

INAUGURATION

FEBRUARY 5 | LUCKNOW



Defence Expo India 2020 कई मायनों में पिछले आयोजनों से काफी अलग है। इसका लक्ष्य innovators तथा manufacturers, public तथा private sector, एवं indigenous व foreign original equipment manufacturers को इस प्रकार से साथ लाना और जोड़ना है जो पहले कभी नहीं किया गया है। इस पूरे आयोजन का magnitude और scale हमारे प्रधानमंत्री नरेंद्र मोदी की सरकार के नये भारत के vision एवं भारत को defence manufacturing के powerhouse के रूप में स्थापित करने के संकल्प की अभिव्यक्ति है।

—रक्षा मंत्री राजनाथ सिंह



“Defence Expo दुनिया भर के leaders और industry captains को भारत आने और यहाँ defence manufacturing में दोनों पक्षों के लिए फायदेमंद साझेदारियां बनाने के लिए एक सुनहरा अवसर है। यह नौजवानों के लिए भी एक अवसर है जो अपनी किस्मत को आजमाते हुए अपने सपनों को पूरा करने का हौसला रखते हैं।”

—रक्षा मंत्री राजनाथ सिंह



PRIME MINISTER NARENDRA MODI INAUGURATING THE DEFEXPO INDIA 2020 IN LUCKNOW ON FEBRUARY 5, 2020

INDIA TARGETING ₹20,000 CRORE INVESTMENT IN DEFENCE CORRIDORS OVER NEXT 5 YRS: PM MODI

Bid to raise defence exports to ₹35,000 crore in same time frame

VISHAL THAPAR

India is setting a target of ₹20,000 crore investment in its Defence Industrial Corridors over the next five years in order to give pace and momentum to its Defence manufacturing sector, Prime Minister Narendra Modi announced while inaugurating the 11th edition DefExpo, the premier Land, Naval and Internal Security Systems Exhibition at Lucknow on February 5.

Investments of ₹3,700 crore and ₹3,100 crore in the Uttar Pradesh and Tamil Nadu Corridors have already been declared, the Prime Minister said, while making a strong pitch for India as a global Defence manufacturing hub.

Among the other targets he enumerated was to increase the number of MSMEs in Defence manufacture to 15,000 in the next five years and to facilitate 200 start-ups to create an eco-system for innovation. “New targets are being set

to give pace to Defence manufacture and expand its scope,” the Prime Minister said in his inaugural address to an audience which included top Defence and Aerospace manufacturers from across the globe.

Modi made a strong case for foreign participation to aid the emergence of India as a Defence Manufacturing hub. “There are unlimited opportunities in Defence manufacturing in India. There’s talent and technology, innovation and infrastructure, favourable policy and security of foreign investment. There’s demand, democracy and decisiveness,” he exhorted with characteristic elan at the glitzy inaugural ceremony, adding that “every paisa invested here will yield big returns.”

While seeking foreign participation, Modi made it clear that India’s objective was to end its import dependence for arms, and emerge as a major Defence exporter. “The mantra is ‘Make in India, Make for India and for the World,’ he said. Another target is to take India’s

“There’s talent and technology, innovation and infrastructure, favourable policy and security of foreign investment. There’s demand, democracy and decisiveness” —PM Modi

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Defence exports to \$5 Billion -or about ₹35,000 crore a year – up from the present over the current level of about ₹10,000 crore.

“India has the world’s second-largest population, the second-largest military and the world’s largest democracy. But so far it could rely only on imports,” the Prime Minister said, pointing out the contradiction in its global stature and its reliance on imported weapons, and stressing that the import dependence is now unacceptable to India.

Modi reeled off a series of reforms and policy incentives over the last five years to stimulate the Defence sector. He talked of a new openness and a partnership approach with Industry to achieve the national objective. “Partnership between the user and producer can strengthen national security. Earlier, it was a big problem for the private sector to access testing infrastructure. Now, that has been resolved. The DRDO is providing ToT to Indian industry free of charge,” he said.

Such enabling measures will improve the competence of Indian industry and increase their participation in global supply chains, he said. “Over the last five or six years, the Government has made this approach an integral part of national strategy,” Modi said, elaborating on discarding the earlier suspicion of Industry.

The Prime Minister suggested that Industry bodies come together on a common platform for Defence to enable better dialogue and advocacy. He said the recent appointment of the Chief of Defence Staff and the creation of a Department of Military Affairs would also streamline the process of Defence procurements.

As part of incentives for the private sector, the procurement of 5,000 components used in military systems would be indigenized. Start-ups being nurtured under the IDEX initiative would be tasked with developing at least 50 new technologies or products. As many as 278 military items so far manufactured only by the Government-owned Ordnance Factories would be opened up to the private sec-



**“The mantra is Make in India, Make for India and for the World.”
—PM Modi**

tor. Under the Artificial Intelligence roadmap, 25 projects have been identified over the next five years. Essential technologies to be indigenized will be identified under the Long-Term Integrated Perspective Plan for Defence Procurements.

Modi also made a point about securing India’s interests in outer space, while emphasizing that India would remain a force for peace and stability.

India presence in space will get stronger because of the big role that its assets in space play in providing good governance for 130 Crore citizens and the security of the nation. “I’m proud that ISRO is creating assets in space and the DRDO is raising defences for these assets,” the Prime Minister said. One of the major displays at DefExpo 20 is India’s Anti-Satellite (ASAT) Weapon, which demonstrated the capability to destroy an enemy satellite in the low-Earth orbit last year.

The Prime Minister also clarified that the build-up of India’s military capability was not directed against any specific country. “India has been a reliable partner for world peace. Indians laid down lakhs of lives in the World Wars despite not having a stake in these wars. Today, it is contributing 6,000 troops for UN Peacekeeping Operations,” he said.

Modi also made a strong pitch for investment in Uttar Pradesh, which he represents in Parliament. “UP, besides being India’s most populous state is also set to become the largest hub in Defence manufacture,” he said. “Make in India in Defence will not only strengthen national security but also create employment opportunity,” he pointed out.

The impressive inaugural ceremony which commenced with the invocation of the five elements of nature and showcased India as a Defence & Aerospace manufacturing hub, was also attended by Defence Minister Rajnath Singh and his deputy Sripad Naik, UP Governor Anandiben Patel, Chief Minister Yogi Adityanath, Chief of Defence Staff General Bipin Rawat and the three Service Chiefs. ●

DEFEXPO 20’S 1ST MOU: IAI TIES UP WITH HAL & DYNAMATIC FOR HERON TP

The Hindustan Aeronautics Limited (HAL), Israel Aerospace Industries Limited (IAI) and Dynamatic Technologies Limited (DTL) on February 5 signed a Memorandum of Understanding (MoU) for marketing, manufacturing and selling of IAI’s Unmanned Aerial Vehicles (UAVs) to Indian potential customers such as Indian Defence Forces, Paramilitary Forces and Central Armed Police Forces at DefExpo 20.

Reports suggested that the MoU includes the integration of the Heron TP HALE by HAL. DTL will make the structure for this UAV.

The first MoU of DefExpo 20, it was signed by Sanjiv Shukla, ED (Corporate Planning), HAL, Eli Alfassi, Executive Vice President, Marketing for IAI and Arvind Mishra, Executive Director & Global COO Hydraulics and Homeland Security for DTL, in the presence of R Madhavan, CMD (HAL), senior executives of HAL, IAI and DTL.

“The collaboration will provide excellent opportunity to HAL to expand its product offerings to Defence Customers, absorb critical technologies and strengthen the Aerospace Ecosystem in the country, especially for UAVs,” said Madhavan.

“We are delighted to sign the strategic agreement with our partners, HAL and DTL. India is an important strategic market for UAVs and I am confident of IAI’s extensive experience and the technological capabilities of HAL and DTL will lead to significant advancements in the field,” said Nimrod Sheffer, President and CEO, IAI.

“This is a Global PPP between HAL, our partner for over two decades, IAI a world leader in UAV technology who we have been teaming with since 2017. This collaboration will provide a boost to ‘Make in India’ and we are committed to establish a broad technological and industrial ecosystem within the country,” said Dr Udayant Malhoutra, CEO & Managing Director of Dynamatic Technologies Limited.



HAL as a long-time partner of IAI is involved in the depot level maintenance of all the MALE and Short Range class of UAVs supplied by IAI to the Indian Defence Forces since 2004. Taking the HAL-IAI collaboration one step ahead, under the scope of this MoU, this partnership would be the first in country to manufacture IAI-designed UAVs in India like Short Range Tactical class having long endurance.

HAL also signed two MoUs with Elbit Systems of Israel. The first was with the Elbit Systems ISTAR Division. It is aimed at assessing the feasibility of a joint development of a Vertical Take-off and Landing (VTOL) Unmanned Aerial Vehicle (UAV) (Rotary UAV of 2000 kilo class) for

maritime and land based military operations which caters to the domestic as well as the global requirements. This will promote mutually beneficial cooperation between HAL and Elbit in terms of technology, manufacturing, marketing and maintenance of the UAV globally.

This capability could benefit in deploying a VTOL UAV for a routine surveillance mission or operating in unsafe areas both during day and night, which otherwise would have to be carried out by manned helicopters.

The second MoU with Elbit Systems was for promoting and marketing the Digital Head Up Displays (HUD) units. The digital HUD would incorporate new features like Wide Instantaneous and Total Field of View with Minimal Binocular Disparity, Large Eye Motion Box and Digital Image Source for increased pilot’s situational awareness. The HUD system is also compatible with Night Vision Imaging Systems having improved maintenance features.

HAL also signed a Non Disclosure Agreement (NDA) with New Space Research & Technologies Pvt Ltd to explore cooperation for joint development and manufacturing of various products and systems in the area of unmanned systems, swarm technology and space systems. ●

— Vishal Thapar



RM MEETS FOREIGN DELEGATES



1. RAKSHA MANTRI AT A BILATERAL MEETING WITH MOS FOR DEFENCE AFFAIRS OF UAE MOHAMMED AL BOWARDI.
2. RAKSHA MANTRI WELCOMING MINISTER FOR DEFENCE PROCUREMENT JAMES HEAPPEY, WHO IS HEADING THE UK DELEGATION AT THE DEFEXPO.
3. RAKSHA MANTRI ALSO MET MALDIVES' DEFENCE MINISTER, UZA MARIYA AHMED DIDI ON THE SIDELINES OF DEFEXPO.
4. THE DEFENCE MINISTER OF OMAN SAYYID BADR BIN SAUD AL BUSAIDI ACCOMPANIED BY A HIGH LEVEL DELEGATION MEETING RAKSHA MANTRI.
5. RM RAJNATH SINGH MET MAJOR GENERAL RAIIMBERDI DUISHENBIEV, CHIEF OF GENERAL STAFF AND DEFENCE MINISTER OF KYRGYZSTAN.

Raksha Mantri Rajnath Singh, today met Foreign Defence Ministers and delegates of various countries on the sidelines of DefExpo 2020 being held for the first time in Lucknow.

Raksha Mantri held bilateral meeting with Mohammed Al Bowardi, MOS for Defence Affairs of the UAE. They exchanged views regarding further strengthening the cooperation in Defence Affairs. The warmth and bonhomie shared between the top leadership of both the countries has resulted in transforming bilateral cooperation to a strategic partnership.

Holding a bilateral meeting with UK Minister for Defence procurement James Heappey, Raksha Mantri underlined the growing ties between the two countries. The meeting while touching various aspects related to defence cooperation also discussed about opportunities to enhance defence level engagements with both the countries.

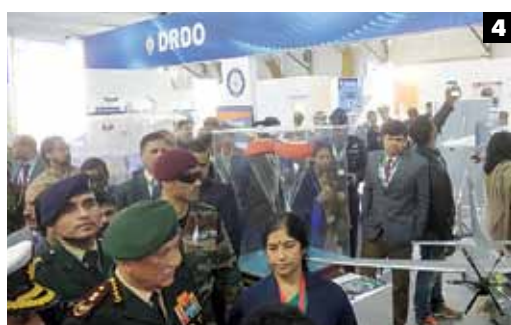
Raksha Mantri held bilateral level talks with Uza Mariya Ahmed Didi, Defence Minister for Maldives. Cordial discussions relating to defence cooperation and Maritime security was held. Cooperation in the field of defence industry forms an important of strategic partnership between both the countries.

Major General Raiimberdi Duishenbiev, Chief of General Staff and Defence Minister Kyrgyzstan met Raksha Mantri and discussed wide range of issues pertaining to defence cooperation. It was decided that the Joint Exercise between special forces of India and Kyrgyzstan named Khanjar VII shall be held soon.

Interacting with Badr Saud Harib Al Busaidi, Minister for Defence Affairs, Sultanate of Oman, Raksha Mantri stressed Defence cooperation was the key pillar of bilateral relations between the two countries. Both Ministers discussed measures to strengthen defence partnership, by enhancing joint maritime security exercises. Raksha Mantri expressed willingness of India's defence industry especially Defence PSUs to work more closely with Oman.

The visiting dignitaries extended thanks to Raksha Mantri for inviting them to the Mega Defence Exhibition, which had proved to be an effective platform for sharing, collaborating and cooperating on various defence technologies and also provide an opportunity to further strengthen ties with India and to expedite Joint projects. Raksha Mantri wished all the visiting delegates to have a pleasant stay here and wished them to visit the various tourist destinations in Uttar Pradesh. ●

HIGHLIGHTS – DAY 1



1. & 2. DEFENCE MINISTER RAJNATH SINGH AT THE DRDO BOOTH
3. CDS GENERAL BIPIN RAWAT AT THE BAE SYSTEMS STAND.
4. CDS GENERAL BIPIN RAWAT AT THE DRDO DISPLAY.
5. CAS AIR CHIEF MARSHAL R.K.S. BHADIAURIA AT THE IAF STALL.
6. KENNETH JUSTER, US AMBASSADOR TO INDIA, AT BAE SYSTEMS STAND.



BHARAT DYNAMICS LIMITED PURSUING SELF-RELIANCE THROUGH 'MAKE IN INDIA'

CHIEF OF THE ARMY STAFF INAUGURATES BDL STALL AT DEFEXPO 20



General Manoj Mukund Naravane, Chief of the Army Staff inaugurated the BDL at Defexpo 2020 today. Cmde Siddharth Mishra, CMD, BDL briefed the Indian Army Chief about the various products displayed at BDL stall.

Bharat Dynamics Limited, headquartered in Hyderabad, has largest-ever display of its products at Defexpo 2020. BDL is showcasing its products under various

categories namely Guided Missiles Weapon System and associated equipment, Underwater Weapons, Air borne products and Ground Support Equipment.

In addition to the above, BDL, for the first time, is showcasing Chatbot, Industry 4.0, Amogha - III and Artificial Intelligence based Counter Measures Dispensing System at the Defexpo 2020. ●

Incorporated in the year 1970 and headquartered in Hyderabad, Bharat Dynamics Limited (BDL) is the only Defence PSU in India engaged in the manufacture of Anti-Tank Guided Missiles (ATGMs), Surface-to-Air Missiles (SAMs), Launchers, Underwater Weapons, Counter Measures and allied defence equipment.

The formative years of BDL witnessed a high degree of Transfer of Technology (ToT) from foreign Original Equipment Manufacturers (OEMs) to produce the much needed weapons required by the Indian Armed Forces. India's thrust towards achieving self-reliance in critical technologies in Defence gave birth to the nation's ambitious Integrated Guided Missile Development Programme during the late 80s in which BDL was nominated as the 'Prime Production Agency'. This paved the way for BDL to initiate its indigenisation efforts and later advance to embark upon the journey of 'Make in India' as well as to establish itself as a manufacturer of both tactical and strategic missiles. The programme gave BDL abundant opportunities to develop its manpower into a highly skilled and specialised workforce and adopt the state-of-the-art technology available worldwide.

