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AEROMAG SHOW DAILY

DEFEXPO 22 INDIA
Ministry of Defence

Prime Minister Narendra Modi inaugurating the DefExpo 2022

PM Modi Inaugurates DefExpo

Prime Minister Narendra Modi inaugurated the DefExpo22 at Mahatma Mandir Convention and Exhibition Centre in Gandhinagar, Gujarat, on Wednesday. Modi said that for the first time, DefExpo is being held exclusively for Indian companies including Indian subsidiaries of Foreign OEMs, Division of companies registered in India or having Joint Venture with an Indian company. The event showcases the expansive scope and scale of Indian defence manufacturing prowess.

At the India Pavilion, the Prime Minister unveiled HTT-40 - the indigenous trainer aircraft designed by Hindustan Aeronautics Limited. The aircraft has state of art contemporary systems and has been designed with pilot-friendly features. During the programme, the Prime Minister also launched Mission DefSpace and laid the foundation stone of Deesa airfield in Gujarat. He said that the forward air force base will add to the security architecture of the country. Noting Deesa's proximity with the border, the Prime Minister said that now India is better prepared to respond to any misadventure on the western borders

Giving further push to the Atmanirbharata in defence, Modi also announced fourth positive indigenisation list of 101 items during the opening ceremony of DefExpo. All the items included in the lists will be procured from indigenous sources as per provisions given in Defence Acquisition Procedure (DAP) 2020. This list provides continuous impetus towards self-reliance in defence.

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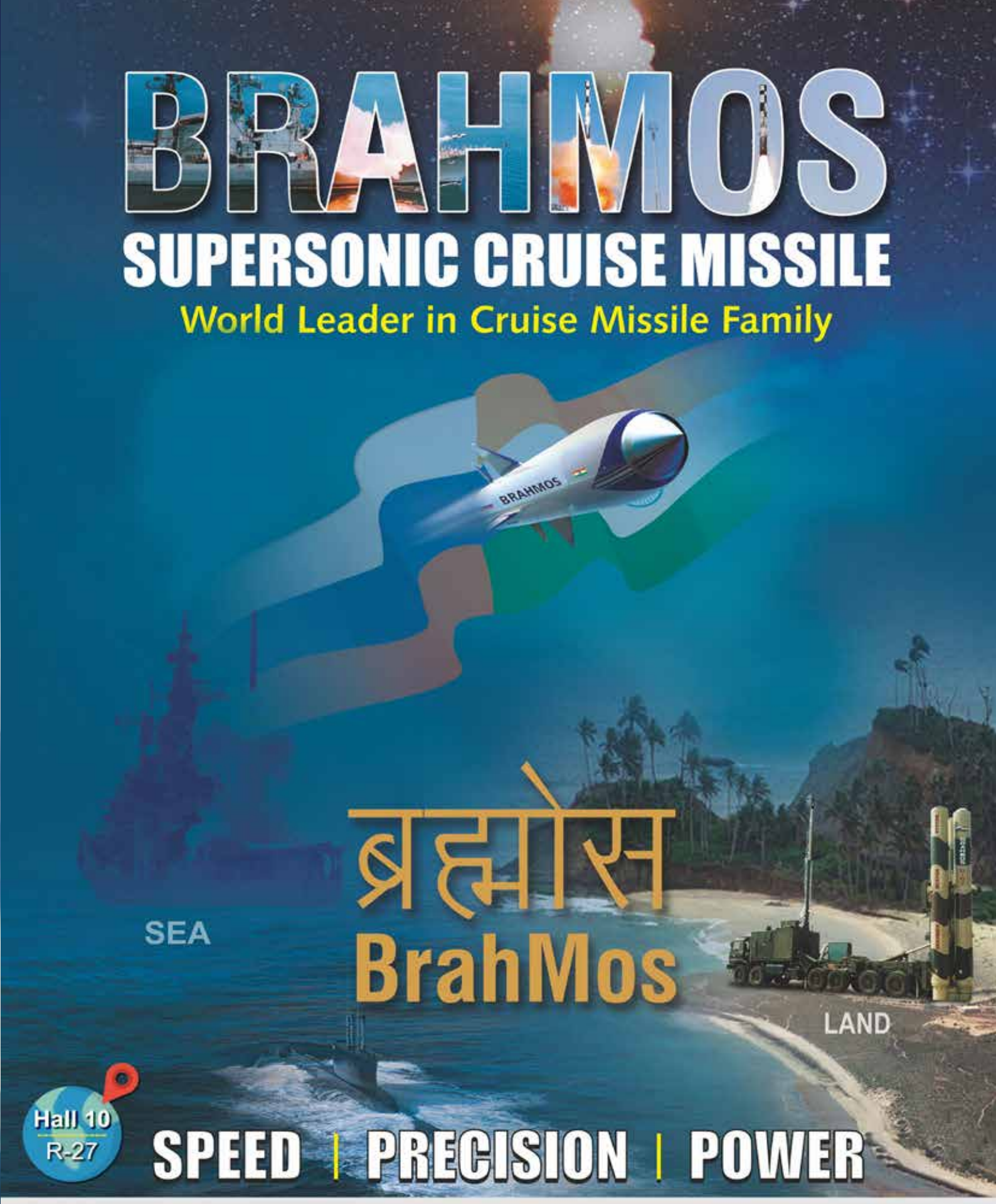

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आज़ादी का अमृत महोत्सव

Startups & Innovators to Come Up with New Ideas: Defence Minister

Defence Minister Rajnath Singh has exhorted startups and innovators to come up with new ideas to modernise the Armed Forces through research & innovation and contribute in making the nation strong, prosperous & 'Aatmanirbhar Bharat' as envisioned by Prime Minister Narendra Modi. Inaugurating Manthan 2022, an event organised by Innovations for Defence Excellence-Defence Innovation Organisation (iDEX-DIO), Ministry of Defence as part of 12th DefExpo, Rajnath Singh said, a large number of startups and innovators are venturing into the defence sector as the Government has created a robust ecosystem for their as well as the nation's growth.

The minister stated that more than Rs 300 crore have been approved for over 100 iDEX winners to develop products/technologies in more than 50 technological areas, stressing that the iDEX initiative has changed the perception that defence production is only for big businesses and industrialists. "In the last 7-8 years, there has been a change in the consciousness of the nation, with greater focus on solutions and goals. Earlier, it was difficult for the youth to contribute in various fields, but initiatives such as iDEX have empowered our young entrepreneurs and given them wings to fly. iDEX, a major iniative towards making India self-reliant, is a platform to provide economic support to entrepreneurs to develop state-of-the-art technologies," he said.

Chief of Defence Staff General Anil Chauhan, Defence Secretary Dr Ajay Kumar, Chief of the Air Staff Air Chief Marshal VR Chaudhari, Chief of the Naval Staff Admiral R Hari Kumar, Chief of the Army Staff General Manoj Pande and other senior officials from the central & state government as well as industry representatives were present on the occasion.

Bharat Forge Signs MOU with General Atomics

Bharat Forge Ltd., the world's leading technology solutions provider and forging company signed a Memorandum of Understanding (MOU) with General Atomics, 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, Bharat Forge and General Atomics' Electromagnetic Systems Group (GA-EMS) will collaborate for Lithium-Ion Battery System for naval platforms/ submarines to address the requirements of Indian Navy. The parties have also agreed to partner with each other in the area of permanent magnet motors.

