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Editorial

‘Zayed’s Sons’ and the Decision to Extend National Service Term

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Since the national and reserve service came into force in June 2014, it has reflected the statement, “The House is Unified”, made by His Highness Sheikh Mohamed bin Zayed Al Nahyan, Crown Prince of Abu Dhabi and Deputy Supreme Commander of the UAE Armed Forces. The positive response from the youth and their families for the decision to extend the term of national and reserve service to 16 months, reflect the deep-rooted values of loyalty and the national spirit flowing in the arteries of the sons of this country who are competing with each other to have the honour of joining the ranks of the Armed Forces and performing the service as a sacred duty.

There is no greater value than participating in the defence of the homeland and contributing to its development and progress at all levels.

The great public celebration and welcome of the decision to extend the national service in social communication and in media and social networking since the announcement of the decision in July, reflect a state of social cohesion and unity rarely witnessed in any country in the world. This is perhaps the most important thing that distinguishes the people of the UAE, who take pride in and rally around their leadership and believe that all its decisions are in the best interest of this country.

The youth of the nation who performed national and reserve service, as well as those preparing to join the ranks of the Armed Forces during the coming period, have applauded this decision. It empowers young people, allows them to make the most of the programmes, training and expertise provided by the Armed Forces, and enables them to make effective contributions to the country’s comprehensive building and progress.

The feelings of the nation’s youth and their positive response to the decision have embodied their pride in the national identity, which is manifested in the competition among them to protect the country’s soil, preserve its various gains, and uphold the UAE’s values and principles of supporting the truth and defending legitimacy. This has simultaneously showed the special status enjoyed by the Armed Forces in the hearts of Emiratis, as it represents discipline, responsibility and good planning, and establishes positive and effective values and behaviours in all its personnel. The description of the Armed Forces as “the factory of men” did not come from a void; it is a result of its vital roles, which is not limited to the preparation of fighters and improvement of their readiness to perform the tasks assigned to them efficiently and competently at home and abroad.

This constructive interaction by the nation’s youth is a source of confidence and reassurance about the present and future of this country. This is a matter of pride and honour, because the good legacy implanted by the late His Highness Sheikh Zayed Bin Sultan Al Nahyan, may God rest his soul, is still present in the minds and hearts of the children of Zayed, who affirm day after day that they are the true wealth of this homeland, the source of its steadfastness and its ability to face any challenges to its security and stability, and a real guarantee to build a future that guarantees for the coming generations a stable, secure and prosperous life.

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Eurosatory: Setting New Highs

Eurosatory has unquestionably established itself as the leading international exhibition in the field of land and air defence and security. The 2018 edition held at Paris was a high water mark in the history of the exhibition with 1,802 exhibitors from 63 countries and 57,056 professional visitors attending the event.

As a dominant concept, "innovation" characterised the 26th edition. This was accentuated by the presence of many start-up companies in the Eurosatory LAB and GENERATE incubator of GICAT. In total, more than 80 start-ups participated. The number of new products unveiled for the first time at the Eurosatory trade fair has been on the increase and reached a new high this year.

The field of security is now a full component of Eurosatory alongside the defence sector. The duality of technologies on many stands and the opening of a new hall mainly dedicated to this field, attest to the growing importance of security issues.

For live demonstrations, the real specificity of the show, the presence for the first time of security forces such as RAID, GIGN, Prefecture of Police (with the BRI and the BSPP), Special Forces and the Ground Forces, was a great success. Besides, there were no less than 71 conferences on varied and complex topics during the expo. On the last day, Eurosatory invited students to allow them a chance to discover the many jobs offered by the defence and security sectors. The participation of the following defence and security majors was the highlight of the show.

BAE Systems Highlights New CV90 MkIV

This fifth generation MkIV combat-proven Infantry Fighting Vehicle (IFV) combines improved battlefield speeds and handling with an upgraded Electronic Architecture to support future growth capabilities. The MkIV represents the next step in the evolution of the CV90 concept. Building on a legacy of best-in-class mobility and survivability spanning


First production Supacat vehicle for Norway

DCI is looking to increase its activities in the Middle East

more than two decades, the CV90 MkIV brings superior technological capabilities and flexibility to today's complex battlefield.

Sandcat Supports Wide Range of Missions

SandCat, Plasan's family of 4X4 armoured vehicles, offer the flexibility and robustness needed for defence and security missions. While providing high-end protection, SandCat maintains its manoeuvrability and agility, even when equipped with surveillance and communications systems. The SandCat family has been designed to support a wide range of challenges and missions including: law enforcement, Special Forces, homeland security, border patrol and armed conflicts. SandCats are also used to transport troops, as command and control centres, and to transport VIPs though conflict zones. To date, there are over 15 variants of SandCats, tailored to meet specific field conditions.

AM General Unveils NXT 360

AM General introduced a next-generation light tactical vehicle that builds upon its M1100 series of Humvees. The NXT 360 officially debuted on the opening day of Eurosatory. The company said the truck would have increased survivability, off-road mobility and payload capacity. The vehicle includes increased kinetic energy threat protection and blast protection for the wheels. AM General also added blast seats and blast mats and boosted the transparent armour to a B7 ballistic protection level.

Thales Presents Defence Cloud Offering

Thales launched the first comprehensive private cloud infrastructure solution to improve the operational efficiency of the armed forces. With Nexium Defence Cloud, Thales is at the heart of the digital transformation of its customers and adapting to the specific needs of armed forces operating in constrained environments with stringent security requirements. Thales' complete, resilient solution enables armed forces to stay connected with any device at any time and operate with complete autonomy in the field. It offers users private access to data in the constrained environment of military infrastructure networks, from central command to forces deployed in theatres of operation.

KNDS Presents Joint Franco-German Tank

KNDS exhibited its first joint product, the EMBT, less than three years after being created around KMW and Nexter. The hull, engine and entire chassis comes from the Leopard 2 A7 and were modified to host the compact and light turret with automatic loading from the Leclerc. Composed of proven and tested technologies, the EMBT is a short-term response to the operational need of the market for high-intensity battle tanks. By assembling a chassis, which is certified to MLC70, and a light turret operated by only two crew members instead of three, the EMBT brings together the best in the battle tank, with an exceptional growth potential (roughly 6t) which allows to integrate many evolutions.

Patria Showcases New 6x6 APC

At the show, Patria launched a new vehicle, Patria 6x6, which brings the basic principles behind its predecessor into the present day, with its multifunctional transport capacity and modularity that adapts easily to the customer's needs. Patria 6X6 is a successor to the Pasi Armoured Personnel Carrier and to complement the vehicle fleets of customers of the legendary Patria AMV 8X8. Patria 6X6 is a multipurpose transport vehicle. The chassis structure is based on the same components as the AMV, but with one less axle. The vehicle is driven by all three axles and steered from the front two, or all three, depending on its equipage. Optional equipage can be added to bring the 6X6 closer to the AMV. For example, various ballistic and mine protection levels, weapon systems, self-protection systems and other interior equipment are available.

Safran Reveals Geonyx

Geonyx is one of the most compact, robust and reliable land inertial navigation and pointing system in the market. It combines high-grade autonomous or hybrid navigation, target geolocation, positioning and pointing accuracy in a SWaP system. Based on the HRG Crystal, the proven pioneering hemispherical resonator gyro, Geonyx offers a real breakthrough in terms of operational efficiency, integration and costs of ownership.

MBDA and Milrem Robotics to Collaborate

MBDA has teamed up with Estonian firm Milrem Robotics to begin developing the world's first unmanned ground vehicle (UGV) specially designed for anti-tank purposes. The joint project will feature the Integrated MMP Precision Attack Combat Turret (IMPACT) system from MBDA that will be integrated onto the THeMIS UGV by Milrem Robotics. The system will be remotely operated and is in line with the system developers' main aim of replacing humans on the battlefield with robots.

Lockheed Martin in Close Co-operation with Germany

At Eurosatory, Lockheed Martin's Executive Vice President for Missiles and Fire Control, Frank St John, said that the company's joint venture with MBDA Deutschland will take the lead in responding to the Request For Proposal (RFP) for the TLVS bid.

"The threat environment has changed since the Medium Extended Air Defense System (MEADS) programme first came to Germany," St John said. "We have been working closely with the German government over the past year, helping them to shape the TLVS requirement."

The company is aiming to respond to the proposal by the end of 2018, and hopes to secure a contract in early 2019. St John noted that the MEADS forms the technical foundation for the TLVS bid, with Diehl's IRIS-T SL medium-range interceptor acting as the effector for the system.

> IRIS-T SLM is the first deployable air defence system totally autonomous of the vehicle

Diehl Exhibits IRIS-T SLM System

Diehl Defence showcased, amongst others, its modern air defence system, IRIS-T SLM. A special feature of the system is the flexible software architecture that allows any national device to be added to it. For example, Sweden will use the system with national radars. This flexibility will also allow any future technologies to be added or any part exchange to be realised with low customisation effort. Another noteworthy feature is the realisation of system elements in standard containers. With this container based technology IRIS-T SLM is the first deployable air defence system totally autonomous of the vehicle. The containers might be added to any suitable national vehicle; also the vehicles might be changed during the lifetime.

FLIR's Black Hornet 3 nano UAV Flies High

FLIR Systems, Inc presented the Black Hornet 3 nano- UAV for use by global militaries, government agencies, and first responders. The Black Hornet Personal Reconnaissance System (PRS) is one of the world's smallest combat-proven nano- UAS, and FLIR's next generation Black Hornet 3 nano-UAV adds the ability to navigate in GPS-denied environments, enabling the warfighter to maintain situational awareness, threat detection, and surveillance no matter where the mission takes them.

Arnold Defense, "FLETCHER" land-based, 2.75-inch/70mm Weapon System

Rheinmetall's Lynx KF41 made its debut at the show

HENSOLDT Debuts 3D Multifunctional Radar

HENSOLDT showed its newly developed TRML-4D radar system for ground-based air defence for the first time. The 3D multifunctional radar, which belongs to the TRS-4D radar family, will deliver rapid response detection and tracking of approximately 1,500 targets in a radius of up to 250km and at an altitude of up to 30km.

TRML-4D uses the latest Active Electronically Scanned Array (AESA) radar technology, which enables the acquisition of targets after just one rotation of the antenna, thus improving the response time and hit probability even in a complex environment. According to the company, HENSOLDT has set up a precise coordination of all the antenna elements in the C band (NATO G band) and special signal processing modes, so the radar can provide extremely exact information on the targets, thus guaranteeing early and precise weapon assignment. An integrated secondary radar system for identifying friend or foe (IFF) has been integrated to prevent friendly fire. The system can be transported by air in an A400M or C130 transport aircraft, but can also be transported by rail. One customer has already placed an order for 10 systems.

General Dynamics European Land Systems (GDELS) presented the new Ascod IFV and Medium Main Battle Tank variants

Kärcher Displays Innovations

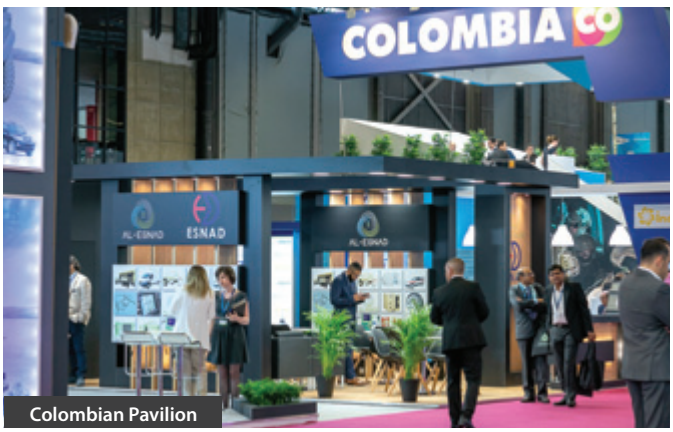
Kärcher Futuretech presented four novelties: The WTC 500 water purification system, the HWM 100 B hot water module with buffer tank, the MPDS 2 universal decontamination system and the MFK 2 mobile catering system. The modular concept of the MFK 2 field kitchen attracted interest, since it can be built up in a lot of different configurations and therefore covers almost every scenario. It is set up on an off-road trailer to allow transport with any suitable vehicle. Power and fuel are centrally supplied in a side storage box for all modules. As a result the MFK 2 is ready for use in less than 30 minutes, the company stated. Depending on the configuration, it is able to prepare complete meals for up to 250 persons or 600 simple dishes.

GDELS Vehicles Provide Tactical Mobility

At the show, General Dynamics European Land Systems (GDELS) presented the new Ascod IFV and Medium Main Battle Tank (MMBT) variants. Both versions are based on the common platform principle and designed with an open architecture to provide an optimum of tactical mobility, manoeuvrability and fightability. The two new vehicle variants were the result of consistent development efforts and investments in a common vehicle platform that was first implemented with the two early Ascod (Austrian-Spanish Cooperative Development) variants, namely Pizarro in Spain and Ulan in Austria, followed by the Donar SP artillery system and the repair/recovery versions through to the British AJAX variants. The MMBT version on display was based on the proven Ascod running gear and was equipped with a Hitfact 120 mm turret from Leonardo.

Spotlight on Turkish Anti-Tank Vehicles Project

The FNSS booth showcased the PARS



Colombian Pavilion

National police forces of France

III 8x8, PARS 4x4 Wheeled Armoured Vehicles (AMV) and the KAPLAN-20 New Generation Armoured Fighting Vehicle (NG-AFV). In fact, the PARS 4x4 with the turret made its debut at the show and the company is quite certain they will be able to present the it with a mortar turret within one month.

The presented unmanned, remote-controlled anti-tank turret on the PARS 4x4 has ballistic protection, two anti-tank missiles and a 7.62 mm machine gun. The turret recently performed its first firing test with the anti-tank missile, during which it successfully hit its target at maximum range.

The vehicles shown were part of the Turkish Anti-Tank Vehicles (ATV) project that was launched by the Turkish Undersecretariat for Defence Industries (SSM) and conducted with FNSS as the prime contractor. This project covers the development, qualification and delivery of a total of 260 vehicles that include the tracked KAPLAN-ATV and wheeled PARS 4x4 ATV platforms.

Insight into Colombian Aviation Expertise

Exhibiting as part of the Colombian Pavilion, the Corporación de la Industria Aeronáutica Colombiana highlighted its experience in the fabrication, repair and maintenance of aircraft in the civil and military sectors. Established in 1956, CIAC is a private-public organisation that undertakes MRO work on a wide range of aircraft, including many of the Colombian air force's fleet.

Key figures

- 1,802 exhibitors from 63 countries, with 65.8 per cent international participation
- 39 national pavilions
- 57,056 professional visitors from 153 countries
- 227 Official delegations from 94 countries and 4 international organisations
- 177 VIP Experts
- 71 conferences

It has been authorised by Airbus Defence and Space as a repair station for the CN-235 and C295 transport aircraft. Other types that have been worked on include the Boeing 737, Lockheed Martin C-130 and Embraer Tucano, plus a range of helicopters. CIAC is also working with Airbus on the co-development of the Atlante+ UAV as part of a programme overseen by the Colombian and Spanish governments.

Hexdrone Illustrates Modular Tundra-M Drone

Tundra-M is one of the most advanced and customisable professional drones created by Hexadrone for users specialised in defence and rescue. CRP Technology has manufactured the Tundra-M prototype via professional 3D printing using Windform Carbon-composite materials. Tundra-M is Hexadrone's first fully modular and easy-to-use drone for industrial and multi-purpose tasks, made for extreme weather conditions thanks to rugged, waterproof design. The rapidly detachable arms and three quick release attaches make it extremely flexible to meet the needs of any profession, while making operational conditions easier to maintain.

Rheinmetall Launches Lynx KF41 IFV

Rheinmetall's Lynx KF41 made its debut at the show as a command and control

vehicle and this infantry-fighting vehicle (IFV) might be called "big brother" of the air-transportable Puma. One of its notable factors is that Lynx can switch within few hours from one role to the other. This becomes possible due to the mission modules Rheinmetall has invented.

A company statement said: "In the past, containers were used to store modules until whenever they were deployed. The modular option invariably resulted in unused resources and a waste of space and material. Rheinmetall mission modules can be directly deployed in standard ISO containers as a standalone solution, and thus play an active role in combat operations. And of course they can still be installed in the roof cut out of the Lynx as flexibly as ever, in the remarkable short time of just two to four hours."

The Lynx IFV exhibited was equipped with the new Lance 2.0 turret, the same turret chosen by the Australian Army. On both sides this Lynx had a missile launcher with two Eurospike missiles.

Texelis' New Platform Meets Stringent Requirements

Texelis launched a new chassis system at the show. The unit, called the Texelis Platform or TXP family, has been designed for armoured vehicles up to 18 tonne gross vehicle weight. The chassis includes everything from the wheels through suspension, steering, powerpack, transmission to the dashboard and all the vehicle mobility electronics. Combining proven, in-production subsystems from suppliers including Cummins, Powerline and Allison, the chassis provides customers with the ability to mount their own designed hull onto a chassis designed to meet the requirements of a rugged 4x4 off road vehicle.

Drone Volt's Expert Drones

Drone Volt showcased its expertise on the development of new technologies based on its UAVs and UGVs used for civil applications since 2011. With its technical expertise and experience, Drone Volt, located in France and abroad (Denmark, Belgium, Canada, Switzerland, Italy and the U.S.), designs and manufactures innovative commercial service drones with applications for agriculture, audiovisual, building and civil engineering works and security.

Centaur Unmanned Ground Vehicle

Thales CloudDefense

Texelis Platform or TXP family was launched at Eurosatory 2018

Xtek Demonstrates Ballistic Armour

Australian defence tech company Xtek displayed its world-leading ballistic armour among a range of other defence equipment. Xtek's ballistic plates and helmets, manufactured with Xtek's proprietary patented XT-claveTM manufacturing technology, protect against 7.62x39mm mid steel core weaponry, but is up to 30 per cent lighter than traditional solutions. Other ballistic products are also available against higher threats using the same technology.

CNIM Group's Innovative Systems

As a leading player in defence and security in France and internationally, the CNIM Group and its subsidiaries Bertin Technologies, Bertin IT and Exensor presented their innovative systems and equipment for the projection and protection of the Armed Forces. Bertin launched several solutions for the protection of the Armed Forces on land and cybersecurity, including SaphyRAD MS, an innovative multiprobe military radiation metre for harsh environment and emergency situations, CamSight, a family of compact and lightweight camera modules for night and day improved vision and Crypto Crossing, a highly secure email gateway solution designed by Bertin IT.

BRONCO 3: ST Engineering's All Terrain Carrier

For the first time at Eurosatory, BRONCO 3, an all-terrain tracked carrier was displayed. A highly mobile twin-cabin vehicle, BRONCO 3 is fully capable of achieving mission objectives across challenging terrains; including soft ground, snow, desert, swamps, and inland waters. It combines the outstanding mobility of Bronco 1 and the proven high survivability of Bronco 2 (Warthog) for tactical manoeuvrability and superior protection in the field. Its smart design is modular to allow quick changing of rear mission

Nexter highlighted excellence in artillery systems with CAESAR and LG1

ECA Group showcased its IGUANA E UGV and its Land robotics solution

modules, as well as network centric to enable future technology insertions.

ATOS Brings Tactical Information Solutions

Bull Battle Management System (Bull BMS) is the solution that ensures the sharing of tactical information available on the battlefield, especially the location of friends via blue force tracking. It is the functional and technical basis of SICS (SCORPION combat information system), at the heart of the SCORPION programme that will renew the equipment of the joint tactical battalions of the French army. Also presented was Auxylium, the information, control and communication solution used by the French Armed Forces for domestic operations, co-developed by Atos and the French Ministry of Defence (MoD).

Pyrotechnic Products From WesCom Defence

WesCom Defence, part of WesCom Signal and Rescue, a specialist in pyrotechnic products for signalling, illumination, training and simulation, displayed a range of high quality specialist pyrotechnic products for the defence industry and latest developments in pyrotechnic technology. These include, the ManPAD Simulator, MERS Illumination Rocket and MECoSt Simulator Impact/Thunderflash.

Arnold Defense Tests Laser Guided Rocket System

Arnold Defense, the St Louis-based manufacturer of 2.75-inch rocket launchers, announced successful test firing results of their "FLETCHER" land-based, 2.75-inch/70mm Weapon System. The FLETCHER system can be mounted on military vehicles as well as base defence platforms.

FLETCHER is a unique design that allows for ease of operation, maintenance and sustainment in support of combat operations. FLETCHER employs an existing suite of guidance modules, rockets and warheads, which are already used in well-known programmes and are readily available to global forces.

Mission-critical Comms Systems from Frequentis

Frequentis has been providing the defence market with mission-critical communication, information and surveillance systems for over seven decades. Frequentis' fully redundant, highly-available communications framework is used by joint and combined forces in today's command centre operations – be it in the air, at sea, or on land for a number of defence projects around the globe, including voice communications for the UK Ministry of Defence (MoD).

FlyEye: Ideal UAS for Combat Zones

FlyEye is a mini UAS that is used for intelligence, reconnaissance, and surveillance of the battlefield, sensitive areas, national borders, natural disasters, or large public events. The reliability and usability of the FlyEye System have been tested and proven during many field evaluations around the world, as well as during active service in combat zones with the Polish Armed Forces. The system has been subject to field evaluations during both day and night and in extreme environmental conditions such as high wind, high and low temperatures, increased humidity and altitude changes.

Reference Text/Photo:
www.eurosatory.com

Defeating Enemy Drones With MyDefence Solutions

PITBULL is plug-n-play and requires minimal training to operate

MyDefence Solutions launched PITBULL, the next generation wearable Counter UAS solution that utilises smart jamming to defeat enemy drones. PITBULL was developed to have minimal impact on other signals while jamming, in an effort to maintain own communication. The Counter UAS jammer is a tactical solution weighing 775 grams that has been designed to be worn on the uniform with the purpose of minimising the cognitive load of dismounted soldiers, so they can focus on the mission instead.