BDL, while performing its primary role of a guided weapon system manufacturer, began investing in in-house R&D with an objective of achieving self-reliance through indigenisation. This laid the foundation for the Company to relentlessly pursue the 'Make in India' programme launched by the Government of India.

It is a matter of pride for the Company that the Anti-Tank Guided Missiles, Underwater Weapons and Surface-to-Air Missile like Akash are being produced with maximum indigenous content and supplied to the Armed Forces with large scale participation from Indian private partners. BDL, over the years, has been progressively developing several vendors for each of its programmes and these vendors have become an integral part of Company's supply chain. As a part of this process, potential vendors are being identified, nurtured and supported with the technical know-how which include extending of BDL's unique test facilities in order to ensure that they remain as viable partners of the Company in the long run.

Indigenisation has been at the core of each of its programme and the Company has been striving to maximise the indigenous content in its products.

BDL, in its plan to become a designer and a developer of new missile systems has created a strong Missile Development Group within its in-house R&D Division to develop the next generation missile system. This concept has been envisaged under the 'Make in India' programme with maximised indigenous content.

As a part of its expansion plan, BDL has forayed

into international market by beginning to export its products to friendly foreign countries. BDL is currently executing export order of its Underwater Weapons viz., the Torpedoes, to friendly country, which again is an indigenous product. Thrust is also being given to explore tie-ups with other friendly foreign OEMs for new missiles and underwater weapons for potential Transfer of Technology. This will boost the Company's endeavors under 'Make in India' initiative and help in exporting these products by becoming the part of OEM's supply chain.

Recent trends indicate rapid strides are being made by countries over the globe in utilizing Artificial Intelligence (AI) based technologies for development of next-generation of weapon systems. Taking cognizance of this fact, BDL has started undertaking development of products for the Armed Forces with AI Technologies with active participation of startups.

The Company has entered into an MoU with International Institute of Information Technology (IIIT), Hyderabad for joint development of AI technologies for products developed at BDL. The MoU envisages setting up of an exclusive 'Centre of Excellence for Artificial Intelligence in Missile Technology'. As per the MoU, BDL and IIIT, Hyderabad will take about five AI projects a year in both software and hardware segments, covering missiles, manufacturing, inspection and allied areas.

Innovation always has been a key to success and growth of any company and BDL has always considered innovation as a part of its R&D efforts. Synergy is being maintained between the industry and academia to sustain balance between experience and knowledge industry. BDL is encouraging startup companies to participate in the innovation programmes of the Company. This is being done in association with the Government of India's MoD's wing, iDEX (Innovation for Defence Excellence) and Telangana State Government. In line with this, the purchase procedures have been amended to encourage more participation by startups and supplies from indigenous vendors with more indigenous content.

As BDL celebrates its 50 glorious years of its service to the Nation, the Company's thrust will be to persistently pursue the 'Make in India' programme by continuing to invest in infrastructure, automate its production lines, adopt continual process improvement, enhance in-house R&D efforts, bring in new generation technology to manufacture missiles and underwater weapons, leverage experience to develop new indigenous products and increase its export revenue.

The pursuit of technological excellence has been the guiding force that has always helped BDL live up to its sobriquet, 'The Force Behind Peace'. ●



AKASH SURFACE-TO-AIR MISSILE (SAM)



HAL STRONGLY SUPPORTS THE INDIAN ARMED FORCES WITH ITS INDIGENOUS AND LICENSE MANUFACTURED PRODUCTS

In conversation with R. Madhavan, Chairman and Managing Director, Hindustan Aeronautics Ltd

Question (Q): What products and capabilities is HAL principally showcasing at DefExpo 20, and in which areas is it seeking partnerships and collaborations?

Answer (A): HAL is showcasing models of platforms/products at its Stall No. R46, Hall 5 as well as the outdoor area. The following models of platforms/products of HAL are likely to be showcased during the DefExpo 20:

- Light Combat Aircraft (LCA) Tejas
- Light Combat Helicopter (LCH)
- Advanced Light Helicopter (ALH)
- Do-228
- Hawk

Some of the avionics/accessories/components/products such as Indigenous Digital Map Generator (i-DMG), Engine & Flight Display Unit, GTEG-60 Engine, Air Producer Engine, Glass Cockpit for Do-228, Automatic Target Recognition (ATR), Digital Sand Rapid Prototyping Technology etc. are also likely to be put up in the HAL stall.

An upgraded Su-30MKI Cockpit Simulator is being displayed during the event.

Further the Light Utility Helicopter (LUH) is being showcased in the outdoor display area. HAL is showcasing its fixed wing and rotary wing platforms in the flying displays. Flying display of ALH Mk IV Rudra, LCH, LUH, Do-228 civil, LCA Tejas aircraft is planned. HAL's participation focuses on technological excellence, under its business verticals such as fighters, trainers, transport aircraft, helicopters, UAVs, engines, systems, and avionics besides projecting the company's futuristic programmes.

Q: It is a daunting task to be responsible for all aerial systems of the country. What are your plans to cope with future challenges?

A: HAL is a premier aeronautical complex in Asia and has been spearheading the aerospace ecosystem in the country for over seven decades by collaborating with private industries, foreign OEMs and academia for various production and development projects. HAL has so far designed and developed 17 types of aircraft/helicopters.

HAL today is seeking a significant presence in the global market while completely supporting India's defence requirements. By outsourcing the non-core activities to Tier I/II/III vendors, HAL is aiming to become a system integrator. HAL's thrust on R&D, co-development and co-production of aircraft, engines and equipment with leading global aerospace companies will not only meet defence requirements by way of supplying indigenous or co-developed products but will also increase the level of exports of aerospace products. Along with the existing products the newer products of the company like LCH, LUH & its versions; HTT-40, UAVs, etc are expected to place HAL on the right pedestal in the world market.

HAL is focused on converting the R&D programmes related to LCA Mk1A, LCH, LUH and HTT-40 into new revenue lines for the company by achieving the full design capability of each product to meet the customer requirement. In order to realise revenues from these projects, support of MoD will be required to receive initial orders at the earliest. Further, HAL is committed to ensure deliveries to the customer on the current production programme such as Su-30MKI, LCA, Do-228, ALH and Cheetal as per contracted schedule. Efforts are being made on getting order for the current products including Hawk to ensure full utilisation of existing production facilities. HAL is also working on exploring the export opportunities for our products and making concerted efforts to realise orders to enter into the identified markets.

In the recent years, there is a growing demand for ROH, upgrades and other after sales supports. So emphasis is on providing better ROH and other after sales support to our customers to the best of HAL's capabilities for aircraft/ helicopters and engines etc to enhance the level of serviceability of HAL customers' fleet.

HAL also aims to enter into engine segment by building indigenous capability of design, development and manufacture of engines for aircraft and helicopters, and civil aviation segment with civil variant of Do-228, which will cater to the requirements arising from RCS-UDAN scheme. Additionally, HAL also looks forward to enter into UAV segment in India as well as International market and towards this we will be establishing collaborations/alliances in future.

Q: Can you elaborate on the progress of Kamov 226T helicopters that are to be produced under the Indo-Russia joint venture?

A: Ka-226T helicopters will be manufactured by the Joint Venture Company of HAL with Russian partners named M/s Indo Russian Helicopters Limited (IRHL). RFP for supply of 200 helicopters, which include 60 in fly away condition and 140 to be manufactured in India, was issued in May 2018 and techno commercial proposal has been submitted which is under evaluation. Regarding the supplies, HAL is awaiting finalisation of the contract between MoD and IRHL after which the first lot of fly away helicopter from Russian side will be delivered between 24-36 months from the date of signing of contract.



A PAIR OF LIGHT COMBAT HELICOPTER (LCH) IN FLIGHT

Q: Successful landing of LCA Navy on an aircraft carrier deck appears to have set the stage for the development of a Twin-Engine Deck-Based Fighter. Would you like to elaborate on this achievement and elaborate on future plans?

A: The demonstration of arrested landing and take-off capability by LCA Naval variant, a technology demonstrator from the ship INS Vikramaditya on January 11, 2020 was a remarkable achievement. Through this India

joins the elite club of five nations who have developed a naval fighter aircraft. This feat paves the way for development and manufacture of the twin engine deck-based fighter for the Indian Navy.

Q: What are the major initiatives taken up in the last few years & what are your modernisation plans?

A: HAL strongly supports the Indian Armed Forces with its indigenous and license manufactured products. The Company continues to emphasise on self-reliance towards development of indigenous products, diversification into civil segment, enhancement of capacity, support development of defence manufacturing ecosystem by developing domestic vendors (including MSMEs) and enhance outsourcing. These efforts will provide steady growth of the Company and opportunities to capitalise on the future requirements arising for Indian Armed Forces.

Considering that aerospace is a highly technology intensive domain and is also characterised by rapidly changing technologies, obsolescence issues etc and to cater to increasing customer demands for existing products, modernisation/upgradation activities are taken up on a regular basis at HAL. The modernisation plan includes upgradation of technology through establishment of new processes, state-of-the-art manufacturing and design facilities, improvement in layouts, storage, material handling and IT infrastructure. Currently, creation of additional capacity is under progress for manufacturing of LCA, ROH of Su-30MKI, ROH of AL-31 FP engine and new programmes like LCH, LUH and HTT-40 etc which are expected to enter production phase in the coming years. ●

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BEL SHOWCASES STATE-OF-THE-ART PRODUCTS AT DEFEXPO 2020

Bharat Electronics Limited (BEL) is showcasing products and systems spanning every domain of its business at the DefExpo 2020. BEL is also showing its R&D capabilities by launching/demonstrating some of its new products /technologies in this show.



(LEFT) BEL WEAPON LOCATING RADAR AND (RIGHT) BEL ATULYA RADAR.

At DefExpo 2020 being held in Lucknow, Navratna Defence PSU Bharat Electronics Limited (BEL) is showing state-of-the-art products and systems spanning every domain of its business – Military Communication, Radar Systems, Missile Systems, Naval Systems, C4I Systems, Electronic Warfare Systems, Avionics, Anti-Submarine Warfare Systems, Tank Electronics, Electro Optics, Gun/Weapon System Upgrades, Shelters, Unmanned Systems, Homeland Security, Cyber Security, Artificial Intelligence based systems and professional electronic components. BEL is also showcasing its R&D capabilities by launching/demonstrating some of its new products/technologies.

BEL's display in the area of Radar include products/models/panels of Active Electronically Scanned Array Radar, Radar for Quick Reaction Surface-to-Air Missile, Radars for automatic detection of first-round location of artillery weapons (Weapon Locating Radar) and Border surveillance and Detection of low flying targets (like Battlefield Surveillance Radar and Air Defence Fire Control Radar - Atulya).

BEL's display in the area of Military Communication include products such as Software Defined Radios, Single Box Communication Solution, Secure Versatile IP Terminal, Cyber Security products/services, Encryptors, High Capacity Radio Relay, Data Diode used to create a physically secure one-way communication channel from one network to another, SDR VPX with NCW Applications, Configurable Live Mk II, etc.

Electronic Warfare and avionic products on display include Tethered UAV, EW Suite for Airborne Application, Quadcopter UAV, Drone Guard System, Directed Infra-Red Counter Measure (DIRCM), Combined Interrogator and Transponder (CIT), CLIFF, EOS CoMPASS, etc.

Also on display will be the complete range of Electro Optics, such as Holo-

graphic Sight, TI Sights, Image Intensifier based Passive Night Sight, Target Acquisition System, Day Night Sights for Tanks, LRF Modules, Pan & Tilt – Electro Optical Director for long range surveillance applications like coastal surveillance, border surveillance, etc.

BEL showcases its Naval Systems capability through Dipping Sonar, Airborne Sonar, Ship Communication Systems and Long Range Surface-to-Air Missile system.

Components/Technology modules on display include TR modules (X band and C band Quad) for Radar application, Smart cards, MPM/TWT Transmitter, Low Band receiver Modules, LTCC substrates/MMR Chips, Solar Products, Electric Batteries for two/three Wheelers, Electronic Fuses for Artillery, etc.

Other Innovative solutions and Artificial Intelligence systems on display are Face Recognition System, Social Network Analysis, Software based Record and Replay System, Video Management System, Ytterbium Fibre Laser, Power Amplifier for sonar application, LTE- Secure Mobile, Machine Intelligence & Robotic Unmanned Ground Vehicles, Radar Pulse De Interleaver, Digital Pre-distortion for Linearization of Power Amplifier, Electronics Target Systems, Decision Support Systems for Coastal Surveillance System, Imagery Solution, Automatic Train Supervisory System, Comprehensive Integrated Border Management System, Speech to Text Technology, Smart City Solutions, Space-based products, etc.

The highlight of BEL's outdoor display is the Weapon Locating Radar – Mountain Version, KU Band SATCOM – vehicle based; X-PAR Compact version, High Altitude Shelters, Missile Containers, Indigenous Fire Control System, Advanced Landing Ground Communication Terminal (ALG-CT) and Air Defence Tactical Control Radar (ADTCR). The entire set of state-of-art equipment on offer will be a force multiplier for any Defence force. ●

CONTROP ANNOUNCES ENHANCED CAPABILITIES FOR THE ISEA-50HD

CONTROP Precision Technologies, a company specialising in the field of electro-optics and infrared (EO/IR) for defence and homeland security solutions, is announcing new capabilities for its iSea-50HD, replacing the thermal camera with a new HD thermal camera, and adding a SWIR channel which enables clear observation in the harsh environmental conditions typical of the Indian maritime climate.

The iSea-50HD system provides maximum-range surveillance using highly sensitive sensors, including an HD Thermal Imaging (TI) Camera working in the 3-5µ band with a continuous zoom lens, a high-sensitivity colour day camera, a SWIR channel and a long-range Eye safe Laser Range Finder (ELRF). Among its additional features are advanced image processing



and unique video enhancement algorithms.

Providing a full solution for naval and maritime operational requirements, CONTROP's compact, light weight iSea surveillance systems have been mission proven since the 1990s, integrated across the globe on a wide variety of vessels and in daily operation for maritime missions such as search & rescue, maritime surveillance, law enforcement, EEZ protection, counter piracy and special operations. In India, the iSea-30HD is already installed and active on multiple vessels belonging to the Indian Coast Guard. CONTROP is actively pursuing new contracts in this market and participating in local tenders for Indian shipyards, with the goal of continuing this successful cooperation. ●



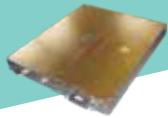
Astra Microwave Products Ltd.

ON A WINNING WAVELENGTH

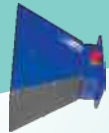
Over

25

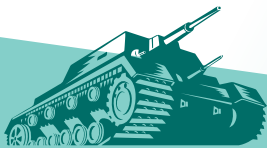
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WORLD CLASS ARTILLERY SYSTEM K9 VAJRA – CHAMPIONING ‘MAKE IN INDIA’

L&T delivered the 51st K9 Vajra, world's leading artillery gun system, from its Armoured Systems Complex (ASC) to the Indian Army on January 16, 2019, maintaining its track record of ahead-of-time deliveries. These deliveries are a testimony to the technical capability, complex system integration skills, planning prowess and execution efficiency of L&T Defence.

The 'K9 Vajra-T' 155mm/52 calibre Tracked, Self-Propelled Howitzer Guns programme is the largest contract awarded to an Indian private company by the Ministry of Defence, through global competitive bidding. The programme involves delivery of 100 systems in 42 months with associated Engineering Support Package (ESP) covering spares, documentation and training and Maintenance Transfer of Technology (MTotT) to the Army Base Workshop to support the Howitzer regiments throughout their life cycle. L&T as winner of the Globally Tendered Programme, converted it to 'Make in India' mode and established a new green-field manufacturing – integration – testing complex at Hazira in the state of Gujarat.

The 'K9 Vajra-T' systems are being delivered with 50 per cent indigenous content (by value), which includes 75 per cent indigenous work packages at the Programme level and involves local production of over 13,000 components per gun system through a supply chain of about 500 Indian Tier-1 manufacturers with over 100 of them from the MSME segment.