Speaking on the occasion, Baba Kalyani, Chairman Kalyani Group said, "We have been relentlessly working towards bringing niche technologies in the country with the aim of making Indian self-reliant in defence verticals.

GA is a market leader for in-service Li-Ion Battery solutions for naval platforms/ submarines and and our partnership with General Atomics is a firm step in the direction to develop Make in India solutions for Indian Navy and setting up a strong defence technology and manufacturing vertical within India."

"We look forward to working with Bharat Forge to meet the requirements of Indian Navy. Our Li-Ion battery system has been developed after 10 years of rigorous R&D. Instead of the usual 'fault prevention', our design philosophy is based on assuming a fault and requiring fault containment', which has made our system extremely safe and reliable", stated Scott Forney, president of GA-EMS.

"We are committed to working with companies like Bharat Forge, whose reputation for excellence and dedication to quality is synergistic with ours, as we continue to deliver technology innovations and cutting-edge systems for undersea and surface platforms."

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BrahMos Aerospace Showcases Universal BRAHMOS at DefExpo

BrahMos Aerospace is a major attraction at the 12th edition of biennial DefExpo 2022, being organised at Gandhinagar.

BrahMos Aerospace is showcasing the BRAHMOS missile in various configurations, including the land-based weapon complex, ship-based weapon complex, underwater version and air-version along with the BRAHMOS air-borne launcher and equipment manufactured by BATL for Defence and Space applications including systems and sub-systems manufactured by various industries associated with BrahMos.

BRAHMOS is the world's fastest, one of its kind, two-staged, universal supersonic cruise missile with top speed of Mach 3 which operates on the 'Fire and Forget Principle'. Stealth technology and guidance system with advanced embedded software provides the missile with cutting edge features.

Today BrahMos Aerospace enjoys a unique place in the world of defence. BRAHMOS supersonic cruise missile is capable of hitting sea and land based targets beyond radar horizons. The missile with pinpoint accuracy has successfully demonstrated its speed, precision and power a number of times from naval ships, Mobile Autonomous Launchers and fighter aircraft.

The supersonic cruise missile has evolved over the years and added many more variants - from sea-to-land, sea-to-sea, land-to-land, land-to-sea, sub-sea-to-land, sub-sea to sea and air-to-land configurations. The missile can be fired either from static, mobile platforms (land & sea) or fighter aircraft, in solo or salvo mode. This multiplicity makes the weapon all the more versatile in taking on the enemy anywhere, anytime.

Many frontline warships of Indian Navy and artillery regiments of Indian Army are equipped with BRAHMOS missiles. The Indian Air Force's frontline fighter aircraft Sukhoi-30MKI, after being modified to carry 2.5 tonne missile integrated with half a tonne launcher, successfully demonstrated BRAHMOS missile's firing capability.

BRAHMOS has also achieved historic milestones in the flagship "Make in India" programme by successfully indigenizing major sub-systems such as booster, nose cap, canister, fuel management system and other major non-metallic airframe components taking the Indian contribution to more than seventy percent. All launcher systems for the weapon are also being manufactured domestically. 100% of ground support equipment for the weapon complex are also being made in India.

The potential BRAHMOS, developed as a fusion of great scientific minds from India and Russia, has grown from strength to strength over the years and added new capabilities to meet divergent war scenarios.

The JV has successfully involved defence industries of India and Russia in producing the BRAHMOS supersonic cruise missile system. It has also brought together a number of competent defence firms and laboratories from both the partnering countries in developing and producing different sub-systems for the universal missile system which has rendered a unique strength to the Indian Armed Forces.

BrahMos Aerospace prides itself in possessing a full-fledged design centre, an Industrial Consortium for producing different sub-systems, a world-class integration, and check-out facilities with stringent quality control.

BRAHMOS attained another historic milestone when on 28 January 2022, BrahMos Aerospace and Republic of Philippines signed a multi-million dollars defence contract to supply Shore-based Anti-Ship Missile System (SBASMS) to the Armed Forces of Philippines (AFP). This historic export deal has certainly paved the way for more such orders for BRAHMOS.

The universal BRAHMOS with its "multi-role, multi-platform, multi-mission" attributes has emerged as the foremost weapon system for modern-day network-centric warfare operations. Today, with numerous launches from various platforms, each achieving technological prowess with continuous upgrades, BRAHMOS is a system par excellence.

DRDO & Indian Army successfully conduct six flight-tests of QRSAM

Defence Research and Development Organisation (DRDO) and Indian Army have successfully completed six flight-tests of Quick Reaction Surface to Air Missile (QRSAM) system from Integrated Test Range (ITR) Chandipur off the Odisha coast. The flight tests were conducted as part of evaluation trials by the Indian Army.

The flight-tests were carried out against high-speed aerial targets mimicking various types of threats to evaluate the capability of the weapon systems under different scenarios, including long range medium altitude, short range, high altitude manoeuvring target, low radar signature with receding & crossing target and salvo launch with two missiles fired in quick succession. The system performance was also evaluated under day and night operation scenarios.

During these tests, all the mission objectives were met establishing pin-point accuracy of the weapon system with state-of-the-art guidance and control algorithms including warhead chain. The performance of the system has been confirmed from the data captured by several Range instruments like Telemetry, Radar, and Electro Optical Tracking Systems (EOTS) deployed by ITR. Senior officials from DRDO and the Indian Army participated in the launches.

These tests were conducted in the final deployment configuration consisting of all indigenously developed sub-systems, including the missile with indigenous Radio Frequency (RF) seeker, mobile launcher, fully automated command and control system, surveillance, and multi-function Radars. The uniqueness of the QRSAM weapon system is that it can operate on the move with search and track capability & fire on short halt. This has been proven during the mobility trials conducted earlier.

Defence Minister of India Rajnath Singh visiting the Japan Maritime Self-Defense Force (JMSDF) Yokosuka Naval base and their ship JS Kumano on September 09, 2022.

'India-Japan Partnership Vital for Peace, Prosperity in Indo-Pacific'

India and Japan were involved in a '2+2 Ministerial Dialogue' in Tokyo, Japan recently which covered a wide spectrum of bilateral and regional issues of mutual interest. Those who took part in the event included Defence Minister of India Rajnath Singh and his Japanese counterpart Yasukazu Hamada; along with the External Affairs Ministers of India and Japan Dr S Jaishankar and Yoshimasa Hayashi respectively.

"As two thriving democracies in Asia, India and Japan are pursuing a special strategic and global partnership. This year is significant for both countries, as we are celebrating 70 years of establishment of our diplomatic relations. This is an important relationship for peace and prosperity in the Indo-Pacific region," said Rajnath Singh after the dialogue.

Military exchanges

"During the discussions, we noted the progress in the military-to-military cooperation and exchanges between the two sides. We shared a common desire to further increase the scope and complexities of our bilateral exercises. We have established staff talks and high-level dialogue between all the three services and the Coast Guard," he said. Singh added that the two nations had agreed on staff talks between the joint staff of the Japanese Self Defence Forces and the Integrated Defence Staff of India.