Recently, MyDefence launched the WINGMAN 103, wearable drone detection for special operations forces, and now joined by the PITBULL, dismounted soldiers will be able to both detect and defeat enemy drones. PITBULL is plug-n-play and requires minimal training to operate. Used together with the WINGMAN detector, the entire process of detecting and defeating malicious drones can be fully automated, allowing the operator to carry on with the mission without worrying about enemy drones.

BAE Systems Debuts iFighting for Combat Vehicles

iFighting technology is designed to optimise vehicle and crew performance

BAE Systems presented a new solution for addressing the challenge of battlefield situational awareness at the recently concluded Eurosatory 2018. Called iFighting, the technology is designed to optimise vehicle and crew performance by harnessing data to enable faster decision-making in combat.

BAE Systems displayed the latest version of the CV90 Infantry Fighting Vehicle, known as the MkIV, integrated with iFighting. The MkIV, the fifth generation CV90, features advancements in speed, mobility, and electronics, and is being offered to the Czech Republic to replace its aging fleet of infantry fighting vehicles.

Based on technology integrated by BAE Systems, the iFighting concept fuses together data from different systems within the vehicle to filter through and prioritise the most critical information. This allows the crew to make quicker and more effective decisions to improve overall performance on the battlefield.

The CV90 MkIV will also have the fourth generation Electronic Architecture compatible with NATO-standard Generic Ve-

U.S. Army Places $484 Million Order For Oshkosh's JLTVs

Oshkosh Defense, LLC, an Oshkosh Corporation company, recently announced that the U.S. Army has placed a $484 million order for 1,574 Joint Light Tactical Vehicles (JLTV) and associated installed and packaged kits.

"This latest order follows the completion of the Multiservice Operational Test and Evaluation (MOT&E) conducted by the U.S. Army and Marine Corps and further demonstrates that the JLTV programme continues to be a top modernisation priority for our armed services," said George Mansfield, vice president and general manager of joint programmes at Oshkosh Defense. "The JLTV is ready to support our troops, and we look forward to getting more soldiers and Marines into this extremely mobile, protected, and proven next-generation light tactical vehicle."

Built with the capability to serve as a highly mobile and protected command centre, the Oshkosh JLTV hosts a complete C4ISR network solution while maintaining its payload, performance, protection and off-road mobility. In addition to the recently completed operational testing, the JLTV also completed Reliability Qualification Testing earlier this year, accumulating over 100,000 miles and exceeding reliability requirements. A Full Rate Production (FRP) decision is expected in FY19.

Oshkosh JLTV hosts a complete C4ISR network solution

hicle Architecture (NGVA), which allows crews to manage large amounts of live-stream data and is interoperable within the NATO Alliance. This step change will enable the introduction of autonomous crew support, machine-learning algorithms — including artificial intelligence capabilities — and augmented reality with the support of 3D map data to enable future adoption and growth.

BAE Systems has partnered with several Czech companies to offer the CV90 MkIV to the Czech Army. The MkIV was unveiled earlier this year as the latest version of the combat-proven CV90, which is in service with numerous European nations.

ACJ320neo Enters Final Assembly

The final assembly in Hamburg

The first ACJ320neo has entered final assembly in Hamburg, Germany, marking the start of a new era in Airbus corporate jets. Featuring one of the largest cabins in its class, the ACJ320neo is due to be delivered to Acropolis Aviation of the UK in the last quarter, together with a second aircraft for Comlux of Switzerland.

More than 300 A320neo Family airliners are already flying with carriers around the world, but deliveries of corporate jet versions are only just beginning. Like the airliner versions, the ACJ320neo Family features new-generation engines and Sharklets, which save around 15 per cent in fuel and deliver a leap forward in range.

ACJ320neo can fly 25 passengers 6,000 nm/11,100 km or 13 hours enabling routes such as London to Beijing or Cape Town and Moscow to Los Angeles, while the ACJ319neo can fly eight passengers 6,700 nm/12,500 km or 15 hours.

Dassault and Thales Collaborate on Cybersecurity

Alain Quevrin, CEO of Thales in Belgium, and Benoît Dussaugey, International Managing Director of Dassault Aviation

On behalf of Rafale International, Dassault Aviation signed a partnership agreement with Thales to develop an industrial cybersecurity centre of excellence in Belgium.

This agreement is part of the Franco-Belgian strategic aviation partnership proposal. It is added to those already signed which cover a wide range of fields, from the maintenance of the Rafale fighter jet , to the training of aeronautical engineers, to the participation in drone projects, the automation of lines production, additive manufacturing, predictive maintenance, simulation, advanced materials research and Smart City projects.

A wide and diverse range of technological expertise and innovation will be developed at the federal and regional levels to cover all areas of cybersecurity including energy, transport, city management and telecommunications.

Boeing to Develop Hypersonic Airliner

Recently, Boeing debuted its first passenger-carrying hypersonic concept at the American Institute of Aeronautics and Astronautics conference in Atlanta. The company is working on plans for a hypersonic passenger aircraft that would cut the journey time between London and New York to around two hours.

The concept jet, unveiled by the U.S. aviation firm this week, would have a potential top speed of more than 3,800mph, close to five times the speed of sound.

Reaching a speed of Mach 5 would allow the aircraft to complete a trip across the Atlantic in around 120 minutes, while a flight crossing the Pacific would take roughly three hours.

The passenger concept could have military or commercial applications; this is just one of several hypersonic vehicle concepts spanning a wide range of potential applications company engineers are studying. Engineers are working company wide to develop enabling technology that will position the company for the time when customers and markets are ready to reap the benefits of hypersonic flight.

Kevin Bowcutt, senior technical fellow and chief scientist of hypersonics said, "Boeing is building upon a foundation of six decades of work designing, developing and flying experimental hypersonic vehicles, which makes us the right company to lead the effort in bringing this technology to market in the future."

Although Bowcutt can't speculate when hypersonic flight for global travel will be a reality, he says it's possible a hypersonic passenger vehicle could be airborne in 20 to 30 years. This concept was on display at the recently concluded Farnborough Airshow, UK.

Rockwell Collins, Iridium to Deliver Next-Gen Solutions

Iridium Communications Inc. recently announced Rockwell Collins as the newest Iridium Certus service provider for the aviation industry. Rockwell Collins will be adding the service to its comprehensive suite of aircraft connectivity applications for commercial, government and ARINCDirectSM business customers.

In addition to being a service provider, Rockwell Collins is also a value added manufacturer (VAM) for the design and production of Iridium Certus terminals. As a VAM and a service provider, Rockwell Collins will play an important role in delivering the next-generation L-band broadband solution to customers around the world.

Iridium Certus will bring broadband functionality, with enterprise-grade quality of service, to the aviation industry no matter where in the world an aircraft may fly. The service will soon deliver the fastest L-band broadband speeds on the market at a competitive price with industry-leading small form factor antennas and terminals. The Iridium Certus high-gain antenna (HGA) solutions will provide data speed options of up to 704 Kbps, and eventually as high as approximately 1.4 Mbps following full Iridium NEXT deployment, with an antenna size of approximately 24 x 10 x 6cm, while the low-gain antenna (LGA) solutions will enable data speeds of up to 176 Kbps.

Initial flight trials will take place later this year, with Iridium Certus commercial service introduction for aviation users expected in mid-2019. Commercial service introduction for other verticals, such as maritime and land-mobile, is planned for 2018.

U.S. Special Ops Select Raytheon's Griffin

Raytheon Company Missile Systems was recently awarded a $315 million contract to produce the Griffin missile for U.S. Special Operations Command.

The deal, announced by the U.S. Department of Defense, enables the company to produce the missile and provides support for product improvements, operations and sustainment. The work will be performed at contractor facilities in Tucson, Arizona.

Fiscal 2018 research, development, testing and evaluation funds will be obligated to satisfy the contract minimum amount, and additional funding will be obligated on a delivery and task order basis.

The Griffin missile is a multi-platform, multi-service weapon that has a proven track record for successful rapid integration on land, sea and air platforms. It is available in two variants: Griffin A, which is an aft-eject missile and Griffin B, which is a forward-firing missile. Raytheon continues to evaluate additional upgrades to Griffin that enables the warfighter.

The Griffin missile provides the user with flexible employment options through a simple, easy-to-operate, graphical user interface. The user can select from multiple flight profile and fuzing modes. It also provides lethal effects and employs GPS-aided inertial guidance and a semi-active laser seeker for pinpoint accuracy.

Raytheon's Griffin missile is a multi-platform, multi-service weapon

Airbus and Safran make H125, H130 More Competitive

Airbus H125 and H130 helicopter customers will get a boost in their operations thanks to a significant reduction in direct maintenance costs for the Safran Arriel 2D engine, which equips both aircraft. The two main improvements provided by Safran are the extension of 25 per cent of the time between overhaul (TBO) to 5,000 hours for new and in-service helicopters, and the new three year/2,000 hours warranty conditions, replacing the previous two year/1,000 hours warranty, for all H125 and H130 helicopters delivered in 2018.

"Safran continuously works to make its engines more robust and easy-to-use," said Nicolas Billecocq, Safran Helicopter Engines' vice president of the Light Helicopter Engines Programme. "Extensive endurance tests conducted on the Arriel 2D and analysis of engine fleet data have enabled us to further validate the engine's strength and simplicity. Thanks to these new improvements, the Arriel 2D will feature one of the lowest direct maintenance costs of its class."

"Improving customer satisfaction and the competitiveness of our products is one of our top priorities at Airbus Helicopters. These engine durability enhancements are a clear illustration of our efforts in this direction," said Axel Aloccio, head of the Light Helicopter Programme at Airbus Helicopters. "The TBO and warranty extension are very concrete improvements for H125 and H130 operators around the world: those two types keep offering the best value for money."

H125 and H130 customers will also benefit from the removal of the calendar limitation, which until now required an engine inspection at a repair centre every 15 years, regardless of the number of hours logged. The robustness of the Arriel 2D eliminates the need for a calendar limit on modules 1, 2, 4 and 5, while for module 3, the engine's condition can be restored during a periodic visit performed at a maintenance centre.

Market Leading Performance

Both the helicopters lead the single-engine market, accounting for almost 70 per cent of deliveries in the last five years. The H125 outclasses other single-engines thanks to its performance in high and hot environments, versatility and low operating costs. The H125 is a common sight at heliports, hospital landing pads, police department operations centres and airports. With built-in manoeuvrability, super visibility and low vibration levels in the cabin, the H125 has earned its reputation as a true multi-mission workhorse. It, outfitted with a FADEC-equipped 847-shp Turbomeca Arriel 2D, provides spacious cabin while boosting the speed up to 137 knots.

H125 outclasses other single-engines thanks to its performance in high and hot environments

The H130 light single-engine helicopter incorporates latest technology

The H125 offers the benefits of enhanced safety and reduced workload with the Vehicle and Engine Multifunction Display (VEMD) for pilots. These attributes have led many law enforcement agencies to rely on the H125 AStar for their most demanding missions. An example is the Los Angeles Police Department's Air Support Division, one of America's most experienced airborne law enforcement units, that uses H125 AStar to patrol a city of 465 square miles that encompasses dense urban areas, an arid desert climate, the Pacific Ocean shoreline and mountainous terrain. The H125 and its earlier versions have been in service with the Air Support Division since 2001, logging more than 75,000 hours of safe flight.

The H125 also performs safely and cost-effectively for air medical services. Configured for vital life-saving and emergency transportation, the H125 can carry up to four people (one pilot, one patient and two attendants) plus medical equipment.

The H130, on the other hand, is the quietest and safest helicopter in its class, having become the reference for passenger transport. The popular H130 (formerly known as EC130) light single-engine helicopter incorporates the latest technology, has a roomy and modular cabin seating with 7-8 passengers and brings comfort, great operational performance, flexibility and versatility. Its Turbomeca Arriel 2D engine provides increased power at lower specific fuel consumption, while other features include an active vibration control system and a redesigned cabin interior structure. The H130's overall visibility, quietness and safety makes it a key member of Airbus Helicopters, Inc.'s AStar product line, and it can be adapted to the needs of private users, as well as tourism and charter operators.

More than 1,000 Arriel 2D-equipped H125 and H130 helicopters are in service worldwide and have collectively logged over one million flight hours. The Arriel 2D offers extremely competitive operating costs, 10 per cent lower in average than those of earlier variants. The Arriel 2D is also backed by a complete Safran service package, notably the Support By the Hour (SBH) contract and the 5Star programme, fully adapted to customers operating fewer than five helicopters.

Reference Text/Photo:
www.airbus.com

Indra and CODALTEC Work on Latin America's First Air Defence System

The Corporación de Alta Tecnología para la Defensa (High-Tech Defense Corporation – CODALTEC) of Colombia and Indra, the technology and consulting company, will embark on the development of an air defence system that will meet the Colombian requirements and potentially those of other countries in the region. It is the first system with these characteristics being developed in Latin America, as a result of the success of the collaboration between Indra and CODALTEC.

Both companies have worked hand-in-hand since they signed the first cooperation and technology transfer agreement in 2014. This agreement ended last year with a significant achievement after CODALTEC delivered an advanced high-mobility tactical radar, TADER (Tactical Air Defense Radar) to the Colombian Air Force, which had been specially designed to detect aircraft flying at a low altitude. In addition, this is the first military air surveillance radar that has been fully manufactured in Colombia and which will be marketed by CODALTEC in the region.

The project represents a qualitative leap that will contribute in accelerating the increase of the capacities of the Colombian defence industry, along with all other initiatives of the Grupo Social y Empresarial de la Defensa (Social and Business Group for Defense – GSED), which is the benchmark in the region, and will strengthen the sovereignty and technological autonomy of the country.

In this regard, CODALTEC will become a member of the exclusive circle of companies with the capacity to market air defence systems, which require a high degree of knowledge and specialisation for their development.

Shielding Air Space

To address this challenge, Indra and CODALTEC have extended their collaboration to the development of command and control systems, the technology field in which Indra is a global leader. This system will receive the data provided by different sensors and merge it to present a comprehensive and integrated vision of the real scenario for military officers. The system

TADER (Tactical Air Defense Radar) is specially designed to detect aircraft flying at a low altitude

The TADER radar will be a key element of the sensor network in the future CODALTEC air defence system

will be capable of immediately detecting any risk and deploying the necessary actions to neutralise it.

The TADER radar will be a key element of the sensor network in the future CODALTEC air defence system. In addition, the system will be fully interoperable with any other type of subsystem, so it can incorporate new capabilities as they appear in the future or integrate the equipment used by the Armed Forces of other countries.

This scalability and flexibility will be a key element for the commercial success of the solution, since it will be adapted to the specific needs of each customer. CODALTEC may deliver a system adapted to each need, either to protect a given area or as a shield for the air space of an entire country.

To achieve these objectives, the Corporation will receive Indra's support. Currently, Indra's Radars and systems protect the Southwest flank of Europe, under the command of the Atlantic Alliance (NATO). The quality and high capabilities of its radars have also led Indra to become the main provider of radars to the NATO. Its systems protect the sky in countries across the five continents.

The company is also working on the development of a space surveillance system that can detect uncontrolled objects orbiting in space. This system will feature one of the most powerful radars in Europe – it will detect objects at a distance of 2,000 km from Earth.

In the civilian sphere, Indra is also one of the leading global providers of air traffic management systems. It is a leader in this field in Latin America and has upgraded the main control centres and air traffic radars in Colombia.

Key Projects in Colombia

Indra has been operating in Colombia for over 20 years and is one of the three leading technology companies in the country. With more than 2,000 professionals and offices in Bogota, Barranquilla and Medellin, as well as a Cloud Excellence Centre in Bucaramanga and two Software Production Labs in Bogota and Pereira, which act as technology hubs to drive emerging projects and trailblazing architectures that are subsequently exported to the rest of Latin America. In addition, the company has a CyberSecurity Operations Center (i-CSOC) in Bogota.

Furthermore, Indra is involved in some of the key innovative projects that are set to drive Colombia's economic and technological development, in sectors such as Infrastructure, Public Administrations, Energy and Smart Cities. Recently, it has deployed cutting-edge technology for managing the Parques del Rio tunnel in Medellin and the Renacer tunnel in Coviandes, the fourth longest in Latin America. Projects such as these have established Indra as one of the leading companies in Colombia and the region in the transport and traffic sector. Other such projects include a solution deployed on the two-lane Bogota-Villavicencio highway; a comprehensive mobility solution for Medellin, encompassing the Metro subway system, Metro Cable, Metro Bus and Ayacucho streetcar; and the deployment of toll systems in Cundinamarca, Los Llanos and the Autopistas del Café.

In the Public Administrations and Smart Cities sector, Indra's initiatives include development of an advanced e-Government platform in Tunja, as well as its involvement in organising the country's recent presidential elections, among others.

Reference Text/Photo:
www.indracompany.com
www.codaltec.com

Smart Manufacturing at Dubai Airshow 2019

The Dubai Airshow 2019 is all set to feature the inaugural exhibition pavilion and a knowledge sharing conference on 'Smart Manufacturing'. The dedicated conference and pavilion will highlight some of this upcoming industry's future benefits such as greater affordability, quality, customisation and speed-to-market innovation, as predicted by industry insiders. Plus, the conference and pavilion will bring together key stakeholders to discuss additive manufacturing, big data processing capabilities, industrial connectivity and advanced robotics.

Smart Manufacturing aims to take advantage of advanced information and manufacturing technologies to enable flexibility in physical processes, in order to address a dynamic and global market. The aerospace industry is an early adopter of Smart Manufacturing as the transition to what has become known as Industry 4.0, or the "fourth industrial revolution".

Adoption of additive manufacturing, also known as 3D printing, technology alone is already very high among aerospace firms, with major players already benefitting from its advantages. Earlier this year, Boeing signed a five-year collaboration agreement with engineering group Oerlikon to develop standard materials and processes for metal-based additive manufacturing, while Emirates Airline is using selective laser sintering (SLS) to make cabin parts for its aircraft, including video monitor shrouds and cabin air vent grills.

Furthermore, Stratasys has launched a new material, a PEKK (Polyetherketoneketone) based high-performance thermoplastic called Antero 800NA, which is specifically used for 3D printing high-temperature, chemical-exposed parts, such as those in aerospace. The potential benefits will impact aircraft manufacturers and operators carrying out retrofits, as well as others who need to respond to demands for customisation, low volumes and quick turnarounds.

Dubai has a dedicated 3D Printing Strategy, with the goal of having 25 per cent of Dubai's buildings 3D printed by 2030, making the Dubai Airshow the ideal platform to bring these two industries together.

Michele van Akelijen, managing director of show organisers Tarsus F&E LLC Middle East, said: "Smart Manufacturing technology is having a game-changing effect on the aerospace industry, with its impact ranging from OEMs to airlines and many more. Dubai Airshow has always been the place to discover the latest industry innovations, and the addition of Smart Manufacturing ensures attendees will continue to benefit from cutting-edge expertise."

Smart Manufacturing will be one of many features at the Airshow, which will also include the Space Conference and Pavilion, Cargo Connect, Airport Solutions Dubai and Global Air Traffic Management (GATM).

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Raytheon Inventions to Fulfil the "Omniscient Foot Soldier" Vision

Modern missions now take place in complex and uncertain battlefield conditions where attacks come simultaneously from multiple directions in both the electromagnetic spectrum and cyber domains. Military units must have a robust, multi-faceted picture of their operational environments, accounting for the activity of both allied forces and threats.

Although rich, real-time situational awareness is increasingly available to airborne and vehicle-assigned forces, dismounted infantry squads are unable to take full advantage of these highly effective capabilities. They have the capacity to deploy precision armaments more safely, quickly and effectively but the current technologies are too heavy and cumbersome for individual units to carry or use in demanding field conditions.

Experimental SXCT Programme

The Defense Advanced Research Projects Agency (DARPA) has thus launched the Squad X Experimentation programme to design, develop and validate system prototypes for combined-arms squads, ensuring U.S. squad dominance over future decades through the following technologies and capabilities:

- Improving shared physical, electromagnetic and cyber understanding of multi-domain operational environments
- Optimising the time-and-space where squads can manoeuvre by using physical, cognitive and material resources
- Shaping and dominating the battlespace through all three domains ensuring fire synchronisation

DARPA's Squad X Core Technologies (SXCT) programme features novel technologies to extend dismounted squad awareness and engagement capabilities without imposing physical or cognitive burdens. ***SXCT will explore four key technical areas:***

Precision Engagement: Engage threats with infantry weapon systems but without weight burdens affecting mission effectiveness, thanks to distributed, non-line-of-sight targeting, and guided munitions.

Non-Kinetic Engagement: Disrupt enemy command-and-control, communications and unmanned assets at

DARPA's vision for Squad X where soldiers carrying tablet computers share screens for unmatched situational awareness

A laser pinpoints a target as a foot soldier calls in air support

squad-operational walking pace with occasional speed bursts, disaggregated electronic surveillance and distributed platform effects.

Squad Sensing: Detect potential threats through multi-source data fusion and autonomous detection.

