous coverage, even when it is undergoing maintenance. The radar is expected to improve the U.S. GMD system by providing metric data to enhance discrimination capabilities or through its ability to distinguish lethal objects from debris and decoys. It may also support U.S. Air Force space operations, including its situational awareness missions.

• Sea-based X-band Radar (SBX)

The Sea-Based X-band Radar (SBX) is a unique radar housed on a decommissioned North Sea oil rig. It produces very high-resolution images of incoming threat clouds, which helps BMD interceptors discriminate between lethal objects and debris.

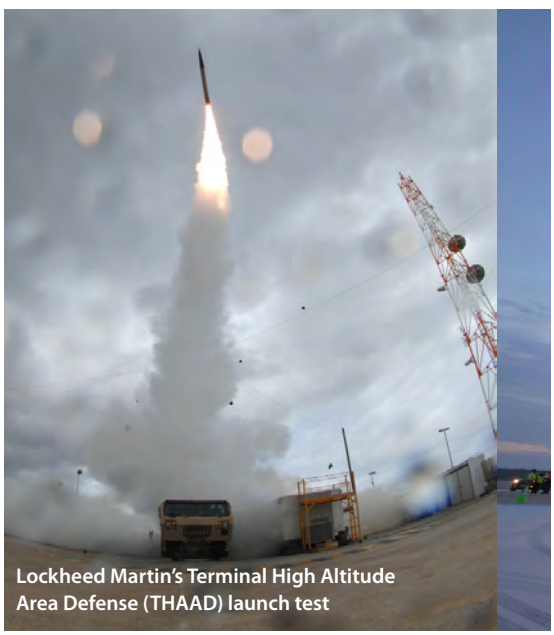
SBX has been deployed on numerous occasions to monitor North Korea's long-range missile tests and routinely contributes to USAF flight tests of U.S. intercontinental ballistic missiles.

• Space Tracking and Surveillance System (STSS)

The Space Tracking and Surveillance System (STSS) is a space-based system developed and operated by the Missile Defense Agency (MDA) that detects and tracks ballistic missiles.

Having served as a complement to other U.S. space-based platforms, this system is an experimental component of the U.S. Ballistic Missile Defense System (BMDS) as a precursor to the planned missile tracking constellation known as the Precision Tracking Space System (PTSS).

The aim of the Space Tracking and Surveillance System is to track missiles through all three phases of flight (boost, midcourse and terminal), discriminating between warheads and decoys, transmitting data to other systems to be used to cue radars and providing intercept handovers and data for missile defence



Lockheed Martin's Terminal High Altitude Area Defense (THAAD) launch test

interceptors to hit their target.

• Space-based Infrared System (SBIRS)

The Space-based Infrared System (SBIRS) is a constellation of integrated satellites in geosynchronous orbit (GEO) and high elliptical orbit (HEO), working with ground-based data processing and command-and-control centres. This system is designed to provide early missile warning, cue missile defences, deliver technical intelligence (TECHINT) and support battlespace awareness.

The SBIRS is intended to replace the aging DSP system of satellites because SBIRS satellites can scan large swaths of territory to detect missile activity, while honing-in on areas of interest for lower-scale activities, including the launch of tactical ballistic missiles. These sensors are independently tasked, meaning that the satellite can both scan a wide territory and fixate on a specific area of concern simultaneously.

• TPY-2 X-band Radar

AN/TPY-2 radars are high resolution phased array X-band radars designed and built for missile defence missions and deployed in either terminal or forward-based modes. The United States currently has 10 TPY-2 radars with plans to produce two more, while seven of the TPY-2s will be in terminal mode and assigned to Terminal High Altitude Area Defence (THAAD) units and five others are in forward-based mode, two of which are deployed to Japan monitoring North Korean missile activity. The remaining three are deployed in Turkey, Middle East and the Persian Gulf region, while being oriented towards Iran.

In terminal mode, the TPY-2 radar is integrated with a THAAD system serving as its primary sensor. Here, the sensor is oriented upward to track the late stages of the missile track enabling the THAAD's capability to intercept outside the atmosphere once a re-entry vehicle enters the atmosphere, while carrying a shorter range owing to the radar orientation.