"The participation of Japan for the first time in the multilateral exercise MILAN and operationalization of the Reciprocal Provision of Supply and Services Agreement in March this year are milestones in the progress of defence cooperation between our forces. We are happy to note that our Air Forces are working closely for early conduct of the inaugural Air Force fighter exercise," Singh said.

According to the Minister, enhancing the 'Defence equipment and technological cooperation' between India and Japan is one of the key priority areas. "In our meeting, I had the opportunity to propose engagements in emerging and critical technological domains. I have also invited the Japanese defence companies to look at opportunities in investing in the Indian Defence Corridors," Singh said.

Maritime ties

Regarding the extensive discussions that took place on ways to enhance maritime cooperation, including 'Maritime domain awareness', India's Defence Minister said that there was consensus on both sides that a strong India-Japan relationship is very important for a free, open, rule-based, and inclusive Indo-Pacific based on sovereignty and territorial integrity of nations. "India's Indo-Pacific Oceans Initiative (IPOI) shares many commonalities with Japan's Free and Open Indo-Pacific (FOIP). India has also developed maritime cooperation with regional partners in consonance with our inclusive vision of Security and Growth for All in the Region (SAGAR)," pointed out Singh.

The Minister also said that India's relationship with ASEAN had emerged as a key cornerstone of the country's foreign policy. "Through ADMM Plus, both India and Japan are working together with ASEAN and other Plus countries for strengthening cooperation across domains including maritime security, HADR, Peace Keeping Operations etc.," he added.

Singh said that during the dialogue, India and Japan shared their respective views on important regional as well as global issues and concurred on the need for peaceful resolution of disputes in consonance with international law.

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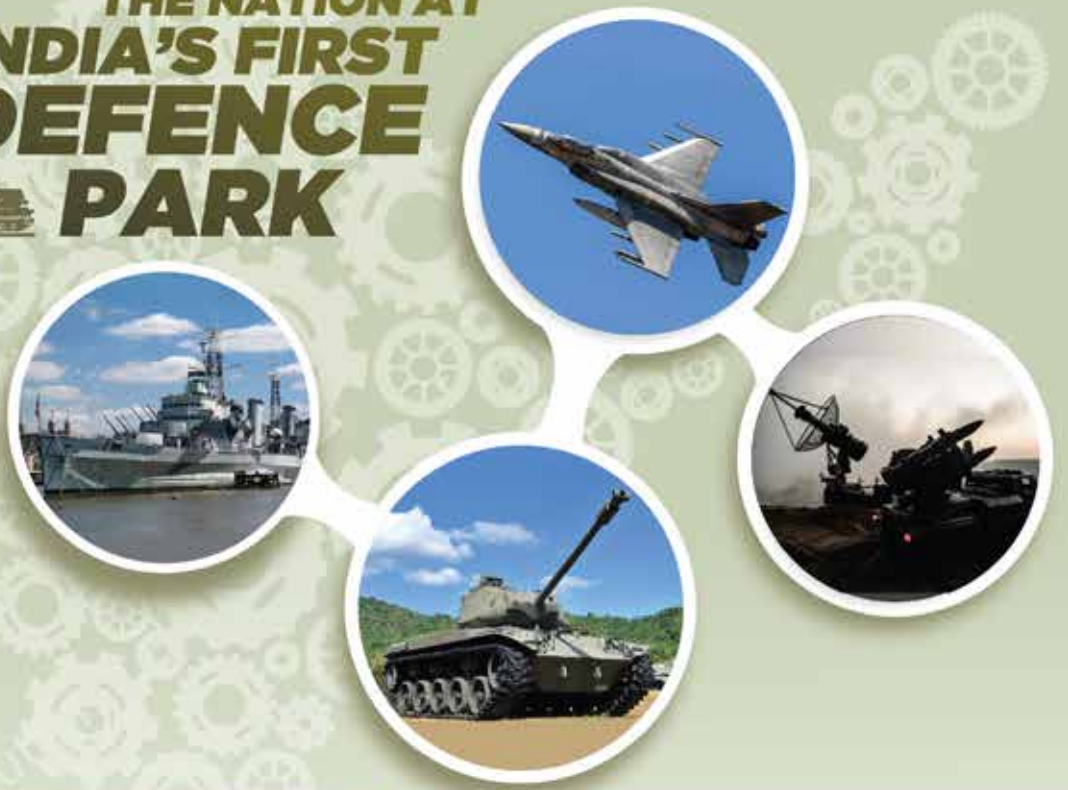

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MDL Makes Great Strides in AI, Exports and Diversification

Being a premier shipbuilder, Mazagon Dock Shipbuilders Limited (MDL) is currently constructing Missile Destroyers, Stealth Frigates and Scorpene Submarines in order to achieve self-reliance in warship production for the Indian Navy. MDL showcases many firsts in maritime security at the DefExpo 2022. At a time when Indian shipbuilding industry is making much progress in terms of warship building technology, MDL is making great strides in emerging technology Artificial Intelligence, promoting exports and pursuing diversification and innovation in the line of products and services offered.

Aptly called 'Shipbuilder to the Nation, Mazagon Dock Shipbuilders Limited (MDL) is one of India's leading Defence public sector undertaking shipyard under the Ministry of Defence. MDL primarily caters to the maritime defence of the country by building frontline warships and Submarines. MDL has a legacy of warship and submarine construction since 1960s with the Nilgiri Frigates being the first of class. The shipyard has undertaken construction of complex frontline warships for Indian Navy, fitted with state-of-the-art machinery and systems. The shipyard has always been the leader in undertaking the construction of the First of Class of all large and complex warships for Indian Navy. At a time when Indian shipbuilding industry is making much progress in terms of warship building technology, MDL is making great strides in emerging technology Artificial Intelligence, promoting exports and pursuing diversification and innovation in the line of products and services offered.

Artificial Intelligence

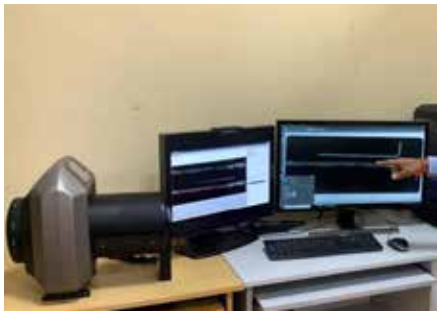
Artificial Intelligence is the 'disruptive' technology which is often used to describe machines that mimic 'cognitive' functions of human mind, such as learning and problem-solving to avoid the errors and inefficiencies. Amalgamating an industry, which has prehistoric roots, with the latest technology in vogue to leverage its full potential is the real challenge for those attempts to implement the Artificial Intelligence (AI) in Shipbuilding.