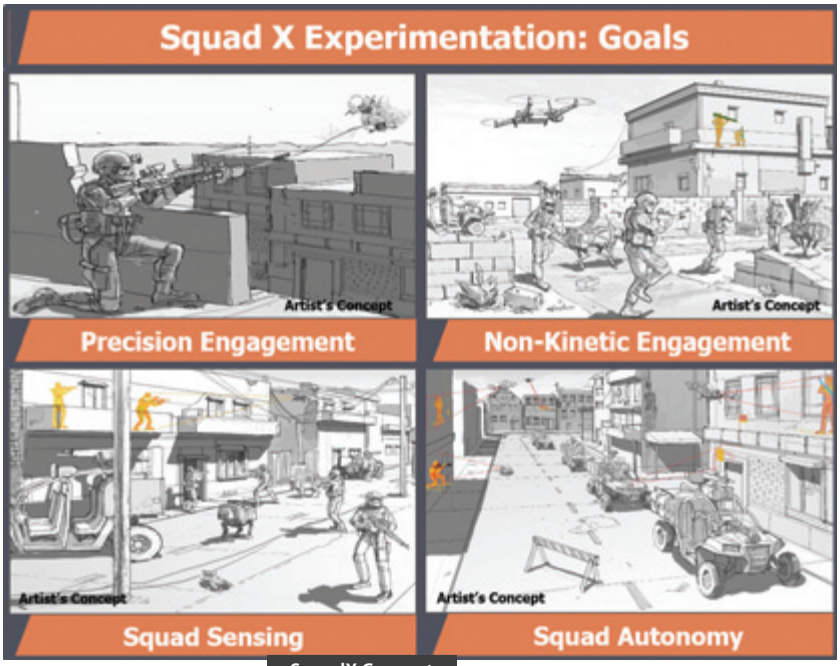
Squad Autonomy: Heighten soldiers' real-time locational knowledge in GPS-denied environments via robust collaboration between humans and embedded unmanned air and ground systems.

Creating the Omniscient Foot Soldier

The fighter of the future will be connected to squad mates, support personnel and robots that can fly around corners or crawl through debris to spot hidden threats. It's a vision that Raytheon is working hard to fulfil.

The inventions emerging from the Raytheon's laboratories and test ranges will help fulfil the U.S. military's Third Offset Strategy, which calls for developing new technologies to create overwhelming advantages.

"We believe we are at an inflection point on artificial intelligence and autonomy," said U.S. Deputy Defense Secretary Bob Work. "Ten years from now, if the first person through a breach isn't a robot, shame on us."



SquadX Concept

From hand-held computers that command those robots to apps that guide paratroopers to the ground, Raytheon is developing new battlefield technologies, under DARPA's SXCT and other programmes.

"It's really about improved man-machine collaboration and combat teaming," said Dave Bossert, a senior engineering fellow at Raytheon's Missile Systems business. "The soldier's human-machine interface, his eyes into the system, is a tablet computer."

Support System

For decades, calling in air support

SXCT Marines

meant a soldier with a radio. But today, Raytheon's Persistent Close Air Support (PCAS) systems connect soldiers on foot, joint terminal attack controllers, or JTACs, on the ground and pilots in the air to share detailed information in real time. A PCAS-enabled soldier can call in air support, piloted or unmanned, in less than six minutes instead of nearly an hour, and for multiple targets.

The PCAS network shares the screens used by the pilot, the JTAC and a soldier with an Android tablet computer. Algorithms help to pinpoint targets, map attack routes and deploy just the right weapon.

"It is providing all the information on the target that the airplane has, passing it all down to the JTAC," said Bossert. "The JTAC can add his perspective, digitally sending it to the aircraft."

DARPA proved the concept with tests conducted near Nellis Air Force Base in Nevada. A JTAC on the ground called in an A-10 attack aircraft with as few as three clicks on a tablet computer.

Saving Lives With an App

A tablet is only as effective as the programme it runs. Raytheon BBN Technologies, one of the company's research centres, helped develop the Android Tactical Assault Kit (ATAK) programme. ATAK allows soldiers to chat, share video, map points of interest and plan routes, sharing information in real time. And it runs on off-the-shelf Android tablets and smartphones.

A PCAS-enabled soldier can call in air support, piloted or unmanned, in less than six minutes

"It started out as a dynamic, moving map, but now ATAK has become a full situational awareness app with a lot of features built in for specific users," said Joe Loyall, a principal scientist at Raytheon BBN.

The app can be customised. Jump Master, for example, is a version for paratroopers, delivering detailed data on wind direction, target zones and even their progress on the way down. Raytheon, one of a handful of core organisations behind ATAK, is continuing its development.

"We are working to develop a decentralised version of ATAK and ATAK servers together, so users will be able to reach back to other organisations, other databases, to get information," Loyall said.

Ultimately, ATAK may be able to fly a vehicle carrying a sensor to a specific location to collect information.

Lightweight and Rugged

Separate devices for radio receiving, radio transmitting and geo-location mean a lot for a soldier to carry. Add a jammer, used to foil adversaries trying to detonate roadside bombs, and you've got quite a load. Hydra Swarm replaces that load with a single, multiple-radio-frequency package.

"The original vision of Hydra was to try and shed between 50 and 80 pounds of gear off the soldier and combine it in one, lightweight device," said Jeff Feinberg, a programme manager at Raytheon BBN.

That device is a radio to communicate, a direction finder to navigate, and a jammer.

"We have a chipset inside the radio with a very flexible front end, so we can run any frequency and any wave form within reasonable limits," said Steven Weeks, the Hydra Swarm programme manager.

Designers consulted with former soldiers to be sure that Hydra Swarm was not only versatile, but also practical. One result: the unit is really rugged.

"Drop it in the water," said Weeks. "You can do that."

Sit Down to Recharge

These electronics need batteries, which have to be charged, something that's not always convenient in the field. Enter Raytheon's iConnect tactical power vest. Now being designed for the U.S. Army at the Natick Soldier Research, Development and Engineering Center in Massachusetts, the vest cuts the size, weight, cost and cabling soldiers will carry.

"What the army is focused on is a single, central battery that will connect to the other batteries and trickle-charge them," said Jeff Mazurek, iConnect programme manager.

The vest is built with strips of conductive material that match up to similar strips built into the seats of Humvees or other military vehicles. To charge the central battery, the soldier simply sits down.

"When a soldier leaves the vehicle, the main battery is completely topped off for as much mission endurance as possible," said Mazurek.

The vest will be constructed from conductive textiles, which eliminates wires and connectors, and will allow soldiers to better distribute electronic devices.

"Our system allows for the soldier to place devices anywhere on his vest, and the system figures out the right kind of power to send to that device," added Mazurek.

Reference Text/Photo:
www.raytheon.com, www.darpa.mil

Elettronica Group Displays Advanced Solutions

At the recently concluded Farnborough International Airshow, Elettronica Group was present with its three industrial assets – Elettronica SpA (Electronic Warfare), Elettronica GMBH (Homelend Security and EW), and CY4GATE (Cyberwarfare), an European leader in defence and security.

Elettronica's systems are in service in more than 30 countries and deployed with their Armed Forces and Security Agencies performing a variety of operational missions, from Strategic Surveillance, to Self Protection, Sigint, Electronic Attack and Operational Support for airborne, naval and ground applications. The Group holds a strong record of successful domestic and international collaborations with key modern military platforms such as the Italian PPA, the fighter Eurofighter Typhoon, the NFH-90 helicopter, the Italian and French ship class Horizon and FREMM, along with projects in the Gulf, Middle East and Asia.

At Farnborough, the spotlight was on the strategic collaboration with Indra, another European defence leader, for the first next- generation, fully European self-protection infrared solution, to defend any type of airborne platforms, from helicopters to transport/tanker to jets, from heat-guided missiles (MANPAD). The solution, named EuroDIRQM (Direct Infrared Countermeasure) reflects its European roots and the use of a new technology, the Quantum Cascade Laser (QCL), the latest development in laser technology that represents a step forward from conventional semiconductor lasers.

MANPADS are today some of the main causes for military aircraft losses in conflict scenarios representing an international threat and a global concern. In addition to MANPADS, new military and security challenges are arising globally in the form of new lethal threats, and one of them is the massive growth in the use of drones. Anti-Drone Interception Acquisition and Neutralization (ADRIAN) is an anti-drone system dedicated to the protection of critical infrastructures and public areas during public events and civil airspace from hostile mini and micro drones threats. The company is already working with the Italian Air and Land Forces for the supply of our anti drone system and with a country in the Middle East.

The Airshow also offered Elettronica Group the opportunity to showcase EDGE, the new escort jamming solution for airborne applications based on a high level of electronic and mechanical innovation. An autonomous pod configuration designed to increase the survivability and success of attacking airborne forces with unique performances and installation capabilities, EDGE's functions are designed to create a safe corridor for multiple mission aircraft. Its embedded ELINT features and networking capabilities enhance situational awareness, intelligence collection and advanced jamming countermeasure against new 3-digit radars.

Visitors also had the opportunity to see the Training and Education activities offered by the Group with its EW Academy, a modern and advanced centre with dedicated infrastructures, assets, processes, scenario simulations and experts covering every aspect the evolving Electronic Warfare domain.

Team Tempest to Scale Heights

The UK unveiled a model of its planned future fighter jet armed with laser weapons, at the recently concluded Farnborough International Airshow. The proposed aircraft will be built by Team Tempest, a consortium including BAE Systems, Rolls-Royce, Leonardo and MBDA.

UK Defence Secretary Gavin Williamson unveiled the Tempest concept at the show that would include autonomous capabilities allowing it to be flown without a pilot on board. Over £2 billion will be invested in the project.

BAE Systems is working alongside the UK Government, the Ministry of Defence, the Royal Air Force and industry partners MBDA, Rolls-Royce and Leonardo to develop technologies to support the UK's world-leading combat air capability today and into the future.

Route to the Future

Today, the world has become more complex and uncertain than ever before. Keeping this in mind, Future Combat Air Systems (FCAS) will need to operate effectively in the most contested, congested and complex environments, where speed and agility are essential. The FCAS will need to be highly capable, flexible, upgradeable, connected and affordable, ensuring it can meet the uncertainties faced by air forces for decades to come.

Investment in Eurofighter Typhoon's on-going enhancement programme includes the development of the latest combat air technologies on Typhoon. These technologies will ultimately be incorporated onto a FCAS, ensuring Typhoon remains at the forefront of technology and will operate seamlessly alongside future platforms.

At the Airshow, a next generation fighter concept model was revealed showcasing key technologies that will be important in the future. The concept gives an indication of the types of technologies that the UK and its partners are developing and investing in so that world-leading capabilities can be delivered for the future.

A FCAS must be able to survive the most challenging combat environments meaning that payload-range, speed and manoeuvrability will be key. Team Tempest is to equip the future fighter with a range of sensors including radio frequency, active and passive electro-optical sensors and advanced electronic support measures to detect and intercept threats.

The system is likely to operate with kinetic and non-kinetic weapons. The integration of Laser Directed Energy Weapons for self-defence and use within visual range combat is also highly likely. The ability to deploy and manage air launched 'swarming' UAVs through a flexible payload bay allows the system to address dangerous Anti-Access Area Denial environments.

Flexible and Connected

Air forces of the future will require a fighter system that is highly flexible and can be applied to a wide variety of military operations. Operators will have the ability to rapidly adapt the system to perform new functions or to change its performance.

Depending on the mission, 'role fit' additions such as low observable conformal fuel tanks, weapons dispensers, air launched UAV dispensers, large modular sensors, long range oblique photography systems for reconnaissance and Laser Directed Energy Weapons could be available.

Adaptability will be built into the system design, with systems architectures, which support a 'plug and play' approach, easily integrating new algorithms and hardware. The system will also support 'scalable autonomy' to provide a number of modes of unmanned operation and a range of pilot decision aids when manned flight is being conducted. These features are dynamically reconfigurable and serve to enhance survivability, availability, cyber resilience, and tactical options.

Furthermore, to deliver significant information advantage and mission effectiveness, the FCAS will act as a 'force multiplier', interoperating with a wide range of other civil and military platforms and services across air, land, sea, space and cyber domains, as well as unmanned systems.

Command and control of other systems, such as UAVs, will be enabled from a fully customisable virtual cockpit, with advanced human machine interfaces including eye tracking and gesture based controls, offering intuitive and sophisticated mission management. Using a similar virtual approach, both mission planning on the ground, and the remote command of unmanned aircraft can be enhanced, ensuring a rapid and effective understanding of the battlespace.

Upgradeable and Cost-effective

The FCAS will be quickly and affordably upgradable, maintaining operational advantage and freedom of action in a rapidly evolving threat environment. Physical interfaces must therefore be strong, lightweight, numerous, and affordably produced. This will be achieved through expertise in additive layer manufacture, joining and fastener technology, 'geometric locking', and low observable materials.

Advanced manufacturing techniques will play a significant role in reducing the unit production cost of the system, and will be a key enabler of flexibility and upgradeability. For example, in-service support costs can be reduced by using robotics adapted from manufacturing to re-fuel, re-arm, role-fit, and repair.

Exoskeletons, wearable displays and computing to provide hands-free instructions, guidance and technical publications could further reduce in-service support costs by helping to improve resource flexibility, improve the quality of work, and the speed at which tasks are performed. The use of artificial intelligence and data analytics in vehicle health and mission related data would improve aircraft availability as well as increase the mission success probability. Training costs could be significantly reduced using the virtual cockpit and virtual mission planning system as a result of their low cost, flexibility, and extreme portability.

To facilitate this, the UK Government launched its Combat Air Strategy at Farnborough, with the aim of delivering the next generation of combat air capability by 2035.

Team Tempest is to equip the future fighter with a range of sensors and advanced electronic support measures to detect and intercept threats

Key Contributions:

- BAE Systems – combat air systems and integration
- Leonardo – sensors, electronics and avionics
- MBDA – weapons systems
- Rolls-Royce – power and propulsion systems

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

"The Future is Built Here"

At the recently concluded Farnborough International Airshow, Boeing announced a total of $100 billion in sales, including $2.1 billion in services.

The company unveiled a number of its innovations that have the potential to revolutionise travel around the world as well as into space, right from hypersonic travel to the future of autonomous flight and manned space flight. It also highlighted its portfolio of commercial and defence products and its broader services business.

At the show, Boeing and Embraer held a conference, announcing plans for a strategic partnership. Boeing's Chairman, president and CEO Dennis Muilenburg, Boeing chief financial officer and executive vice president for enterprise performance & strategy, Greg Smith, and Embraer chief executive officer and president, Paulo Cesar de Souza e Silva, presented details of the proposed partnership, which includes ventures in commercial airplanes and lifecycle services, as well as defence. This announcement coincided with the launch of Boeing NeXt, an incubator organisation for future commercial mobility solutions.

"*Boeing led the way at Farnborough, demonstrating value for our customers, capturing important new business in products and services, and announcing the unique strength of our strategic part-*

Aviation Capital Group ordered 20 737 MAX 8s

Boeing announced $100 billion in sales, including $2.1 billion in services

Advanced F-15 provides superior performance

nership with Embraer. We also invested in our European communities, and launched our new Boeing NeXt organisation — proving the future is built here, at Boeing," said Muilenburg.

Key Contracts

Boeing marked an exceptional week for order capture in commercial aviation, with customers announcing 673 orders and commitments in total, reflecting a continued resurgence in demand for freighters and strong order activity for the 737 MAX and 787 passenger airplanes. Boeing secured 48 orders and commitments for the 777F, five for the 747-8F, reflecting continued strengthening in the cargo market globally.

A strong preference for Boeing's passenger airplane portfolio was also visible, with 52 orders for the 787 and 564 for single-aisle 737 MAX, and strong demand for the 737 MAX 10, with 110 orders and commitments.

Some of the inked deals include:

Dubai-based Aircraft Lessor and BA Opt for 777-300ERs

Boeing and Dubai-based aircraft lessor, Novus Aviation Capital, announced its first direct agreement with Boeing for up to four 777-300ERs, at the show. The commitment carries a list-price value of $1.44 billion.

Furthermore, Boeing and British Airways (BA) also announced a commitment for three 777-300ER airplanes. BA will take the 777s on an operating lease with a leasing company.

Dreamliners in Demand

Boeing and two undisclosed airlines reached agreements to buy a total of 15 787-9 Dreamliners valued at $4.2 billion. One of the airlines would become a new 787 customer. The second airline is adding more 787s to their Dreamliner fleet.

Plus, Boeing and Hawaiian Airlines announced that the companies finalised an order for 10 787-9 Dreamliners, valued at $2.82 billion at list prices. The deal also includes purchase rights for 10 additional 787s.

Plus, Boeing and Vistara, the joint venture between Singapore Airlines and Tata Group, agreed to order six 787-9

Dreamliners, with options for four more jets at. The agreement, valued at $2.8 billion at current list prices, will enable Vistara to become the first operator of the 787-9 in India.

The MAX Factor

At the show, the company and an unidentified customer reached an agreement for an additional 100 737 MAX airplanes. The commitment carries a list-price value of $11.7 billion.

Furthermore, Boeing and four customers also signed commitments for a total of 93 737 MAX airplanes, including a carrier that has committed to 40 of the high-capacity version of the MAX 8 airplane. The commitments are valued at nearly $11 billion.

Also, Boeing and the Vietnamese low-cost carrier, VietJet, signed a MoU for an additional 100 737 MAX airplanes. The agreement is valued at more than $12.7 billion at current list prices.

Boeing and the Indian carrier Jet Airways also confirmed an order for an additional 75 737 MAX 8 airplanes during a signing ceremony. The order is valued at $8.8 billion at current list prices.

New Supply Chain Management Capability

Ukraine's ANTONOV signed an agreement with Aviall, a Boeing subsidiary, including an intent to support the production of their newest aircraft programme, the AN-1X8. Aviall will manage supply chain procurement for ANTONOV production, including logistics and forward stocking concepts.

Also, Canada-based International WaterGuard (IWG) signed a 10-year exclusive distribution agreement with Aviall for lavatory water heaters, which fit Boeing 737, 747, 767 and 777 fleets.

Wide Portfolio

The U.S. Department of Defense displayed several Boeing platforms, including the AH-64 Apache attack helicopter, the CH-47 Chinook heavy-lift helicopter, the F-15E Strike Eagle and the C-17 Globemaster military transport aircraft.

AH-64 Apache: This multirole combat helicopter features fully integrated avionics and weapons, plus state-of-the-art digital communications capabilities that enable real-time, secure transfer of battlefield information to air and ground forces. Apaches are in service with the U.S. Army and international defence forces around the world.

CH-47 Chinook: The first Chinook Block II engineering and manufacturing development (EMD) helicopter is now loaded in final assembly. The Block II programme incorporates several upgrades to increase lift capability. Those upgrades include Advanced Chinook Rotor Blades, an upgraded fuselage, a new fuel system and a new drivetrain. Overall, the aircraft will increase its payload capacity by more than 4,000lbs while also performing in higher and hotter conditions.

F-15E Strike Eagle: The Advanced F-15 being provided to international customers provides superior performance in terms of service ceiling, speed, range, endurance and payload capacity while retaining growth potential to ensure the customer can perform missions effectively now and in the future.

C-17 Globemaster III: It is an advanced airlifter, designed for long-range transport of equipment, supplies and military troops and is used extensively to support combat operations, disaster response, humanitarian relief and aeromedical evacuation missions. Boeing has delivered C-17s to the U.S. Air Force, Australia, Canada, UAE, India, UK and the 12-member Strategic Airlift Capa-

Boeing, VietJet Sign Agreement for 100 737 MAX Airplanes

RNLAF signed a service contract with Boeing for Apache and Chinook

> 737 MAX 7, which is scheduled to enter service in 2019, made its airshow debut with flying displays

bility initiative of NATO and Partnership for Peace nations.

Combined Helicopter Support

Boeing and the Royal Netherlands Air Force (RNLAF) signed a Combined Helicopter Support services agreement that will provide maintenance, services and spare parts to the RNLAF's fleet of AH-64 Apache and CH-47 Chinook helicopters.

The performance based logistics contract, called COHESU, is designed to drive flexibility, affordability and availability to the RNLAF of its fleet of Chinooks and Apaches.

Breakthrough Capabilities

On the airfield, the 737 MAX 7, which is scheduled to enter service in 2019, made its airshow debut with flying displays. Technology advancements allow the MAX 7 to fly 1,000 nautical miles farther and carry more passengers than its predecessor, the 737-700, while having 18 per cent lower fuel costs per seat.

Boeing's flying display also included a Biman Bangladesh 787-8 featuring capabilities that have made the 787 popular with operators and passengers. Since 2011, almost 700 Dreamliners have been delivered to operators, flying more than 250 million people while saving an estimated 25 billion pounds of fuel.

The company also participated in the Cargo Village section to showcase its family of freighters and lifecycle commitment, along with services offered. Other commercial airplanes on display were an Air Italy 737 MAX 8, a 777-300ER, 747-8 Freighters, and a Royal Air Maroc 767 Boeing Converted Freighter, which were seen at the Cargo Village.

Reference Text/Photo:
www.boeing.com

MH-47G Chinook helicopters, the special operations variant

MQ-25

The Smarter Way For Tactical Aviation Fuelling

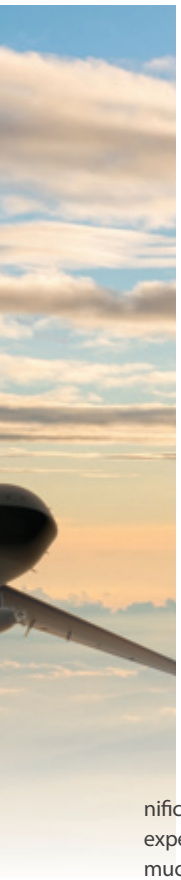
Given the challenges facing tactical aviation, smarter fuelling solutions are required. Thus, with the MQ-25, the U.S. Navy is taking the bold step of bringing a new and exciting unmanned element to carrier aviation.

