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# DRDO CONDUCTS MAIDEN LAUNCH OF MRSAM

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**41st Year of Publication**

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# MRSAM ARMY VERSION TESTED SUCCESSFULLY

DRDO achieved a major milestone on 23 December 2020 with the maiden launch of Medium Range Surface-to-Air Missile (MRSAM), Army Version, from Integrated Test Range, Chandipur. The missile completely destroyed a high-speed unmanned aerial target, which was mimicking an aircraft, with a direct hit.

Army version of MRSAM has been developed by DRDO and Israel Aerospace Industries, Israel. MRSAM Army Weapon System comprises a Command Post, Multi-Function Radar and a Mobile Launcher System. The complete Fire Unit was used during the launch in the deliverable configuration. A team from the Indian Army also witnessed the launch. Number of range instruments such as Radar, Telemetry and Electro-Optical Tracking System were deployed and captured the complete mission data, validating the weapon system performance including the destruction of the target.

Raksha Mantri Shri Rajnath Singh lauded the efforts of DRDO and associated team members and said that India has attained a high level of capability in the indigenous design and development of advanced weapon systems.

Secretary Department of Defence R&D (DDR&D) and Chairman, DRDO Dr G Satheesh Reddy congratulated the scientists for successfully demonstrating the performance of the MRSAM Army Weapon System registering direct target hit in its maiden launch. He also lauded the efforts of the entire team in realizing the system within a record time.

**MRSAM being test fired from ITR Chandipur**

# SUCCESSFUL FLIGHT TEST OF SMART ANTI AIRFIELD WEAPON FROM HAL'S HAWK I

In yet another milestone, DRDO successfully conducted captive and release trial of indigenously developed Smart Anti-Airfield Weapon (SAAW) from Hawk-I of Hindustan Aeronautics Limited (HAL) off the Odisha coast on 21 January 2021.

The smart weapon was successfully test fired from Indian Hawk-Mk132 of HAL. This was the ninth successful mission of SAAW conducted by DRDO till now. It was a text book launch, which met all mission objectives. The telemetry and tracking systems installed at Interim Test Range (ITR), Balasore captured all the mission events.

SAAW is indigenously designed and developed by DRDO's Research Centre Imarat (RCI), Hyderabad. This is 125 Kg class smart weapon, capable of engaging ground enemy airfield assets such as radars, bunkers, taxi tracks, and runways etc. up to a range of 100 km. The high precision guided bomb is light weight as compared to weapon system of the same class. The weapon was earlier successfully test fired from Jaguar aircraft.

Dr G Satheesh Reddy, Secretary DDR&D & Chairman DRDO congratulated the teams involved in the successful trial.

# DRDO DEVELOPS INDIA'S FIRST INDIGENOUSLY 9MM MACHINE PISTOL

DRDO and Indian Army Infantry School, Mhow jointly developed India's first indigenous 9 mm Machine Pistol using their respective expertise in the complementary areas. The weapon has been developed in a record time of four months. The machine pistol fires in-service 9 mm ammunition and sports an upper receiver made from aircraft grade aluminium and lower receiver from carbon fibre. 3D printing was used in designing and prototyping of various parts including trigger components made by metal 3D printing.

**9 mm Machine Pistol**

The weapon has huge potential in Armed Forces as personal weapon for heavy weapon detachments, commanders, tank and aircraft crews, drivers/ dispatch riders, radio/radar operators, closed quarter battles, counter insurgency and counter terrorism operations, etc. Besides, it would also be useful for the central and state police organizations as well as for VIP protection duties and policing. The pistol is likely to have production cost under Rs 50,000 and has potential for exports.

Keeping the Hon'ble Prime Minister's vision of *Aatmnirbhar Bharat* in view, this small step will pave way for self-reliance in this category of weapons.

# SUCCESSFUL TRIALS OF 5.56 X 30 MM JOINT VENTURE PROTECTIVE CARBINE

DRDO designed 5.56 x 30 mm Joint Venture Protective Carbine (JVPC) has successfully undergone the final phase of user trials on 7 December 2020 meeting all the General Staff Qualitative Requirements (GSQR). The weapon, aptly named Asmi meaning, Pride, Self-Respect and Hard Work, is ready for induction into the services. This was the last leg of trials in a series of user trials, which have been carried out in extreme temperature conditions in summer and in high altitude in winter. JVPC has successfully met the stringent performance criteria of reliability and accuracy in addition to quality trials conducted by the Directorate General of Quality Assurance (DGQA).