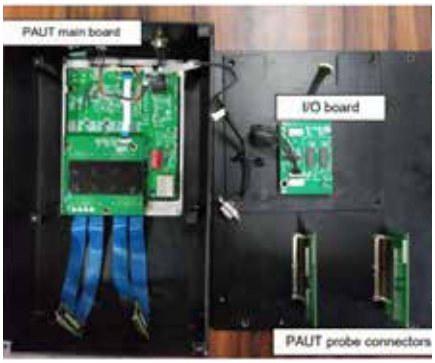
Mazagon Dock Shipbuilders Ltd (MDL) has developed three AI projects over these years –Artificial intelligence enabled computerized Radiography, AI-based robotic weld inspection tool using phased array ultra sound technic (PAUT) and an AI-enabled Remotely Operated Vehicle (ROV). More industry specific AI projects are in pipeline at MDL to meet the increasing demand for automating the processes, cost estimation, planning, procurement and production

In AI-enabled computerized radiography, the imaging plates are erased by exposure to light and may be reused almost immediately. The storage and preservation of films on reusable imaging plates for which data can be stored in the digital format. No darkroom condition, chemical or consumables are required and it needs only very less processing time. The digital films can be stored in computer, cloud or remote network server. Using the Computerized Radiography (CR) approach enables efficient archiving of the data with no degradation of the quality of the image. Moreover, digital films cannot be tampered and it ensures more reliable data. Using it very cheap considering the re-usability and environment-friendliness.

The AI based robotic weld inspection tool using phased array ultra sound technic (PAUT) is portable and is able to detect and obtain the images of defects based on the physics of ultrasonic waves in welded structures. It can perform robotic weld inspection at area where accessibility is limited. This reduces the requirement of scaffoldings and saves time & cost. It can perform automated evaluation of defect detection using AI based tools. It is safe and quick, easy for test set-up. Also, rapid inspections can be done with digital recording of data.

AI enabled Remotely Operated Vehicle (ROV) has an advanced control system for easy operation with a maximum depth rating of 50 m. It enables modern optical and sonar based survey. Other features include, hydrodynamic open frame design, assisted obstacle avoidance, high thrust and manoeuvrability, high definition real time visual system, ultrasonic thickness measurement and deployable up to sea state 3.





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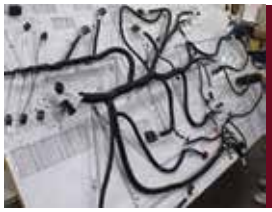

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GRSE: Strengthening Indian Armada through Indigenisation

Cmde PR Hari, IN (Retd.),
Chairman & Managing Director,
GRSE Ltd.

Set up in 1884 to repair vessels of River Steam Navigation Company, GRSE has several achievements to its credit in its long journey. After its acquisition by GoI in 1960, GRSE has built 788 platforms including warships for Indian Navy, Indian Coast Guard, and Government of Mauritius & Seychelles Coast Guard. From Frigates, Corvettes, Fleet Tankers, Landing Ship Tank, Landing Craft Utility to Survey Vessels, Offshore Patrol Vessels and Fast Attack Craft - the repertoire is rich and varied. Making 107 warships for the Indian & foreign maritime forces, GRSE has record of building and delivering the highest number of warships by any Indian shipyard till date. With proven credentials, the shipyard is on a growth path, reaffirming its motto "In Pursuit of Excellence and Quality in Shipbuilding.

Rooted in the nation's vision of attaining Atmanirbharata in defence, Garden Reach Shipbuilders & Engineers Ltd (GRSE), a premier warship-building company in India, is at the cusp of a major transformation facilitated by its knowledge, skill levels and operational capabilities gained over the years. With brand equity, a healthy balance sheet and a dedicated team at the helm, the Mini Ratna Category 1 Public Sector Company, GRSE is playing a key role in defence preparedness of India by producing the most modern warships through indigenisation and strengthening the Indian armada.

Being the only DPSU Shipyard to get the 'Excellent' rating in the MoU performance evaluation for FY 2020-21, when the entire industry bore the brunt of the covid pandemic, GRSE continues to set new benchmark in Atmanirbharata in warship construction. The company's order book stands at Rs 24,100 Crore as on 31 March 2022. GRSE's vision is to be globally recognized as the best Indian Shipyard and also become a Navratna Company by 2030.

Ongoing Projects

The ongoing projects include construction of 24 ships & vessels under seven prestigious projects - Frigates (P17A), Survey Vessels (Large), ASW Shallow Water Crafts (ASW-SWC) for Indian Navy, Fast Patrol Vessel (FPV) for Indian Coast Guard, Next Generation Electric Ferry for Govt of West Bengal, Ocean Going Passenger cum Cargo Ferry Vessel for Republic of Guyana and Patrol Boats for a government agency of Bangladesh. Concurrently, the shipyard is undertaking measures to strengthen internal processes, systems, and infrastructure and cost effectiveness. Several new initiatives have also been launched under the 'Ease of Doing Business' drive.

Indigenising Warship Building

As part of Make in India initiatives of Ministry of Defence, GRSE has made commendable progress by successfully incorporating a high percentage of indigenous equipment fit into the ships being built for the Indian Navy and Indian Coast Guard. This is evident on-board Kamorta class ASW Corvettes, the first warship built in the country with indigenous DMR steel and overall 90% indigenous content with a unique feature of superstructure made of carbon fibre composite material. The Landing Craft Utility (LCU) ships, designed in-house by GRSE also achieved similar distinction. The company so far has delivered eight such LCU Mk IV ships to the Indian Navy.

The delivery of Fast Patrol Vessel – 'SCG PS Zoroaster' to the Seychelles Coast Guard in Febuary 2021 and orders for supply of "Ocean Going Passenger cum Cargo Ferry Vessel" from Govt of Guyana and Patrol boats for Fisheries Department of Bangladesh, to support the vision of 'SAGAR', bear testimony to GRSE's thrust for exports and realigning marketing strategies to match with the dynamic global environment. These orders were bagged through competitive bidding with international players in the fray.

GRSE & Syama Prasad Mookerjee Port Kolkata jointly inaugurated the GRSE-KPDD Khidderpore Dry Dock Unit in Kolkata for the development & utilisation of three existing dry docks. The project aims to explore new business opportunities in ship repair & refit of defence & commercial segments leading to revenue generation and contributing to skill development, infrastructure upgrade and employment generation in West Bengal.

Taking a revolutionary step towards reducing the Carbon emission in the water transport sector, GRSE associated with the Government of West Bengal for design and construction of Next Generation Electric Ferry. The zero-emission full electric ferry is designed to carry 150 passengers with provision of air conditioning sitting arrangements.

The Art of Warship Design

GRSE's in-house design capability remains its major area of strength with the multi-disciplinary 100-plus design team working towards developing various concept designs for current and future warship projects aided by state-of-the-art Virtual Reality Lab. Offshore Patrol Vessel,

GRSE recieved Green Channel Certification by DGQA for supply of Bailey Type Portable Steel Bridges to Indian ArmyNequi con core nus, coriae voluptas etum volor sincipsandit

GRSE Signed Concession Agreement with SMPK to Revamp Dry Docks at Khidderpore

Landing Craft Utilities, Survey Vessels (Large) and ASW Shallow Water Crafts have been designed in-house by GRSE. VR Lab resolves design issues in a very short time with reliability and accuracy. The lab also shows 3D models in virtual environment to assist the production and customers to get faster approval of the ship system. The company's Design and R&D Department has received recognition from the Department of Scientific and Industrial Research (DSIR), Ministry of Science & Technology, for its performance.

GRSE has its competitive edge as the shipyard has modernised infrastructures to undertake integrated shipbuilding using advanced modular construction technology to facilitate construction of larger ships in reduced timeframe. With modernised infrastructure facilities across three production locations, GRSE is today in a position to construct 20 Warships concurrently using Advanced Modular Integrated Shipbuilding Technology in line with the best in the world.