• Upgraded Early Warning Radar

Upgraded Early Warning Radars (UEWR) provide detection, tracking, and classification data to the Ballistic Missile Defense System (BMDS). Three UEWRs are currently deployed by the United States from locations in Beale AFB in California, Fylingdales in the United Kingdom and Thule AFB in Greenland, while the Missile Defense Agency is also working to upgrade the Early Warning Radars in Cape Cod, Massachusetts and Clear, Alaska. UEWRs are nearly identical to Early Warning Radars in technical capability, but contain certain software and hardware upgrades enabling the radars to communicate with the Ground-Based Midcourse Defense system.

Utilising an upgraded receiver exciter and frequency time standard in their missile defence role, UEWRs primarily perform target classification and missile tracking to cue other sensors and interceptors. Although they cannot perform midcourse discrimination, they can begin to classify objects as threatening or non-threatening so narrowing the range of objects that a higher resolution radar, such as the Sea-based X-band Radar (SBX), would need to observe.

Reference Text/Photo:
www.boeing.com , www.mda.mil

Quick Facts

- Interceptors are emplaced at two sites in the United States, one in Vandenberg, Calif., and the other in Fort Greely, Alaska.
- Altogether, the Ground-based Midcourse Defense system requires 20,000 miles (32,187 kilometers) of fiber optic cable.
- Boeing has been prime contractor since 1998.
- Boeing has collaborated with the U.S. Missile Defense Agency in the design, development, integration, test and sustainment of all GMD components.
- Key subcontractors include Northrop Grumman, Raytheon and Orbital Sciences.

Placing the 44th Ground Based Interceptor (GBI) in its silo

Predator B: The Multi-Role Single Solution for ISR

The Certifiable Predator B (CPB) class of Remotely Piloted Aircraft Systems (RPAS) has been optimised for Intelligence, Surveillance and Reconnaissance (ISR) through the development of two variants SeaGuardian and SkyGuardian, to support a variety of homeland security and other non-military roles.

The General Atomics Aeronautical Systems, Inc. (GA-ASI) Predator B is closely associated with military missions, but its air vehicle performance and sensor-carrying capabilities make the airframe a natural choice for a wide spectrum of non-military uses.

GA-ASI has developed the unarmed SeaGuardian RPAS for non-kinetic roles to advance its capabilities through recent developments in sensor, communications, airspace integration and flight control technology. The SkyGuardian can be fitted with a maritime radar when needed to become a SeaGuardian.

Both RPAS models utilise the same airframe as Certifiable Predator B, including the long-span wings for increased range/endurance and airworthiness flight/mission system improvements. They typically carry the same communications systems and sensors, with SeaGuardian including a long range multimode 360° maritime radar (such as the Raytheon SeaVue) mounted beneath the fuselage and providing a highly detailed real-time operational picture for domain awareness.

The new SeaGuardian will carry the Lynx Multi-Mode Radar, optimised for similar over land Intelligence, Surveillance and

General Atomics Aeronautical Systems, Inc. (GA-ASI) announced the first flight of the Guardian Remotely Piloted Aircraft (RPA) in Japan during an opening ceremony, which took place on the island of Iki last month. Operating from Iki in Japan's Nagasaki Prefecture, the Guardian will collect data for scientific research to be shared across multiple government agencies, with the demonstration flights intended to promote the civil and scientific applications of the RPA.

"We thank the Mayor of Iki and the many other public and private stakeholders for their making this demonstration possible, said Linden Blue, CEO of GA-ASI. "We believe that these flights of long-endurance RPAs in Japan's maritime environment will provide valuable information and we look forward to reviewing the important data gathered from these flights." Mayor Shirakawa joined GA-ASI in emphasising that "We are delighted to host the RPA flight demonstration on our island of Iki. The demonstration is an important milestone for the many peaceful uses of RPAs, including maritime disaster security and maritime resource management. Iki is located near the boundaries of Japan, so surveillance capabilities are an important matter for us."

The demonstration flights were opened to members of the public on Sunday 13th May as the first demonstration of a long endurance RPA by a private company in Japan. For demonstration purposes, the Guardian flights consisted of approximately 10 five-hour sorties over a three-week period from Iki Airport, although this aircraft configuration is capable of more than 20 hours of endurance in a single sortie.