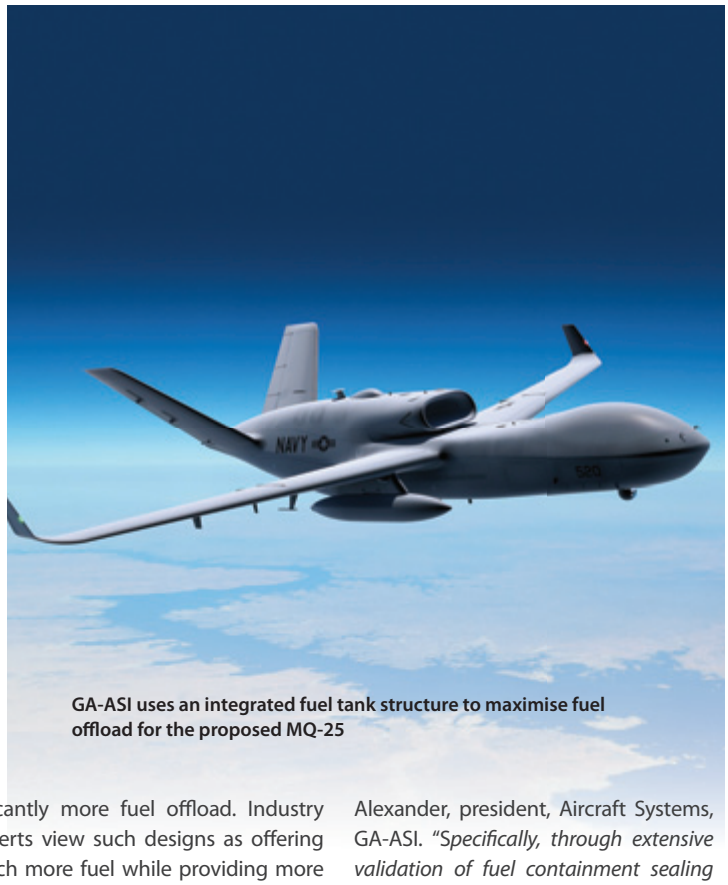
Airborne refuelling between F/A-18 is almost the highest cost service available today, while the U.S. Navy is also wearing out its premier fighters by configuring at least six of their 44 carrier air wings as heavy tankers. It should be remembered that about 20 per cent of a Super Hornet's fatigue life is being consumed by the tanking mission.

Therefore, January 2018 saw the U.S. Navy begin examining proposals to field an unmanned tanking and Intelligence, Surveillance and Reconnaisance (ISR) system for operational deployment on aircraft carriers. The addition of a carrier-based unmanned tanker will return six U.S. strike-fighters to the carrier strike group, while providing more efficient tanking aircraft overhead or at range.

New Design Concept

The U.S. Navy anticipates a design that can encompass 15,000 pounds of fuel at 500 NM from the carrier with sig-





GA-ASI uses an integrated fuel tank structure to maximise fuel offload for the proposed MQ-25

nificantly more fuel offload. Industry experts view such designs as offering much more fuel while providing more than 12 hours of un-refuelled endurance when configuring for ISR. F/A-18's and F-35's thus operate at range on enemy targets far from the aircraft carrier as well as facilitating "bridge the night" operations.

In turn, GA-ASI now uses an integrated fuel tank structure to maximise fuel offload for the proposed MQ-25 unmanned aerial refueling aircraft for the U.S. Navy. GA-ASI has applied its knowledge of advanced composite aircraft structures to develop integrated fuel tanks in a large-scale wing box test article and a full-scale wing skin pre-production validation article.

"*The integral fuel tank wing box test article will reduce technical and schedule risk for the programme,*" said David R. Alexander, president, Aircraft Systems, GA-ASI. "*Specifically, through extensive validation of fuel containment sealing methods, advanced non-linear buckling finite element analysis models and thick composite laminate construction, we have accelerated engineering design consideration prior to the detail design phase and production.*"

A full-scale, inner-wing skin demonstration article was built in March at GA-ASI's Spanish Fork, Utah, facility to verify the tooling and lamination concepts for the MQ-25. The team has validated the outer mould line tooling approach for the build process, which has enabled accelerated engineering and tooling fabrication for the MQ-25 programme.

Unmanned Deck Handling

Using a Predator C Avenger jet aircraft as a surrogate, GA-ASI has successfully demonstrated aircraft carrier deck handling to include taxi capability and transition to the launch-and-recovery phases. As part of the proposed MQ-25 solution, GA-ASI has thus demonstrated that the new carrier-based unmanned tanker can integrate the complexities of existing flight deck operations.

> MQ-25 will be able to 'talk back' to the controller and other flight deck personnel

MQ-25 deck operations will now use specially designed director wands that are the same size, shape and weight as those used today. Directors fully control aircraft taxi operations on deck to lower/raise the launch bar, spread/fold the wings and raise the arresting hook.

GA-ASI also employs unique gesture recognition algorithms in the wands that recognise standard Naval Air Training and Operating Procedures (NATOPS) flight deck director hand gestures. They then translate and send those commands to the MQ-25 air vehicle, which receives and converts them into the appropriate aircraft actions.

MQ-25 will hence be able to 'talk back' to the controller and other flight deck personnel using a small series of LEDs that change colours and/or flash to show that they have received a command while indicating the aircraft's condition or operating state. In addition, a safety observer on deck can stop the aircraft instantly whenever an un-

GA-ASI MQ-25 engine is designed to be the easiest to maintain and most accessible in its thrust class

safe situation is identified.

Long-Endurance Fuel Offloading

The MQ-25 has been designed to combine a large fuel offload with a long-endurance capability in an aircraft that can deliver 15,000 pounds of fuel at 500 NM. It can thus enable two F-35's to operate at 1000 NM from the carrier.

Currently, 69 different MQ-9 Predator are in continual orbit around the world. Ground commanders find that a persistent ISR leads to a more effective, kinetic utilisation of their manned assets.

Best-in-industry Partnerships

To offer MQ-25 to the U.S. Navy, Boeing Autonomous Systems will support GA-ASI with aviation and autonomous experience, with the Pratt & Whitney (P&W) PW815 engine powering the MQ-25.

The GA-ASI/P&W team completed its first powered PW815 run on 5th April this year with GA-ASI MQ-25A inlet and exhaust configuration. The PW815 commercial engine is designed to be the easiest to maintain and most accessible engine in its thrust class.

Pratt & Whitney's EA-6B (J52 engine) and F-35 (F135 engine) now meet Navy propulsion requirements. They also provide unmanned aircraft experience from the X-47B programme (F100 engine).

UTC Aerospace Systems will design/build the landing gear and L3 Technologies will provide the communications systems. BAE Systems will supply a variety of software capabilities, including mission planning, cybersecurity and navigation, while Rockwell Collins offers a new generation of the TruNet ARC-210 networked communications airborne radio and a comprehensive simulation framework.

GKN Aerospace's Fokker business continues to provide GA-ASI with landing gear technologies for MQ-9 and proven carrier tail hook technologies for the MQ-25 arresting hook. After testing its EMALS and AAG systems, General Atomics Electromagnetic Systems, can now provide upfront carrier integration experience and risk reduction, while General Atomics Systems Integration supplies U.S. Navy landing gear integration expertise.

Optimising Strike-Group Safety

It is easy to envision the MQ-25 launching at the end of a typical carrier flyday, then recovering for first launch the following day. Meanwhile, MQ-25 operators perform all the tasks required to keep the strike group safe and operationally informed, whether at sea or ashore.

In contested environments, the side that knows where the enemy is (or is not) will have the advantage. Hence aircraft operating at a distance from the carrier will also play a counter-ISR role, helping the aircraft carrier to stay concealed until a time and place of their choosing.

Some have argued that longer endurance aircraft will have less fuel capacity, with naval observer Jerry Hendrix arguing that "Designing an aircraft to fly 12 hours unrefueled negatively impacts its ability to carry large fuel (or other) payloads over long distances." In reality, relatively long (12 hours or more) endurance and air refueling offload are not mutually exclusive, meaning that both are necessary to meet the U.S. Navy's critical operational needs.

As a stealth fighter, the F/A-18 is not optimised for fuel give or ISR, but the MQ-25 has no need for fast manoeuvres at heavy g-loads. Hence, aircraft designers understand that utilising high-bypass engine technology creates aircraft with significant endurance and fuel offload.

Time for Unmanned Tankers

Well-designed tanker/ISR platforms are destined to change sea combat, as enabling next-generation aircraft to operate forward will return the deep-strike mission to carrier aviation. Persistent, networked ISR enables the CSG to enjoy a range of capabilities while allowing it to dominate in contested environments.

Studies, evaluation and analysis have concluded that both range and long-endurance ISR are compatible in the same air vehicle design for significantly large tanker fuelling. It is now time for Super Hornets to leave the tanking business and for the U.S. Navy to replace them with the MQ-25 programme.

Reference Text/Photo:

Strategic Perspectives

Implementing Strategy: Cross-cutting National Efforts

By: Dr. John R.Ballard
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Focusing national power is a complex task, particularly when the objective is designed to influence another nation or its leadership. Cross-cutting national capabilities can often be powerfully effective in such complex work. For example, using force can be powerful but comes with great potential cost; fortunately, defense capabilities can also be used to augment diplomacy and influence other states without the use of lethal force. Today we face unrest in many parts of the region; solutions to these challenges will require the employment of cross-cutting national tools such as strategic defense communications to reassure friends and dissuade opponents.

The objective of strategic defense communications is to engage key audiences to create, strengthen, or preserve conditions to advance national interests through information and supporting defense actions synchronised with other elements of national power. The United States believes that strategic defense communications have been critical in countering the radical ideologies of the Islamic Republic of Iran, the Muslim Brotherhood, al-Qaeda and other extremist organisations in the 21st century. Strategic defence communication efforts can include both high-level dialogue among defence leaders (such as the Chief of Staff traveling to meet with other national leaders), sometimes known as defence diplomacy, and a range of other coordinated actions, messages, and forms of military engagement used to inform, influence, or persuade other states in support of national objectives. Such strategic defence communications may include public or civil affairs, information operations, defence support to public diplomacy (often conducted by defence attaches overseas), and diplomacy itself (for example when defence officials contribute expertise to treaty and peace discussions). When well aligned to UAE policy and our regional context, strategic defence communications have proven very useful in countering Iranian influence in the region, for enhancing regional understanding of the current issues with Qatar, for building international support for the war combatting the Houthi opposition in Yemen, and for demonstrating patriotic commitment to national objectives. Thus, strategic defence communications have applications in peacetime, crisis and in war.

Each of those activities can influence or persuade selected audiences in significant ways, but they are much more powerful when used in coordination with diplomatic efforts. Many government organisations can and do support strategic communications, under the overall responsibility of the Ministry of Foreign Affairs, but defence officials have particularly useful expertise to contribute in this area, potentially expanding the breadth and impact of a national influence campaign. The key task is to ensure all government efforts are coherent and mutually reinforcing.

The world order is complex now and growing even more dynamic over time; managing multiple potential threats will test even the best strategic leaders as they seek to influence with so much activity around the region. Global power struggles will continue, but the UAE's ability to employ strategic defence communications in concert with traditional diplomacy will continue to help it succeed, particularly because UAE leaders act in concert with national values, with deeds not just words, thus reinforcing the integrity of UAE strategic actions with a range of effective communications.

Australia Seals MQ-4C Triton Deal

The Australian Department of Defence recently announced its plan to purchase Northrop Grumman Corporation's Triton aircraft system. According to Prime Minister Malcolm Turnbull, Australia will buy six MQ-4C Triton remotely piloted aircraft to add to its maritime patrols, with the initial investment of AUD1.4 billion ($1 billion) for the first drone. The total cost for the six drones, including facilities upgrades and support, will reportedly be AUD6.9 billion. With this investment Australia has become the first export customer for Triton and will also enter into a $200 million cooperative programme with the U.S. Navy for the development, production and sustainment of the MQ-4C Triton.

An unmanned aircraft system (UAS) with an autonomous capability built for maritime intelligence, surveillance and reconnaissance (ISR), Triton is the first Northrop Grumman-built aircraft system Australia has purchased. The Royal Australian Air Force (RAAF) will operate the system.

"*Northrop Grumman looks forward to bringing the Triton UAS with its autonomous capability to Australia*," said Ian Irving, chief executive officer, Northrop Grumman Australia. "*Working with RAAF and the U.S. Navy, we are confident that we can provide the best capability to fulfil Australia's maritime mission.*"

Triton can reportedly fly at altitudes of 55,000 feet for 24 hours at a time and is equipped with sensors that provide high-resolution imagery and near real-time video. Pilots and sensor operators fly the Triton from ground stations, which can command flights all over the world.

"*Triton provides unprecedented endurance and 360-degree coverage through its unique sensor suite*," said Doug Shaffer, vice president of Triton programmes, Northrop Grumman. "*Australia has one of the largest sea zones in the world over which it has rights to use marine resources, also known as an Economic Exclusion Zone. As a flexible platform, Triton can serve in missions as varied as maritime domain awareness, target acquisition, fisheries protection, oil field monitoring and humanitarian relief.*"

The Triton has a sensor package designed specifically to detect, track, classify and identify ocean vessels. The aircraft also incorporates improvements for the maritime sensor suite, gust loads, hail and bird strikes, lightning protection and engine inlet anti-icing. These features allow the aircraft to descend and ascend through harsh maritime weather environments to gain a closer view of ships and other targets at sea when needed.

Triton builds on Northrop Grumman's legacy of success in autonomous systems. The U.S. Navy recently acquired two operational Triton aircraft and is under contract for six more.

The system will deploy in operational orbits, with one aircraft on station, another flying home, a third en route and a fourth getting prepped. These orbits can cover 3.6 million nautical square miles in one day. The Early Operational Capability (EOC) MQ-4C Tritons delivered to Point Mugu, California, are just the beginning. The later versions also will be equipped with Multi-INT technology, further expanding Triton's ISR mission.

Strong Partnership

Northrop Grumman has been building

Left to Right: Northrop Grumman Chairman and CEO, Wes Bush, Prime Minister of Australia, Malcolm Turnbull, Minister for Defence, Marise Payne, Minister for Defence Industry, Christopher Pyne, and Chief of Air Force Air Marshal, Leo Davies AO, CSC

its presence in Australia for many years. The global aerospace and technology company will be the anchor tenant of an AUD $50 million Electronic Sustainment Centre of Excellence, to be established at the Badgerys Creek Airport precinct in western Sydney. The new centre will support advanced electronics such as communications and electronic warfare equipment, and targeting pods. The company will bring together highly skilled technicians, engineers and other professionals whose work will be further supported by its high-end technology and software expertise.

Through a Global Supply Chain Deed signed with the Australian Department of Defence in 2011 and renewed in 2017, Northrop Grumman is identifying opportunities for Australian industry to be part of the company's global supply chain. For example, Northrop Grumman's largest Australian F-35 Lightning II joint strike fighter supplier, Quickstep Technologies, demonstrated that its new production facility is equipped and qualified to manufacture and deliver quality composite parts for the F-35's centre fuselage. At a new facility opened in Bankstown, Sydney, in 2012, Quickstep is expected to manufacture over 36,000 parts for the F-35.

Northrop Grumman also works with CEA Technologies, one of Australia's leading military electronica systems and radar companies, and Electro Optics Systems, which develops products incorporating advanced electro-optic technologies for the global aerospace market.

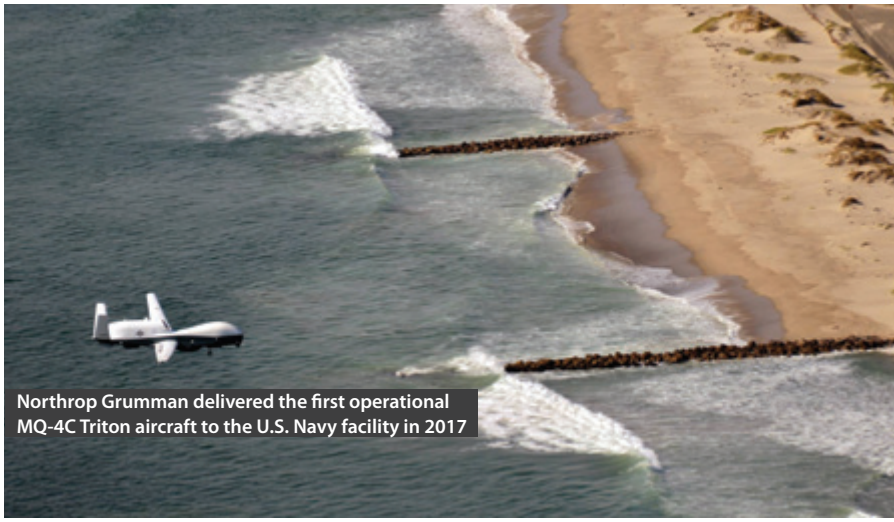
"*Australia and the U.S. are celebrating 100 years of Mateship this year, marking an alliance that goes back to the trenches of WWI. Northrop Grumman is proud to partner with such a loyal friend and provide this unprecedented capability to the RAAF*," said Irving. "*We consider Triton and its autonomous technology to be the future of the next centennial of aviation, and we are honoured to be part of this century-long partnership.*"

The Australian government said the new aircraft will complement its new P-8A Poseidon aircraft by helping undertake ISR missions; aiding in anti-submarine warfare and maritime strike capabilities; and adding to search and rescue capabilities.

The first Triton is expected to be introduced into service in mid-2023, while all six aircraft are planned to be delivered and in operation by late 2025. They will be based at RAAF Base Edinburgh in South Australia.

Northrop Grumman delivered the first operational MQ-4C Triton aircraft to the U.S. Navy facility in 2017, providing the service with unparalleled endurance and 360-degree coverage that allows for a vastly expanded maritime ISR mission.

Reference Text/Photo: www.northropgrumman.com, www. Reuters.com


Northrop Grumman delivered the first operational MQ-4C Triton aircraft to the U.S. Navy facility in 2017

Gripen-E: Boasting Undeniable Edge

Saab's Gripen E's test aircraft is taking advantage of the unrivalled flexibility of the aircraft's design and the next two Gripen E aircraft for the flight test programme are benefiting from key design decisions.

Explaining the progress being made on the test aircraft, Jonas Hjelm, senior vice president and head of Saab business area Aeronautics, said at the recent 2018 Farnborough International Airshow: "Today's threats are not tomorrow's and modern fighters could be viewed as a network of flying supercomputers seeking to outperform their opponents.

"So we designed Gripen's smart architecture to ensure that we can introduce the latest powerful computers and other hardware swiftly and simply which is unmatched in this industry. We have the double advantage of being both the newest aircraft and able to effortlessly leap ahead as processing power advances. The pilot flying Gripen E will therefore have an undeniable edge."

The two aircraft (known as 39-9 and 39-10) benefited by having new and upgraded computers rapidly added to them, further improving the capabilities from the first aircraft, 39-8. A critical factor was that this could be done without affecting the flight critical systems and so was completed in days and weeks, rather than in months and years as is typical in fighters. It means Gripen E can be at the forefront of air combat for decades as new features or technologies demand every greater processing power.

The flight included several test manoeuvres at supersonic speed. This paves the way for future trials involving carriage and release of missiles, drop tanks and other external stores.

International Programme

Gripen E is an international programme and there has been progress with the design of Gripen F, the two seat version. This is being designed with Embraer in Brazil and can be used for training, Combat Readiness training, Combat Missions and Electronic Warfare Officer, Mission Commander and Weapon System Officer in the rear seat. Additional highlights have been further deliveries around key hardware such as the Wide Area Display being led by the Brazilian company AEL Aeker. Gripen E is being developed for the Swedish Air Force whilst the Brazilian Air Force will receive

both Gripen E and F.

The pylons, which were part of the external stores carried by Gripen aircraft with designation 39-8 in test flights were from the Swiss company RUAG Aerostructures.

Gripen E's pylons are installations by which additional tanks for fuel, surveillance systems or guided weapons can be attached under the aircraft. Eight pylons are supplied per aircraft. These technologically sophisticated components include both electronic as well as mechanical systems and must meet the highest demands regarding aerodynamics and load capacity.

Since the first flight with the Gripen E test aircraft (39-8) last year, an intensive flight trials period has been successfully conducted. The aircraft has shown throughout the expansion of the envelope expected performance and behaviour, with high availability and reliability. Gripen has now taken another big step towards customer delivery next year by flying with external stores.

"Gripen flew as expected and we are very pleased with the flight test results. During the flight, the aircraft carried out a number of actions to verify the flying and handling qualities of the aircraft with this extended configuration", said Hjelm.

The flight tests included several test manoeuvres at supersonic speed

> Gripen's smart architecture ensures that the latest powerful computers and other hardware can be introduced swiftly and simply

Arexis jammer pod has the capability to screen and protect against low frequency radars

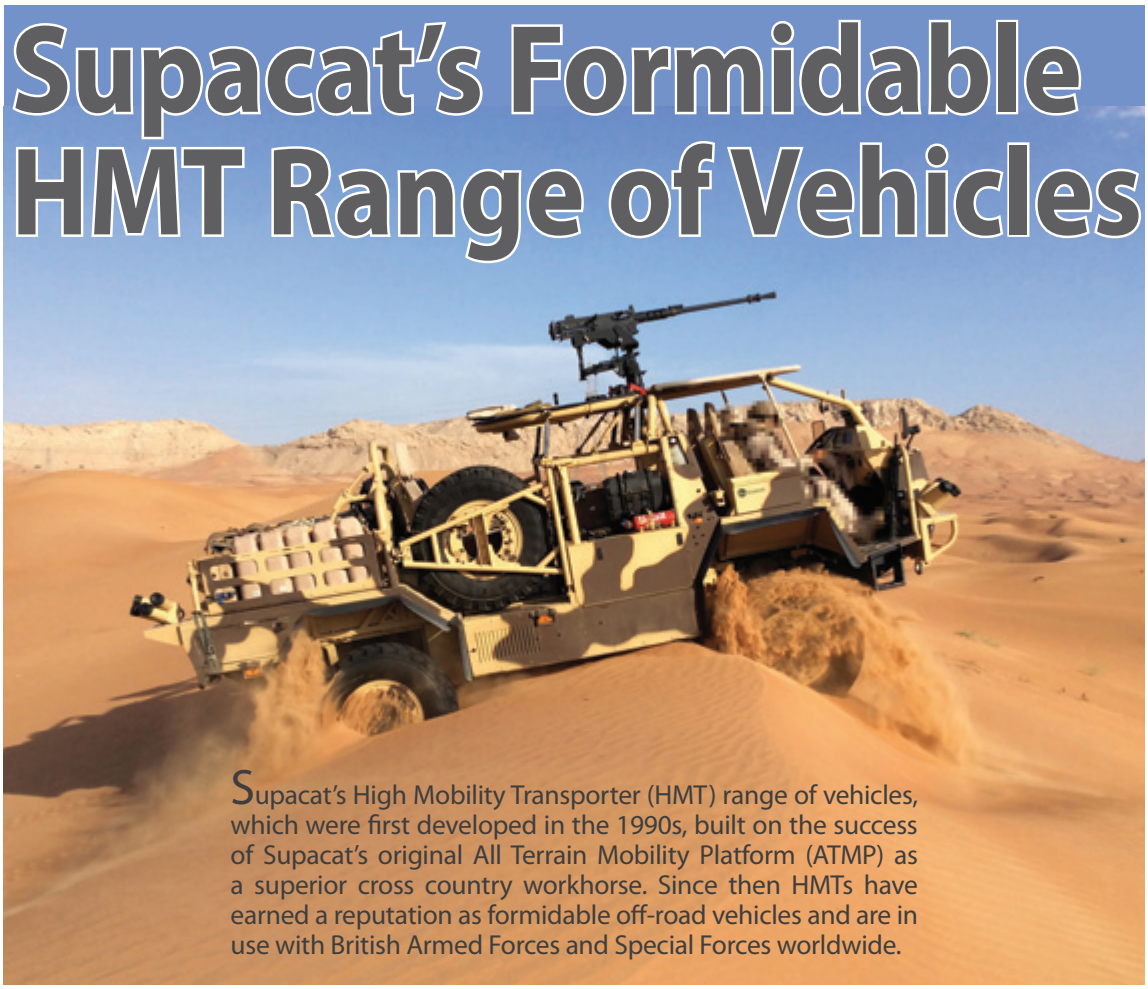
The first flights with external stores were conducted over the Baltic Sea at the beginning of July. Besides two of the IRIS-T air-to-air missile, the aircraft carried five pylons. Dirk Prehn, CEO of RUAG Aerostructures said: "As a major supplier in the Gripen programme, responsible for the design and manufacture of the pylons and other components, we contribute to the superior performance of the fighter, in terms of safety, performance, life cycle cost and quality".