**High Altitude User's Trials of JVPC**

**JVPC**

JVPC is a gas operated semi bull-pup automatic weapon having more than 700 rpm rate of fire. The effective range of the carbine is more than 100 m and it weighs around 3 kg with key features like high reliability, low recoil, retractable butt, ergonomic design, single-hand firing capability, and multiple picatinny rails, etc. These features make it a very potent weapon for counter insurgency/counter terrorism operations by security agencies. The carbine has been designed as per Indian Army's GSQR, by Armament Research and Development Establishment (ARDE), a Pune-based laboratory of DRDO. The weapon is being manufactured at Small Arms Factory, Kanpur and ammunition at Ammunition Factory, Kirkee, Pune. The weapon has already passed the Ministry of Home Affairs trials.

Raksha Mantri Shri Rajnath Singh had unveiled the 5.56 x 30 mm JVPC during DefExpo-2020 at Lucknow. Secretary DDR&D and Chairman DRDO, Dr G Satheesh Reddy congratulated DRDO team, user team and development agencies for successful reaching this milestone.

# SAHAYAK-NG, AIR DROPPABLE CONTAINER TESTED SUCCESSFULLY

DRDO along with Indian Navy conducted successful maiden test trial of 'Sahayak-NG' India's first indigenously designed and developed Air Dropped Container from IL 38SD aircraft (Indian Navy) on 30 December 2020 off the Coast of Goa. The trial was conducted by Indian Navy to enhance its operational logistics capabilities and provide critical engineering stores to ships, which are deployed/stranded more than 2000 km from the coast. GPS-aided air dropped container has reduces the requirement of ships to come close to the coast to collect spares and stores.

DRDO's Naval Science and Technological Laboratory (NSTL), Visakhapatnam and Aerial Delivery Research and Development Establishment (ADRDE), Agra has developed the container along with the industry partner M/s Avantel for GPS integration. The container is having the capability to carry a payload up to 50 kg and can be dropped from heavy aircraft.

Secretary DDR&D and Chairman DRDO Dr G Satheesh Reddy congratulated DRDO scientists, Indian Navy and the industry partners involved in the successful maiden trial.


# ARDE DEVELOPS E-APPROVAL MODULE OF INTEGRATED MATERIAL MANAGEMENT SYSTEM

Integrated Material Management System (IMMS) developed in-house by the Armament Research and Development Establishment (ARDE), Pune was released on DRDO Day on 1 January 2021 by Dr G Satheesh Reddy, Secretary DDR&D and Chairman DRDO. IMMS would be implemented at all the DRDO labs/estts.

IMMS was functional at 12 DRDO labs through DRONA. During the nationwide lockdown due to COVID-19 pandemic, handling and movement of physical files became risk prone. Secretary DDR&D and Chairman DRDO, Dr G Satheesh Reddy, advised ARDE to include an e-approval module to the software for contactless e-Approvals of the files. Team ARDE successfully developed the e-Approvals module with support from software and network team of Directorate of IT&CS, DRDO, editorial inputs from Director ITM and overall logistics support from Office of DG (HR), DRDO and Directorate of DFMM, DRDO. IMMS is now functional all across DRDO.

# DRDO YOUNG SCIENTIST LABORATORY DEVELOPS QUANTUM BASED TECHNOLOGY FOR RANDOM NUMBER GENERATION

Random numbers have essential role in many fields like quantum communication, cryptography (key generation, key wrapping, authentication, etc.), scientific simulations, lotteries and fundamental physics experiments. The generation of genuine randomness is generally considered impossible with classical means. Quantum Mechanics has the inherent potential of providing true random numbers and thus has become the preferred option for the scientific applications requiring randomness.

DRDO Young Scientist Laboratory for Quantum Technologies (DYSL-QT) has developed Quantum Random Number Generator (QRNG) that detects random quantum events and converts those into a stream of binary digits. The laboratory has developed a fibre-optic branch path-based QRNG on the principle that if a single photon is incident on a balanced beam splitter, it will take either of the beam-splitter output paths randomly. As the path chosen by photon is random, the randomness is translated to sequence of bits.