Engineering

The Bailey Bridge division of the company has been keeping pace with the ship division in its R&D efforts in designing and developing new products. The division has developed and successfully carried out trials of new products including first-of-its-kind Man Portable Pedestrian Assault Bridge, which is made of light weight carbon fiber reinforced composite material for the Indian Army, 140 feet Double Lane (7.50 m wide) and 190 feet Single Lane modular bridge, both being 70R class load capacity and made of 7 feet panels.

GRSE is the only organization in India qualified by DGQA, for the prestigious Green Channel Certification for the Bailey Type Portable Steel Bridges. So far, GRSE has supplied more than 5,500 portable steel bridges to Indian Army, Border Road Organization, State PWDs, Central Government and friendly neighborhood countries.

Digital India Initiatives

To maintain its competitive edge, the company is shifting to smart manufacturing (Industry 4.0), through thrust on innovations in automation, robotics and the industrial internet of things. It is also introducing Artificial Intelligence, Machine Learning, Interoperability and secured connectivity enabling real time monitoring. This control and optimization of processes, resources and systems is expected to help in workload consolidation across design, production & supply chain management, significantly in the future.

HAL Releases Orders Worth Rs 52 Crore at DefExpo 2022

Laying major thrust towards Indigenisation,Hindustan Aeronautics Limited (HAL) released Project Sanction Orders to domestic Indian Partners to the tune of Rs 52 Crore, at the on-going DefExpo 2022 here today.

Dr Ajay Kumar, Defence Secretary, handed over the Orders to Industry partners at a programme held at the HAL Stall, in the presence of Mr C B Ananthakrishnan, CMD, HAL. The domestic Indian partners will now manufacture the LRUs which were being imported till now.

The Indian industry partners will indigenously design and develop parts like Infra-Red Radiation Suppression Systems, Engine Air Intake Particle Separator, Emergency Flotation System and Night Vision Goggles for Light Utility Helicopter and others.

The Defence Secretary also launched the Indigenisation Supplier Relationship Management Portal (I-SuRe) on the occasion. The portal is the new digital initiative to boost the indigenization initiatives of HAL and will facilitate faster collaboration between HAL and the Indian industry partners.

HAL has strategically shifted from Transfer of Technology based manufacturing system to indigenous development by involving industry partners. The success stories in indigenising 75 items are captured in the form of the Album. The Defence Secretary released the album.

Mr Alok Verma, Director (HR), Mr E P Jayadeva, Director (Operations) Dr D K Sunil, Director (Eng, R &D) and other senior officers of HAL and DRDO were present on the occasion.

Leader in Creating Protective Materials, Structures

Russia's Research Institute of Steel develops complexes of armour, dynamic, electromagnetic, anti-radiation protection and shields against high-precision weapons by means of reducing visibility.

Established in 1942 for the development of tank armour, the JSC Research Institute of Steel is today the main enterprise in Russia dealing with materials and structures for the protection of weapons and military equipment of the ground forces. The company now develops complexes of armour, dynamic, electromagnetic, anti-radiation protection and shields against high-precision weapons by means of reducing visibility. The Institute creates new armour and composite materials and produces a wide range of personal protective equipment, including bulletproof vests and helmets, with products being supplied to many foreign countries also.

The main advantage of the Institute is its vertically-integrated structure, which includes research and development units with a full production cycle. Such integration makes it possible to reduce the time from the beginning of development to the launch of a pilot series of products into operation. And the maximum concentration on competencies helps create technical solutions that are ahead of their time and allows further development of weapons protection complexes. The Institute also lays much stress on scientific research, primarily in the field of materials science.

Armour steels and composites based on ceramics and high-modulus polyethylene, aluminum and titanium armour, materials that offer protection against ionizing radiation and flame retardant materials are among the materials science challenges that the Institute is working on today.

Utilizing new materials, the Institute creates unique protection complexes for the next generation needs of the Ministry of Defense, the Ministry of Internal Affairs and other law enforcement agencies in Russia. The experience gained over decades of successful work allows the Research Institute of Steel to offer consumers products that meet modern challenges posed by both the changing nature of combat operations and increasing terrorist threats.

Major milestones

Since its establishment in 1942, the Research Institute of Steel has crossed a number of milestones. Some of the major events include:

Welding of T-34 tank armour in conditions of large-scale production in 1942 and improving the quality of engine parts, suspension and tracks the next year. In 1948, development of technology for automatic welding of tank hulls and turrets T-10, T-54 with large diameter electrodes took place.

In 1951, the Institute introduced bulletproof steel 54P, which does not require low tempering after welding. Implementation of the process of high-performance automatic welding with an adjustable three-phase arc and introduction of the technology of casting tank turrets in coquille were done in 1954.

In 1959, full-scale tests of T-54, T-55, T-10 M tanks under the influence of nuclear weapons was carried out. Development and implementation of the world's first anti-atomic protection for tanks and infantry fighting vehicles also was achieved.

Meanwhile, development of the world's first combined protection with anti-cumulative filler for the T-64 tank was witnessed in 1962 and in 1964, introduction of heat-resistant alloy 7M for turbine blades of the T-64 tank engine and development of rotor welding technology took place.

Similarly, in 1967, development of aluminum-welded armour ABT-101, BAT-102 for BMD-2 and BMP-3 and steel armour of ultra-high strength with TMO BT-70 for BMP-2 was carried out.

In 1971, development of the first domestic bulletproof vests for the Ministry of Internal Affairs was done by the Institute, along with development of camouflage deforming staining schemes for armoured vehicles and the Cape RPMs.

Successful testing of the world's first

prototypes of active protection 'Fan' and 'Nitrogen' for tanks was witnessed in 1972. Two years later, the Institute introduced the new technologies: ESP, DIZ, TMO (ESP - electroslag remelting, DIZ - differential isothermal hardening and TMO – thermo-mechanical processing).

In 1979, development, organisation of production and mass delivery to the troops of the first domestic bulletproof vests 6B2, 6B3TM took place. In 1982, development and adoption of the mounted complex DZ 'Kontakt-1' for T-55, T-62, T-72, T-80 tanks were carried out. A year later, ultra-high-strength sheet steel 44 for bulletproof vests was introduced.

In 1985, development and organisation of production of the first domestic armoured ceramics for bulletproof vests and production of bulletproof vests 6B4 and 6B5 with ceramics took place. Development of anti-radiation protection for equipment and personnel working on the liquidation of the Chernobyl accident was the highlight of 1986.

The following year, development and adoption of a universal dynamic protection complex of the built-in type 'Contact-5' was the major event. In 1989, development of a welded-rolled turret for T-72 and T-80 tanks was the major milestone.

In 1995, development of GOST standards for armoured clothing and creation of a system of certification of protective equipment took place. The next year, development and the start of serial production of combined titanium helmets of a high level of protection for Special Forces of the FSB was carried out.

Subsequently, in 1999, development and adoption of the first domestic 6B7 fabric polymer helmets was the highlight. The following year, the Institute developed and exported the DZ complex for BMP-3. Two years later, development and adoption of a new generation of bulletproof vests 6B11 and 6B12 and helmets 6B 14, 6 B 6, SS-5 were the major events.

In 2005, adoption of a new complex of universal DZ modular type 'Relict' was the highlight and in 2006 delivery to the MO of a family of helmets of the new generation 6B26, 6B27, 6B28 was carried out.