Reconnaissance requirements, including border protection, humanitarian assistance and disaster relief, anti-trafficking, search-and-rescue, mapping, fishery patrols and pollution monitoring. Predator B models have been used extensively in non-military roles by NASA and U.S. Customs and Border Protection (CBP), thanks to littoral surveillance capability with an Inverse Synthetic Aperture Radar (ISAR) mode and multi-contact detection, cueing and tracking.

Multi-Role legacy

NASA has used a Predator B-designated 'Ikhana' on numerous scientific research programmes – a Native American Choctaw word meaning 'intelligent, conscious or aware' and indicative of the aircraft's research goals. The Predator B's integration of a wide range of sensors allows it to operate as a platform for numerous scientific experiments at much lower cost than with manned aircraft.

Moreover, the U.S. CBP Office operates a mixed fleet of Predator Bs and earlier variants of Guardians against a range of illegal cross-border activities, including the smuggling of people and narcotics. CBP Guardians perform a similar task along the coast, employing their multi-role maritime radar to detect and track surface activity.

Eye-in-the-sky persistence

Both NASA and CBP Guardian Operations have highlighted the value of RPAS in providing a persistent oversight capability before, during and after natural disasters to inform emergency response commanders of where assets should be deployed for maximum effect. The data can also be used at local level by individual response teams to assist operations and enhance their own safety.

A Guardian RPAS with high-definition sensors and wide-reaching communications capabilities can significantly enhance the ability of responding agencies to handle containment and relief activities. Described as an "aerial pick-up truck", Guardian can be a powerful asset to protect infrastructure and livelihoods, ultimately saving lives.

Its ability to carry large payloads makes the Guardian RPAS suitable for many other applications in both government and commercial sectors, offering significant savings in comparison to manned platforms. The aircraft provides unmatched persistence, versatility and cost-effectiveness across a broad spectrum of requirements.

Mobile communications umbrella

Certifiable Predator B RPAS can also provide a communications relay to first responders where mobile phone and radio towers have been rendered inoperative, so enabling communications between otherwise dissimilar radio systems. The "mobile tower" in the sky thus helps the most vulnerable to reach out quickly for help in emergencies, closing the time needed for find and assist.

Imaging and radar mapping enables the RPAS to compile detailed data of a vulnerable area prior to an impending disaster. Flying similar profiles afterwards and using change-detection software enables crew to identify areas of major damage rapidly or where further damage is likely to occur.

SkyGUARDIAN ISR endurance

With its long endurance, SkyGuardian provides persistent Intelligence, Surveillance, Reconnaissance (ISR) at a significantly lower cost than manned aircraft where endurance is typically limited by the onboard crew. The RPAS can use its endurance to reach areas far from base at a fraction of the cost of dispatching a manned aircraft.

SkyGuardian can carry a wide variety of sensor payloads providing highly detailed intelligence from a significant standoff range. Other advanced technologies, such as change detection, allow the exploitation of raw data to meet a variety of military requirements, particularly applicable to the changing nature of the battlefield.

Through its ability to carry a large weapon load and advanced automated control systems, SkyGuardian can launch attacks against detected threats, greatly reducing the kill-chain between detection and an armed response. It can prosecute a mission over a lengthy period without needing to return to base for refuelling or crew changes.

SkyGuardian was designed for focused military use in operational theatres, leveraging the Predator family legacy of 4,000,000 flight hours, with 90 per cent of these flown in combat by the U.S. Air Force, France, Italy, and the United Kingdom. The aircraft is now making further evolution into other missions, requiring the ability to operate outside of military-controlled airspace for training purposes or otherwise.