L&T has put in sustained efforts and innovation in indigenising 'K9 Vajra-T', right from the prototype built for user evaluation trials by indigenously developing fourteen critical systems, including the Fire Control System, Direct Fire System, and the Ammunition Handling System. The Gun is also equipped with other India specific modifications for desert conditions such as Auxiliary Power Pack, Air-conditioning Systems, Fire Fighting Systems, and NBC Protection Systems which are being indigenously produced.

L&T partnered South Korea's largest defence company Hanwha to adapt the well proven K9 Thunder to realise the Vajra variant and enable indigenous manufactur-



DEFENCE MINISTER RAJNATH SINGH FLAGGING OFF THE 51ST K9 VAJRA FROM L&T ARMoured SYSTEMS COMPLEX

ing by training a team of engineers and integration specialists at Hanwha facilities. Subsequently, this team trained supply chain partners as well as own extended teams.

The ASC is a state-of-the-art facility to manufacture and integrate advanced armoured platforms such as Self-Propelled Artillery Howitzers, Future Infantry Combat Vehicles (FICV), Future Ready Combat Vehicles (FRCV) or Future Main Battle Tanks.

Spread over 40 acres within L&T's sprawling 755-acre Hazira Manufacturing Complex, the ASC comprises of high-end machinery and automation aids, feeder shops, and a full-fledged mobility Test Tracks for acceptance and qualification of armoured vehicles. ●

DYNAMATIC TECHNOLOGIES SPEARHEADS SKILL BUILDING

Dynamatic Technologies Limited designs and builds highly engineered products for Automotive, Aerospace & Defence, Hydraulic and Security applications. With manufacturing facilities in Europe and India, we are able to meet customers' exacting requirements across six continents. We are geared towards providing innovative and creative solutions to our customers on a continuous basis.



Dynamatic is a Tier-1 supplier for the likes of Airbus, Boeing, BELL and HAL for manufacturing of complex aero-structures. The Company has built a strong training programme for the newly recruited technicians without having any aerospace know-how. In the last decade the Company with its trained workforce is able to deliver critical class-1 aero-structures as a global single source.

Aerospace & Defence Industry in India has opened up with its manufacturing businesses and is on the rise. While the Organisations are setting up manufacturing facilities, it is required to hasten and build a pipeline of skilled workforce who are industry ready. In order to bridge this gap, Dynamatic has set up an exclusive 'Aerospace Skill Development Centre' at Government ITI Devanahalli, Bangalore. This training provides necessary exposure into the aero-structural activities and has already helped students get employment with many Aerospace & Defence companies.

Dynamatic Technologies has received the Special Commendation from the Institute of Directors for the Golden Peacock National Training Award 2019 held in Dubai on 6th March 2019. ●

STRENGTHENING LOCAL PARTNERSHIPS

Emmanuel de Roquefeuil, VP & Country Director, Thales India details their expanding footprint in India

SP's Team (SP's): What are your exhibits at DefExpo 2020?

Emmanuel de Roquefeuil (Roquefeuil): At DefExpo, we are exhibiting a wide range of products and solutions through a series of demonstrations across four categories – Land, Naval and Air, Digital Transformation and Security.

SP's: Brief us on your associations and joint ventures with the Indian companies in the country?

Roquefeuil: We are proud of our co-operative partnerships with public and private sector industries that are fully in line with the 'Make in India' initiative of the Indian government. We have been working closely with Hindustan Aeronautics Limited (HAL) for over five decades and have joint ventures with Bharat Electronics Ltd (BEL), Samtel, L&T Technology Services and Reliance Aerostructure Limited. We are also working with over 75 supply chain partners in the country, engaged in our global supply chain across defence and civil markets. We have been strengthening our local partnerships too, generating business worth over 1000 crore for our Indian supply chain partners and creating hundreds of job opportunities.

SP's: Which Thales systems are being supplied to India as part of the Rafale and the Mirage 2000 upgrade programmes?

Roquefeuil: Our contribution to the Rafale includes the RBE2 active electronic scanning array (AESA) radar, the SPECTRA electronic warfare system, the front-sector optronic systems, the CNI system (communication, navigation, identification), the majority of the cockpit display systems as well as power generation systems and a logistics support component.

The upgrade of Mirage 2000 fleet enhances the technical-operational capabilities of the Indian Air Force's Mirage 2000. These include longer-range detection across the entire spectrum, improved tactical situation awareness, longer-range weapon firing against multiple simultaneous targets, weapon stealth and an extended operating envelope with the capability to engage ground targets whilst countering airborne threats. ●



BEML SEEKS GLOBAL TIE-UPS IN MISSILE TECHNOLOGY

D.K. Hota, CMD BEML talks about collaborations sought for unmanned ground vehicles and defence spares

Question (Q): How has BEML evolved over the last few years?

Answer (A): With respect to Defence vertical, it has seen a rising trend in performance over the last five years. BEML has around ₹2,600 crore orders as on date and around ₹1,400 crore orders are in the pipeline for the current FY. BEML is the top supplier of metro coaches in the country. This ensued highest ever sales last year and a record order book position to over Rs 10,000 Crore. We achieved indigenisation levels of over 90 per cent in mainline Mining & Construction products, Rail coaches & EMUs, over 80 per cent in High Mobility Vehicles (HMV) and over 65 per cent in Metro cars. BEML has consistently achieved over 80 per cent of sales through exports.

Q: Which products are you showcasing at DefExpo 2020 and what are your key objectives at this show?

A: In line with the theme of 'Digital Transformation', BEML is launching AI-based mobile healthcare diagnosis system. It is also showcasing new crew protection vehicles, Heavy Transportation Vehicles, Engineering Plant Equipment, High Mobility Vehicles, De-mining equipment, Medium Bullet Proof Vehicles, Armoured Command & Control Vehicles, Bulldozer with Hydrostatic Transmission Drive technology (BD50HST), 20-Ton-class heavy transportation vehicles and Mounted Gun Systems in association with OFB. We have also indigenously developed Infra-red Signature Suppression systems for Indian Navy.

Q: How has BEML fared in India and in the export markets?

A: BEML has supplied around 8,500 high mobility military trucks of various vari-

ants to Indian Army over the past three decades for various projects like Missiles, Launchers, Bridging Systems, Ground Support Vehicles, Radar programmes, etc. BEML has also supplied Armoured recovery vehicles, Wagons, Tank & Missile aggregates, Trailers, Towing tractors etc. to Indian army. BEML has exported mining equipment to 68 countries.

Q: What major initiatives has the company taken to bolster its 'Make in India' programme?

A: BEML is exploring to establish JV with technology partners for manufacturing of Defence spare parts in the Defence corridors of India in order to reduce import burden and develop manufacturing eco-system amongst MSMEs.

For equipment manufacturing, BEML plans to collaborate with global OEMs, introduce and subsequently manufacture new products for the Indian Army and ensure maximum localisation of around 50-60 per cent by value of the products.

Q: Is the company planning any local or international collaborations to enhance its technical know-how and its production capabilities?

A: BEML plans to associate with global leaders for manufacturing Airborne structures, Aircraft systems that would enable BEML reach a level of a 'Lead Integrator' in the area of missile systems.

In addition to this, BEML is also signing MoUs and NDA with strategic OEMs for introducing new products such as autonomous ground vehicles, twin tracked carriers, light armoured dozers, aggregates for T-90 tank, etc., under 'Make in India' initiative. ●

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INNOVATIONS FOR DEFENCE EXCELLENCE (iDEX)

Innovations for Defence Excellence (iDEX) launched by the Government in April 2018, primarily aims at creation of an ecosystem to foster innovation and technology development in Defence and Aerospace by engaging Industries including MSMEs, start-ups, individual innovators, R&D institutes & academia, and provide them grants/funding and other support to carry out R&D which has good potential for future adoption for Indian defence and aerospace needs.

iDEX is funded and managed by a 'Defence Innovation Organization (DIO)' which has been formed as a 'not for profit' company for this purpose by the two founder members i.e. Defence Public Sector Undertakings (DPSUs) - HAL & BEL. iDEX functions as the executive arm of DIO, carrying out all the required activities while DIO provides high level policy guidance to iDEX. This is the second part of a 3-part series detailing the objectives and activities of iDEX.

PATTERN OF ENGAGEMENT

It is intended to create a "corporate VC" for Indian defence needs. iDEX is empowered to run challenges, hackathons, and several month-long accelerators that help the Services co-create technologies with innovators. Furthermore, iDEX connects innovators to the different military entities that absorb technologies, to enable co-creation and co-innovation.

To achieve the objectives, it is envisaged to engage with existing and create new Defence Innovation Hubs where innovators can get information about needs and feedback from the services directly and create solutions for India's major defence platforms. This structure is also geared towards attracting more innovators to work for the defence sector in India. At the other end, this will enable the military to understand to concept of "Fail Fast and Recover Faster" in the technology domain and use it to its own benefit. With this paradigm, the military will be able to work with and incorporate smaller and faster moving entities in the defence domain.

IMPLEMENTATION METHODOLOGY

iDEX is funded and managed by "Defence Innovation Organisation (DIO)" formed as a "not for profit" company. The modalities of implementation of DIF will be managed by a specialised team known as the Innovation for Defence Excellence (iDEX) within the DIO. DIO provides high level policy guidance to iDEX which has functional autonomy. The CEO of iDEX is selected and recruited by the DIO and is a professional person of sound technical, scientific and engineering background with divergent knowledge and experience in innovation and research. CEO of iDEX would also be CEO of DIO thereby providing the linkage between the high level policy guidance given by DIO and its implementation in a professional manner through iDEX. The iDEX team has the following composition:

Tech experts - The iDEX has created a roster of experts in core areas and engage them as per the requirement of Defence Innovation Hubs.

Tech deployment experts - Deployment of technologies is a growing discipline, with individuals who understand the dynamics of integrating tech in complex institutions and environments. These include system integrators, user interface experts, design experts, etc.

Innovation stakeholders - Co-creation and adoption of innovation is now an advanced discipline and requires specialised skills. Experts with these skills are an integral part of the team, to be able to successfully connect tech. innovators and users in the armed forces.

While iDEX leads the overall effort to create an innovation ecosystem in the country, each Defence Innovation Hub would be independent financial viable unit functioning with the help of assistance provided by DIO under the guidance of iDEX. Through the network of Defence Innovation Hubs throughout the country,



(TOP) DEFENCE MINISTER RAJNATH SINGH ADDRESSING AT THE DEF-CONNECT UNDER THE AEGIS OF INNOVATIONS FOR DEFENCE EXCELLENCE (iDEX), IN NEW DELHI; DEFENCE MINISTER INSPECTING THE INNOVATIVE EXHIBIT AT THE DEF-CONNECT.

the iDEX underpins an ecosystem of defence tech. and innovation stakeholders.

FUNDING OF DIO

The DIO has been formed with a nominal capital under the Companies Act by the two founder members i.e., HAL & BEL. DIO has an initial corpus fund which is utilized for funding iDEX projects. The funding for DIO comes from:

Initial Contribution from HAL and BEL

The corpus fund raised by HAL and BEL for DIO is presently conceived as ₹100 crore, ₹50 crore each from HAL and BEL. Over and above, the corpus fund may be increased subsequently depending upon the requirements and external "donors/contributors" interest through crowd funding. HAL & BEL being founder members contribute to the initial corpus fund of ₹50 crore to start with.

Contribution from Defence PSUs

All Defence PSUs, namely HAL, BEL, BEML, BDL, MIDHANI, MDL, GRSE, GSL, are encouraged to participate in the initiatives of iDEX through DIO and required to contribute an amount of 2 per cent of their net profits to DIO for creating the innovation ecosystem in the country.

CSR Funds

Under guidelines for CSR, CSR funds can be used for eligible Incubators. Defence PSUs earmark 25 per cent of their CSR funds for supporting iDEX in the country.

Funds from other PSUs/Government agencies/Departments

Several technologies developed in defence and aerospace have dual applications, both in Defence/Aerospace sector and/or in civil/commercial sectors. To name a few, Gallium

Nitride products, AI applications, UAVs are such technologies. Since it is expected that other PSUs/Government agencies/Departments may be interested in taking up development of such technologies, iDEX may approach such other PSUs/Government agencies/Government Departments to join iDEX initiative as long as such initiatives are within the broad mandate of iDEX. Such funds received would be through DIO.

ALLOCATION OF FUNDS BY MINISTRY OF DEFENCE

Ministry of Defence may release funds if it is satisfied that such funding is required in furtherance of the objectives of Defence Production. Such funding from Government are based on a request from iDEX/DIO and after due appraisal by MoD and approval of Competent Authority, on a case to case basis.

As each Defence Innovation Hub and each project requires different amounts of assistance in terms of time and funds, the exact amount and duration of funding is decided on a case by case basis. This funding is used only for piloting/prototyping and not for equity purchase. ●



MDL OFFERS STATE-OF-THE-ART FACILITIES



MDL SCORPENE-CLASS SUBMARINE VELA, THE FOURTH OF SIX UNDERWATER WARSHIPS LAUNCHED AT MDL IN MUMBAI



THE FIRST SHIP OF PROJECT 17A NILGIRI BEING LAUNCHED AT MDL IN MUMBAI

Mazagon Dock Shipbuilders Limited (MDL) was established nearly over 250 years ago. In the year 1774, a small dry dock was built to service ships of the British East India Company. With the passage of around 250 years, the Yard has grown from a single unit repair establishment into a multifunctional, state-of-the-art shipyard, building various types of warships for the Indian Navy.

It passed through various ownerships like the P&O lines and the British India Steam Navigational Company, till it was taken over by the Government of India and established as a Public Sector Undertaking under the Ministry of Defence in 1960. It is today the Country's premier and lead warship building yard.

MDL, today, is the premier shipbuilding yard in the country, producing world class state-of-the-art ships and submarines. Over the last six decades, MDL has delivered over 796 ships/submarines/platforms to various customers both in India and abroad. Out of which 43 have been delivered to the Indian Navy, which form a formidable part of the Fleet of the Indian Navy. The range of platforms delivered to various customers range from Destroyers, Stealth Frigates, Submarines, Missile Boats, Corvettes, Offshore Patrol Vessels, Multipurpose Support Vessels, Offshore Supply Vessels, Dredgers, Tugs and Cargo-cum-Passenger Vessels. The main customer for MDL is the Indian Navy. Presently, MDL is involved in building four Stealth Destroyers, four Frigates and four Scorpene class submarines for the Indian Navy. These ships/submarines are slated to be delivered in a staggered manner over the next 6-8 years.

In the recent past, MDL launched two ships, one submarine and delivered one submarine to Indian Navy. Imphal, the third guided missile destroyer of P15B was launched in the presence of Admiral Sunil Lanba, Chief of the Naval Staff on April 20, 2019 later in the year, Vela the fourth scorpene submarine of P75 was launched on May 6, 2019 in the presence of Secretary Defence Production, Dr Ajay Kumar and finally Nilgiri, the first of the P17A frigate was launched on September 28, 2019 in presence of Defence Minister, Rajnath Singh. On the same day, the second scorpene submarine Khanderi was delivered to the Indian Navy.

MDL is the only Shipyard with a proven track record of constructing conventional submarines and destroyers. The key capabilities with which MDL has achieved and sustained the reputation of being the premier shipbuilding yard includes: Integrating Weapon Systems; Fabricating three types of Pressure Hull; Series production capability and state-of-the-art Shore Integration Facility (SIF) created for complete Combat system integration prior installation. This is the first of its kind in India.

The current order book status consist of four P15B Missile Destroyers, four P17A Stealth Frigates, six Scorpene Submarines and order for Medium Refit and Life Certification (MRLC) of INS Shishumar. Besides, MDL is bidding for P75-I Submarines and refits of warships for the Indian Navy/MoD.