Meanwhile, Saab has also made a new significant addition to its extensive repertoire of electronic warfare (EW) self-protection systems with a product family called Arexis. One version of Arexis is the on-board EW suite in the new version of the Gripen fighter, Gripen E/F. It will be one of the most advanced EW systems ever installed in a fighter aircraft.

Saab is expanding the Arexis product family by presenting the Arexis advanced electronic attack jammer pod. The Arexis jammer pod has the capability to screen and so protect the approach and departure of entire strike formations against low frequency radars by the smart utilisation of Digital Radio Frequency Memory (DRFM) based jamming techniques.

Reference Text/Photo:
www.saabgroup.com

Supacat's Formidable HMT Range of Vehicles



Supacat's High Mobility Transporter (HMT) range of vehicles, which were first developed in the 1990s, built on the success of Supacat's original All Terrain Mobility Platform (ATMP) as a superior cross country workhorse. Since then HMTs have earned a reputation as formidable off-road vehicles and are in use with British Armed Forces and Special Forces worldwide.

HMT's are now produced configured in 4×4 as HMT 400, 6×6 as HMT 600 and in the convertible 4x4 to 6x6 variant, HMT Extenda. HMT400 is best known as `Jackal` and HMT600 as `Coyote` in the Tactical Support Vehicle (Light) role in service within the UK Ministry of Defence's core fleet.

The HMT 400, HMT 600 and HMT Extenda platforms provide the base vehicle on which a range of mission or role requirements can be integrated. Since its introduction into service in 2003, the HMT base vehicle has been adapted in various configurations for many specialist roles to meet each customer's mission requirements. There are now close to 1,000 in service worldwide.

HMT Extenda has been specifically designed for, and is used by, the world's elite Special Forces. It has been battle proven over the last 15 years. It is unique in being convertible to either a 4×4 or 6×6 configuration by fitting or removing a modular, self-contained third axle unit. This `plug and play` system allows the conversion to be completed within hours to offer users the flexibility to adjust payload or range for different operational requirements. Extenda uses the HMT variable height air suspension system which allows it to match the capabilities of the HMT 400 and HMT 600 series sister platforms.

Open Architecture

Like the other HMT series variants, HMT Extenda's open architecture provides for various levels of protection and great variety in the roles and missions for which it can be configured. The hamper is designed as a modular system to enable rapid conversion for a variety of missions. The vehicle can be supplied with an optional mine blast and ballistic protection kit and can be

HMT Extenda is used by the world's elite Special Forces

fitted with different communications, ISTAR and force protection equipment to suit a wide range of operational roles. The latest Mk2 version of HMT Extenda has recently entered service with two global Special Forces customers and a third customer is at the start of its delivery programme.

"Securing these three latest prestigious customers for the HMT Extenda underlines its position as the vehicle of choice for the modern fighting forces and reinforces our world lead in this niche corner of the defence industry," said Nick Ames, Chief Executive of Supacat parent, SC Group.

HMT Extenda Mk2 has recently entered service in Australia under the Defence Material Organisation (DMO)'s JP2097 Ph 1B (REDFIN) Programme for 89 Special Operations Vehicles – Commando (SOV-Cdo). The New Zealand Defence Force subsequently became a new customer for Supacat, and this year accepted into service a new fleet of Special Operations Vehicles – Mobility Heavy (SOV-MH) based on Extenda Mk 2. The Mk2 was also selected to provide a new fleet of High Mobility Vehicles for the Norwegian Armed Forces. Supacat has started delivery of the contract, which includes a comprehensive through-life support package, with the first production vehicle officially handed over in May this year.

HMT 400 Desert

A year ago at IDEX 2017, Supacat unveiled HMT 400 Desert, a new HMT variant adapted to enhance performance in the desert's harsh environment and climatic conditions. It has a lighter gross vehicle mass which improves the power-to-weight ratio and increases mobility over deep desert sand. Further desert features include cooling, a central tyre inflation system and lightweight bead locks to enable the vehicle to be operated at the lowest tyre pressures.

The vehicle is configured to fully comply with the UAE Presidential Guard's requirements for a new special operations vehicle, including tactical CH-47 internal loading, and underwent successful tactical trials and testing by UAE forces during last summer.

"We have been engaged with the UAE for a number of years and seek to provide their Special Forces with the global Special Forces vehicle of choice", said Phil Applegarth, Head of Supacat. "*Supacat is committed to supporting the region, and in the event that HMT 400 Desert is selected by the UAE Presidential Guard, a large element of the production and subsequent support programmes will be conducted in UAE*".

High Performance Solutions

The flexibility of the HMT series has been recently demonstrated by Supacat in developing additional variants and conversions to meet wider and emerging requirements. These include HMT in the Recovery, Logistic Support and Gun Towing roles. At London's DSEi 2017 Supacat unveiled the 10.5 tonne HMT Light Weight Recovery (HMT LWR) as the global defence industry's most versatile LWR vehicle. Supacat has developed HMT LWR to fill a capability gap to recover vehicles operating in hard to access urban and rural locations, a requirement of the UK MoD's Light Weight (Air Portable) Recovery Capability (LW(AP)RC) programme. HMT LWR is 6x6 and offers high levels of agility, off-road performance and protection in common with the HMT family and utilises many HMT design features such as the variable height air suspension system, engine and drive line.

Supacat is an innovative engineering and design company providing global, defence focussed products and services with facilities in the UK and Australia. Its agility and speed enables the company to provide and fully support high performance solutions in short timescales. Supacat is part of SC Group, a holding company for a number of international businesses providing global, cross-sector products and services. It is one of the world's leading Groups of companies specialising in the design and development of equipment operating in harsh environments, from defence to marine, oil & gas, renewable energy, nuclear power and mineral exploration.

LAV 700 to Pack Lethal Punch

General Dynamics Land Systems (GDLS) – Canada's latest 8x8 Light Armoured Vehicle (LAV) 700, is now in production for a Middle East country. The new vehicle leverages on technology from the 8x8 Stryker infantry carrier vehicles (ICVs), and its variants built for the U.S. Army as well as the latest LAV 6.0 currently in production for Canada.

GDLS's LAV 700 provides a next-generation wheeled combat capability, based on combat-proven technology. It features state-of-the-art digital command and control architecture, including health and usage monitoring systems. The self-sealing fuel tanks, energy attenuating seats, add-on armour and scalable ballistic protection add to the increased survivability of the GDLS double-V hull, which can protect against land mines and improvised explosive devices.

The LAV 700 is developed on the basis of instructions received from the customer based on the experiences of their fights and was inspired by the Stryker experiments in Afghanistan and Iraq. This Middle East customer has contracted a large number of different types of these armoured vehicles in a deal that exceeded $14 billion.

All these features are integrated with attention to detail, in a high-capacity chassis rated for more than 32,000 kg. The result is a technologically advanced LAV, with speeds exceeding 110km/h and a range in excess of 1,000km. Trench crossing capability is greater

than 2.2m and its payload is 11,000kg.

Cutting-edge Systems

Like all other LAVs, the LAV 700 is available in a full range of mission configurations, including: personnel carrier; command and control; direct and indirect fire support incorporating 30mm and 40mm weapon systems as well as turreted mortars and assault guns; anti-tank; security, reconnaissance and surveillance; ambulance; and repair and recovery.

The vehicle can be fitted with a wide range of weapon systems, from small-calibre Remote Weapon Systems, through medium calibre turrets, plus direct and indirect support for over-matching lethality. Leading-edge systems and sensors coupled to a sophisticated open-architecture C4 suite ensure full mission flexibility.

The LAV 700 can be fitted with ceramic add-on armour kit for a higher level of protection. So ballistic protection is scalable, depending on the threat. It is estimated that maximum level of all-round protection is against 14.5mm armour-piercing rounds. The front arc can withstand hits from 30mm cannons. Cage armour can be installed for protection against anti-tank rockets. Plus, the vehicle is fitted with automatic fire suppression and optional NBC detection systems. Also, there is a laser warning system and shot detection system, and it can be fitted with active protection system. Furthermore, this vehicle has adjustable ground clearance, which can be raised to the highest level when it is crossing areas where mine threat is high. Crew and dismounts are seated on energy absorbing seats.

> LAV 700 can be fitted with various turrets or remotely controlled weapon stations

Currently, the LAV 700 is one of the most protected armoured personnel carriers in the world. Once fitted with a powerful armament, it can even be considered as a wheeled infantry-fighting vehicle.

The LAV 700 can be fitted with various turrets or remotely controlled weapon stations. A baseline version is fitted with a 12.7 mm machine gun. This vehicle is proposed with 30- or 40 mm turrets. The armoured personnel carrier accommodates around 6-8 dismounts. Troops enter and leave the vehicle via a rear power-operated ramp. Also, there are roof hatches for firing or emergency exit.

Upgrades and Variants

The powerpack comprises a Caterpillar C13 turbocharged diesel engine developing 711hp coupled to an Allison 4800 SP automatic transmission with seven forward and one reverse gears and a single-speed transfer case. It is one of the major improvements over 450hp engine of the LAV 6.0.

For a higher level of cross-country mobility, hydropneumatic independent suspension with ride height control is fitted. This is augmented with a central tyre inflation system (CTIS) as well as run-flat tyres. Ground clearance of the vehicle can be selected from the driver's position. On hard surface roads it uses 8x4 configuration for maximum range, while 8x8 configuration is engaged over difficult terrain and off-road. Its two front axles are steerable.

The LAV 700 armoured vehicle can be airlifted by a C17 Globemaster III or Airbus A400M military transports.

Reference Text/Photo:
www.gdels.com

LAV 700 can be fitted with ceramic add-on armour kit

TEXTRON's Impressive Show at FARNBOROUGH

Bell Helicopter, Textron Aviation Inc., Textron Aviation Defense LLC, Textron Systems, and Textron Airborne Solutions and TRU Simulation + Training: With all this extensive product portfolio and more, Textron truly impressed at the Farnborough International Airshow.

"We had a great range of products at Farnborough, reflecting our strong commitment to product development over the past several years," said Scott Donnelly, Textron's Chairman and CEO. *"Among the highlights were our latest offerings of commercial and military aircraft, unmanned aircraft and simulation and training solutions. The show is always a special opportunity to meet with established and potentially new customers from around the world."*

Bell Boeing is soon to begin U.S. navy CMV-22B production work under $4 billion contract. This contract provides for the manufacture and delivery of 39 CMV-22B aircraft for the Navy; 14 MV-22B aircraft for the Marine Corps; one CV-22B for the Air Force; and four MV-22B aircraft for the government of Japan.

Bell Helicopter: Product of Innovation

For decades, Bell has been known for building aircraft that enable life-saving missions and support militaries around the world. Textron's aircraft are able to rapidly deliver and retrieve warfighters in extreme, challenging environments and for fast transport. When it comes to developing tiltrotor technology, or producing life-saving aircraft, Bell has the innovative minds and the relentless drive to revolutionise vertical takeoff and lift.

The Next-Generation Aircraft on Static Display were:

The Bell 505 Jet Ranger X light single engine helicopter is the ideal military trainer and offers incredible value unlike any other helicopter in its class. With more than 100 delivered around the world, it is designed to be easier and safer to fly thanks to its superior standard equipment and state-of-the-art Garmin 1000H TM glass cockpit.

The Bell 429 is designed with the future in mind, enhancing occupant safety, with the adaptability to remain at the forefront as mission requirements evolve. The Bell 429 is chosen by police forces, air medical teams and militaries around the world for time-sensitive missions.

The Bell V-280 Valor and Bell V-247 Vigilant were featured in the new Live Product Demo Area. The Bell V-280's new tiltrotor technology is Bell's answer to the U.S. Army's Future Vertical Lift programme; it has been designed to revolutionise military capabilities with unmatched speed, range, payload, agility, survivability and endurance. The Bell V-247 tiltrotor is designed to address the evolving military and transportation demands for a shipborne Unmanned Aerial Systems platform.

For more than 80 years, Textron had been reimagining the experience of flight—and where it can take us.

Textron Aviation

Textron Aviation and Textron Aviation

Bell 505 Jet Ranger X light single engine helicopter

Beechcraft T-6 Texan II military flight trainer

Defense highlighted their defence and special mission capabilities, including a static display of the world's premier military flight trainer—the Beechcraft T-6 Texan II—and special mission-equipped Cessna Citation CJ4, Beechcraft King Air 350i and Cessna Grand Caravan EX aircraft.

Since the Beechcraft® T-6 Texan II turboprop's entry-into-service in 1994, nearly 1,000 aircraft have amassed more than 3.2 million hours across worldwide military flight training operations by 10 nations spanning the Americas, the UK, Asia and the Middle East.

Textron Aviation Defense also displayed the Cessna Citation CJ4, King Air 350i and Cessna Grand Caravan EX, each featuring flexible interiors designed for a broad spectrum of special mission applications.

The Citation CJ4 jet redefines versatility for a light jet. The CJ4 has added speed, range and cabin size over its predecessor without incurring midsize jet operating costs. The Collins Pro Line 21 avionics suite streamlines the ease of operation of the CJ4. Features such as single point refuelling, an externally serviceable lavatory and excellent range deliver what crew and cabin passengers appreciate.

True to its legacy of innovation, the Beechcraft King Air 350i surpasses its predecessor's high-calibre performance with more payload capability and range, a quieter interior with standard Wi-Fi, and Pro Line Fusion avionics with full touch-screen simplicity. The King Air is the world's best-selling business turboprop family.

The Cessna® Grand Caravan EX is known for its dependable and efficient performance by regional airlines, charter operators and cargo carriers worldwide. The Grand Caravan EX was engineered for challenging missions, high payloads and short, rough runways while delivering single-engine economy and simplicity.

Textron Systems

Textron Systems showcased the NIGHT-


Fury precision guided weapon system on Shadow


NightWarden is a new Group 3 tactical unmanned aircraft system

WARDEN Tactical Unmanned Aircraft System (TUAS), Aerosonde HQ, as well as the Fury and G-CLAW precision weapon systems. The NIGHT WARDEN TUAS, which debuted at the 2017 Paris Airshow, made its first presence at Farnborough Airshow. Its multiple payload locations, open architecture and software automation, coupled with its satellite communications capability, gave NIGHTWARDEN advanced flexibility and power for tackling various simultaneous mission requirements. The platform also offers up to 18 hours of endurance and a range of up to 1,000 kilometres. Textron Systems' family of TUAS offers proven and reliable experience with more than one million flight hours from operations around the world.

The Aerosonde HQ combines the vertical takeoff and landing capabilities of a multi-rotor platform with the proven efficiency, range and speed of the Aerosonde Small Unmanned Aircraft System (SUAS) fixed-wing aircraft. This HQ capability can be integrated into an existing or new Aerosonde system in less than five minutes, yielding a very diverse mission set with an extremely small, and highly mobile, operational footprint.

Also on show was Textron Systems's G-CLAW and Fury precision guided weapon systems. Fury was displayed on the NIGHTWARDEN TUAS and Textron Aviation's AT-6, while G-CLAW was on Textron Aviation's Cessna Caravan. The systems utilise global positioning system (GPS) /inertial navigation system (INS) and a Semi-Active Laser Seeker, to provide high levels of accuracy for weapon guidance and target engagement. Their advanced warhead designs and tri-mode fuzes maximise lethality against a wide range of targets.

TRU Simulation + Training

TRU Simulation + Training delivers innovative, total aviation training solutions to the commercial and military markets while providing superior technical support and customer service. TRU continues to build its presence as a leading provider to aircraft OEMs, including as an approved supplier to Boeing for the 737 MAX and 777X training programmes. TRU successfully qualified and delivered the world's first-ever 737 MAX Full Flight Simulators (FFS) to Boeing's Training Campuses in Miami, Singapore, Gatwick and Shanghai as Boeing continues to expand its 737 MAX FFS order. TRU continues to expand its footprint in Asia through several new Airbus full flight simulators for the A320 and A350 aircraft platforms—provided to Airbus' growing base of global training centres in Beijing, Singapore and beyond.

Airborne Tactical Advantage Company (ATAC)

ATAC, a part of Textron Airborne Solutions, is an industry-leading provider of tactical flight training and adversary services which was acquired by Textron in 2016. ATAC provides allied partners and the U.S. Departments of the Navy and Air Force with realistic fighter adversary flight operations involving numerous tactical aircraft, highly skilled former military fighter pilots, and an impressive maintenance and logistics program. In addition to preserving flight hours on front-line active military aircraft, ATAC also enables the Department of Defense to focus on "blue air" combat flight training, ensuring U.S. military pilots have every possible tactical advantage, while saving the U.S. DOD significant costs.

Reference Text/Photo:
www.textron.com

Strategic Perspectives

Capstone on Combined Effects Thinking

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This article completes the series on combined effects strategy. First, the foundation. My first two articles of 2018 related the legacy of Dr. John Ballard's thought as National Defense College Dean in terms of four core competencies for the security strategist. In the next article, I emphasised the need to blend theory with practice to inspire action with vision, and to question assumptions, logic, and evidence. The fourth article also discussed fundamentals of out-thinking one's competitors. This can be done through flexible strategies that re-arrange ends, ways and means rather than replicate them.

On the basis of understanding strategy as a creative process, the fifth article explained how using confrontation and cooperation at the same time can create powerful effects. The effects may be causative and preventive, and psychological and physical. Such a holistic approach influences the enemy's will and capability in ways that hierarchical organisations, and either cooperation or confrontation, do not. The next article described North Korean plans to win with superior combined effects, and attendant campaigns designed to set conditions to achieve those effects. Last month's article detailed the language and logic of how to craft diplomatic, informational, military, economic and social (DIMES) lines of effect.

This article caps all of the preceding by highlighting an historically useful combined effect — inducing a dilemma. Let's consider two of many Chinese examples.

In the Spratly Islands during the 1980s, China used diplomatic and economic inducement, and military coercion, to impose a dilemma on Vietnam that strengthened China's sovereignty over claimed territory. How? First, China used internationally contracted drilling companies to conduct surveys in Vietnam-claimed maritime territory. These operations induced Vietnam to conduct counter-surveys in the area. The dilemma for Vietnam was, watch China manipulate a proxy to occupy disputed territory, or confront peaceful maritime operations protected by Chinese naval forces. Vietnam chose to conduct counter-surveys as a way to avoid the extremes of either doing nothing or confronting directly. Vietnam's decision effectively took China's bait, which led to a military conflict in which Vietnamese forces were defeated. The combined effect was one of induced coercion, and it worked to China's advantage.

Another Chinese example of inducing a dilemma is the ongoing strategy in which China persuades Taiwan to unify with China, while at the same time deters Taiwan from declaring independence. This persuasive–deterrent combination presents a dilemma for Taiwan because it polarises a key political issue in democratic Taiwan. That is whether to unify with, or declare independence from, China. Trust of China's intent to preserve Taiwan's de facto sovereignty is a central concern. China induces this domestic dilemma for Taiwan from time to time with demonstrations of force: missile firings in 1995-1996 that landed just north of Taiwan; routine military exercises that simulate invasions of Taiwan; and other live-fire exercises and military movements around Taiwan. The combined effect is one of induced persuasion and deterrence.

Combined effects strategy is about how to create superior combinations of effects. Enlightened leadership at multiple levels is needed to orchestrate the dynamic coordination of all relevant instruments of power. Best-practices education is key. At the National Defense College, a curriculum of continuous improvement is key to unleashing the human spirit of critical thinking and empowered decision-making required to prevail against such distributed threats, opportunities and challenges.

ST Engineering Aerospace to Service Japan's Solaseed Air

Solaseed Air 737-800

ST Engineering Aerospace, part of ST Engineering, recently secured a multi-year component Maintenance-By-the-Hour (MBH) contract from Japan's Solaseed Air. The agreement will see ST Engineering Aerospace continuing its support in component maintenance for the airline. As part of the contract, the company will expand its scope of component support services for Solaseed Air's fleet of Boeing 737-800s.