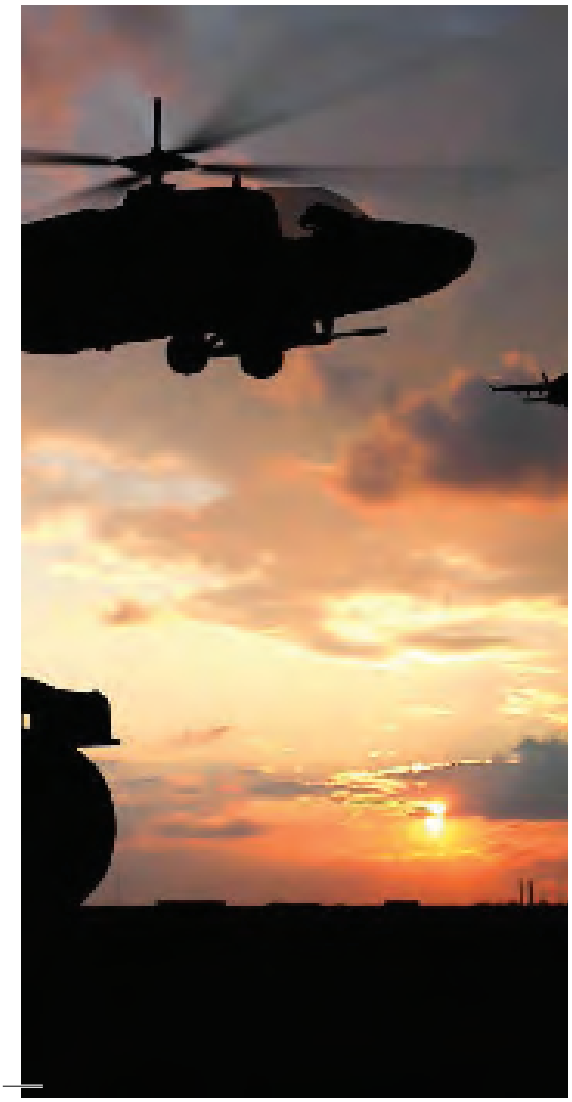
Certification and modifications

Much of SkyGuardian's design is driven by airworthiness regulations where each aircraft part comes with the 'paper-trail' necessary to trace its provenance and manufacturing processes. All elements, including the Honeywell TPE331 engine and the McCauley four-bladed propeller, require airworthiness certification in the SkyGuardian installation.

Compared with the 'legacy' aircraft, SkyGuardian uses approved airworthiness materials conforming to those employed in airliner construction. Overall maintainability has thus been improved, while airframe design life has been extended from 20,000 to 40,000 flight hours.

Technical Specifications

Wing Span: 24m
Length: 11.7m
Powerplant: Honeywell TPE331-10 Turboprop
Max Gross Takeoff Weight: 5670 kg
Fuel Capacity: 2721 kg
Payload Capacity: 2177 kg across 9 hardpoints (8 wing, 1 centerline)
363 kg internal
1814 kg external



The SkyGuardian's enhanced safety features include better protection against lightning strikes and improved anti-icing system. Hardened external radomes increase resistance to bird strikes while containing improved thermal management and fire-zones internally, including stainless steel walls.

One significant system change is the partition between mission and flight applications enabling isolation of flight technologies from payload systems. This change enables a roll-on, roll-off like capability for emerging sensor systems, otherwise impossible with an integrated flight and mission application.

A 'black box' flight data recorder is included and SkyGuardian has an Automatic Take-Off and Landing system, with the option of a back-up conventional manual flight system required by some customers. The GA-ASI Advanced Cockpit GCS has also been modified to meet approval requirements, with some hardware changes required for flight-critical functions comparable to the technology of modern business aircraft.

Innovative performance enhancements

In developing SkyGuardian, GA-ASI has also improved the performance and capabilities of the baseline air vehicle. Longer span wings fitted with winglets allow almost 1360 kg (3,000 lb) of additional fuel to be carried internally and in an ISR unarmed configuration, endurance rises from 27 to more than 40 hours to produce an increase enabling the use of the aircraft in a greater number of roles, operating in difficult-to-reach regions.

It should be emphasised that the new wings have extra hard points, raising the total number of external stores/payload-carrying stations to nine (four under each wing and one under the centreline). Meanwhile, the SkyGuardian has a slightly lengthened fuselage to create space for the installation of the DRR.

SkyGuardian is fitted with Automatic Dependent Surveillance-Broadcast (ADS-B) and Traffic Collision Avoidance System (TCAS) II as standard. Nonetheless, the DRR is catered for as an option to provide a detect-and-avoid capability in a non-cooperative environment, so offering unmatched persistence, versatility and cost-effectiveness across a broad spectrum of military requirements.

Reference Text/Photo:
www.ga-asi.com