MDL has been continuously striving to enhance the indigenous content in the successive deliveries of ships and submarines. A 'Make in India' cell is active in MDL since May 2015 and to further boost and strengthen the indigenisation effort, a dedicated Indigenisation Department has been established in MDL. MDL's efforts and commitment towards indigenisation are evident from the fact that the percentage of indigenisation of surface ships has gone up to 75 per cent approximately.

MDL currently operate from one location in Mumbai, which limits its expansion programme. However, the transfer of title of Nhava Yard to MDL has opened

up avenues for growth and expansion. Nhavayard is spread over an area of 37 acres with a 141m long jetty.

MDL is planning to develop the Nhava Yard, a greenfield shipyard to carry out ship building and ship repair activities.

Over the years, the shipyard has created facilities that can handle complex shipbuilding projects. MDL is equipped with state-of-the-art infrastructure and processes, which include a world class design facility with a futuristic virtual reality centre and sophisticated 3D software.

To keep up with changing times, Mazagon Dock has modernised its facilities to undertake modular construction by investing in a 300 tonne Goliath crane, Module Shop with a retractable roof, a second wet basin, a Training Centre and a Submarine Assembly Workshop for a second line of submarines.

With the enhanced infrastructure, now, MDL has the capacity to simultaneously construct 10 warships and 11 submarines. ●

MDL's efforts and commitment towards indigenisation are evident from the fact that the percentage of indigenisation of surface ships has gone up to 75 per cent approximately



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यूपी रक्षा औद्योगिक गलियारे के लिए आदर्श उत्प्रेरक हो सकता है डिफेंस एक्सपो 2020

एक मौजूदा मजबूत रक्षा औद्योगिक पारिस्थितिकी तंत्र के साथ, डिफेंस कॉरिडोर का लक्ष्य भारत को रक्षा विनिर्माण में आत्मनिर्भर बनाना है।



उत्तर प्रदेश की राजधानी लखनऊ में 21 फरवरी, 2018 को यूपी इन्वेस्टर्स समिट 2018 को संबोधित करते हुए प्रधानमंत्री नरेंद्र मोदी।

आम बजट 2018-19 पेश करते समय तत्कालीन वित्त मंत्री (स्व.) अरुण जेटली ने देश में दो डिफेंस इंडस्ट्रियल कॉरिडोर स्थापना का प्रस्ताव रखा था। इसका उद्देश्य सार्वजनिक और निजी दोनों क्षेत्रों में घरेलू उत्पादों को बढ़ावा देना था। जेटली ने कहा था कि सरकार रक्षा उपकरणों के उत्पादन में निवेश को बढ़ावा देने के लिए इन औद्योगिक गलियारों के निर्माण पर ध्यान केंद्रित करेगी। इस घोषणा को ध्यान में रखते हुए देश में दो डिफेंस इंडस्ट्रियल कॉरिडोर एक उत्तर प्रदेश और दूसरा तमिलनाडु में स्थापित किए गए। ये रक्षा गलियारें मौजूदा रक्षा उत्पादन सुविधाओं के आसपास विकसित किए जा रहे हैं। साथ ही सुक्ष्म, लघु और मझोले उद्यम (एम.एस.एम.ई.) और मूल उपकरण निर्माता (ओ.ई.एम.) की सक्रिय आपूर्ति श्रृंखला बनाने के लिए नए उद्योग क्लस्टर स्थापित करने की योजना है। आवश्यक परीक्षण और प्रमाणन सुविधाओं, निर्यात सुविधा केंद्रों, प्रौद्योगिकी हस्तांतरण सुविधा आदि के साथ इन गलियारों में भारतीय रक्षा उद्योग शामिल होगा और रक्षा सार्वजनिक क्षेत्र के उपक्रमों (डी.पी.एस.यू.) को बढ़ावा देगा। प्रत्येक रक्षा गलियारों के समूह में से एक में किसी एंकर यूनिट के आसपास रक्षा उत्पादन इकाइयों का एक प्रमुख क्लस्टर विकसित किया जाएगा। इन दो गलियारों में से पहला (रक्षा औद्योगिक गलियारा) चेन्नई और बेंगलुरु के बीच चल रहा है, जो कि कट्टपल्ली बंदरगाह, चेन्नई, तिरुचि, कोयंबटूर और होसुर को जोड़ता है।

उत्तर प्रदेश रक्षा औद्योगिक गलियारा केंद्र सरकार द्वारा स्थापित किया गया था, जिनमें छह समूह अलीगढ़, आगरा, झांसी, चित्रकूट, कानपुर और लखनऊ हैं। इस संबंध में एक रक्षा योजना समिति का भी गठन किया गया था। उत्तर प्रदेश के मुख्यमंत्री योगी आदित्यनाथ ने एक बार कहा था कि उनकी सरकार ने प्रस्तावित बुंदेलखंड एक्सप्रेसवे के साथ एक रक्षा विनिर्माण गलियारा स्थापित करने की योजना बनाई है, जो कि रक्षा उत्पादन के क्षेत्र में "भारत को आत्मनिर्भर" बनाएगी। मुख्यमंत्री ने यूपी एक्सप्रेसवे औद्योगिक विकास प्राधिकरण (यूपी.डा.) के अधिकारियों और नोडल एजेंसी को भी प्रदेश में रक्षा गलियारे परियोजना पर काम में तेजी लाने और रक्षा मंत्रालय के साथ तालमेल के निर्देश दिए, जिससे गलियारे में रक्षा विनिर्माण इकाइयां स्थापित की जा सकें।

इस कड़ी में उत्तर प्रदेश की राजधानी लखनऊ में पहली बार डेफेक्सपो इंडिया-2020 का आयोजन होने जा रहा है। डेफेक्सपो भारतीय रक्षा उद्योग को अपनी क्षमताओं का प्रदर्शन करने और अपनी निर्यात क्षमता को बढ़ावा देने के लिए एक उत्कृष्ट अवसर प्रदान करने का वादा करता है। इतना ही नहीं, इस शो के 11वें द्विवार्षिक संस्करण को लेकर अनुमान है कि यह निवेशकों को आकर्षित करने के साथ-साथ क्षेत्र को अत्याधुनिक तकनीकी मामले में एक उत्प्रेरक का काम करेगा। यह प्रदर्शनी रक्षा क्षेत्र

में निवेश के लिए यूपी को एक आकर्षक गंतव्य के रूप में स्थापित करेगी और रक्षा उद्योग में गठबंधनों और संयुक्त उद्यमों के लिए एक मंच के रूप में कार्य करेगी। रक्षा गलियारों का शिलान्यास 15 फरवरी, 2019 को झांसी जिले में प्रधानमंत्री नरेंद्र मोदी ने किया था। इस दौरान अनुमान लगाया गया था कि इस गलियारों से करीब 2,50,000 लोगों के लिए रोजगार के अवसर आएंगे। प्रधानमंत्री द्वारा 21 फरवरी, 2018 को लखनऊ में यूपी इन्वेस्टर्स समिट के उद्घाटन समारोह में पहली बार गलियारों की घोषणा करने के लगभग एक साल बाद झांसी का आयोजन हुआ। समिट के उद्घाटन के बाद प्रधानमंत्री ने कहा कि बजट में उल्लेखित दो रक्षा औद्योगिक गलियारों में से एक राज्य के बुंदेलखंड क्षेत्र में प्रस्तावित है, जो 20,000 करोड़ रुपये का निवेश लाएगा और 2.5 लाख लोगों के लिए रोजगार के अवसर पैदा करेगा। प्रधानमंत्री ने इस बात पर जोर दिया कि बुंदेलखंड क्षेत्र की विकासात्मक आवश्यकताओं को ध्यान में रखते हुए यह निर्णय लिया गया है। प्रधानमंत्री ने कहा कि यहां के छोटे और मध्यम उद्यमों को गलियारों से लाभ होगा। साथ ही लाखों युवाओं के लिए रोजगार के नए अवसर पैदा होंगे। इससे स्थानीय युवाओं को नौकरियों की तलाश में अन्य स्थानों पर जाना नहीं पड़ेगा।

हिंदुस्तान एयरोनॉटिक्स लिमिटेड (एच.ए.एल.) की चार इकाइयों लखनऊ, कानपुर, कोरवा और नैनी (प्रयागराज), नौ आयुध निर्माण इकाइयों जिनमें कि कानपुर, कोरवा, शाहजहांपुर, फिरोजाबाद और गाजियाबाद स्थित भारत इलेक्ट्रॉनिक्स लिमिटेड (बी.ई.एल.) एक इकाई को मिलाकर उत्तरी राज्य में पहले से ही कई एयरोस्पेस और रक्षा (ए एंड डी) कंपनियों की भारी मौजूदगी है। इन कंपनियों के पास पहले से ही देश भर के विक्रेताओं और आपूर्तिकर्ताओं का एक इको-सिस्टम है। इस मजबूत उपस्थिति के साथ, विक्रेताओं और आपूर्तिकर्ताओं का एक पारिस्थितिकी तंत्र पहले से मौजूद है।

यूपी रक्षा औद्योगिक गलियारा परियोजना की शुरुआत राज्य द्वारा संचालित भारत इलेक्ट्रॉनिक्स लिमिटेड (बी.ई.एल.) द्वारा विनिर्माण सुविधा के साथ सफलतापूर्वक हुई। बी.ई.एल. पहली कंपनी थी जिसने स्कीम के तहत राज्य सरकार के पास जमीन के लिए संपर्क किया। परियोजना की नोडल एजेंसी यूपी.डा. ने कॉरिडोर के लिए छह जिलों में 5,000 हेक्टेयर से अधिक जमीन चिह्नित की, जिसके लिए किसानों को सर्किल रेट से चार गुना अधिक मुआवजा दिया जाएगा।

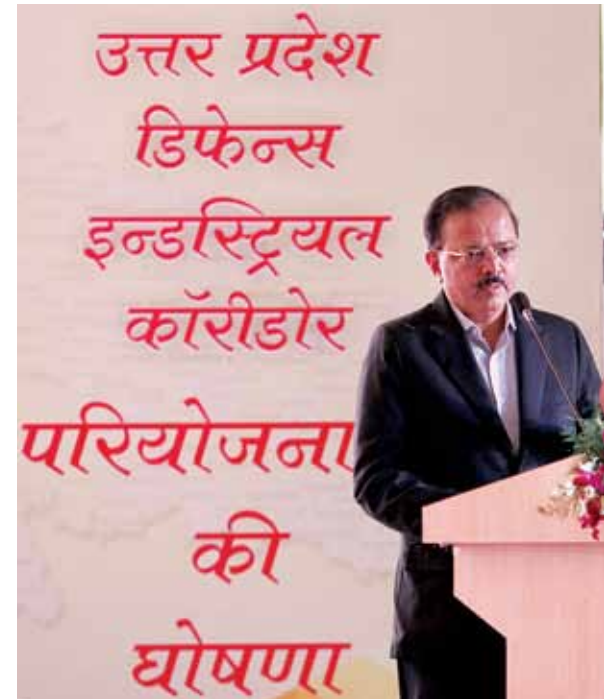
यूपी डिफेंस कॉरिडोर की कुछ प्रमुख विशेषताएं

- एम.एस.एम.ई. और ओ.ई.एम. की संयुक्त आपूर्ति श्रृंखला बनाने के लिए रक्षा उत्पादन इकाइयों का एक प्रमुख समूह बनाने का लक्ष्य
- यूपी रक्षा औद्योगिक गलियारे के प्रमुख नोड हैं, अलीगढ़, आगरा, झांसी, चित्रकूट, कानपुर और लखनऊ
- राज्य में नौ आयुध कारखानों, एच.ए.एल. की तीन विनिर्माण इकाइयां और एक बी.ई.एल. इकाई चल रही हैं
- राज्य में रक्षा अनुसंधान एवं विकास संगठन (डी.आर.डी.ओ.), ए.एस.ई.आर.डी.सी.-एच.ए.एल. आदि की स्थापित आर एंड डी केंद्र हैं
- इस गलियारों के लिए मौजूदा सक्षम बुनियादी ढांचे में शामिल हैं:
- बेहतरीन सड़क नेटवर्क के साथ सामरिक महत्व का स्थान
- ए.के.आई.सी. (अमृतसर-दिल्ली-कोलकाता औद्योगिक गलियारा परियोजना) और ई.डी.एफ.सी. (पूर्वी डेडिकेटेड फ्रेट कॉरिडोर) के जलांचल के साथ स्थित
- आगरा-लखनऊ एक्सप्रेसवे
- कानपुर, दादरी, बोडाकी और वाराणसी में बेहतरीन सामरिक आधारित
- रक्षा गलियारों में निवेश के अवसर, जिनमें झांसी, आगरा, कानपुर में डिफेंस पार्क शामिल हैं। लखनऊ, कानपुर, आगरा में एयरोस्पेस पार्क शामिल हैं। साथ ही रक्षा सार्वजनिक क्षेत्र की इकाइयों (डी.पी.एस.यू.) का विस्तार •



“यूपी की बेहतरीन राज्य नीति सैन्य औद्योगिक उद्यमों के विकास के लिए एक अवसर प्रदान करती है”

उत्तर प्रदेश एक्सप्रेसवे औद्योगिक विकास प्राधिकरण (यूपी.डा.) लखनऊ में 5 से 9 फरवरी तक होने वाली डिफेंस एक्सपो 2020 में समूह एंजेसी की भूमिका अदा कर रहा है। इस समय यूपी.डा. के मुख्य कार्यपालक अधिकारी अवनीश कुमार अवस्थी हैं। वे अपर मुख्य सचिव (गृह) के पद पर भी हैं। ऐसे में डिफेंस एक्सपो और इससे जुड़े अन्य मसलों पर वरिष्ठ पत्रकार संजय भटनागर ने अवस्थी से बातचीत की। विस्तृत साक्षात्कार के कुछ अंश प्रस्तुत हैं।



उत्तर प्रदेश में रक्षा औद्योगिक गलियारे के लिए परियोजनाओं का शुभारंभ

संजय भटनागर (भटनागर): डिफेंस एक्सपो 2020 एशिया में अब तक का अपनी तरह का सबसे बड़ा आयोजन माना जा रहा है। इतने बड़े आयोजन के लिए उत्तर प्रदेश का ही चुनाव क्यों किया गया?

अवनीश कुमार अवस्थी (अवस्थी): प्रधानमंत्री नरेंद्र मोदी ने लखनऊ में फरवरी 2018 में आयोजित यूपी इन्वेस्टर्स समिट के दौरान उत्तर प्रदेश में रक्षा गलियारों के निर्माण की घोषणा की थी। हमने तुरंत गलियारों के लिए जमीनी स्तर पर काम शुरू किया। उसके बाद, हमारे मुख्यमंत्री योगी आदित्यनाथ जी ने इसे प्रदर्शित करने की बात सोची, जिसका परिणाम है डिफेंस एक्सपो।

भटनागर: उत्तर प्रदेश की राजधानी लखनऊ में भारत की वृहत रक्षा प्रदर्शनी आयोजित करने के पीछे आपके अनुसार मूल विचार क्या हैं?

अवस्थी: इस तथ्य से कोई इनकार नहीं कर सकता है कि भूमि की उपलब्धता और सस्ते व कुशल मानव संसाधन के मामले में यूपी सबसे बड़ा राज्य है। वास्तव में, हमारे पास एक बेहतरीन राज्य नीति है, जो पेशेवरों और उद्योग जगत को सैन्य औद्योगिक उद्यमों के विकास के लिए एक अवसर प्रदान करती है।

भटनागर: इस आयोजन की तैयारी को लेकर क्या रणनीति बनाई गई?