Takeo Kikuchi, Executive Vice President of Maintenance & Engineering, Solaseed Air, said: "We are very happy to extend our agreement with ST Engineering Aerospace for component support. The excellent service support and strong relationships between our staff proves decisive to select ST Engineering Aerospace as our partner while we expand our fleet. We expect that our close working relationship will continue to improve."

While Lim Serh Ghee, President of ST Engineering's Aerospace sector, added: "We are happy that Solaseed Air has chosen to continue the partnership with ST Engineering Aerospace for their component maintenance needs, which have changed through their fleet growth and maintenance planning. Such long-term partnerships enable us to fulfil our proposition in providing a flexible and customised MBH programme to meet the evolving needs of customers, while they can also continue to expect the same, if not greater, level of care and dedication from us."

> MBHTM programmes allow operators to keep operating costs low

A global network of distribution centres, satellite stores, and repair shops, both in-house and external, support ST Engineering Aerospace's trademarked MBH programme. Through customised MBHTM programmes, airlines can select a range of support services and pay a corresponding flight hour rate. This way, operators are able to keep operating costs low and also minimise fixed asset inventory holdings in terms of spares or maintenance equipment.

Today, ST Engineering Aerospace provides integrated component support for a fleet of more than 600 aircraft on the MBH basis, servicing over 20 aircraft operators in Asia Pacific, Europe and the Middle East. In Asia alone, over 10 airlines have selected the company as their preferred component solutions service provider.

ST Engineering is a global technology, defence and engineering group specialising in the aerospace, electronics, land systems and marine sectors. Headquartered in Singapore, the Group has been serving customers in the defence, government and commercial segments in more than 100 countries. With more than 500 smart city projects across 70 cities, it continues to help transform cities through its suite of Smart Mobility, Smart Security and Smart Environment solutions.

Compass Call Moves to a Modern Platform

BAE Systems has started preparations to transition its advanced Compass Call electronic warfare (EW) system from the aging EC-130H aircraft to a more contemporary platform that will considerably improve mission effectiveness. Commonly known as the 'Cross Deck' initiative, it will enable the U.S. Air Force to continue disrupting enemy command and control capabilities well into the future.

As the mission system integrator for the programme, BAE Systems is working with L3 Technologies to transition the Compass Call capabilities onto an EC-37B aircraft, a special-mission Gulfstream G550 that meets the U.S. Air Force requirements. This new platform will provide combatant commanders with improved standoff jamming capability and flexibility to counter sophisticated communications and radar threats.

"The Compass Call mission electronics are world-class EW systems that are in high demand from operational commanders because of their electronic attack capabilities and their ability to protect critical missions," said Pamela Potter, director of Electronic Attack Solutions at BAE Systems. "The cross-decking programme enables the Air Force to maintain existing, unmatched EW mission capabilities in an economical business jet that can fly faster, higher, and farther than its predecessor, improving mission effectiveness and survivability."

Improving Mission Effectiveness

Compass Call is an airborne tactical weapon system that has provided protection and supported special missions on the EC-130H since 1981. BAE Systems serves as the platform's systems engineering, integration, and testing lead as well as the mission system prime contractor.

To meet new mission requirements and combat advanced threats, BAE Systems will re-host the EC-130H's mission equipment onto the higher performing EC-37B aircraft. The new platform will support Compass Call capabilities that are required in multiple mission plans to support operation in anti-access/area denial and irregular warfare environments. By integrating mature electronics onto a state-of-the-art aircraft, the total weapon system will provide pilots and operators greater confidence.

When the EC-37B enters service as a 21st century electronic attack platform, the combination of technology maturation and a new aircraft is projected to provide: A 50 per cent reduction in weight and in operating costs, the ability to operate at higher altitude, execution at longer ranges, along with performance at faster speeds.

In 2017, BAE Systems and its partners completed the initial design review of the Compass Call weapon system, and the final design review is planned for this fall. Initial modifications of the first G550 are underway, with the first two aircraft fielded in 2023. A total of 10 new aircraft are planned. However, the company will continue to sustain the electronics for the fleet of EC-130H Compass Call aircraft while it develops, procures, manufactures, and integrates electronics for the new fleet.

BAE Systems is working with L3 Technologies to transition the Compass Call capabilities onto an EC-37B aircraft

MBDA's Superior Air Defence Systems and Anti-Ship Missiles


Marte ER on NH90 helicopter


Teseo MK2A firing from Destroyer

At the recently concluded SeaFuture 2018 in La Spezia, Italy, MBDA showcased its consolidated expertise in air defence systems and anti-air/anti-ship missiles. La Spezia is one of the three Italian sites of MBDA, and is the focus point for MBDA's Italian anti-ship systems, where the Marte and Teseo missile families were conceived and are produced.

The company is renowned for designing and producing missiles and missile systems to meet the whole range of current and future operational requirements for armed forces around the world. Some of the products and systems displayed included:

Marte ER: It represents the third generation within the Marte family of missile systems and is derived from Marte MK2/S. The main difference between the two is the introduction of a turbofan engine in place of the rocket motor. Marte ER's design takes into account that Marte MK2/S is already qualified and installed on naval versions of European AW101 and NH90 helicopters, offering advantages such as same mechanical, functional and electrical helicopter interfaces; same logistic support and no platform hardware changes required. It can be launched by helicopters, ships, coastal batteries, and maritime patrol aircraft and fast jets. The missile weighs 315kg, while its length is 3.60m, and max body diameter is 316mm. Its range is well beyond 100km, while its speed is high subsonic.

Teseo MK2A: It provides improved performance in terms of over the horizon targeting and operations in complex naval scenarios. It is capable of ranges in excess of 180km. Target data is derived from the ship's command system or taken directly from the ship's surface search radar. Mission planning allows the selection of different firing modes (such as fire-and-forget or midcourse guided) and of specific trajectories and evasive manoeuvres. Mid course re-vectoring from a co-operating ship or helicopter is also possible.

The excellent capabilities of the missile allow the system to operate effectively in both littoral and blue water environments. The system is in service in 12 countries worldwide, with ships of different class from hydrofoils up to destroyers and aircraft carriers. MBDA and the Italian Navy are currently evaluating a new evolution to the Teseo missile. It weighs 780kg, its length is less than 6m and has high subsonic speed.

Flexible and Agile Solutions

At the show, MBDA demonstrated its expertise in air defence with the Enhanced Modular Air Defence Solution (EMADS) system operating the brand new CAMM-ER missile for short to medium range air defence domain and the Aster family for long range air and missile defence.

CAMM ER: The Common Anti-air Modular Missile Extended Range (CAMM ER) is from the CAMM family of next generation air defence missiles, designed for both the land and sea environments. Incorporating advanced technologies, CAMM-ER provides protection against all known and projected air targets including fighter aircraft, high-speed missiles and precision munitions.

CAMM-ER has an active RF seeker that provides true all-weather performance

with great clutter rejection capabilities. The lightweight missile is highly agile with a high-lethality warhead and advanced fuzing package, giving a high probability of kill against a wide threat set. It weighs 160kg, while its length is 4.2m and diameter is 190mm. The range is in excess of 40km and its speed is supersonic.

Aster: These missiles form the cornerstone of Europe's naval as well as land based air defence programmes. The Aster missile family comprises Aster 15 for short to medium range and Aster 30 for short to long-range air defence. Aster is a lightweight, highly manoeuvring and agile missile equipped with a high-performance active RF seeker.

Thanks to the unique combination of aerodynamic control and direct thrust vector control (PIF-PAF), the missile is capable of very high-G manoeuvres. Together, these features give Aster an unmatched hit-to-kill capability. Aster missiles provide ships with an all-round anti-missile and anti-air capability to ensure self-defence, consort protection and long-range interception capability for area defence, and anti-ballistic missile protection. Aster missiles are in service on the latest vessels brought into service by three of Europe's major navies and with several other navies around the world.

The Aster 15 weighs 310kg, while its length is 4.2m and diameter is 180mm. Its maximum speed is Mach 3, its range is in excess of 30km and it can reach an altitude of 13 km. On the other hand, the Aster 30 weighs 450kg, its length is 4.9km and diameter is 180mm. Its maximum speed is Mach 4.5, its range is in excess of 120km, and it can reach an altitude of 20km.

Strategic Growth

With a significant presence in five European countries and within the U.S., in 2017 MBDA achieved a turnover of 3.1 billion euros with an order book of 16.8 billion euros.

CAMM-ER has an active RF seeker that provides true all-weather performance

MBDA CEO Antoine Bouvier said: "The group continues to move forward on each of its three strategic pillars: to give its domestic countries guaranteed access to missile technological sovereignty, to pursue European consolidation, to develop international activities; these three actions jointly contribute to the critical mass of MBDA, that is its ability to achieve long-term development faced with its global competitors. We continue to view the future with optimism, targeting, as we expected, €4 billion in revenue by 2020. To support this growth, the group plans to hire nearly 1,200 people this year, after recruiting 1,000 in 2016 and as many in 2017."

On the international front, 2017 saw the creation in India of a joint venture between MBDA and its Indian partner Larsen & Toubro to meet the Indian Armed Forces' future requirements under the New Delhi government's 'Make in India' policy.

Domestically the year was marked in France by the first deliveries of naval cruise missiles (MdCN) and medium-range missiles (MMP) for land combat; in the UK, by the order for additional Meteor missiles to continue with integration on F-35 Lightning II; in Germany, by the formal kick-off of negotiations with the authorities on the TLVS air defence and anti-missile programme; and in Italy, by the choice of the CAMM ER missile within the framework of the replacement of the Aspide air defence missile system. Co-operation in Europe on missile technologies also made significant progress in 2017, which will deliver future economies of scale and enhanced competitiveness in the coming years.

With more than 90 armed forces customers in the world, MBDA offers a range of 45 missile systems and countermeasures products already in operational service and more than 15 others currently in development.

The 'Sea at 360 Degrees': The Undisputed Protagonist of Seafuture

Organised by Italian Blue Growth (IBG) - promoting company together with the Italian Industries Federation for Aerospace, Defence and Security (AIAD), the Region of Liguria and Blue Hub in cooperation with the Italian Navy - the Seafuture 2018 edition took place from 19 to 23 June in the La Spezia Navy Base, Italy. Seafuture is dedicated to naval vessel upgrading and life-cycle management based on the latest sophisticated technologies.

The Seafuture sought to analyse at length all aspects of the maritime domain to provide a business model that combines industry, science, technology and environmental awareness, which epitomise the goal of Seafuture.

During a press conference, Cristiana Pagni, president of IBG as well as creator and promotor of the event, provided facts and figures for the Seafuture sixth edition: 9,000 square meters of exhibition space between the historic buildings of the Navy Base, over 40 foreign delegations, 1,500 bilateral meetings between companies and delegations and between companies themselves, 28 conferences, seminars and workshops regarding both technical and strategic policy issues.

Around 180 major companies and small-to-medium enterprises, together with other maritime cluster organisations and sector associations including State institutions and Government and non-governmental organisations, mainly from Italy, but also from all over the world participated in the Seafuture 2018 edition. The Italian shipbuilding sector was represented by Fincantieri, Orizzonte Sistemi Navali, Intermarine, Cantiere Navale Vittoria, Effebi, Ferretti Security and Defence (FSD), Baglietto Navy, Novamarine, Stem Marine, CABI Cattaneo and Zodiac, along with the combat system and naval equipment suppliers including Leonardo, MBDA, Elettronica, Calzoni, GEM Elettronica, Gay Marine, Civitanavi Systems, Ingegneria Dei Sistemi (IDS), Martec, RINA, Seastema, Sitep, Insis, Elsel, Nuova Connavi, Drass, Eurocontrol, Fiocchi Munizioni, MTU, Volvo Pent, Thales Alenia Space Italia, the French shipbuilding giant Naval Group and Thales, NATO's Centre for Maritime Research and Experimentation (CMRE) and the Ligurian Cluster of Marine Technologies (DLTM).

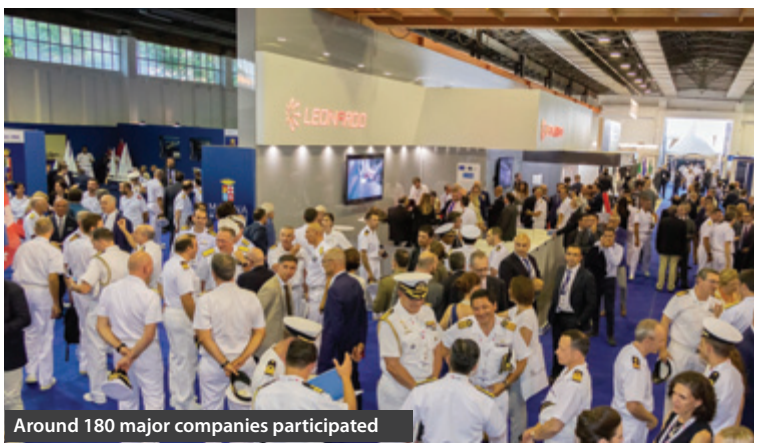
Foreign delegations and operators got the opportunity to visit and experience at sea demonstrations not only on-board the latest generation warships such as the Italian Navy multi-purpose FREMM frigates in both anti-submarine (ASW) and general purpose or anti-surface warfare (ASuW) configurations but also on-board the newest smaller vessels and boats produced by the Italian shipbuilding sector, in addition to the Italian Navy's older vessels which could find new life through a proper refitting and upgrade project, to be managed by the national shipbuilding industry.

ITS Virginio Fasan and ITS Luigi Rizzo – respectively ASW and ASuW – configured multipurpose frigates developed and built under the joint French-Italian programme managed by European OCCAR agency – and the Amerigo Vespucci training vessel were at the show. Besides, foreign delegations had the opportunity to experience at sea demonstrations, among others, on-board Ferretti Security and Defense (FSD) 20-metres FSD195 fast patrol vessel in a new variant, Baglietto Navy's 15-metres FFC-15 fast multipurpose transport landing troop vessel and Stem Marine 7.5-metres STEM 750 Jet rescue boat.

Visitors also got to see the 12-metres SWAD (Sea Watch Dog) unmanned/optionally piloted surface vehicle (USV/OPV) developed by DLTM-lead group of 8-companies under government funding and L3 Calzoni's Lyra remotely operated vehicle (ROV) in action. Leonardo and Ingegneria Dei Sistemi (IDS) exhibited respectively the AWHero short-range tactical rotary-wing and the IA-17 small fixed-wing UAVs.

Foreign delegations had the opportuni-

Seafuture 2018 edition took place from 19 to 23 June in the La Spezia Navy Base, Italy



Around 180 major companies participated

ty to experience at-sea demonstrations on-board ITS Euro (Maestrale-class frigate), ITS Aviere (Soldati-class fleet-patrol ship), Driade (Minerva-class corvette), and discover how these vessels could find a new life and missions, under advice from the Italian Navy and naval shipbuilding industry.

Besides the exhibition in itself, the Seafuture is well-known for its conferences, seminars and workshops agenda. The matters which were dealt with, ranged from maritime security, to shipbuilding, refitting, combat system, propulsion and research and development – including the following topics:

A Comprehensive Approach to Maritime Security

The defence of national economic interests at sea and the security of maritime traffic in a geostrategic context characterised by new threats, was the main theme of the opening forum on the first day of Seafuture 2018, titled 'A Comprehensive approach to maritime security', which was introduced by the Chief of the Italian Navy, admiral Valter Girardelli. The forum analysed the modern threats in the maritime domain

> Leonardo and IDS exhibited respectively the AWHero short-range tactical rotary-wing and the IA-17 small fixed-wing UAVs

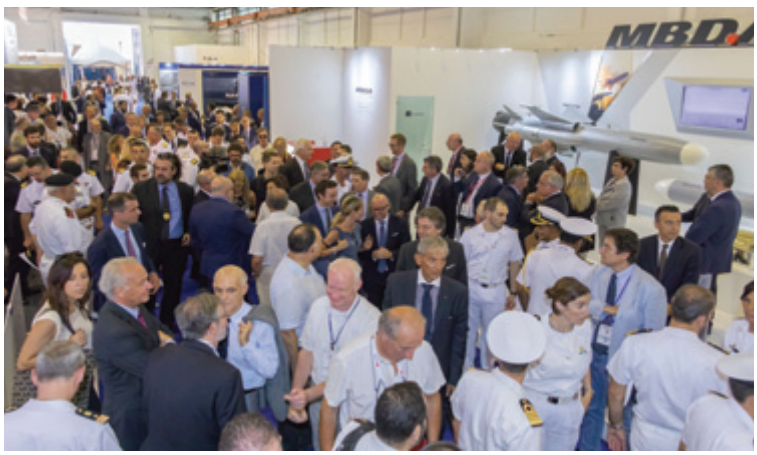
associated with national economic interests and worldwide traffics security and stability in worldwide traffics. A think-tank grouping the main actors of the Italian maritime cluster considered traditional and modern point of views (POVs), also studied the increasing connections between maritime and cyber domain.

On the first day of Seafuture , the Italian Navy Logistic Command also presented its know-how and solutions through the Orizzonte Sistemi Navali's (OSN) Total Global Support (TGS) FREMM programme and latest OCCAR and nationally-managed programmes with OSN, Italian MoD and Systecon Group and Italian Shipowners association representatives.

Excellences in the National Naval Industry and Global Challenges

"Facing global challenges through the technological innovation, towards SHIP 4.0", was the main theme of the industry forum on the second day. The forum provided the stage not only for national giants such as Fincantieri shipbuilding group and Leonardo defence and security group but also for major industrial players such as MBDA and Elettronica, respectively leaders in the missiles and electronic warfare sectors as well as for smaller to medium companies.

Exploitation of the successful refitting and renovation projects of previously-operated Italian Navy's vessels for the Bangladesh Coast Guard and Peruvian Navy were the case studies for the refitting and renovation forum held on the second day of Seafuture with the participation of Fincantieri, small and medium industries, Italian and Peruvian navies and Italian MoD defence industries agency (AID).



MBDA and Elettronica were part of Seafuture 2018

European and National Excellences in Defence Procurement

The naval focus on the third day was on the European and national excellences in defence procurement and programme management. The Director of OCCAR (Organisation Conjointe de Coopération en matière d'Armement / Organisation for Joint Armament Co-operation) procurement agency and the Director of Italian MoD's Naval Armaments Directorate (Direzione degli Armamenti Navali - NAVARM) presented their respective organisation, mission and vision and reciprocal relationships, with a focus on programmes with the participation or leading position of Italy.

The same day, the IT MoD presented the results of the European Strategic technology forecasting survey (Pythia project) with Engineering Ingegneria Informatica and Zanasi & partners, alongside the 'Haruspex suite' innovative technology to counter cyber-attacks and the 'Cyber crisis management' role play game to stimulate attention on cyber security.

Italian MoD's Naval Armaments Directorate

In addition to naval platforms, the Italian MoD's Naval Armaments Directorate (NAVARM) is involved in the development, design, testing, validation and procurement of on-board systems, sensors and weapon systems. During the forum, NAVARM highlighted the implementation of Human Centre Design with the use of virtual reality into the design process developed for the new Italian Navy's platforms.

The Directorate and Martec Company presented a number of activities to improve on-board safety such as passive and active protection, damage control and redundant systems, optimisation of human machine interface and new hardware for command and control stations. Under the 'Far Seas' research project on Lithium Ion Batteries and Battery management system, Italian Navy together with Fincantieri, FAAM and La Sapienza University presented a national propulsion solution for future U212A submarine application.

The Naval Arsenal of La Spezia, where Seafuture was held, together with Dragonfly company presented the 3D printing technology project for rapid production of spare parts (MARAMASP programme).

Addressing the use of Unmanned Systems in Underwater Warfare

A shared innovative vision between the Italian Navy, national industry and the Italian research domain in the development, procurement and employment of autonomous underwater and remotely controlled vehicles was at the heart of a two-day workshop with the participation of NATO Science & Technology Organization (STO) Centre for Maritime Research and Experimentation (CMRE).

The autonomous underwater and remotely controlled vehicles exploiting the latest technologies including artificial intelligence are foreseen to be used in countering underwater unmanned and manned submarines, mines and hybrid threats in addition to conduct intelligence, surveillance and reconnaissance operations.