In 2008, delivery to the MO of a family of helmets of the new generation 6B26, 6B27 and 6B28 took place. The same year, the Institute delivered the first set of computer training programmes for the T-90 tank to a foreign customer. In 2009, development of a family of highly protected armoured vehicles 'Bear' for the army was the major event.

One year afterwards, development of armour protection for the family of armoured vehicles of universal purpose 'Typhoon' was done. In 2011, development of a protection complex for upgraded T-90 MS tanks was achieved.

Development and supply of protection for Ural-V armoured vehicles was the highlight in 2014. Other major events that year included development of a new armoured steel grade 44S-Sv-Sh and a special fire-resistant structure for the Onezhets 300VG forest fire tractor.

In 2015 creation and implementation of new protective complexes for the line of advanced armoured vehicles Armata, Kurganets, Boomerang were the highlights. During the years 2017-2019, modernization of protection of serial armoured vehicles T-90MS, T-72B3, BMD-4, BMP-3 took place.

In 2018, the organisation of serial production of the dynamic protection element 4C23 and the release of the first batch of these elements for the DZ 'Relict' complex on T-72B3 tanks were carried out.

Products

The Institute's products include personal armour protection equipment; anti-radiation vests; energy-absorbing chairs; tanks designed and civilian products.

Body armour of the executive class – 'Style'; Bullet-proof vests of the 'New generation' series; Bulletproof vests of the 'Visit' family; Ceramic armour panels; Explosion-proof fuel tanks; Fabric polymer armour helmet K26; Lightweight anti-mine kit 'Vityaz-PM'; Mangal; Modification 2; Modular canopy; Body armour of 'Dozor' family; Bulletproof vests of 'Collection' series; Bulletproof vests of 'Beetle' series; Bulletproof vests rescue series 'Float; Bulletproof vests of the UBJ series; Unloading system; Antenna mast; Armour panels made of ultra-high molecular weight polyethylene; Armour plate 'Tablet' and Armour helmet 'Elbrus-T' are among the products.

Protective complexes

The Institute also offers Dynamic protection; Mine electromagnetic protection system; Upper hemisphere protection complex; A set of means to reduce visibility; A set of lattice screens; Anti-radiation protection; Anti-shatter screens; Equipment to improve fire and explosion safety; Mine protection; Armoured vehicles; Special high-security equipment and Balls of linear devices polymer.

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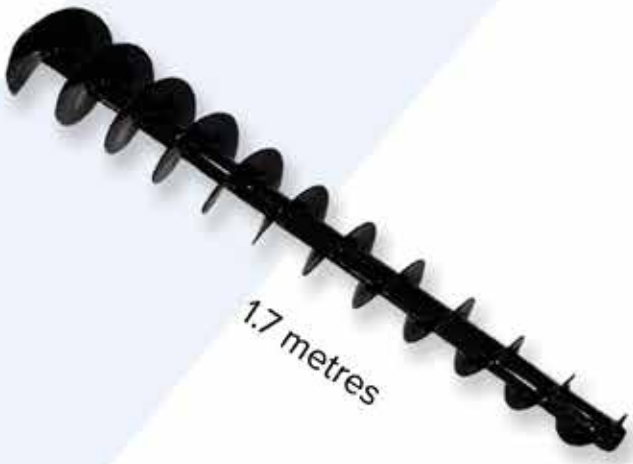

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Indigenously Developed LCH- 'Prachanda' Inducted into IAF

Defence Minister Rajnath Singh inducting indigenously developed Light Combat Helicopter (LCH) to Indian Air Force, in Jodhpur.

In a big boost to Aatmanirbharatha in Defence, the Light Combat Helicopter (LCH), designed and developed by Hindustan Aeronautics Limited (HAL), has been formally inducted into the Indian Air Force (IAF) in Jodhpur.

Naming LCH as "Prachanda", Defence Minister Rajnath Singh, who presided over the function said that its induction comes during the Amrit kal when the Nation is celebrating Azadi ka Amrit Mahostav and a pointer to the future when IAF will be the topmost force in the world. The minister also took a sortie onboard the LCH shortly after its induction into IAF.

Chief of Defence Staff (CDS) General Anil Chauhan, Chief of Air Staff Air Chief Marshal V.R. Chaudhary, Air Marshal Vikram Singh, Air Officer Commanding-in-Chief, South Western Air Command, Chairman and Managing Director of HAL C.B. Ananthakrishnan, senior officials of Ministry of Defence, IAF and other dignitaries were present on the occasion.

In his address, Rajnath Singh praised the role of IAF in meeting internal as well as external threats to the country since independence. He added that the induction of LCH, with its tremendous power and versatility, not only enhances the combat capabilities of IAF but is also a big step towards self-reliance in defense production, as envisioned by Prime Minister Narendra Modi. The trust reposed and support extended by the IAF towards indigenous design & development is evident through the examples such as Marut, Light Combat Aircraft, Akash missile system, Advanced Light Helicopter and the Light Combat Helicopter. "The induction of LCH underlines the fact that just as the country trusts the Indian Air Force, the IAF equally trusts the indigenous equipment," he added.

Air Chief Marshal V.R. Chaudhary, Chief of Air Staff said that induction of LCH adds unique capability to the IAF's combat potential. Versatility and offensive potential of the LCH is at par or better than most attack helicopters operating globally. Selection of the personnel in the 143-helicopter unit which will man the LCH have been made based on professional competence to ensure operationalization of the unit at the earliest, he added.

BEL signs MoU with MIL

Bhanu Prakash Srivastava, Director (Other Units), BEL, and S K Rout, Director (Operations), MIL, exchanging the MoU documents at Defexpo in the presence of Ravi Kant, CMD, MIL, Joydeep Majumder, Executive Director, BEL and other senior officers of BEL and MIL.

Navratna Defence PSU Bharat Electronics Ltd (BEL) has signed an MoU with Munitions India Limited (MIL), a Defence PSU, to jointly address the requirements of Indian Defence and Export markets in the areas of Ammunition, Explosives and related systems.

Bhanu Prakash Srivastava, Director (Other Units), BEL, and S K Rout, Director (Operations), MIL, exchanged the MoU documents at Defexpo today in the presence of Ravi Kant, CMD, MIL, Joydeep Majumder, Executive Director, BEL and other senior officers of BEL and MIL.

The MoU aims at leveraging the complementary strengths and capabilities of BEL and MIL and strengthens the spirit of the Make In India initiative of Government of India, for achieving self-reliance in Defence Sector. The co-operation will enable the companies to jointly address the domestic and Export opportunities in the areas of Ammunition, Explosives and related systems and sub systems.

MAG5 Innovations: Pioneers in Container-Based Shooting Ranges

Anil Girkar
Founder Director
MAG5 Innovations Private Limited

Creating new products with innovative technologies takes a lot of effort. MAG5 Innovations Private Limited has achieved success in this regard by introducing container-based mobile shooting ranges. Anil Girkar, Founder Director of the company, explains how the product took shape, its functioning and advantages.

Could you tell us about the inception of the company and the journey since then?

During the times of the COVID-19 pandemic, our parent company which is into LED manufacturing, rentals and sales was completely shut down and struggled for existence. So, we thought differently and put our brains and efforts towards new technologies, and soon registered MAG5 Innovations Private Limited with Startup India.