QRNG system developed by the laboratory has passed the global randomness testing standards, viz., NIST and Die-harder Statistical Test Suites at the speed of ~150 kbps after post-processing. The generated random numbers have been evaluated and verified using DRDO's indigenously developed Randomness Testing Statistical Test Suite of SAG.

With this development India enters the club of countries with the technology to achieve generation of random numbers based on the Quantum Phenomenon.

# DRDO INKS FRAMEWORK MOU WITH MORTH FOR GEO-HAZARD MANAGEMENT

DRDO entered into a framework memorandum of understanding (MoU) on 20 January 2021 with the Ministry of Road Transport and Highways (MoRTH) to strengthen collaboration on sustainable geo-hazard management. Dr G Satheesh Reddy, Secretary DDR&D and Chairman DRDO and Shri Giridhar Aramane, Secretary MoRTH signed the MoU. DRDO and MoRTH will cooperate in various mutually beneficial areas related to geo-hazard management. The initiative will ensure safety against landslides and other natural calamities on national highways in the country.

DRDO's Defence Geo-Informatics Research Establishment (DGRE) is developing critical technologies for enhancing combat effectiveness in snow-bound terrains. The expertise of DGRE in mapping, forecasting, control and mitigation of landslides and avalanches in the Himalayan region will be utilized for designing national highways including tunnels. Terrain and modelling simulation is an important asset with DGRE that plays an important role in planning and building robust road infrastructure in difficult terrains. MoRTH is responsible for development and maintenance of National Highways across the country.

Expertise of DRDO will be utilized in providing sustainable mitigation measures to damages caused by landslides, avalanche and other natural factors on various National Highways in the Country.

# DRDO HANDS OVER MOTOR BIKE AMBULANCE TO CRPF

Institute of Nuclear Medicine and Allied Sciences (INMAS), a Delhi-based Life Sciences laboratory of DRDO, handed over Rakshita, a bike-based casualty transport emergency vehicle to Central Reserve Police Force (CRPF) in a ceremony held at CRPF HQ in New Delhi on 18 January 2021. DS & DG (LS), DRDO, Dr AK Singh handed over the model of Rakshita to DG CRPF, Dr AP Maheshwari, followed by the flagging off the contingent of 21 bikes on the occasion.

The bike ambulance will help in overcoming the problems faced by Indian security forces and emergency healthcare providers. It will provide life-saving aid for evacuation of injured patients

from low intensity conflict areas. This will be handy in the congested streets and remote locations, where access through ambulance is difficult and time consuming. The bike can respond to a medical emergency faster than a four-wheeler due to its functionality and integrated emergency medical support system. Rakshita is fitted with a customized reclining Casualty Evacuation Seat (CES), which can be fitted in and taken out as per requirement. Other major features are the head immobilizer, safety harness jacket, hand and foot straps for safety, adjustable footrest, physiological parameter measuring equipment with wireless monitoring capability and auto warning system for driver. The vital parameters of the patient can be monitored on the dashboard mounted LCD. It is also equipped with air splint, medical and oxygen kit for on spot medical care. This bike ambulance is useful not only for the paramilitary and military forces but has potential civil applications too.

**Flagging off of Bike Ambulance Rakshita**

# CVRDE PRODUCTS HANDED OVER TO USERS

DRDO handed over Retractable Landing Gear Systems for Tapas and SWiFT UAVs and 18 types of filters for P-75 Submarine developed by Combat Vehicles Research and Development Establishment (CVRDE), Chennai on 10 January 2021 in the presence of Hon'ble Member of Parliament Dr Kalanidhi Veeraswamy, Parliamentary Standing Committee Member for Defence, Dr G Satheesh Reddy, Secretary, DDR&D and Chairman DRDO and Shri PK Mehta, DS & DG (ACE), DRDO.

CVRDE has indigenously designed and developed 3-ton Retractable Landing Gear (RLG) Systems for Tapas UAV. The design, development and testing of this gear system was carried out in coordination with CEMILAC and DGAQA for certification. First set of Retractable Landing Gear System manufactured by industry was handed over by Director CVRDE, Chennai to the Director, ADE Bengaluru. CVRDE has also designed and developed 1-ton Retractable Landing Gear System for a different class of UAV known as SWiFT. This system is designed and developed for accommodating the Landing Gears within the constrained bay volume. It is being manufactured by industry with due inspection and certification by CEMILAC and DGAQA. This system was also handed over to ADE, Bengaluru.