Developments in R&D and Applied Programmes in the Naval Domain

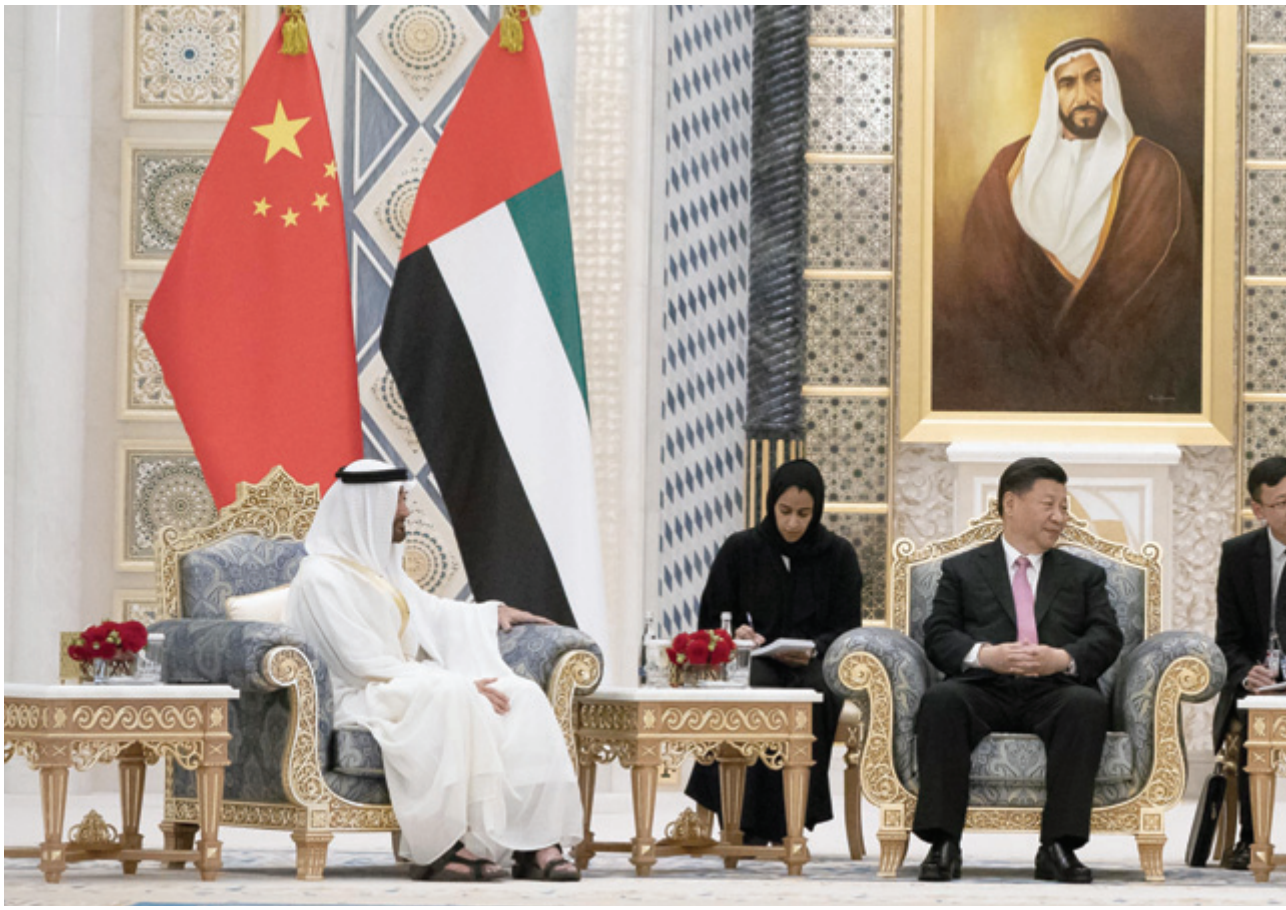
ATENA (Associazione di Tecnica Navale) and Pisa University presented the activities in the electromagnetic spectrum control and management, including electronic warfare and signature control.

The International Navy Safety Association (INSA), a team of international navies and classification societies, has been developed on NATO request and has now published a safety code for warships, known as the Naval Ship Code and published as ANEP 77. Italy's RINA classification society and an Italian Navy representative discussed the code's development, its use on a number of recent warship projects, analysing both technical and practical applications, and the future plans for the code.

Reference Text/Photo:
www.seafuture.it

UAE and China: Strong Anchors

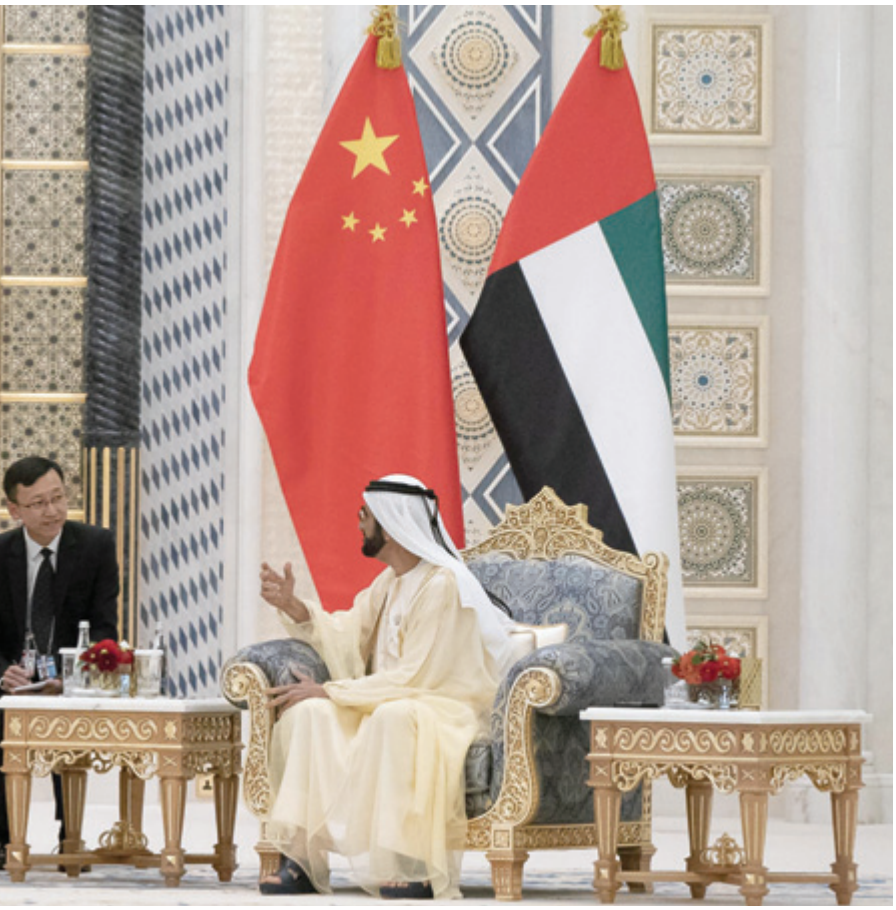
An inspiring cultural model for developmental cooperatio



The official reception ceremony for the Chinese President Xi Jinping on his important historic visit to the UAE in July 2018 reflects the deep relations between the two friendly countries, which are expanding and growing in a deliberate manner. This embodies the will of the two leaderships and their desire to expand cooperation and benefit from the great potential and capabilities of the two economies, and to promote all of this by building a comprehensive system of strategic partnership based on cooperation in all fields. In this issue, Nation Shield sheds light on the reality of the UAE-China relations, the basis of these relations and the prospects for their development.

for Strategic Partnership

ion for the benefit of nations and peoples



On his first overseas tour after being re-elected as president of China in March 2018, the Chinese President Xi Jinping paid an official visit to the United Arab Emirates on July 19, 2018, for three days. During the visit, he met with His Highness Sheikh Mohammad Bin Rashid Al Maktoum, the Vice-President and Prime Minister of the UAE and Ruler of Dubai, and His Highness Sheikh Mohamed bin Zayed Al Nahyan, Crown Prince of Abu Dhabi and Deputy Supreme Commander of the UAE Armed Forces. Just before the visit, they issued an official welcoming statement in which they described the visit as historic. The UAE launched the UAE-China Week, running from July 17 to 24, which coincided with the Chinese President's visit and was aimed at placing a spotlight on the relations between the two nations, and the enhancement of commercial cooperation, cultural exchange and friendship between the two peoples. The UAE will celebrate UAE-China Week annually, coinciding with Chinese New Year celebrations.

"*We welcome Chinese President Xi Jinping on this historic visit,*" said HH Sheikh Mohammed bin Rashid Al Maktoum. "*We are happy to celebrate on an annual basis a culture of thousands of years and strategic relations that realise the visions of both countries and peoples*."

His Highness Sheikh Mohamed bin Zayed Al Nahyan, Crown Prince of Abu Dhabi and Deputy Supreme Commander of the UAE Armed Forces, said the UAE and China play a pivotal role in the stability of the region and its economic future.

"*Over 28 years ago, the late Sheikh Zayed bin Sultan Al Nahyan visited China, founded the strategic relationship between the two countries that has yielded fruitful trade and investment as well as cultural relations for more than three decades*," Sheikh Mohamed bin Zayed added.

"*China is an international commercial giant with a global political weight playing an active role in stabilising the global economy and attaining peace and security,*" Sheikh Mohamed Bin Zayed said.

The Underlying Principles of UAE-China Cooperation

The UAE-China relations are based on a set of strategic foundations and principles that have been the driving force of these relations since their inception in the mid-1980s. These elements and principles are as follows:

• Historical Background: The late Sheikh Zayed bin Sultan Al Nahyan, may God rest his soul, laid the foundation for relations between the two countries since

the founding of the United Arab Emirates in 1971. On December 3, 1971, the founding leader sent a telegram to the Chinese Premier Shaun Enlai informing him of the establishment of the UAE. The former Chinese leader responded with a congratulatory telegram to the late Sheikh Zayed, declaring China's official recognition of the United Arab Emirates. The bilateral diplomatic relations between the United Arab Emirates and the People's Republic of China were launched on November 1, 1984, and the UAE Embassy was opened in Beijing in March 1987. The second qualitative phase of relations was the visit of the founding leader, in 1990 - which was the first visit of one of the leaders of the GCC countries - to China. The visit launched a new phase in the cooperation between the two friendly countries, and laid the foundation for cultural relations between the two countries.

• The Consensus on the Development of Bilateral Relations: An analysis of all the statements of leaders and officials in the United Arab Emirates and the People's Republic of China indicates a strong political will of the leaderships of the two countries to develop relations in the interests of the two friendly peoples. Before his visit to China in December 2015, His Highness Sheikh Mohamed bin Zayed Al Nahyan had described the UAE's relations between the two countries as 'strategic partnership'.

• A Firm Foundation of Common Interests: The UAE regards China as one of the most important international powers that guarantee global security and stability and is a key element in the security and stability equations in the Middle East due to its growing position in the existing world order.

• The convergence of views on regional and international issues and files: The positions of the two countries reveal the convergence of viewpoints and positions on most regional and international issues.

• Mutual visits and continuous dialogue: The visits of the leaders of the two countries are a turning point in the bilateral relations. Mutual official visits began with an official visit by the former Chinese President Yang Chang-kun to the UAE in 1989. The late Sheikh Zayed bin Sultan Al Nahyan visited China in May 1990.

Areas and Prospects of Joint Cooperation

The UAE-China relations are exemplary

in their development and growth in various fields and sectors. These areas include the following:

• The Political Level: Relations between the UAE and the People's Republic of China have been developing continuously since they were officially launched in November 1984. The UAE's leadership has been keen on developing relations with China in view of China's growing position in international decision-making as one of the five permanent members of the Security Council.

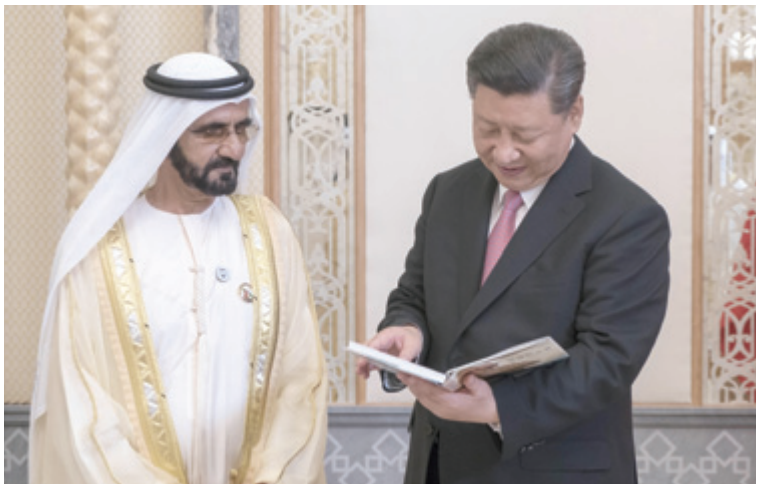
• The Economic Level: The economic partnership between the UAE and China is one of the fastest growing partnerships between the developed countries, due to the fact that both countries have opportunities and prospects for economic expansion and development.

• The Cultural and Educational Level: There are strong cultural and educational links between the two countries, which is one of the most important pillars of bilateral relations between the two countries. The UAE established the Sheikh Zayed Center for the Study of Arabic Language and Islamic Studies at the University of Foreign Studies in Beijing in 1984, a centre that plays a vital role in supporting cultural relations and communication.

• The Tourism Sector is one of the most promising sectors in terms of economic cooperation between the two countries. The UAE aims to boost its share of the Chinese tourism market, which is estimated at 100 million Chinese tourists annually.

The Aspects of the Growing Strategic Partnership Between the UAE and China

The mutual visits between the leaders of the UAE and China in recent years confirm that the strategic partnership is proceeding on its way. This bears indications of the vitality and dynamism of the UAE foreign policy, the promotion of opportunities to achieve the UAE development objectives, and the openness to other civilisations and cultures. It is worth mentioning here the international recognition of the efforts of the UAE aimed at strengthening the foundations of security and stability in the region. The UAE is also keen to develop relations with regional and international forces and benefit from their balanced views in dealing with the issues and crises of the region.



China's Perspective of Its Gulf and Arab Relations

China's strategic perspective of the Gulf region in particular, and the Arab region in general, is an integral part of China's overall strategic vision, which is based on the use of China's soft power resources and mechanisms to achieve the country's strategic objectives and the acquisition of the power to influence in international decision-making through soft power as represented by economy, investments, technology, trade, transfer of knowledge and exchange of experiences. China always seeks to invest its huge financial capacity to win over new friends though the gateway of foreign investment and export to various countries and regions of the world. The "Belt and Road" initiative is the latest model of China's strategy.

"Belt and Road" and UAE-China Relations

The "Belt and Road" initiative was launched for the first time in 2013 by Chinese President Xi Jinping, who was elected President of the country for life. He launched it under the name of "One Belt and One Way". The name changed to "Belt and Road" after the initiative became more complex and had many tracks that differ from the old historical path of the Silk Road. More than 100 countries participated in the 2017 "Belt and Road" forum.

The UAE is already an important economic partner of China and is one of the most important trading partners of Beijing internationally. The UAE and Chinese diplomacies share common features in their adoption of soft power and attractive development model to expand globally and gain confidence and influence. Therefore, it is necessary for the UAE to strengthen its relations with the world's second largest economy.

Conclusion

The UAE is one of the most secure, stable and open countries in the world. It already hosts the headquarters of international companies, as well as more than the 4,000 Chinese companies operating in the UAE, which is therefore a major focus of the "Belt and Road" initiative, which is in line with an initiative launched by His Highness Sheikh Mohamed bin Zayed Al Nahyan, in 2015 to revive the ancient Silk Road.

The visit of the Chinese President to the UAE will certainly contribute to a qualitative leap in the relations between the two countries, especially in the economic fields. The joint efforts focus on developing cooperation in specific vital sectors, including trade and economic cooperation, investment, industry, energy and renewable energy, SMEs, innovative industries, health, education, tourism, infrastructure, financial services, inspection and quarantine, standards and specifications, aerospace and local cooperation.

The UAE-China relations are an important model that embodies the principles of the UAE's foreign policy, based on diversity and openness and building balanced relations with various powers and international actors in the east and west, within the framework of mutual respect and common interests. The frequent mutual visits and the growing common strategic interests herald a promising quantum leap in mutual relations between the two countries. According to HH Sheikh Mohammad bin Rashid Al Maktoum, the visit "ushers in a new phase of fruitful cooperation and a promising future."

Important indicators

• The mutual relations between the UAE and the People's Republic of China have witnessed a significant growth, following the historic visit of HH Sheikh Mohamed bin Zayed Al Nahyan, to China in December 2015.

• The total Chinese community in the UAE reached 200,000 by the end of 2016, and more than 4,000 Chinese companies are operating in various sectors, mainly oil, renewal energy, tourism and industry.

• Total weekly flights between the two sides exceed 100 flights for the UAE and Chinese airlines.

• China's top 4 national commercial banks have opened seven branches in the UAE.

• China has established the Asian Infrastructure Investment Bank as a multilateral institution to finance infrastructure projects in emerging Asian countries, and the UAE is a founding member of the Bank.

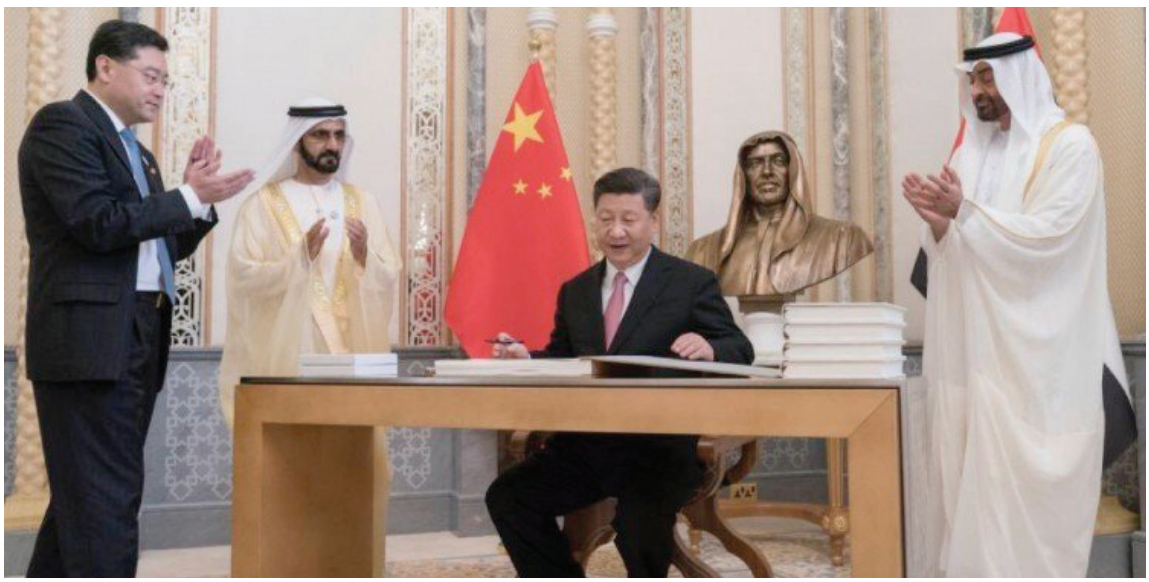
• The UAE and the People's Republic of China are working closely to improve international trade routes. Examples include the agreement signed by Abu Dhabi Ports with China's Cusco Shipping Company to double the capacity of container handling at Khalifa Port.

• Non-oil trade between the two countries reached AED 195.8 billion in 2017, compared to AED 169 billion at the end of 2016, an increase of 15.1 per cent.

• The UAE's foreign trade with China accounted for 14.7 per cent of the country's total foreign trade for 2017.

• The UAE ranked third on the global index of countries that make the most of the "Belt and Road" initiative.

• Projections point to a continued growth in trade between the two countries during this year 2018 and the coming years, in light of the policy of openness and building fruitful trade partnerships adopted by the UAE with different countries of the world, especially China.



Ambitious Visions for UK Air Combat

Hawk is a jet-powered advanced trainer aircraft

As the Royal Air Force (RAF) enters its second century, it is important to recall the importance of the UK, a pioneer in air power. Britain's national prowess in air invention and innovation resulted in the first purpose-built air-to-air combat aircraft, the first ground-based integrated radar defence system, the turbojet engine and the first vertical take-off and landing aircraft.

As Secretary of State for Defence Gavin Williamson launches a new capability acquisition programme to replace Typhoon, we will mark this announcement of an exciting first step into a new century with an examination of the UK's combat air strategy and capabilities.

Combat Air Strength

The demands placed on combat air never cease to evolve and with the adversarial counters of both state and non-state actors becoming ever more complex, high capability threat systems continue to proliferate widely, as they have done over the last 20 years. Upgrades to legacy systems and the increasing availability of off-the-shelf options means that potential adversaries are more versatile, affordable, and adaptable in exploiting software-enabled systems.

The 2018 National Security Capability Review has highlighted how the world has become more uncertain and volatile since 2015. For two decades now, the UK and allies have focused attention on counter-insurgency operations due to the technological advantage of Western air forces being reduced by adversaries whose highly capable systems can achieve and maintain air control.

In 2017, the Ministry of Defence's (MoD) Development, Concepts and Doctrine Centre produced a Future Force Concept report, concluding that future air domains will continue to feature highly-capable integrated air-defence systems and an increasingly complex electromagnetic environment. Moreover, combat-air systems will need to be agile and adaptable to address and harness technological change in the space and cyber domains as they become increasingly important to armies seeking an information advantage.

With the UK's long and proud history of working with international partners to deliver world-class combat-air systems, combat air strategy is a crucial pillar of the government's 'Modernising Defence' Programme. The ability to deter and defeat potential combat air adversaries at a time and place of choosing are prerequisites to the UK's delivery of its defence, foreign policy, and economic objectives, ensuring that successful air control and attack functions enable Britain to act free from intervention by other states or entities.

F35 Lightning has advanced sensors and stealth technology

The UK government's Future Combat Air System Technology Initiative involves an investment of nearly £2bn over ten years to develop the technologies of the future, while upgrading existing capabilities such as Typhoon and F-35 to keep them cutting-edge. Following the retirement of Tornado in 2019, the UK is committed to ensuring Typhoon's operational effectiveness, enabling the aircraft to operate with the RAF until at least 2040.

World-class Industrial Base

As the increasing technological complexity of combat air systems drives up costs, to counter threats effectively governments are forced to trade between capability and platform numbers, driving existing platforms to remain in service longer. Longer service life and greater time between project initiation and delivery creates a greater risk of early obsolescence, underlining both the challenge of maintaining world-leading industrial skills to field systems, which remain relevant in rapidly evolving environments.

For a decade, the UK has enjoyed significant success exporting combat air capabilities, including platforms, sub-systems, training and support solutions for Tornado, Typhoon, Hawk and F-35 and accounting for over 80 per cent of the UK's annual defence export orders of around £6bn, with Typhoon exports being particularly important in reducing MoD costs for key weapons capabilities. Meanwhile, UK intellectual property (IP) has been critical in securing the UK's enhanced industrial position in the F-35 programme, where early design and development phases have allowed the UK to compete successfully for key elements of the F-35 Global Support Solution.

UK-wide industrial challenge

The 2015 Strategic Defence and Security Review sought to upgrade the Typhoon's sensors and weapons, extending its service to remain operationally effective and commercially competitive for decades, but risking a widened gap between major air system design phases. Despite Typhoon exports and F-35 enhancements providing enough revenue to sustain Typhoon manufacturing into the 2020s, the lack of clear future UK requirements has not stimulated the R&D investment necessary to refresh national IP and placed key engineering skills at significant risk.