I have always been fascinated by innovative technologies and having an Army background, I pondered over how we could address the issues related to shooting training in the armed forces. So, we came up with the idea of mobile shooting ranges and engaged in extensive research activities. In fact, we carried out numerous techno-driven brainstorming sessions and challenges for almost two years. New technologies are always bumpy rides, especially regarding the finances.

But, after all the hard work, we have created certain niche products in shooting ranges and feel very much satisfied. We have now applied for three patents for our research in shooting ranges.

What are the products and services offered by you?

Container-based mobile shooting range is a new concept and only four or five countries in the world possess this technology. We conducted a detailed study about the India-specific requirements and technology available at the international level in this field. Following which, different ideas as well as concepts were researched and implemented. As a result, our products and services entirely match the real war and riot situations. This helps the shooters to programme their mind for dealing with the actual events.

We offer two types of shooting ranges. One is 'Target Pro' for army and paramilitary forces and the other is 'Target Sports' for sports arenas. The USP of our shooting ranges is the distraction mode, which we designed especially for the defence and paramilitary forces. In this mode, there is 8D sound to create the real mode war situation and riots through a shaking platform. The whole range is covered with an intelligent lighting system where we can create any situation as per the requirements.

There is also an errant shot detection facility, customisable protection protocol, staff notification and smart range axis notifications. Gunshot detection, auto desk shoot mode, hide-and-shoot mode, automated shaking platforms, conical-shaped bullet trap system and solar system are some of the techno inbuilt product specialities in our mobile shooting ranges.

Could you elaborate on the idea of 'Target Pro' container-based shooting range, which is an innovative product from the company?

A typical shooting range is time-consuming, stagnant, space consuming and immovable; whereas, a container-based shooting range with retrieval system is prudent in time management, mobility, saves spaces and is operative anytime, anywhere, with the most-modern smart range information system. The idea behind a container-based facility is to make shooting ranges more adaptive, easy to operate and superior in training methodologies.

How does 'Target Pro' outweigh a typical shooting range? How safe is it?

Contemporary shooting ranges need huge areas, sanctions from the government authorities, safety protocols and large operative expenditures. They do not have technology adaptations or an individual approach. We address these issues through innovative technologies.

Successfully-tested AR500 armour steel makes our container-based range safer. It has unparalleled multi-hit capabilities with 360-degree protection - 5 mm on the sides and 6 mm at the bottom. AR500 body armour plate has the ability to stop/sustain high velocity military bullets of 5.56 and 0.30 calibre.

Our shooting range is built to perform well against steel core 'penetrator' rounds like the M855 and have the least back face deformation of any category. They also have a long shelf life, with a proper anti-frag coating and plate carrier.

Door-locking system with rifle placement after the shooting is predetermined as per safety protocols. The inside door is locked with its protection management system and the shooter cannot open this door as per his will. In fact, the door will not be opened/unlocked without placing the rifle in its safest position as per procedure.

There is a pre-psychological test, a weapon locking and unlocking protocol, door locking and unlocking after usage of the weapon with visual checking and a weapon-keeping protocol. A conical-shaped bullet trap system makes the range

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safer as it buckets the misfired bullets from any direction with precision. Fire and theft protection for guns and ammunition is also installed in the mobile shooting range.

What are the other highlights of the container-based shooting range? Could you describe the specifications of the retrieval system?

A container-based shooting range is designed, developed and technologically adapted for real war situations and shooting perfection through continuous training. It has mobility and easy access with meticulous MIS assessment, which will massively change the skill set of each firer, making him better equipped for any kind of situation. The shooting range has a rugged design and it can be used in any terrain with a 360-degree layer of protection.

Our 'Interactive target retrieval system' auto tunes the distances of the shooting targets with precision as per the command. The control unit includes an encoder and PID controller. It also includes a hall sensor for self-calibration of the apparatus. Patent has been applied for this product.

The carriage unit is mounted on one or more tracks and includes at least one motor configured to drive the carriage unit on the tracks. The carriage unit further includes a plurality of rollers driven by the motor for its smooth forward and backward movement. A control unit controls the motor which drives the carriage unit and includes an encoder and a proportional integral derivative (PID) controller. The encoder can be of the optical rotary type and calculates the distance travelled by the carriage unit in terms of number of revolutions of a motor shaft coupled to the carriage unit, where the encoder transmits a pulse signal per revolution of the motor shaft. The PID controller monitors the distance travelled by the carriage unit and accuracy of the travelled distance of the carriage unit and, accordingly, calculates the errors therein. The camera unit is mounted on the carriage unit and is configured to capture images of a target for score calculation. Meanwhile, the target-holding unit is mounted on the carriage unit and is configured to hold and rotate the target. The target-holding unit includes a second motor, which is a stepper motor for precise rotation of the target.

Who are the target customers of the products? Are you aiming at exports?

Obviously, the customers are the armed forces, paramilitary forces, sports and government bodies, clubs and training centres. We are certainly looking forward to making a presence in the international arenas.

Ashok Leyland Exhibits three advanced products at DefExpo

Ashok Leyland, Indian flagship of the Hinduja Group and the largest supplier of logistics vehicles to the Indian Army, showcased three advanced-technology products and solutions at DefExpo.

Col Sonam Wangchuk (Retd), unveiled "JEET 4x4", an all-new Light General Service Vehicle, Indigenously Designed, Developed and Manufactured by Ashok Leyland. Rajesh R, Vice President – Defence & Power Solutions Business, Ashok Leyland unveiled and launched other products in the presence of senior dignitaries from Indian Army and MoD.

The products at the Def Expo are: -

1. JEET 4x4: a proven vehicle platform, equipped to perform in hills, high altitude, cross country, plains & desert terrain
2. LBPV 4x4: Light Bullet Proof Vehicle 4x4
3. Tank T72 GB Assembly aggregates: Gear boxes

Dheeraj Hinduja, Executive Chairman, Ashok Leyland, said, "We continue to evolve as a trusted partner to the Indian armed forces in providing end-to-end solutions in the area of mobility.

The products showcased today demonstrate our team's capability and an innate understanding of the arduous operating conditions. We endeavor to expand our portfolio of products and solutions and contribute significantly towards the "Atmanirbhar Bharat" initiative."

Rajesh R, Vice President – Defence & Power Solutions Business, Ashok Leyland, said, "At the DefExpo, we are delighted to present our next generation capabilities for the Defence forces, keeping in view their anticipated mobility trends. These advanced technology solutions developed by our in-house R&D would also address the growing demand for resource efficiency and optimization."

The Expo Displays a Grand Picture of New India: PM

Remarking on the organisation of the DefExpo 2022, Prime Minister Narendra Modi said that the expo paints a picture of New India and its capabilities whose resolve is being forged at the time of Amrit Kaal. He further added that it is an amalgamation of the country's development as well as states' cooperation. Underlining the uniqueness of this edition of Defexpo, the Prime Minister remarked that it provides a glimpse of the capability and possibility of India in one single frame. He further informed that more than 400 MoUs are being signed for the first time ever.