CVRDE has also designed and developed 18 types of hydraulic, lubrication, seawater and fuel filters for P-75 submarine. This indigenization project was funded by DRDO and Navy jointly and the technology was successfully transferred to the industry. Two sets of these filters, duly qualified by DQA (N), were handed over to Indian Navy.

Secretary DDR&D highlighted the importance of indigenous design efforts and complimented the industries who have established the manufacturing facilities for making these critical components.


**Handing over of P 75 Filters to Indian Navy**

# MOU BETWEEN DRDO & MAHARASHTRA METRO FOR ADVANCED BIODIGESTER TECHNOLOGY

DRDO and Maharashtra Metro Rail Corporation (MAHA-METRO), signed MOU on 5 January 2021 for implementation of DRDO's advanced biodigester Mk-II technology for the treatment of human waste (night soil) in the metro rail network. MAHA–METRO a joint venture company of the GoI and Government of Maharashtra, is working with DRDO to conserve water and protect the environment by using DRDO's eco-friendly biodigester units (a non-sewered sanitation technology) in its facilities.

Dr AK Singh, DS and DG, Life Sciences, DRDO, and Dr Brijesh Dixit, MD, Maharashtra Metro Rail Corporation Limited (MMRCL) exchanged the MoU. DRDO's biodigester is an indigenous, green and cost-effective technology, with a rare distinction of having one of the largest numbers of ToT holders. Indian Railways has installed about 2.40 lakh biodigesters in its fleet of passenger coaches. For the MAHA-METRO, the technology has been revamped and further improved to save the water and space.


**Exchange of MoU for Biodigester Mk-II technology between DRDO and MAHA-METRO**

The technology is upgraded through improvements in the bio-degradation efficiency, design modification and addition of secondary treatment module. The new reactor provides more path length with increased biological reaction time, thereby enhancing the bio-degradation efficiency of the system. This technology was primarily developed for the Armed Forces posted in the Himalayan regions including Leh-Ladakh and the Siachen glacier.

# DRL INKS MOU WITH ADP COLLEGE

Defence Research Laboratory (DRL), Tezpur signed MoU with Anandaram Dhekial Phookan (ADP) College, Nagaon to promote cooperation in scientific education and research. The MoU was signed by Dr SK Dwivedi, Director, DRL and Dr Surajit Kr Bhagowati, Principal, ADP College on 4 January 2021. This MoU would enable the utilization of each other's strengths and collaborative research work.

**Exchange of MoU between DRL and ADP College**

# DRDO CELEBRATES FOUNDATION DAY

DRDO observed its 63rd Foundation Day on 1 January 2021 at DRDO HQ. Dr G Satheesh Reddy, Secretary DDR&D & Chairman DRDO met Raksha Mantri Shri Rajnath Singh and presented him a model of Akash Missile System, which is recently cleared for export. On the occasion, Chairman DRDO along with DGs and Directors of DRDO HQ paid floral tributes to Dr APJ Abdul Kalam at DRDO Bhawan.

DRDO was established in 1958 with just 10 laboratories to enhance the research work in Defence sector and was tasked with designing and developing cutting edge defence technologies for Indian Armed Forces. Today, DRDO is working in multiple cutting edge military technology areas, which include aeronautics, armaments, combat vehicles, electronics, instrumentation, engineering systems, missiles, materials, naval systems, advanced computing, simulation, cyber, life sciences and other technologies for defence.

Addressing DRDO fraternity, Chairman DRDO extended warm wishes to DRDO employees and their families. He stated that an eventful year has passed and a new one is about to begin and asked scientists to innovate and create for the Nation. He said that efforts of DRDO have given a quantum jump to India's self reliance in defence, contributing towards Aatmanirbhar Bharat.

He declared Export as the theme of DRDO for 2021 and mentioned that many products based on DRDO technologies have already been exported by DPSUs and Industry. DRDO develops critical defence technologies and products to meet the requirements of the Indian Armed Forces.

He said that in 2020, DRDO achieved many milestones such as maiden landing of LCA Navy on-board INS Vikramaditya, demonstration of Hypersonic Technology Demonstration Vehicle (HSTDV), Quantum Key Distribution (QKD) & QRNG developments in area of Quantum Technology, Laser Guided Anti Tank Guided Missile (ATGM), Supersonic Missile Assisted Release of Torpedo (SMART), Anti Radiation Missile (NGARM), enhanced version of PINAKA Rocket System, Quick Reaction Surface to Air Missile (QRSAM), Maiden launch of MRSAM, 5.56 x 30 mm Joint Venture Protective Carbine (JVPC) and many other milestones.