In response, £2bn of joint government and industry investment has sought to sustain and enhance key skills and capacity into the 2020s, providing investment in key UK design engineering skills as a means of generating UK IP and ensuring a major role for UK industry in delivering the systems that succeed Typhoon.

New Partnership Opportunities

Having worked alongside the U.S. to deliver the world-class F-35, the UK continues to enjoy highly successful partnerships across Europe, building on successful relationships with international partners in the export market and now diversifying to provide technical consul-

F-35: Stealth Fighter

The UK is the only Tier 1 partner on the F-35 programme. The experience and Intellectual Property from programmes including Harrier, Tornado and Typhoon meant that the UK could bring world-leading technology to this U.S.-led programme. As a result, UK companies deliver around 15 per cent of every aircraft in the biggest defence programme in history. This supports a supply chain in the UK of over 500 companies. Decades of research and development on Short Take-Off and Vertical Landing (STOVL) aircraft propulsion systems, from the 'flying bedstead' to the Pegasus engine on Harrier, helped secure the UK's status as a Tier 1 partner in the F-35 programme. Rolls-Royce is developing the LiftSystem for the F-35B Lightning II, the world's first STOVL-capable supersonic aircraft.

Dual-mode Brimstone Responds to Urgent Needs

In 2007, the Royal Air Force identified the need for a low collateral damage precision strike capability for Iraq and Afghanistan. An innovative Ministry of Defence-industry partnership delivered in just 18 months. MBDA developed a new, dual-mode seeker by converting existing single-mode, 'fire-and-forget' Brimstone missiles, significantly reducing the timescale to deliver the required capability. The resulting weapon, continuously updated, remains the bedrock of the Royal Air Force's precision strike capability.

The UK government's Future Combat Air System Technology Initiative involves an investment of nearly £2bn over ten years

Tornado Weapons include two Paveway IVs, a single Brimstone and ASRAAM

tancy for key partner nations.

Hence, when the fourth-generation is retired from service in the late 2030s, Typhoon platform and system upgrades will ensure it remains operationally competitive well beyond this point, while providing a significant market for a successor to these capabilities over the period 2040-2060.

Delivering future capability

Successive combat-air systems cost more and take longer to develop, but technological and process developments from the wider industry offers the opportunity for change with some approaches already successfully implemented to drive down the significant systems support costs. Nonetheless, the UK industry will need to deliver ever-increasing levels of productivity, efficiency, and sustainability throughout the supply chain, requiring greater innovation and diversification at the prime contractor level to reduce reliance on platform-driven acquisitions.

While bespoke investment is needed for systems integration, propulsion, sensors and weapons, the other essential skills required are common to a range of wider industry, high technology, manufacturing and aerospace sectors, entailing that the MoD can work with the Department for Business, Energy and Industrial Strategy to develop the means to incentivise greater involvement of the wider UK skills base. Combat air will increasingly be defined by the battle to collect, process, share, exploit and protect data, but the wider UK industrial base has the potential to provide full integration of industrial solutions and the air combat industry needs to respond imaginatively and inclusively to this opportunity.

Meeting Future Requirements

UK companies need to be able to work together to deliver affordable next generation technology that meets national objectives. To become sustainable, UK industry must focus on delivering success in an increasingly competitive global market and secure its world-leading position in this field through profitable international partnerships.

The UK government is hence looking to the industry to embrace this challenge

Royal Air Force Typhoons with paveway

Meteor: Successful Multinational Collaboration

Meteor is a beyond-visual range air-to-air missile. It was developed through a highly successful, six-nation programme, which is currently delivering game-changing air-to-air combat capability. A robust governance model was adopted at the outset. A UK-led Joint Project Office is empowered to drive the programme to cost and time, with a single contracting authority and single industrial leadership. Workshare is allocated with strict commercial targets and a single production line avoids duplication and inefficiency.

by increasing self-funded investment in research and development, including technology demonstrations, de-risking key technologies prior to full acquisition programmes and seizing the opportunity to fail fast and learn from the experience. It will also be necessary to address the trend of evermore expensive and complex combat-air systems and the associated time needed to bring them into service by developing and exploiting new technologies, techniques and processes (such as synthetic design, model-based engineering and rapid prototyping).

The UK government is also looking to build on the expertise derived from Typhoon and F-35 support solutions to develop innovative plans for driving down the through-life costs of programmes. A culture must be fostered of continuous improvement and efficiency to ensure the costs of development and manufacturing reduce over the course of the future acquisition programme.

The overall objective is to deliver assured capability by leveraging the best processes and technologies throughout the global supply chain within the constraints of operational advantage and freedom of action. This strategy includes the exploitation of UK high-value manufacturing catapults, small and medium-sized enterprises, international partners' capabilities, and civil sector investment to maximise value for money.

Finally, the UK government would like the industry to develop a transparent methodology that links requirements to cost, risk, and time to deliver. Such an approach to combat air will enable the government, the supply chain, potential partners and respective industries to make informed decisions through new, collaborative ways of working which align incentives, minimise transactional costs and ensure all sides are held to account for performance.

Team Tempest's Future

Team Tempest is a pilot project to deliver the MoD's Future Combat Air System Technology Initiative by 2020. The strategy identifies and sets a framework and roadmap for future decisions, challenging government and industry to cooperate in adapting the UK approach to the sector and driving pace and affordability.

Team Tempest is thus intended to give international partners a clear signal of UK's intent in proposing rapid and evolved engagement. The MoD's role is to develop a detailed implementation plan with partners to deliver key strategic objectives and prepare the groundwork for the UK's future acquisition decisions.

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Arabian Peninsula History

The Dhofar War in Oman, 1965-1975: *A Historical Perspective*

By:
Stephen James Quick
Acadamic Staff, UAE NDC

In 1975, a coalition headed by the Sultan's Armed Forces (SAF) finally defeated the decade-long insurgency in Oman's Dhofar province in a Counter-insurgency (COIN) campaign described as "...model in every way" (Beckett, 2001:230). Importantly, under the Sultan, both 'state-building' and military tools were utilised to bring about the eventual victory in what was one of the region's most strategically significant confrontations of the 1960s and 1970s where "…its outcome had significant implications for the Arabian Gulf's sub-

sequent history" (Hughes, 2015:424). The SAF's eventual victory prevented the collapse of Oman to a Marxist insurgency and buffered the spread of Communist great power proxy influence in the Arabian Gulf during the height of the Cold War, and safeguarded the crucial flow of Gulf oil for the world economy.

Background

Up to the mid- 20th Century Oman was

an isolated country, both geographically and politically with Britain being the country's primary strategic partner. Formal treaty relations had been in place between Britain and the ruling Sultan since 1798 (Hawley, 1995: 59-60) and the incumbent ruler (Sultan Said bin Taimur) had delegated conduct of Oman's foreign affairs to Britain since 1932 when he assumed power. With towering mountain/jebel ranges, an unusual monsoon season (Khareef) and an ethnically distinct population, Dhofar was unique in the Arabian peninsula. Alongside the extremely conservative and frugal regime of the Sultan these were significant factors in the development and longevity of the insurgency that followed. Omanis were denied the trappings of modern life e.g. radios or eye glasses and even when oil revenue came on stream in 1967, only very limited funds were directed to development in infrastructure, health and education (being worst in Dhofar, with but a single primary school, no medical facilities at all and no electricity or running water in 1965) (White, 2008:3). What started as a small-scale nationalist rebellion in 1965 via the Dhofar Liberation Front (DLF) was not successfully contained. Fanned by sometimes repressive SAF practices such as crop burning/well-capping and the UK's withdrawal from Aden in 1967 (and resultant communist bloc-sponsored People's Democratic Republic of Yemen-PDRY), allowing establishment of a rebel 'safe haven' across the border; the now Marxist-dominated insurgency spread rapidly. With popular support from the Dhofari population (either genuine support or through widespread indoctrination and/or intimidation by the fanatical Marxist insurgents), by 1970 the war was in danger of being lost.

State-building COIN Perspective

With insurgent activity alarmingly also being discovered in northern Oman, the country's survival was in real danger and the son of Sultan Said, Crown Prince Qaboos took power in 1970, exiling his father. In less than two years, the tide of war was turning to the government side, with social and economic development being prioritised, as well as large uplift in military spending. Also, through Britain's intensive lobbying (plus assistance via the U.S. and Saudi Arabia) Oman was accepted as a member of both the Arab League and United Nations in 1971; a crucial step to bolstering Oman's image/perception as an independent country fighting a legitimate conflict within its borders. Along with the establishment of the first ever Embassies in Muscat, this provided a powerful regional and international voice for Oman in dealing with the insurgency and diplomatically isolating the key backer of the rebels; the People's Democratic Republic of Yemen (PDRY) (including 'outmaneuvering' protests about Omani retaliatory airstrikes in PDRY territory). These state-building efforts all helped lay the foundation for later military victory.

Military COIN Solution

Delivery of vital helicopters and artillery were prioritised and SAF was tripled in size from only 3,000 to over 10,000 men in just two years by 1972 (Ladwig, 2008: 72). In addition, alongside Royal Engineer, Royal Air Force units and specialist military training teams, Britain covertly seconded up to c.250 of its elite Special Air Service (SAS) regiment to Dhofar to train/lead local tribesmen/Surrendered Enemy Personnel (SEP) as Firqat militia units to undertake combat missions. The SAS also implemented a classic 'hearts and minds' COIN strategy, providing a range of services from intelligence gathering to medical/veterinary care and assisting with civil aid programmes, plus dissemination of 'white

The counter-narrative strategy included broadcasts/ leaflet drops which reinforced the peaceful message of Islam

propaganda' on behalf of the Sultanate authorities (to counter false propaganda broadcast from communist-controlled Radio Aden). This counter-narrative strategy included broadcasts/leaflet drops which reinforced the peaceful message of Islam which was diametrically opposite to the violently-imposed atheist views of the Marxist insurgents. Though improving, the military situation remained a virtual stalemate, and with Britain's domestic economic issues, (resulting in the UK military withdrawal from east of Suez in 1971), the Sultanate authorities were forced to look elsewhere for help. Alongside practical support from countries such as the UAE/Saudi Arabia, large-scale effective assistance came initially from Jordan, which sent combat engineers and Special Forces, but also in the unlikely guise of a pre-revolutionary Iran which provided troops (c.5000 by 1975, Valeri, 2017:59) and vital extra helicopter lift capability from 1973. In addition, an aggressive new strategy implemented by the seconded British Commander Sultan's Armed Forces (CSAF) divided up the jebel via reinforced barriers to physically split the insurgent forces and 'choke' their supply routes. No fewer than four huge wire, mine and sentry-fortified 'lines' were constructed from 1971 to 1974 (e.g. Hornbeam Line, 1972) which cordoned the insurgents into ever smaller zones to be 'mopped up' by SAF and Firqat units. Alongside such policies, and after the remarkable defeat of a massed insurgent attack on the small SAS and Askar/SAF garrison in the town of Mirbat in July 1972, the SAF were finally in the ascendancy. This culminated in December 1975 with SAF/allied units attacking the main insurgent supply base

at the Shirshitti caves in western Dhofar. The surviving insurgent (and supporting PDRY regular army) combatants were forced across the PDRY border, ceasing to be a significant threat which allowed Sultan Qaboos to declare victory after ten long and costly years of war. By 1970 the war was nearly lost to the insurgent forces. Post-1970 with new leadership and the will to engage diplomatically, increase expenditure and aggressively prosecute the COIN campaign crucially by both 'state-building' and (not just) military means, it was only a matter of time before victory was achieved. As Maj-Gen Ken Perkins (CSAF, 1975-77) stated: "...A counter-revolutionary war cannot be won by military means only. The military create conditions in which political forces can operate, while politics, often involving international opinion, produce(s) a favourable environment for military success" (Perkins, 1979: 45). Despite not being a complete tactical success/'model' campaign (SAF and allies suffered hundreds of casualties, thousands of Dhofari civilians were killed and the war absorbed up to 50 per cent of Oman's annual GDP (Ladwig, 2008: 72), from a wider strategic perspective, the Dhofar COIN campaign can, however, be considered an overriding success for Oman, the UK (and other military allies) as well as for 'the West' in the context of the Cold War. Importantly, victory was also a vital stabilising factor within the Middle East at a critical period in the region's history. Despite its shortcomings, the Dhofar war's eventual prosecution has, however, been described as "...probably the best conducted counterinsurgency campaign ever fought" (Ladwig, 2008: 63), and a key example of how to facilitate an ally's victory via a process of 'COIN by consultancy'.

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Russia's New Multirole Fighter

MiG-35

The MiG-35 is a Russian multirole fighter designed by the Mikoyan division of the United Aircraft Corporation (UAC). Using the NATO reporting name Fulcrum-F, the "MiG" comes from the Joint-Stock Company Russian Aircraft Corporation (RAC) which made its first international presentation during Aero India 2007 as an export version of the MiG-29M OVT.

The RAC "MiG" line consists of up-to-date fighters, interceptors and multi-role combat aircraft, including newly developed fighters of the unified family of MiG-29K/KUB, MiG- 29M/M2 and advanced MiG-35. The MiG-35 (single seat) and MiG-35D (double seat) are "4++" generation multi-role fighters, developed from the serial-produced MiG-29K/KUB and MiG-29M/M2 aircraft.

The fighter plane has the thrust vectoring of the MiG-29OVT as an additional option. This feature alongside improved avionics and weapon systems and the optical locator system (OLS) makes the aircraft less dependent on ground-controlled interception (GCI) systems, enabling the MiG-35 to conduct independent multirole missions. Moreover, as the new export variant, it combines the modern systems of the MiG-29M2 with an AESA radar and with its integrated defensive systems increasing combat survivability.

Zhuk-MA' AESA Radar

The MiG-35 is compatible with Russian and weapons applications of foreign origin with a full training set using an interactive computer-based training system and full-mission simulator with motion system. Most of all, the MiG-35/MiG-35D is notable for its next-gen defence system:

– Radio electronic reconnaissance and electronic counter measures;
– Optronic systems for attack missile and laser emission detection;
– Decoy dispensers to counteract the enemy in radar and infrared ranges.

Moreover, the MiG-35 will be the first Russian aircraft to be fitted with a multi-role active electronically scanned array. AESA radar provides a clear advantage over competitors due to the factors:

– extended operating frequency range;
– increased quantity of detected, tracked and attacked targets;
– possibility of simultaneous air and ground-target attack;
– extended detection range;
– enhanced surface mapping resolution;
– high jamming protection and survivability.

Innovative OLS Imaging

The Phazotron Zhuk-MA antenna consists of 160 modules, each with four receive-and-transmit modules offering a 160km

(85nm) air target detection radius with 300km for surface ships. The OLS allows the MiG-35 to detect targets and aim weapon systems because, unlike a conventional radar, it has no emissions and cannot be detected. Trials taking place demonstrated the MiG-35's ability to detect, track and shoot at aerial targets, where a development prototype destroyed an aerial drone with an air-to-air missile launched by an Indian pilot.

Thanks to engineers of the Russian federal space agency choosing short-wave bands to increase sensitivity and detection range, the OLS has powerful optics with IR vision which has increased sensitivity of the complex several times and has increased detection range. The OLS of MiG-35 makes it impossible for planes to hide, helping MiG-35 pilots to spot the USAF's stealth planes. As the slightest speck of dust can cause blurred vision, the OLS glass uses leuco-sapphire to extend its lifetime while not corrupting the signal.

Dual-thrust Engine Power

The MiG-35 has two thrust-vectored engines whose power plant includes a two-engine RD-33MK with 7 per cent higher thrust power, equipped with smokeless combustion chamber and a new FADEC-type electronic control system. The RD-33MK has increased afterburner thrust to 9,000 kilograms-force (88,000 N; 20,000 lbf) and a 1,145 kilograms (2,524 lb) dry weight thanks to modern materials used on the cooled blades.

Although it retains the same length and maximum diameter, the RD-33MK has incorporated infrared and optical signature visibility-reduction systems, increasing service life to 4,000 hours. The RD-33MK thus ensures shipborne fighters enjoy unassisted take-off capability, retain performance in hot climates and profit from a significant combat efficiency boost.

The MiG-35's combination of thrust vectoring control (TVC) and advanced missile-warning sensors ensures combat superiority as the RD-33's gas flow stability is exemplary against ambient disturbances, greatly improving aircraft control and onboard weapon firing. Optional "all aspect" thrust-vectored RD-33MK engines guarantees aircraft superiority in the manoeuvring dogfight.

Applied Space Avionics

The MiG-35/MiG-35D's airborne avionics are centred upon an IRST system whose infra-red, TV and laser-sighting equipment uses space technologies not previously applied in aviation. New features include increased range, detection, tracking, identification and air lock-on; laser range-finder for ground/surface targets in day-and-night forward and rear hemispheres; and formation of target designation and laser illumination of ground targets.

The armament control system integrates a new helmet-mounted target designation system. Equipped with a podded IRST system, these features enable the MiG-35/MiG-35D fighters to fulfil a wide range of missions:

– Air superiority gains against 4th/5th-generation fighters;

– Interception of existing and developed air attack means;

– Ground/surface target destruction with all-weather high-precision weapon use outside air defence zones;

– Air reconnaissance using optical-electronic and radio-technical equipment;

– Group actions including air control over groups of fighters.

Next-Gen Refuelling Technology

A strap-on tank behind the cockpit permits the MiG-35 a higher 950 l internal fuel capacity, while external fuel tank capacity has increased to 2,000 l sus-

pended under the fuselage.

With three external fuel tanks, the ferry range has also risen to 3,100 km, with a range of 5,400 km after single in-flight refuelling.

The newly digitised fuel management system also includes a new digital fuel metering system.

MiG-35 Weaponry

The MiG-35/35D offers high combat effectiveness thanks to equipment with short- and medium-range air-to-air missiles, air-to-surface missiles, guided aerial bombs, unguided rockets and bombs, and an internal gun.

In addition to the "A-A" and "A-S" class weapons applied to the MiG-29K/KUB and MiG-29M/M2, an open avionics architecture allows the MiG-35/MiG-35D aircraft to integrate long-range weapons capable of attack targets without approaching the air defence zone, including weapons of Russian and foreign origin.

Both single and double seat versions of the MiG-35/35D have the same airborne equipment and weapons thanks to a high unification level of structure.

Air-to-surface armament systems are driven by new generation optronic systems and can now be used against targets illuminated by its own laser or against targets illuminated by external ground and air sources.

The MiG-35/MiG-35D fighter structure is based upon the following innovative features of the MiG-29K/KUB, MiG-29M/M2 aircraft:

– Increased weapons load stored at nine external stations;

– Increased fuel capacity, in-flight refuelling and possibility of using as a tanker;

– Airframe and main systems anti-corrosion technology developed to simplify operation in tropical weather conditions;

– Significantly reduced radar signature;

The MiG-35 can climb at the rate of 330m/s

– Three-channel fly-by-wire control system with quadruple redundancy.

Operational improvement has been key to the MiG-35's development with greater reliability of aircraft, engines and avionics in addition to a lengthened lifetime, service life and mean time between engine overhauls (MTBO). The MiG-35 aircraft flight hour cost is almost 2.5 times lower than those of the MiG-29 fighter, while both MiG-35/MiG-35D aircraft now provide for independent operation.

Optimal Performance Aircraft

The MiG-35 can climb at the rate of 330m/s with normal and ferry range of the aircraft at 2,000 km and 3,100 km respectively.

The aircraft weighs around 11,000 kg at a service ceiling of 17,500 m and a maximum take-off weight of 29,700 kg.

Trials and Development

According Russian News Agency (TASS) reports, the Mikoyan corporation has now completed MiG-35 factory trials, paving the way for serial production to begin: "The factory trials of the MiG-35 multirole fighter jet produced in the interests of the Defense Ministry of the Russian Federation have been completed. The certificate of the trials completion was signed in December 2017."

The trials began on 26th January 2017, when the specialists checked the fighter's onboard radio-electronic equipment, the sight and navigation com-

MiG-35 can conduct independent multirole missions

The MiG-35/35D offers high combat effectiveness with its missiles, guided aerial bombs, unguided rockets, and an internal gun

plex, radar, engines and other aircraft systems. On 28th January 2017, MiG officially demonstrated the new MiG-35 to the Russian government, followed by demonstrations to export customers. This MiG-35 differed from the one first unveiled in 2007 in lacking the AESA radar, as well as thrust-vectoring control, to keep procurement costs low for foreign customers.

Both the single-seat MiG-35 "961" and the two-seat MiG-35D "967" have a very high commonality with the MiG-29K/KUB airframes, excepting the braking parachute installed in place of the hook, present on the naval aircraft. The MiG-35D "967" was equipped with a similar AESA radar as fitted to the older MiG-35 demonstrator "154", identifiable by the dark-grey short-nose radome.

Russia's current state armament programme aims at 2020, stipulating the deliveries of MiG-35 fighter jets to Russia's Aerospace Force. Hence, in 2017, MiG's Director General Ilya Tarasenko claimed the corporation is working on MiG-35 delivery contracts with 29 countries currently operating MiG-29 aircraft, including Kazakhstan, Myanmar, Bangladesh, Peru and some other Latin American countries: "By its combat potential, the scope and the efficiency of its missions and the price/quality ratio, the MiG-35 is today a perfect combat vehicle for operation in high intensity armed conflicts. The aircraft makes it possible to use the entire range of existing and up-and-coming Russian and foreign armament, including weapons designed for heavy fighter jets."

Reference Text/Photo:
www.migavia.ru

General characteristics

Crew: 1 or 2
Length: 17.3 m (56 ft 9 in)
Wingspan: 12 m (39 ft 4 in)
Height: 4.73 m (15 ft 6 in)
Wing area: 38 m^2 (409 ft^2)
Empty weight: 11,000 kg (24,250 lb)
Max. takeoff weight: 29,700 kg (65,500 lb)
Powerplant: 2 × Klimov RD-33MK afterburning turbofans