अवस्थी: यह एक वाजिब सवाल है। दो साल पहले जब गलियारों के निर्माण की घोषणा की गई, तब हमने सबसे पहले इसके क्रियान्वयन की दिशा में काम शुरू किया। उसके बाद प्रधानमंत्री कार्यालय और रक्षा मंत्रालय के साथ नियमित रूप से परामर्श करते हुए डिफेंस एक्सपो की तैयारी शुरू की। जैसा कि आप जानते हैं, यूपी के मुख्यमंत्री योगी आदित्यनाथ जी हमेशा उचित प्रणाली और प्रक्रियाओं में विश्वास करते हैं। हमने सबसे पहले सुनियोजित तरीके से एक अनुकूल माहौल बनाने की दिशा में काम शुरू किया, फिर इस क्षेत्र में बड़े निवेश की आकांक्षा की।

भटनागर: उसके बाद आप किन प्रक्रियाओं से गुजरे?

अवस्थी: प्रधानमंत्री की घोषणा के तुरंत बाद हमने राज्य में रक्षा गलियारों स्थापित करने की शुरुआत की। रक्षा उद्योग स्थापित करने के लिए छह नोड्स झांसी, लखनऊ, कानपुर, आगरा, चित्रकूट और अलीगढ़ बनाए। ये नोड्स बेहतरीन रोड नेटवर्क के साथ बुनियादी ढांचे पर निर्भर हैं। प्रस्तावित बुंदेलखंड एक्सप्रेसवे पहले से मौजूद लखनऊ-आगरा एक्सप्रेसवे और यमुना एक्सप्रेसवे के माध्यम से राष्ट्रीय राजधानी से जुड़ेगा। ये नोड्स हवाई मार्ग के जरिए शेष भारत से जुड़े हैं। सबसे महत्वपूर्ण यह है कि हम संभावित निवेशकों के लिए पर्याप्त बिजली और मजबूत कानून-व्यवस्था का दावा कर सकते हैं।

भटनागर: नीतिगत लचीलापन को लेकर क्या कहना चाहेंगे?

अवस्थी: रक्षा गलियारों की परियोजना को लेकर लगभग 80 प्रतिशत भूमि का अधिग्रहण हो चुका है। इसके अलावा, संशोधित रक्षा और एयरोस्पेस यूनिट और रोजगार प्रोत्साहन नीति लागू है। हम निवेशकों की मदद के लिए पूरी तरह से तैयार हैं। हम राज्य में मजबूत विनिर्माण पारिस्थितिकी तंत्र विकसित करने के लिए प्रोत्साहित करेंगे। जो लोग उत्तर प्रदेश में रक्षा इकाइयां स्थापित करने के इच्छुक हैं, उन्हें एक नई उद्योग की जरूरतों के हिसाब से हर सुविधा उपलब्ध कराई जाएगी।

भटनागर: क्या राज्य के मौजूदा रक्षा पारिस्थितिकी तंत्र से इस क्षेत्र को बल मिलेगा?

अवस्थी: पूर्ण रूप से मिलेगा। पहले से ही राज्य में नौ प्रमुख आयुध कारखाने हैं। हिंदुस्तान एयरोनॉटिक्स लिमिटेड और बी.ई.एल. की इकाइयों में बेहतरीन अनुसंधान और विकास की सुविधाएं हैं। यूपी सरकार ने रक्षा गलियारों से संबंधित सेंटर ऑफ एक्सीलेंस की स्थापना के लिए आई.आई.टी. कानपुर और आई.आई.टी. वाराणसी को मंजूरी दे दी है। •



NAG ANTI-TANK GUIDED MISSILE



NAG MISSILE ON DISPLAY

India on July 19, 2019, declared its indigenous third-generation anti-tank guided missile (ATGM) NAG ready for induction as an operational weapon in the Army. A helicopter-launch version has also been developed. This is the last of the missile systems conceived under the Integrated Guided Missile Development Programme (IGMDP) in 1983 which will now be produced industrially to be used

as an operational military weapon.

The announcement follows successful completion of summer user trials by the Indian Army at the Pokhran Field Firing Ranges in Rajasthan from July 7 to 18. The 4 km range missile cleared winter trials in February 2019. India's Ministry of Defence claimed a 100 per cent success rate in user trials for the NAG, which has been developed by the Defence Research and Development Organisation (DRDO). "As part of the NAG summer user trials, six missions were conducted under the extreme temperature conditions of the Pokhran Ranges. All the missiles have met the mission objectives including minimum range, maximum range, in direct attack as well as top attack modes and achieved a direct hit on to the target," the Ministry of Defence announced in a statement. The imaging algorithm withstood the test of severe hot weather conditions in ensuring the missile hit the target. "All the ten missiles, which were fired during winter and summer trails, successfully hit the targets," the statement added.

The NAG is an all-weather ATGM with day and night capability, developed to destroy highly fortified enemy tanks within a range bracket of 500 metres to 4 km. It is a fire and forget missile which uses an imaging infrared seeker in lock-on-before-launch mode. The missile is launched from the NAG missile carrier (NAM-ICA) - a modified BMP-2 Infantry Combat Vehicle - which is capable of carrying up to six combat missiles. The imaging algorithm withstood the test of severe hot weather conditions in ensuring the missile hit the target.

This ATGM uses an 8 kg tandem HEAT warhead capable of penetrating Explosive Reactor Armour and Composite Armour. Integration work is going on to retrofit the Rudra helicopter with the Helina variant of the NAG. The helicopter-launched version has a nose-mounted thermal imaging system for guiding the missile.

The NAG has reduced the market for foreign-made ATGMs in India. The maturity of this indigenous missile is reportedly the reason for putting on the backburner larger orders for foreign-made ATGMs. ●

NETRA — THE INDIAN EYE IN THE SKY

The Netra served as the "operational brain" that guided the 12 Mirage 2000 strike aircraft of the IAF as they flew into enemy territory and destroyed a major terrorist camp. Perhaps the most significant participant that played a key role in supporting the airstrike mission, was the indigenously produced Netra Airborne Early Warning & Control System (AEW&CS) aircraft. Two of these platforms based at IAF Station Bhatinda in Punjab were deployed in support of the airstrike mission.

The Netra AEW&CS aircraft is a multi-sensor platform that has been developed by the Indian Defence Research and Development Organisation (DRDO) together with a laboratory under it - the Centre for Airborne Systems (CABS) located in Bengaluru. The Netra has an indigenously developed Active Electronically Scanned Array (AESA) radar system mounted on the Embraer ERJ 145 twin-engine aircraft. The AESA radar is an airborne surveillance system which has the capability to detect and track aircraft, missiles, ships and vehicles as well as provide command and control to direct friendly forces. The platform is also equipped with a secondary surveillance radar, electronic and communication counter measures, Line of Sight (LoS) as well as beyond-LoS data link and voice communication system.

The Netra has been designed to be an extremely capable operational platform. It has the capability to receive fuel in flight which can double its airborne endurance to nine hours. The AESA radar mounted on top of the fuselage of the aircraft provides electronic scan coverage of 240 degrees up to a range of 500 km, a feature that gives it the capability to track targets deep inside enemy territory without the need to cross the international border or the LoC. The Netra can detect radar signals and monitor all communications that takes place among the units and formations of the armed forces of the enemy. The Netra can also alert pilots about incoming missiles as it has infrared detection capability that can sense the hot exhaust of the missiles. While it is not equipped with cameras, it can collect and collate all electronic intelligence it gathers and beam it back live to not only the commanders on the ground to take speedy decisions but also to the national security establishment in the capital to facili-



THE NETRA AEW&CS AIRCRAFT

tate monitoring of ongoing operations in real time and take timely decisions.

Feasibility study for the project to develop an AEW&CS platform by the IAF jointly with DRDO was carried out and based on the report, the government sanctioned the project for three platforms to be delivered. The first aircraft was delivered in 2017 followed by delivery of the second platform soon after. The DRDO has plans to develop an advanced version of the platform as well. Beyond the initial order for three aircraft, the IAF has placed orders for another six platforms. It is understood that the IAF is pitching for another 20 platforms, the total fleet totaling to 29 to cover both the Western and Northern fronts simultaneously in the event of a two-front war. ●



GSL: CONSISTENT TRACK RECORD OF TIMELY DELIVERIES



Goa Shipyard Limited (GSL), functioning under the administrative control of the MoD, Government of India, has positioned itself as a fastest growing shipbuilder on the west coast of India, capable of designing and building high technology and sophisticated ships. With an unmatched track record of timely execution and delivery at 'fixed cost' of over 200 Ships and more than 160 Fast Interceptor Boats, GSL stands as the success story of the changing face of Indian Defence Shipyards.

Equipped with an in-house design capability and most modern facilities, GSL has excelled in its core competence area of building a wide range of Patrol Vessels, Missile Boats, Landing Crafts, Training Vessels, Survey Vessels, Sail Training Ships, Fast Patrol Vessels and Yardcraft for the Defence Sector, besides other types of vessels in the commercial sector. GSL has capability to design and build ships to its customer's requirements and its in-house R&D unit is recognised by DSIR, Ministry of Science & Technology, Government of India.

The last few years have seen transformational performance by Shipyard in all quarters. The Shipyard established unique benchmark in Indian Shipbuilding by delivering over 23 ships, all ahead of schedule, amounting to Gross tonnage of 32,000 tonnes, highest in the industry. The throughput achieved validates the processes & productivity which has been consistently increasing year on year. GSL has achieved 'Excellent' MoU rating in last financial year with unique distinction of 100 per cent marks, first amongst all Shipyards in last 10 years.

In 2018-19, the Shipyard completed Coast Guard Advanced Offshore Patrol Vessel Project (AOPV) involving six ships, with all six Vessels delivered ahead of schedule and build period of 2,400 tonne AOPVs reduced to 36 months from 67 months taken earlier for last OPVs built by GSL. Based on the superior operational performance of these Vessels and reduced 'build periods' achieved by the Shipyard, Coast Guard placed order for construction of additional five OPVs, work for which commenced in March 17 with delivery scheduled in 2020-21. The construction of all five ships are progressing as per schedule with three vessels already launched. The first vessel is presently undergoing sea trials with indigenously built gear boxes.

The Shipyard, with its excellent track record and performance, has made significant inroads into global market with export of diverse vessels to Indian Ocean Region (IOR) Countries. Shipyard has exported 36 vessels and a Damage Control Simulator to friendly foreign countries. These projects again were delivered ahead of schedule and superior build quality led to accolades at the highest levels.

Riding on the success wave, GSL has a promising future as it is scheduled to execute highly challenging state of the art Projects for 02 Advanced Missile Frigates and 12 Mine Counter Measure Vessels (MCMVs) for Indian Navy. With regards to Advanced Missile Frigates 1135.6, the

EMBRAER AEW&C - EYE IN THE SKY

The EMB-145 AEW&C is a derivative of the Embraer ERJ-145 regional jetliner airframe, modified with the integration of an airborne early warning radar and mission system. Embraer was awarded a contract to develop and produce the EMB-145 AEW&C for the Brazilian Government. Subsequently, the Hellenic Air Force of Greece ordered four EMB-145 AEW&C. Mexico also ordered one aircraft for border and coastline monitoring. A fleet of three aircraft is sufficient to sustain two airborne patrols around the clock for a limited time, or one airborne patrol with one aircraft on continuous ground alert for more than 30 days. Capable of long endurance at normal patrol speeds, the EMB-145 has a high dash speed which contributes to survivability on patrol missions. The EMB-145 AEW&C crew includes the pilot and co-pilot, five mission systems specialists and up to three reserve crew members. With an air-to-air re-fuelling capability to augment its five-hour operational endurance, the ERJ-145's self-protection suite includes missile approach and radar warning receivers.



Embraer signed a MoU with India for the procurement of three systems under which Embraer will supply three ERJ-145 aircraft and perform the modifications required to carry the active array antenna unit (AAAU) AEW&C system developed by India's Centre for Airborne Systems (CABS) of DRDO. Mounted on the Embraer EMB-145 by the DRDO's Centre for Airborne Systems (CABS) in Bangalore, India's state-owned Defence Research and Development Organisation (DRDO) handed over the second of three indigenously designed Netra airborne early warning and control (AEW&C) systems to the Indian Air Force (IAF) in September 2019 to augment the service's network centric capabilities. The AEW&C system provides 240-degree coverage and surveillance ranges between 250 km and 375 km. The first Netra system was delivered to the IAF in 2017 which was deployed alongside the Mirage 2000H fighters that bombed an alleged Islamist militant training base in northwest Pakistan in late February 2019. ●

first two ships of the class will be constructed at Russia and the next two will be constructed at GSL under ToT. The contract for the same was inked in January 2019 and the project is presently in the design phase with production scheduled to commence in early 2020. This Project will aid in consolidating GSL's position in construction of large weapon intensive platforms.

Constantly building and consolidating its experience gained over half a century and reputation for excellence and consistent track record of timely deliveries, GSL today, confidently looks ahead to successfully meet the challenges of the future requirement of our forces indigenously. ●

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NAVAL GROUP: EXPERT IN CUSTOM MADE SOLUTIONS



DRONE SYSTEMS, A VERY COST EFFECTIVE FORCE MULTIPLIER

Drones are the new onboard operational capabilities and challenge, being addressed by the Naval Group's experts in close collaboration with the French Ministry of Defence and the French Navy. Several design, development and deployment activities are centered around the integration of drones on-board any vessel. The challenge is a stimulating one and our dedicated teams are seeing the projects advancing quickly and new opportunities opening up in the international markets.

AN AREA THAT IS YOUNG AND PROGRESSING RAPIDLY

The adventure started in 2016 as a result of successful experiments on-board the off-shore patrol vessel L'Adroit. Naval Group had thereafter installed drone system on the Landing Platform Dock (LPD) ship Dixmude. This was first deployed in stand-alone mode, i.e. without being linked to the combat system but controlled by a console developed by Naval Group and housed in a shelter on the flight deck. A second shelter, in the aviation hangar, was used for vehicle maintenance. "Our goal was to

study the impact of its presence on-board and evaluate the safety measures before expanding the range of its functions", explains Audrey Hirschfeld, Project Manager.

The trials took place in May 2017, off the coast of Montpellier. "Gathered on the visual defence bridge, at dusk, all eyes fixed on the drone, we all held our breath until it took off", mentioned of the key engineer on the project, recalling the emotion of the teams in front of the screens of the Operations Control Room, which showed the images from the drone's camera. "It was our best reward", she continued.

With some further great successes on-board the FREMM frigates and Gowind* corvettes, Audrey and her team have at last proved the challenging project to be industrially feasible and executable for multiple platforms.

INNOVATION AND EMULATION

This first trial campaign has proven convincing for Naval Group and now the company has been entrusted with the study and sustainable integration of the drone system into the LPD's combat system. Further technical trials have confirmed the expectations. Embarked on the Corymbe mission in September 2017, in the Gulf of Guinea, followed by the Jeanne d'Arc mission, the drone system gradually revealed its full potential for surveillance and reconnaissance missions.

For spring 2019, Naval Group is preparing the deployment on the Dixmude. The drone system will comprise a new Naval Group's console, a more extensive communication system and an additional airborne vehicle.

In the medium term, a complete drone system – with two airborne vehicles, new payloads – should equip each LPD. Integration on the Tonnerre LPD is foreseen for 2020 and the deployment on-board the other Mistral class LPDs around the world could follow soon after, as we are engaged in such discussion with international navies.

NAVAL GROUP'S EXPERTISE IN WARSHIP DESIGN AND INTEGRATION

This know-how accumulated over decades of developing modern and increasingly automated warships is a rare competence which can be used to integrate any type of drones on warships. With Indian Navy requiring the induction of more drones in the short, medium and long term, we see tremendous opportunities to share with DRDO and industrial stakeholders our expertise to provide custom made solutions. ●

—Rear Admiral R.K. Shrawat (Retd), CMD, Naval Group India



ALPHA DESIGN TECHNOLOGIES: PUTTING 'MAKE IN INDIA' POLICY INTO ACTION

Col. H.S. Shankar, VSM (Retd), Chairman & Managing Director, Alpha Design Technologies Pvt Ltd in conversation with SP's Team

SP's Team: What have been the most recent defence developments?

H.S. Shankar (Shankar): ADTL has been declared as L1 for prestigious Pichora Radar / Missile Upgrade Project. Project to be completed in next three years.