"DefExpo has the power and dreams of the youth, it has the resolve and capabilities of the youth. It has hopes for the world and opportunities for friendly nations. It's the symbol of a new beginning. The biggest Defence Expo of the country so far has marked an emphatic beginning of a new future. I know that this has also caused inconvenience to some countries but several countries, with a positive mindset, have come with us" the Prime Minister said.

Noting the positive response from various countries, the Prime Minister expressed happiness that when India is giving shape to its dreams, 53 friendly countries from Africa are walking with the country. He said that the relationship between India and Africa is based on time-tested trust that is further deepening and touching new dimensions with the passing of time.

"Today, from international security to global trade, maritime security has emerged as a global priority. The role of the merchant navy has also expanded in the era of globalisation. The world's expectations from India have increased, and I assure the world community that India will fulfil them. Therefore, this DefExpo is also a symbol of global trust towards India," Modi said.

The Prime Minister highlighted that space technology is shaping new definitions of India's generous space diplomacy, giving rise to new possibilities. "Space technology is an example of what security will mean for any strong nation in the future. Various challenges in this area have been reviewed and identified by the three services. We have to work fast to solve them. Mission Defence Space will not only encourage innovation and strengthen our forces but also provide new and innovative solutions," he added.

L3Harris and Merlinhawk to localize WESCAM MXTM-Series Service Capability

L3Harris Technologies (NYSE:LHX) has signed an agreement with Merlinhawk Aerospace, India's certified aerospace and defence design and manufacturing company, to open a WESCAM MX-Series electro-optical and infrared (EO/IR) systems service center.

This strategic agreement is aimed at localizing service capabilities under a WESCAM Authorized Service Center (WASC) through the transfer of knowledge, specialized tooling and technical publications, which will support the advanced repair facility.

"L3Harris continues to invest in its advanced customer-care ecosystem and establish a foundation for more self-reliant system maintenance that increases mission availability and reduces total ownership cost. We are honored to collaborate with Merlinhawk Aerospace," said Kristin Houston, President, Electro Optical, L3Harris.

"By collaborating with L3Harris, we will create an advanced repair facility, enabling end-users here in India and across the region to fully benefit from both Merlinhawk and L3Harris' turnkey solutions and greater knowledge sharing leading towards localization," said Ram R Ramineni, Managing Director at Merlinhawk.

DRDO Successfully Test Fires Laser-Guided ATGMs

Indigenously developed Laser-Guided Anti-Tank Guided Missiles (ATGM) were successfully test-fired from Main Battle Tank (MBT) Arjun by Defence Research and Development Organisation (DRDO) and Indian Army at KK Ranges with support of Armoured Corps Centre & School (ACC&S) Ahmednagar in Maharashtra.

The missiles hit with precision and successfully destroyed the targets at two different ranges. Telemetry systems have recorded the satisfactory flight performance of the missiles.

The all-indigenous Laser Guided ATGM employs a tandem High Explosive Anti-Tank (HEAT) warhead to defeat Explosive Reactive Armour (ERA) protected armoured vehicles.

The ATGM has been developed with multi-platform launch capability and is currently undergoing technical evaluation trials from 120 mm rifled gun of MBT Arjun.

Defence Minister Rajnath Singh has complimented DRDO and Indian Army for successful performance of the Laser Guided ATGMs. Secretary, Department of Defence R&D and Chairman DRDO Dr G Satheesh Reddy congratulated the teams associated with the test firing of Laser Guided ATGMs.

IAI to Supply DroneGuard Comjam Systems to Asian Country

Hundreds of DroneGuard systems are operational worldwide, and are used successfully to counter a range of UAS threats, including attempts to penetrate airspace or execute coordinated attacks

Israel Aerospace Industries (IAI) has been awarded a contract to supply DroneGuard ComJam systems for the long-range detection and disruption of Unmanned Aerial Systems (UAS) to an Asian country. The contract comprises several dozens of mobile systems.

In recent years, the use of UAS has increased dramatically, and they have become a potential threat to borders, sensitive facilities, manoeuvring forces and major events. UAS may be used for hostile purposes such as gathering intelligence, smuggling, or even carrying armaments. Furthermore, their detection is often difficult because of their small physical size, slow air speed, and low altitude flight.

To deal with this threat, IAI's ELTA Division has developed DroneGuard ComJam: an advanced system for locating and disrupting UAS communications and navigation capabilities, whether they are operating independently or in groups (swarms), without impacting civilian communications and GPS in the same area. The system detects hostile UAS, identifies their mode of operation, and disrupts their communications and navigation so that they are essentially shut down. DroneGuard ComJam offers the advantage of long-range operation, whereby the UAS is disabled while it is still far away – long before it poses a threat to the protected site.

Hundreds of IAI's DroneGuard systems have been delivered to customers around the world, where they are used to protect critical installations, as well as major events such as the G20 Summit held in Argentina in 2018.

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NFSU - Developing Niche Defence Technologies

Hon'ble Prime Minister Shri Narendra Modi at Cyber Defence Centre, NFSU

Hon'ble Home Minister Shri Amit Shah inaugurating Narcotics (NDPS) Lab at NFSU

NFSU is an Institution of National Importance (INI) under Ministry of Home Affairs (MHA). Located in Gandhinagar Gujarat where Defence EXPO'22 held; NFSU is the world's first and only University dedicated to Forensic, Behavioural, Cybersecurity, Digital Forensics, and allied Sciences. To strengthen our Defence Forces and contribute towards National Security, various Centres and Schools of NFSU are developing innovation solutions, software applications & systems for the Indian Air Force, Indian Army, Navy and CAPF Establishments; and offering important training solutions for Armed Forces. NFSU has forged important alliances & MoU's with Indian Air Force, Indian Army, Indian Navy, NSG, SPG & other Law Enforcement establishments to provide training, cutting-edge technologies in areas of Integrated Intelligence, Operational Software, Cyber Defence, Digital Forensics, Behavioural Sciences & Ballistics Testing & Research.

Centre for Futuristic Defence Studies (CFDS) at NSFU undertakes development of Combat Applications, Drone Platforms, Anti-Drone Technologies & Systems, 3D Scanning Sensors. NFSU has niche expertise & experience in Drone Forensics, Indigenous Drone Detection Systems, Drone Jammers, and Anti -Drone Command & Control (C2) tech, training programs on Drone technologies, Drone Forensics and Anti-Drone Systems.

Centre of Excellence (CoE) in **Cyber Security** is the first **ISO-IEC 27001** certified lab in India at NFSU. CoE in Cyber Security provides Cyber warfare training and cyber technology development. It provides tools that help strengthen the stability, security and performance of Cyber infrastructures and IT systems used by government, Defence, CAPF and Law Enforcement agencies & undertake training, R & D and test cyber technologies to ensure consistent operations and readiness for real world deployment & developed **Cyber Kiosk.**

Ballistics Research & Testing Centre undertakes testing of various armoured vehicle, Bullet proof jacket, Rifles, and other weapons of Armed Forces & CAPF.

School of Police Science & Security Studies undertakes training programs on Homeland security, Land Border & Maritime security, Armed Force, CAPF, LEA.

School of Behavioural Science (SBS) imparting research in human behaviour and cognition, brain functioning, clinical psychology, and Neuropsychology. Defence delegations & dignitaries are hosted at NFSU's. NFSU is show casing various Defence technologies, solutions & capabilities towards Atamnirbhar

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