He highlighted the contributions of DRDO during COVID Pandemic and said that nearly 40 DRDO laboratories developed more than 50 technologies and over 100 products on war footing to develop products & technologies for combating COVID 19 pandemic in India. These included PPE kits, Sanitizers, Masks, UV Based disinfection systems, Germi Klean and critical parts of ventilator leading to ventilator manufacturing in the country in a very short span of time. He further said that DRDO has established three dedicated COVID hospitals at Delhi, Patna and Muzaffarpur in a record time for strengthening the medical infrastructure. In addition, Mobile Virology Research and Diagnostics Laboratory (MVRDL) were developed to speed-up the COVID-19 screening and R&D activities at various locations for strengthening the COVID testing capabilities.

He mentioned that new policies and procedures were launched for increasing the efficiency and ease of engagement with various stakeholders in the development. DRDO has also taken major steps for further strengthening its base for taking up technological challenges for the defence systems development and will continue to strive for the best in defence technology and ensure the system development in the shortest time.

While congratulating DRDO scientists and all other personnel who worked in close coordination with the Armed Forces for user trials, he set many targets for them. He talked about the flagship programmes of DRDO such as Hypersonic Cruise Missile, Advanced Medium Combat Aircraft (AMCA), New Generation MBT, Unmanned Combat Aerial Vehicle, Enhanced AEW&CS, LCA MK II and many other systems. He called upon DRDO scientists to focus on next generation needs including cyber security, space and artificial intelligence.

The immense potential available in DRDO has been a catalyst for the development of industries in defence manufacturing sector. He highlighted that the academic institutes, R&D organizations and industry need to work together on the advanced and futuristic technologies to make India self-reliant in defence sector. He mentioned that a number of SMEs and MSMEs are supplying small components to subsystems for all DRDO projects and have been nurtured by DRDO. Now they have become partners in all new developments. He stated that DRDO conducted a competition "Dare to Dream" for Startups and very enthusiastic response have been received. He further added that at least 30 Startups should be supported every year to develop innovative products for our forces.

He said that DRDO should make efforts towards strengthening long term ties with the Academia and aim to leverage the academic expertise available in the country and increase the synergy with them. DRDO should concentrate on applied research and translational research and then make prototypes from the applied research. He further said, that the industry should be in a position to adopt these technologies and have necessary infrastructure, and scale these up to market with sustained quality.

Dr Reddy underlined the need to focus on documentation and productionisation for faster induction and said that many new initiatives towards enabling the industry and empowering youth for Defence R&D will be taken by DRDO.

Chairman DRDO also launched an Online Industry Partner Registration Module to simplify the process of vendor registration. He released the DRDO Monograph on "Issues on Development of Communication Technology using Orbiting Satellites" and also the Environmental Safety Manual and Guidelines for Disposal of Life Expired Chemicals and Gases at DRDO Laboratories.

The following DRDO labs also celebrated DRDO Day at their respective places.

## ITR, CHANDIPUR

Integrated Test Range (ITR) celebrated 63rd DRDO Day–2021 on 1 January 2021. On

this occasion, Director ITR, Shri HK Ratha briefed about the achievements of ITR during the Year 2020. He highlighted the notable accomplishments of ITR during the year 2020 such as the successful Test Firing of a number of Missiles in spite of prevailing COVID-19 pandemic. He appreciated the social activities taken up by ITR like distribution of sanitizer made by ITR among the police personnel and staffs of District HQ Hospital, Balasore and also Drone Sanitization in and around the town was a huge success.

He further emphasised on the contributions of every individual of ITR along with the support of the families towards achieving this goal. He inspired employees to have a shared vision of world class test range with state-of-the-art instrumentation and infrastructure along with expansion of Ranges.

The fourth edition of in-house Hindi magazine *Arohi Utkrushtata ki Or*, fourth edition trilingual magazine 'Utkarsh committed towards excellence', 'Goal Document of ITR 2021' and ITR Profile Video were released during the occasion. A new and renovated campus automation system, a step towards e-file system, in Campus Area Network (CAN) website of ITR was also inaugurated during the celebration.