- MoD has placed Contract with us for manufacture and supply of indigenously developed 1545 No's ULSB Mk III. This is in addition to 2000 No's already manufactured and supplied ULSB Mk III three years back.
- Significant progress has been made in major R&D projects, such as, Software Defined Radios (Both for IAF & Army), High Capacity Radio Relay, Tactical Access Switch, BMP-2 Upgrade (with modified T-72 TIFCS), EW Suites, etc.
- Minister of State for Home launched POLNET 2.0 (Pan India Police Network 2.0) on 20 January 2020.
- Major Hub and Ground Antenna receiving terminals in SAARC Countries (Indian Prime Minister inaugurated ADTL's 140 stations at Bhutan recently), Andaman & Nicobar, etc.

SP's: Kindly elaborate on the role played by ADTL in the Tejas programme, Su-30MKI as well as simulator and helicopter upgrades?

Shankar: ADTL's subsidiary Alpha-Tocol has been awarded Contract by HAL for manufacture and supply Rear Fuselage Assembly for Light Combat Aircraft (LCA). They are also awarded for manufacture and assembly of Jig, Nose Box and Pylons, RF Assemblies for LCA. For Su-30, Alpha-Tocol makes Ailerons, Flappers, engine mounts, etc., so far fitted on indigenously made 120 aircrafts. Also, Alpha-Tocol takes on portion of overhaul of Su-30 at HAL Nasik.

SP's: Please elaborate on the partnership with DRDO and DPSU's shared by ADTL?

Shankar: Tremendous strides have been taken with both DRDO and ADTL on major IFF projects of CABS (Interrogator, Transponder and Combined RF Seeker for MR-SAM, Missile Launch Detection System (MILDS) for Mi-17 and Mi-17 1V Upgrade, EW sub-systems, etc.

SP's: What has been the export interest in ADTL's products?

Shankar: During 2018-19 and 2019-20, ADTL's sales turnover consisted of more than 85 per cent exports (highest ratio for any Public / Private Industry). ●



FROM THE MOON TO CUTTING EDGE INTELLIGENCE, IAI LEADS UNIQUE SPACE DEVELOPMENT

The Beresheet spaceship, co-developed by Israel Aerospace Industries (IAI) and SpaceIL has recently attracted world-wide attention after flying towards the moon in ever-growing elliptical orbits and successfully achieving the lunar orbit.

Unfortunately, the historic lunar lander, which orbited the moon in April while transmitting high quality images of the moon's surface did not make a successful soft landing as planned.

Despite this setback, the achievements demonstrated in this mission represent considerable innovative, technological and engineering knowledge in building space vehicles. A follow-on mission to reattempt the moon landing has already been announced and IAI is continuing to advance its growing family of space assets.

It is the first spacecraft to orbit the moon and attempt a landing as a purely private initiative, rather than a government programme. Beresheet was developed and constructed at a cost of just 100 million US dollars, significantly cheaper than similar projects that have cost billions.

Weighing just 600 kilograms, it was the smallest spaceship to attempt the moon landing and it represents IAI's determination, achievements and experience in building small and light weighted space vehicles.

One of the aims of the Beresheet mission was to promote scientific, technical and engineering education for the next generation of Israeli schoolchildren, as well as research and development.

The knowledge that went into Beresheet will prove critical in future cooperation between IAI and Germany's OHB Systems AG, a leading satellite manufacturer, which signed a teaming agreement with IAI last January.

Under the terms of the agreement, the two companies will jointly offer the European Space Agency a commercial access service for lunar landers to conduct exploration missions.

Just recently it was announced that IAI will develop and build Israel's national communication satellite, the "Dror 1". The Dror 1 is intended to meet the satellite communication needs of Israel for the next 15 years. The Dror 1 is comprised primarily of local Israeli technologies developed at IAI, including an advanced digital communication payload and "smartphone in space" capabilities, to provide communication agility throughout the satellite's lifetime in space.

HIGH RESOLUTION INTELLIGENCE - THE OPTSAT 3000

In addition to IAI's growing civilian space activities, the company's line of OptSat 3000 satellites continue to be a world leader in high resolution visual for the intelligence services.

In the 21st century combat arena, the ability to quickly receive and utilize intelligence data from space is becoming increasingly central to the success of combat operations around the world. Imagery consumers have come to realize that satellite imagery at resolutions worse than 0.5 m simply do not allow clear, accurate, well defined information to be extracted from those images.

This is particularly true for tactical operations, in which rapid, precise visual intelligence on suspicious targets holds the key to mission success. It is excellently planned for missions, as military, Home Land Security, agriculture, disaster monitoring, national resources and environmental, urban planning and infrastructure, etc.

The latest versions of optical satellites rolling off IAI production lines are designed with this goal in mind and are developed to be agile, deliver many targets, in high resolution, fantastic image quality, and to do this quickly, so that this intelligence can be used for tactical operations.

IAI is Israel's space development center, with about four decades of technological experience behind it, enabling Israel to be one of the few countries in the world with such domestic space capabilities.

With an image resolution of approximately 40 centimeters, and a weight less

than 400 kilograms, OptSat 3000 is significantly lighter than other optical satellites with the same resolution levels, and can therefore acquire images of many more targets.

Its light weight enables advanced maneuvering abilities, meaning that it can deliver many targets in high resolution.

OptSat has an active production line, with IAI manufacturing a number of existing orders for clients. The satellites coming off the OptSat production line today are upgraded variants of the first OptSat 3000 types that were produced.

OptSat 3000 is also well designed to perform classic long-term intelligence-gathering. An advanced command and control system enables rapid programming of the satellites.

IAI'S SAR SATELLITES ARE AT THE CUTTING EDGE OF SPACE-BASED INTELLIGENCE GATHERING

The world of synthetic aperture radar (SAR) satellites is at the cutting edge of space-based intelligence capabilities. These satellites provide resolutions and detection capabilities that significantly boost the Users' ability to conduct tactical operations, while also conducting enhanced long-term intelligence monitoring.

The advantages of SAR satellites are well established. Thanks to their radar beams, these observation platforms can 'see' at nights, gaze through cloud cover, and excel at identifying changes and mapping out areas.

IAI TecSar satellites are uniquely designed to provide this type of high-resolution intelligence, but in quantities that appear to be unmatched.

In addition to the technological capabilities that come with space-based radar intelligence-gathering, the TecSar platforms are significantly smaller, lighter, and faster maneuverability than other satellites in their category.

Additionally, the highly precise nature of the radar means that operators can run automatic algorithms on SAR satellites, enabling autonomous detection programs.

The TecSar satellites combine these solutions with outstanding maneuverability, resolution and image quality, TecSar can also cover wide areas if ordered to do so.

While SAR images do not appear very natural to the human eye, their detection ability means end users can locate changes on the ground that optical satellites cannot. They pick up changes, as well as classic man-made targets like launchers, vehicles, and ships.

MICRO AND NANO SATELLITES - DESIGNED FOR VARIETY OF CONSTELLATIONS AND DUAL USE MISSIONS

IAI has also delved into the development of nano and micro satellites, which deliver imagery with resolutions of around one meter as well as variety of research and science sensors.

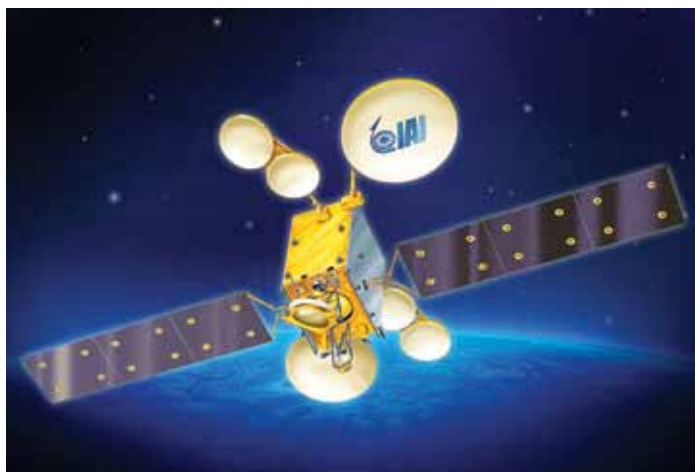
These smaller, lighter satellites, the Optsat-180 and the Optsat-500 series, weigh between 25 and 100 kilograms, still deliver high performance.

IAI launched a nano-satellite into space, together with Ben Gurion University of the Negev in a scientific mission, to explore various climatic phenomena. Since its launch (2016), the satellite has provided measurements beyond the original mission expectations.

Another scientific mission, to be conducted with the Israel Institute of Technology in Haifa, is being planned. ●

IAI is a world leader in both the defense and commercial markets, delivering state-of-the-art technologies and systems. To learn about the wide range of IAI's capabilities and the innovative solutions in Space, Air, Land, Naval Cyber and HLS domains, you are invited to visit us at Booth R33, DefExpo India 2020 Exhibition.

—Lital Ben Ari, Corporate Communications, IAI



IAI WILL DEVELOP AND BUILD ISRAEL'S NATIONAL COMMUNICATION SATELLITE, THE DROR 1



“IT IS A MATTER OF GREAT HONOUR FOR US TO PARTNER IN THE ‘MAKE IN INDIA’ INITIATIVE”

*Boeing has been a strong partner in the mission readiness and modernisation of the India's defence forces. **Surendra Ahuja**, Managing Director, Boeing Defense India, talks to **SP's Team** on how the company is looking forward to continue engaging with armed services on their future requirements and with our Indian partners and suppliers.*

SP's Team (SP's): What are the major areas that the Indian armed forces have shown interest in?

Surendra Ahuja (Ahuja): Boeing has been a strong partner in the mission readiness and modernisation of the country's defence forces. Our proven portfolio of products and services offer unmatched operational capabilities across the entire mission spectrum.

This partnership has been growing incrementally every year with the deliveries of the C-17 Globemasters, the AH-64E Apaches and the CH-47(I) Chinooks to the Indian Air Force, and the P-8Is to the Indian Navy. India has 10 CH-47(I) Chinooks against an order of 15 and 17 AH-64E Apaches against an order of 22. Both the Chinooks and the Apaches were inducted by the IAF in 2019. Boeing also delivered the 11th C-17 to the IAF in 2019.

Today, India is at the front and center of significant opportunities. We look forward to continue engaging with the armed services customers on their future requirements and with our Indian partners and suppliers – who are absolutely critical to helping us build India's future aerospace ecosystem.

SP's: BDI was established to focus on services and sustainment programmes for platforms. How is this being implemented in India and globally?

Ahuja: We are committed to ensuring mission readiness and offering seamless service support on our platforms (and non-Boeing in some instances). Boeing's International Government & Defence (IG&D) organisation cultivates synergies between the defence and services businesses in key markets, one of them being India.

Boeing Defense India (BDI) is a local entity that provides holistic lifecycle solutions for government and defence customers in India and ensures the high availability of platforms to our defence customers for missions at competitive costs. Boeing's integrated logistics support is enabling the highest fleet readiness.

With the theme of DefExpo 2020 being digital transformation of defence, Boeing's aerospace expertise with data-based information uniquely positions the company to provide its defence customers empowered decision support to optimise their operations and missions. Boeing utilises methods such as machine learning, simulation and modelling, advanced forecasting & predictions, artificial intelligence, statistics, network analysis and pattern recognition to provide end-to-end data analytics solution for the entire sustainment process, i.e., mission planning, MRO management, supply chain logistics.

We are committed to partnering with India to indigenise services capability. In fact, we have accelerated our efforts to set up a local sustainment support footprint in India to further enhance maintenance, training and the supplier base.

SP's: How is the sustainment of the IAF's fleet of C-17 transport aircraft and the Navy's P-8I aircraft being implemented? What are the key elements to the services and sustainment package as part of the contract with India?

Ahuja: We are in a unique position to integrate defence platforms and services in-country. Boeing is optimised to provide lifecycle value to our Indian customers, whether it's on current defence aircraft or those pursued in the future.

We are working with the Indian Air Force and the Indian Navy to provide exceptional opera-

tional capability and readiness for Boeing aircraft such as the P-8I, C-17 and the Head of State. The P-8I and C-17 have demonstrated an excellent record in supporting the missions they have been deployed for and the forces have expressed satisfaction about their operational readiness.

Boeing has established an in-country C-17 simulator training center which has completed thousands of training hours for aircrews and loadmasters. Boeing at Hindan Air Base supports the IAF C-17 fleet under the Globemaster Integrated Support Programme that maintains an average rate of 85 per cent + mission capability.

India's P-8I fleet is also supported through our services business by providing spares, ground support equipment and field service representative support. Boeing's integrated logistics support has enabled the highest state of fleet readiness at the lowest possible costs. Since induction, the Indian Navy P-8I fleet has surpassed 25,000 flight hours.

Boeing is setting up a ~60,000 sq.ft. Training Support & Data Handling (TSDH) center for the P-8I at INS Rajali, with a secondary center at INS Kochi, to provide training to aircrews and maintenance technicians. The training solution is customized for the Indian Navy and offers an integrated learning approach that combines classroom education with simulation. The indigenous, ground-based training system for P-8I allow Indian Navy crews to increase proficiency in a shorter time, while reducing the on aircraft training time resulting in increased aircraft availability for mission tasking.

We are committed to delivering advanced capability and readiness to India's defence forces and to meet their needs.

SP's: What is the level of your engagement with the Indian industry?

Ahuja: It is a matter of great honour for us to partner in the country's 'Make in India' initiative. Boeing has been steadily increasing its sourcing from India for its global manufacturing and supply chain.

Our annual sourcing from India stands at US\$1 billion from more than 200 suppliers who are providing advanced, complex components and subassemblies for our commercial and defense aircraft as part of an integrated global supply chain. These parts and assemblies cover critical components such as aero-structures, wire-harness, composites, forgings, avionics, mission systems and ground support equipment for Boeing's commercial and defense aircraft.

For instance, Tata Boeing Aerospace Limited in Hyderabad, Boeing's joint venture with Tata Advanced Systems Limited, is already manufacturing AH-64 Apache fuselages for customers around the globe.

Dynamatic Technologies manufactures the ramp and complex aft pylon for the Chinook heavy-lift helicopters. Similarly, Rossell Techsys manufactures wire harness and electrical panel for the AH-64 Apache, and the harness for V-22 Osprey. SASMOS HET Technologies manufactures electrical panel assemblies and wire harness for the F/A-18 Super Hornet and F-15 Strike Eagle. Hindustan Aeronautics Ltd. (HAL) manufactures F/A-18 gun bay doors and wire harnesses, and P-8I weapons bay doors and identification friend-foe transponders.

We are constantly looking at doing more here, given the proven ability of our partners to deliver world-class quality and talent. ●



AH-64E APACHE (TOP) AND CH-47(I) CHINOOK (ABOVE) OF THE INDIAN AIR FORCE



RAFAEL: PROVIDING CUTTING EDGE TECHNOLOGY IN THE FIELD OF MISSILES AND THE BATTLEFIELD ELECTRONIC SPECTRUM

Brigadier General Ariel Karo, Executive VP, Marketing and Business Development, RAFAEL in conversation with SP's Team.

SP's Team (SP's): What is the theme of Rafael's participation at Defexpo? What are the highlights of the display?

Brigadier General Ariel Karo (Karo): RAFAEL makes in India. RAFAEL has been working steadily to create Technology Partnerships or Joint Ventures with major Indian companies to address various projects and has created structures to ensure technological transfer to India, including last summer's inauguration of a state-of-the-art facility at Hardware Technology Park, Hyderabad for local manufacturing of the SDR BNET communication.

At DefExpo 2020, RAFAEL is showcasing a variety of solutions and capabilities in various fields, to include the SPIKE Family of EO, precise, multi-platform, multi-range missiles, Air Defence Capabilities including the SPYDER low level surface-to-air missile system designed to counter attacks by aerial threats, the famous Iron Dome and the C-Dome Naval Defence System and the Drone Dome Defence against Hostile UAVs.

We are also displaying the EPIK Guidance Kits for Rockets, a new concept of RAFAEL to upgrade existing Rocket Artillery Systems for Autonomous, Pin-Point hit Accuracy and increased range capability.

For Communication requirements we are presenting our BNET broadband IP SDR (software defined radio), supporting the modern digital battlefield's needs with high-speed, low-delay, reliable connectivity for broadband data, voice and video on the move.

SP's: Which Rafael technologies could be the key to warfare in future?

Karo: If one wants to zoom in on just a few, we believe air defence is a major game changer as we have seen in Israel with Iron Dome's extraordinary performance in taking out 90 per cent of enemy short range projectiles, thereby bringing damage and loss of lives to a minimum. One more system that has dramatically improved forces' ability to carry out missions is the SPIKE missile, which has been supplied to 34 nations, out of which 19 are NATO members. India is also a customer of the SPIKE missile. Having an electro-optical seeker, making it GPS-independent, SPIKE enables standoff attacks from many platforms, including shoulder-launched, vehicular, naval vessel and helicopter platform. With its maximum range of 30 km and unparalleled precision, SPIKE has been and remains one of RAFAEL's flagship products, and with its 5th generations capabilities, it is sure to play a key role in almost any kind of air, land or naval warfare. Today's battlefields are undergoing far-reaching changes that affect the operational needs of land, air and sea forces: near-real-time applications, such as sensor-to-effector cycle closure systems, are emerging. Communications systems as vital enablers, are required to be agile, allow fast deployment, be highly scalable and remain robust in the face of the chaos of battle, all the while operating under constant jamming and Cyber-attacks.

Rising up to meet these challenges and basing itself on decades of experience in the development of C4I solutions, RAFAEL has developed the BNET Family - which since 2014 has been a globally field-proven

Broadband IP Software Defined Radio solution for tactical operations on both Air and Land platforms, addressing the challenges of the battlefield (e.g. limited spectrum, communicating with autonomous systems, connecting multiple sensors and shooters, etc.). The BNET is a Spectrum-Aware SDR - cognitively utilising the spectral arena of the battlefield to the fullest.

SP's: What are the onward plans for the Indian market? Which programmes of the Indian Army and Navy could be of interest to Rafael?

Karo: As far as systems for land and naval systems, we are offering the Spike Family of electro-optical, precision-guided, tactical missiles launched from the air, ground and sea, Remote-Controlled Weapon Stations for ground and naval applications. We are also offering BNET SDR communication.

SP's: What is the agenda of the JV with Kalyani?

Karo: At KRAS (Kalyani-Rafael Advanced Systems) we have established the capability of the SPIKE ATGM production within India. We have received a limited order so far for the SPIKE for a limited quantity. Based on the local production capabilities we established in India, it is expected that the Indian MoD will place additional orders for the SPIKE as well as for other missiles, which will allow us to put the trained workforce into operation and support the MADE in INDIA programme. We are also looking at some export options once production for local needs will commence. KRAS will also, where required, provide maintenance and upgrade support to the existing Rafael products in use within the Indian military.

SP's: After MRSAM, what is on the agenda with the DRDO?

Karo: Rafael prides itself on having cutting edge technology in the field of missiles and the battlefield electronic spectrum. These technologies have been used in many of the products that Rafael offers its global clients, and includes the MRSAM. We are open to cooperation with countries which match with Israel's strategic partnerships on any product that these partners wish to source through Rafael.

We remain confident that the MRSAM is only the first of many such partnerships that will emerge in the future, given the strategic ties between the countries.

SP's: What is the value of Rafael procurements from the Indian supply chain?

Karo: The value cannot be easily quantified as it is dynamic in nature. However, based on contracts awarded to Rafael by the Indian MoD, we have chosen to procure a large number of component and systems through our Indian Offset Partners (IOP). This includes our two Joint Venture companies, KRAS and ARC created with the Kalyani Group and the Astra Microwave respectively. These JV Companies are also poised to receive contracts from the Indian MoD for systems based on Rafael technology. Once contracted for, the extent of the supply chain within India will only increase. ●



(TOP) BNET BATTLEFIELD;
(ABOVE) IRON DOME.



ROLLS-ROYCE BETS BIG ON ENGINE CO-CREATION WITH INDIA

Joint programmes between countries is the way forward, Louise Donaghey of Rolls-Royce tells Vishal Thapar of SP's Team

SP's Team (SP's): What's your vision for India's defence sector?

Louise Donaghey (Donaghey): India's defence procurement strategy is undergoing a transformation. This requires a fundamental shift in the approach as building industry scale capabilities takes a long time and a lot of effort. To reduce the time cycle, we believe that another parallel strategy for India should be to actively consider indigenisation through Co-development and Collaboration. And this must happen across the entire value-chain – from research, design and development to manufacturing, integration, as well as services.

To get benefits in the long run, India should invest in its own R&D to develop its own IP. To do this in a short time, with lesser investments and superior success rate, joint R&D programmes are a good solution. It would require providing special tax incentives to R&D in defence and sponsoring R&D projects at private industry level to encourage R&D for developing critically advanced technologies.

Against this backdrop and with our growing engineering footprint in India, Rolls-Royce is well positioned to contribute towards co-creation across the entire value-chain.

SP's: What new systems and technologies are you showcasing at DefExpo2020?

Donaghey: We are excited to present the capabilities of the Rolls-Royce MT30 engine for Navy vessels. It is the world's most power dense marine gas turbine in service today. One of the key strengths of MT30 is that it has the power for today and also tomorrow so effectively helps to future-proof a platform against the future demands for increased electrical power from system upgrades such as weapons and sensors.

In addition, our MTU brand is showcasing the EM 50-2 Integrated Bridge System that forms the central access point for all information that is crucial to safe and efficient ship operation.

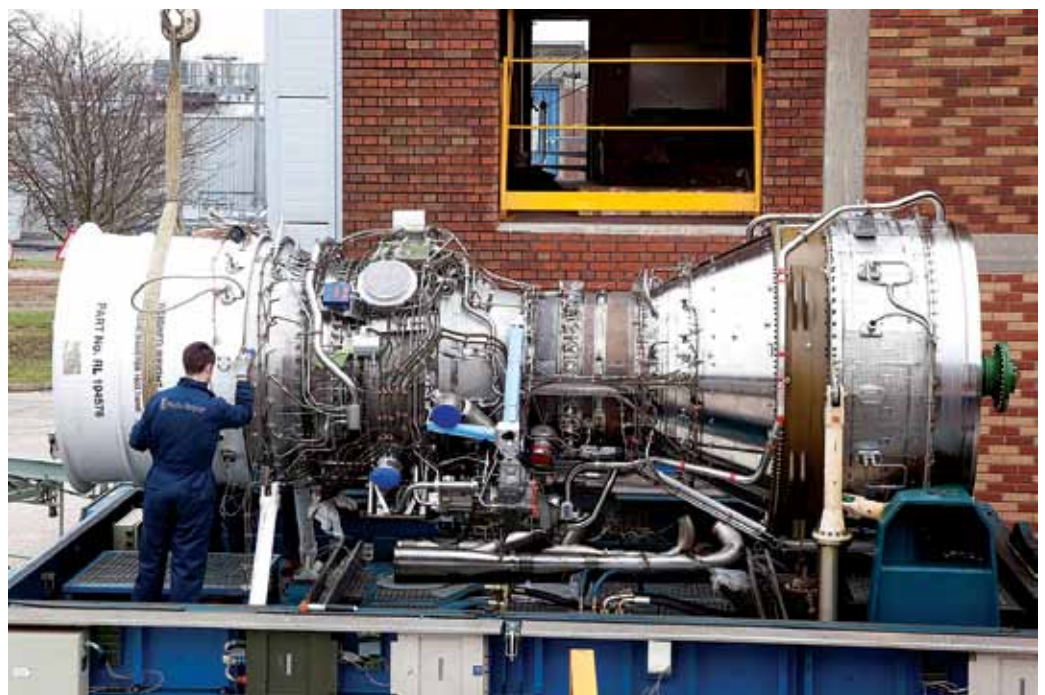
SP's: Is Rolls-Royce ready to support the IAF's Jaguar fleet into the 2030s?

Donaghey: Rolls-Royce is committed to providing the highest possible levels of support to the Adour Mk 804/ Mk811 in the Jaguar for as long as the IAF chooses to operate them.

SP's: How can Rolls-Royce assist in developing indigenous power plants for Indian military platforms?

Donaghey: At Rolls-Royce, we are working closely with the Ministry of Defence, DRDO, HAL and others on how to co-create products and solutions for the Indian market because we believe that joint programmes between countries will lead the way in the future.

Going forward, we seek to embrace opportunities to co-develop and co-manufacture for the growing aerospace and defence sector with the right Indian strategic partners. This will pave the way for a stronger ecosystem with further upstream and downstream value chains forming as a natural corollary.



(TOP) ADOUR POWERED JAGUAR AT HAL; (ABOVE) MT30- ROLLS-ROYCE

SP's: What are your expectations from DefExpo 2020?

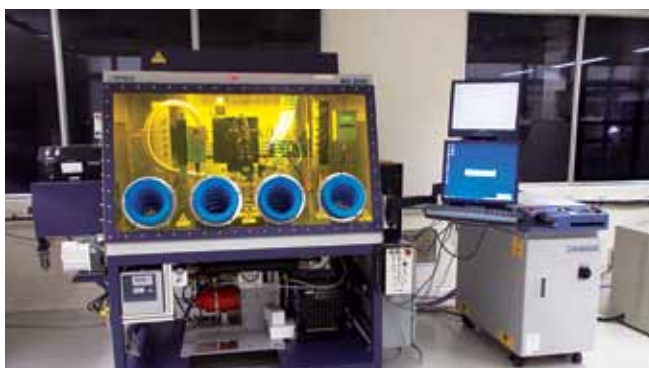
Donaghey: In areas of strategic importance, like security, partnership and co-creation can be of even great relevance. It involves joint investment in resources and skills among the partners, where the partners may also jointly own the IP developed for solutions. ●



AMPL - THE IDEAL 'MAKE IN INDIA' PARTNER FOR STRATEGIC ELECTRONICS

Hyderabad based Astra Microwave Products Ltd. has positioned itself as the manufacturing partner for foreign OEM's looking to make their products in India and supplying to the swiftly increasing demands of defence forces in India for modern equipments. With offsets taking a backseat in the Policy domain of the Government of India and the present Government policy of 'Make in India', many of the future defence procurements are expected to move in this direction. The Hyderabad based firm is therefore well placed in positioning itself as a partner for design and/or manufacturing strategic electronics for major foreign OEM's that are eyeing the high capital spending of the Indian Armed Forces.

Astra Microwave is a Hyderabad based public listed firm that has expanded its operations to Bengaluru as announced in the previous edition of Aero India and has also set up an office in Delhi to work on the futuristic requirements of the Indian Ministry of Defence, eyeing opportunities on defence systems in collaboration with foreign equipment manufacturers. The company has invested heavily into infrastructure and has been supporting the Defence Research Development Organisation, Indian Space Research Organisation and the Defence Public Sec-



(TOP) BENGALURU UNIT; (ABOVE) LASER WELDING.

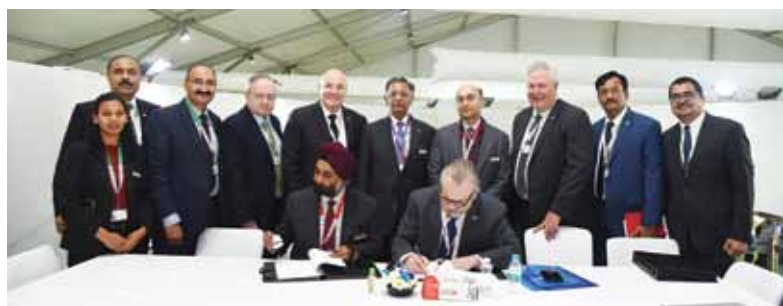
tor Units for Strategic Electronics that form part of Radar Systems, Electronic Warfare Systems, Telemetry Systems and Satellite Systems. Having worked in various programmes of Indian Defence, supplying strategic electronics in the form of sub-systems and components, the company is already working in the high technology domain.

The company believes that with their technological ability on the sub-system level combined with the expertise of foreign OEM's, they can support the requirements of the Indian Armed Forces under the Buy and Make Indian category. It is only logical then, that Astra Microwave poses themselves as an ideal partner to Foreign OEM's for "Making their products In India".

Astra Microwave has already been manufacturing sub-systems for many foreign OEMs under the Offset Programme. Starting work with Built to Print basis, Astra has also been given some opportunities to products on Built to Specifications. As they have already been delivering high end modules in high quantity meeting the quality and delivery benchmarks and this combined with their strong presence in the Indian market, makes the company ideally

poised to go on further and become a strong player in the Buy and Make Indian category of Defence Procurements. ●

BHARAT FORGE SIGNS MOU WITH GENERAL ATOMICS FOR NAVAL SYSTEMS



Bharat Forge Ltd (BFL), on February 5 signed an MoU with General Atomics of the US, a global leader in the research, design, and manufacture of a diverse portfolio of electromagnetic and advanced power and energy technologies.

Under the terms of the MOU, BFL and General Atomics' Electromagnetic Systems Group (GA-EMS) will investigate opportunities to develop and integrate power generation, storage, control and distribution technologies related to surface and undersea naval platforms, and advanced projectiles for weapon system platforms to address Indian defence requirements.

"We have been relentlessly working towards bringing niche technologies in the country with the aim of making India self-reliant in defence vertical. This partnership with General Atomics is a firm step in the direction to develop new technologies in-house to produce benchmark products for naval systems, reduce expenditure due to dependency on imports and setting up a strong defence technology and manufacturing vertical within India," said Baba Kalyani, chairman and managing director BFL.

"We look forward to working with Bharat Forge to develop strategies for bringing advanced power, energy, and weapon system capabilities to India in support of Indian defence initiatives," Scott Forney, president of GA-EMS, remarked. ●

— Vishal Thapar



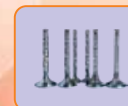
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मिथानि में निर्माण, भारत में निर्माण
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ROBUST, LONG-TERM DEFENCE PARTNERSHIPS ARE BUILT ON COMMITMENT AND TRUST

William L. Blair, Vice President & Chief Executive, Lockheed Martin India in conversation with **SP's Team**



C-130J SUPER HERCULES MILITARY TRANSPORT AIRCRAFT



LOCK HEED MARTIN'S F-21 FOR INDIA, FROM INDIA

SP's Team (SP's): Indian defence ecosystem looks for investment from global OEMs. Could you outline the concrete policy measures that make the investment attractive for the defence sector in India?

William L. Blair (Blair): Defence-industrial partnership has long been a hallmark of strategic ties and trust between nations. The US and India are natural partners with many shared interests, and we are very encouraged by the positive trend we're seeing in India-US relations, including on the defence-industrial partnership front.

Robust, long-term defence partnerships are built on commitment and trust, which requires investing in people, as well as products and platforms. For example, in collaboration with Tata Advanced Systems we have established an industrial base in Hyderabad where we currently produce C-130J empennages which incidentally are on all Super Hercules aircraft globally and a metal-to-metal bonding facility at the same location. This bears testimony to our contribution to the development of Indo-US defence industrial partnership.

SP's: Can you please describe the Make in India aspects of your F-21 proposal.

Blair: The F-21 provides unmatched opportunities for Indian companies of all sizes, including Micro, Small & Medium Enterprises (MSMEs) and suppliers throughout India, to establish new business relationships with Lockheed Martin and other industry leaders in the US and around the globe.

In addition to production in India, an F-21 partnership integrates Indian industry into the world's largest and most successful fighter aircraft ecosystem – a \$165 billion market. Approval by the US Government for such an important strategic move signals firm movement forward and maturity in US-India relations. The F-21 will be a game-changer for the Indian Air Force, Indian industry and India-US strategic ties.

SP's: What are the R&D initiatives of LM in India and does that give you a competitive advantage for F-21? Can you give an example of success with your R&D initiatives in India?

Blair: Yes, Lockheed Martin has been a strong supporter of Government of India initiatives. As a part of our larger commitment to support Indian innovation, Lockheed Martin has sponsored and supported the India Innovation Growth

Programme (IIGP) since 2007 in partnership with the Department of Science and Technology, the Indo-US Science and Technology Forum, University of Allahabad, the Federation of Indian Chambers of Commerce and Industry, Stanford Graduate School of Business, and the IC2 Institute at the University of Texas.

The IIGP has pioneered an initiative that has supported more than 400 innovators and start-ups with in-depth technology commercialisation training and handholding support to commercialise and scale their ventures in India and across the world. To date, the revenue generated for Indian entrepreneurs through this programme is approaching \$1 billion, and it is a flagship innovation programme in the Department of Science and Technology.

We believe the F-21 will significantly boost India's innovation ecosystem as continuous innovation is a fundamental part of successful fighter aircraft programmes.

SP's: What is the in-country infrastructure that has been set up as part of the C-130J deal with India?

Blair: In partnership with Mahindra Defence Systems, Lockheed Martin is meeting the increasing global demand for C-130J military flight training for the Indian Air Force at the C-130J Super Hercules simulator training center at Hindon Air Station in India. This state-of-the-art training center provides qualitative and quantitative training to C-130J pilots, combat system operators and loadmasters. Through realistic and holistic learning environments, crew members are able to hone critical tactical and operational skills to conduct a variety of missions including humanitarian aid, natural disaster support, airlift, search and rescue and special operations.

Besides this, our two joint ventures with TATA in Hyderabad (Tata Lockheed Martin Aerostructures, Ltd., and Tata Sikorsky Aerospace (TSAL) gives impetus to the government's Skill India initiative by honing the skills of young workforce (average age 25) through apprenticeship programme and on-the-job trainings, necessary for the manufacture of components and aerostructures produced in the plants. To date, more than 1,500 personnel have been trained to support current operations and provided skills in aerostructure manufacture through the life of the plant. These include personnel that now form part of the wider aerospace industry. ●



THE NEW FRONTIERS OF WARFARE

A peep into the India Pavilion for a glimpse of the Digital Warzone and innovations to fight future wars

VISHAL THAPAR

A synthetic voiceover welcomed Prime Minister Narendra Modi as he stepped into the 'India Defence Technosphere Command & Control Centre' to inaugurate the futuristic India Pavillion, designed to physically reflect the DefExpo 20 theme, 'Digital Transformation of Defence'. It could have been a scene straight out of Star Wars, as the Prime Minister entered a Dome-shaped hangar to activate a simulated Tactical Battle Area Command Centre by placing his palm on the LED screen next to the entryway. An electric wave was triggered, spreading across all the screens lining the periphery. The entire dome was filled with sparks, turning into a virtual 'network' projected on the ceiling. An 'impulse' darts around the dome and finally bursts at the centre. This triggers an Audio Visual display on the large screen. The exhibition space - 'Cyberverse' - is designed like an immersive circular gallery.

Featured in this Virtual Warzone experience are Smart Soldiers as Systems using Cyber, Stealth and Artificial Intelligence (AI) capabilities, leveraging next generation network and surveillance systems for unleashing Network Centric Warfare in concert with air power and strength at sea, projecting Indian national power through smart weapons and new generation missiles, extending the frontiers of warfare to Space, and seeking tactical battlefield advantage with AI-enabled Drone Swarms and Combat UAVs.

The India Pavilion is meant to provide an experience of the transformation India seeks. It is populated by a touch table with a complete pavilion map. Information on key displays is available through QR code-enabled links. iPads are available for reading e-books and a Twitter Wall streams live posts.

A Defence Transformation Lab illustrates the pursuit of self-reliance through innovation and enterprise, profiles the 'Make in India' success stories and exhibits future possibilities. Fuelling this shift is the Department of Defence iDex (Innovation for Defence Excellence) initiative. The digital display showcases winners of the 'Defence India Start-up Challenge' that is aimed at supporting innovators to create solutions and prototypes. Also profiled are winners from 'Dare to Dream', a contest launched by the Defence Research and Development Organisation (DRDO) to encourage innovative defence and aerospace technologies.

What the Prime Minister viewed inside the circular immersive 'Cyberverse' gallery were technologies empowering jointness among the armed forces. The display simulates a command and control process for a joint military operation by the three armed forces. This includes:

- **India's Integrated Air Command and Control System (IACCS)** – Video depicting maintenance of airfield security by the Air Force and the Army using integrated technologies.
- **Coastal Surveillance Systems (CSS)** – This captures the use of key technologies deployed during the missions, e.g., search and rescue, radar surveillance, navigation, interception, etc., through a common operating picture, enabling regional security and partnerships and placing India as a net security provider in the region.
- **Comprehensive Integrated Border Management System (CIBMS)** – Border security – Detection, interception and countermeasures through various connected systems.

A voiceover weaves the three scenarios together. Here's an overview of the main elements of the India Pavilion display:

SOLDIER AS A SYSTEM

The Soldier as a System is at the heart of the envisioned Digital Frontiers, transforming boots on the ground into . This transforms the "next-gen, self-reliant fighting machine." This also features superior next generation Light Weight Small Arms and lighter, more reliable body armour. The weight of armour has been the soldier's burden of survival. With new wearable technology, troops of the future will carry out war fighting and soldiering tasks more freely while enhancing security, protection and safety.

Some areas where new technology could be applied are:

- Improving Aiming Capabilities
- Monitoring the Physical State of Soldiers While on Field
- Real Time Communication Between Troops

- Providing 360-Degree Battlefield Awareness

DRONE SWARMING, THE FUTURE OF WARFARE

Low-cost, intelligent and inspired by swarms of insects, drone swarming is set to revolutionise future conflict. From overwhelming enemy sensors with a deluge of targets to spreading out over large areas for search and rescue missions, swarms could have a range of uses on and off the battlefield.

For counter-swarming, indigenously designed and developed radars for the detection of mini and micro UAVs including numerous RF sub-systems, phased lock loop, amplifier of the radar and detection of small USVs at a reasonable distance.

POWERING HUMAN NETWORKS

The showpiece India Pavilion provides several glimpses into augmenting India's future capabilities through state-of-the-art Cyber Security Platforms, Stealth Technologies and Artificial Intelligence (AI) which are at the very core of threat evaluation, weapon assignment, surveillance, predictive maintenance for airborne and ground systems and remote location healthcare possibilities. In February 2019, the Ministry of Defence established a high-level Defence AI Council (DAIC) tasked to provide strategic direction towards the adoption of AI in Defence.

NEXT-GEN DRONES FOR NETWORKING & SURVEILLANCE

The Pavilion gives the viewer an opportunity to explore the newest offerings in surveillance and networking systems that are all set to bolster defence systems along the border.

Next-generation drones now under conception will provide battlefield commanders access to real time video during military operations. Networking would enable effective management of drone fleets and cutting through a mass of video and data provided by multiple drones to provide actionable information to commanders and shorten the time from information to quality decision-making.

AI in command and control system can become the best and fastest at analysing information and as a result can make quicker assessments and gain an operational advantage over its opponent. It would enable decision support by providing threat analysis to predict enemy actions and analyse own forces' options before execution of action.



INDIA PAVILION AT DEFEXPO 20

SMARTER MISSILES FOR GREATER IMPACT

On exhibition are the newly-demonstrated Anti-Satellite (ASAT) capabilities and game changing missiles like the Nirbhay sub-sonic long-range cruise missile, the Astra medium-range air-to-air missile and SAAW developed by the Defence Research and Development Organisation (DRDO).

Successfully launched as a part of 'Mission Shakti' on March 27, 2019, DRDO's ASAT missile destroyed a predetermined live satellite 300 km above the Earth, demonstrating India's capability to interdict and intercept a satellite in outer space based on a complete indigenous technology. India joined a select group of nations – USA, Russia and China – with a similar technology.

The ASAT missile is a derivative of DRDO's Ballistic Missile Defence Interceptor. It is a three-stage missile with two Solid Rocket Boosters and "Hit to Kill" capability at a speed of speed of 10 km per second.

STRENGTH AT SEA

The naval display traces the progression of warship building capability in India from the Nilgiri class to the Godavari and the Shivalik class and highlights the vision for the futuristic Project P17A frigates in terms of its design, sensors, weapons and Combat Management Systems capability as well its propulsion system.

UNMANNED MUSCLE

There's a clear emphasis on the development and employment of Air, Land, Water and Underwater autonomous vehicles and also robots. Concepts and models have been presented by the DRDO as well as the emerging private sector complex. The highlight are the DRDO's Rustom-2 HALE (High Altitude Long Endurance) and the Rakshak VTOL (Vertical Take-Off and Landing). The Rustom-2 is being developed to operate at an altitude of 30,000 feet and the Rakshak at 15,000 feet. The DRDO's Robot Sentry marks the emphasis to reduce the direct exposure of troops to situations with high risk of fatality. ●



INDIA-FRANCE DEDICATED TO INTENSIFY INDIA'S INDIGENISATION IDEAS



France has constantly been projected as a very significant and old partner of India especially when it comes to the defence sector. With several significant French players operating in India like Thales, Dassault and Safran, to name a few, France holds enough importance in India's strategic endeavours. This was again brought to light at the first seminar held at the 11th edition of the DefExpo 20 which is being organized in Lucknow from February 5-9, 2020. In the DefExpo 20 as well, France has one of the largest delegations.

The seminar was conducted on the first day of the exhibition by SIDM (Society of Indian Defence Manufacturers). The India-France defence industry seminar was themed around "exploring synergies of joint manufacturing for Make in India". A large delegation of French and Indian dignitaries participated in the seminar. The opening session was addressed by Rear Admiral A.K. Verma (Retd) (Principal Adviser, SIDM & Former CMD, GRSE), Benoit Dussauguey (Chairman of international commission of GIFAS Senior Executive Vice President, International of Dassault Aviation), Lt General J.K. Sharma, PhD (Retd) (Senior Defence Advisor, Government of Uttar Pradesh), Dr Amit Sahai (Joint Secretary P&C, Department of Defence Production), Emmanuel Lenain (Ambassador of France to India, Government of France), Mekapati Goutham Reddy (Minister for Industries, Commerce, Information Technology, Government of Andhra Pradesh), and Anand Stanley (CEO and Managing Director Airbus India & South

The seminar focused on how to make the partnership between the two countries stronger in context of 'Make in India' and the dedication of both countries to explore the joint manufacturing possibilities.

Asia). Two panel discussions around joint manufacturing for 'Make in India' and joint experience of Indian and French companies benefiting from offsets, followed.

The seminar focused on how to make the partnership between the two countries stronger in context of 'Make in India' and the dedication of both countries to explore the joint manufacturing possibilities.

Representing the Ministry of Defence, Dr Sahai, talked about the importance of investment in the defence industry and the need for adequate awareness about the same. "As France has an eminent presence in this sector, this is a significant opportunity to further strengthen the ties and explore all possible opportunities between the two countries," he highlighted.

The French Ambassador said that India's industry is a very vibrant and concrete one and they hope to establish many more industries in the country as this is a two-way relationship.

The way forward is to co-create world class technologies in India through strategic partnerships to strengthen the base of defence manufacturing and keep up with the government's focus on indigenisation.

Making fruitful use of the opportunity available, Lt General J.K. Sharma highlighted how appropriate is the setting up of this defence exhibition in Lucknow, the capital of Uttar Pradesh (UP). He also stressed upon the strengths of the state and talked about the UP industrial corridor. ●

— Ayushee Chaudhary

DGAQA OUTREACH AT DEFEXPO-20

To realize the dream of self-reliance in the defence aerospace sector, Government of India is putting special thrust on defence aerospace for enhancing the participation of private industries under its flagship program i.e. 'Make in India'.

DGAQA stipulate the Quality Assurance requirement for the defence aerospace industry. DGAQA is the Government designated Quality Assurance regulatory Authority for military Aviation since 1954. Product certification and compliance to the QA requirement are paramount in the field of military aviation. Generating awareness about these requirements for the growing industrial Diaspora of this sector is to be focused.

DGAQA is showcasing products under its QA coverage as well as various schemes available to the aerospace industry under the umbrella of 'Make in India' programme. Various activities are also planned during the DefExpo 20 such as on the spot events/quiz with an objective to outreach for the industry, create awareness on the quality and certification requirements as well as MoD schemes for promotion of indigenous defence manufacturing. A facilitation desk is available at DGAQA stall to address all the queries of MSMEs and private manufacturers.

EVENT HIGHLIGHTS

Major foreign and indigenous aerospace firms like Thales, BAE Systems, Boeing, Adani, Midhani and Bharat Dynamic Limited visited the DGAQA stall and were apprised of various schemes for Registration of firms, Utilization of DGAQA test facility, Third Party Inspection, Quality rating of Firms & Certification of Aviation Product by DGAQA for Promotion of Defence Export.

Senior officials of DGAQA proactively visited various Indian LSIs and MSMEs like BP Engineers Lucknow, PTC Ltd, Vishwakarma Tools Ghaziabad, Mineral Oil Corporation (MOC), Autotec Systems Bangalore and informed them about various DGAQA provisions.

REGISTRATION & QUALITY RATING OF FIRMS

Three conferences were conducted to highlight the registration process of firms and the manufacturers were advised on Capacity Assessment procedures. Emphasis was given on creating ease of quality inspection through Quality rating of Vendors. The sessions were chaired by A.K. Bhatte, Director General AQA, Sanjay Chawla, ADG (Koraput) and Jitendra Kumar, ADG (North & Central Zone). ●





ARMED FORCES LEAVE THE AUDIENCE ENTHRALLED

From the emergence of the Surya Kirans to the sorties by Tejas, the formations by the daredevils to the mock display by the ATAGS, the live demonstration at the DefExpo 20 strikes the chord

The displays are what attract a majority of the crowd at these exhibitions. What sets the DefExpo further apart is that in addition to static and aerial display, it also offers a live demonstration by the Indian Army.

Prime Minister Narendra Modi graced the inauguration ceremony of DefExpo 20 along with Defence Minister Rajnath Singh and Chief Minister of Uttar Pradesh Yogi Adityanath and then proceeded towards the live demonstration area at the DefExpo site, Vrindavan Yojna.

Invoking the daring and thrilling spirit that the armed forces possess, the live demonstration was accelerated by the Indian Army Daredevils team who sped across the area displaying various exciting and dangerous formations on their bikes. The visitors were then forced to hold their head high as the paratroopers' team from the Indian Air Force (IAF) glided down to the ground. Some of these parachutes were indigenous productions of the DRDO (Defence Research and Development Organisation).

The picture of the sky continued to transform as the various aircraft from the IAF, the Indian Army, the Coast Guard and the Hindustan Aeronautic Limited (HAL) took over. From HAL's Light Combat Helicopter (LCH), Rudra, to the unarmed version of the Dhruv, to the fighter aircraft Tejas, Sukhoi, Jaguars to the heavy lift helicopter, Chinook, the aerial display was a visual delight for the visitors. The famous acrobatic demonstration team of the IAF, Surya Kirans were rightly the show stealers who mesmerised the audience flying past in many different formations. With their nine aircraft, the Surya Kirans displayed formations of Tejas, the recently handed over French fighter Rafale, a falcon formation as well as that of a space ship.

The climax of the live demonstration was portrayed by the Army which left the audience gasping at what they saw. Depicting the demonstration area as a mock site of conflict, the army showcased how it tackles the situation when the enemy attacks an area. The display included forming a temporary bridge, the involvement of choppers to deport and uplift infantry as well as tanks, and artillery weapons of the likes of Vajra, Dhanush, Bofors, and the latest DRDO Advanced Towed Artillery Gun System (ATAGS). ●

— Ayushee Chaudhary



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