Annual Cash Award of ITR for commendable performance during the year 2019 and ITR Rajbhasha Award for significant contribution towards implementation of Official Language Policy of the Union and Rajbhasha Hindi were given to the employees of ITR.

**Releasing of in-house Hindi magazine during DRDO Day celebration at ITR**

## NPOL, KOCHI

Naval Physical & Oceanographic Laboratory (NPOL) celebrated DRDO Day on 1 January 2021. The programme started with a webcast of a New Year message from Dr G Satheesh Reddy, Secretary DDR&D and Chairman DRDO. Due to prevailing Covid-19 pandemic situation, the function was webcast within NPOL also, with everyone viewing the programme from their desktop. Shri S Vijayan Pillai, OS & Director, NPOL addressed NPOL fraternity via webcast and highlighted the significant achievements of the laboratory in year 2020 with focus on completion of milestones in ongoing projects. He also highlighted the commitments in the year 2021, and the projects to be initiated in the New Year.

On DRDO day, Director launched the new Biometric Attendance system for the RFID based ID cards, by marking his attendance on the new device.

**Shri S Vijayan Pillai, OS & Director, NPOL launching the new BAS on DRDO Day at NPOL**

# RAISING DAY CELEBRATIONS

## DMRL HYDERABAD

Defence Metallurgical Research Laboratory (DMRL) celebrated its 57th Annual Day on 23 December 2020 as per the guidelines of COVID-19. Dr G Madhusudhan Reddy, OS and Director, DMRL, presented the progress and achievements made by the laboratory in the field of armour and ammunition, naval systems, aeronautical systems and missile systems. He outlined the achievements of the lab during 2020. Various DRDO laboratory awards were given to the employees for their outstanding contributions.

Dr Madhusudhan Reddy addressing the employees on DMRL Raising Day

## LRDE, BENGALURU

Electronics and Radar Development Establishment (LRDE), Bengaluru, celebrated Lab Raising Day and DRDO Day on 1 January 2021. Shri P Radhakrishna, OS & Director, LRDE, spoke about the achievements of LRDE during 2020 and goals for 2021. He presented DRDO Lab-Level Awards, DRDO Cash Awards to the meritorious employees and Educational Awards to the meritorious students of the LRDE staff. Address by Dr G Satheesh Reddy, Chairman DRDO, on the occasion of DRDO Day was also webcasted.

Award distribution on LRDE Raising Day

## NMRL, AMBERNATH

Naval Materials Research Laboratory (NMRL) celebrated its 68th Raising Day with great enthusiasm and passion on 5 January 2021 as per the HQ Covid-19 guidelines. Dr M Patri, Director, NMRL, addressed the


Release of Annual Report of NMRL on its Raising Day

gathering and exhorted NMRL fraternity to provide latest technological solutions to Armed forces. NMRL Annual Report was released on this occasion. Lab-level and cash awards were presented to the employees for their outstanding contributions.

# SWACHHATA PAKHWADA

## DMRL, HYDERABAD

DMRL celebrated Swachhata Pakhwada during 1-15 December, 2020. Activities like Distribution of Pamphlets, display of banners at the main entrance, swachhata pledge by employees at their respective work places, swachhata rally inside the DMRL premises, door to door campaigning by Swachhata Pakhwada Committee, painting of the trees along the road side in the campus and disposal of unused files, furniture, machinery, other items were carried out. A one day programme was also organized at DMRL's ATC campus, Devatalagutta. Swachhata talks were organized by taking all precautions for COVID-19. Many officers and staff participated in the programme. Representatives from AIDEF Union, Works Committee, Members and Chairman of Swachhata Pakhwada Committee delivered Swachhata talks.

**Swachhata drive at DMRL**

## PXE, CHANDIPUR

Swachhata Pakhwada-2020 was observed with various activities at Proof & Experimental Establishment (PXE), Balasore form 1 December 2020 to 15 December 2020. Banners, posters and placards on cleanliness were displayed at prominent locations of Balasore and PXE premises to increase awareness. A cleanliness rally was organised at Chandipur in which Director Shri DK Joshi, senior officers and employees participated to create awareness.

A talk on "Harnessing Green Energy" was delivered by Shri Sachin Kumar, Sc 'E'. Other activities like disposal of unserviceable furniture, door-to-door campaigning, cleaning of office premises were conducted till 15 December 2020. A large member of employees participated in these events.

**Swachhata drive by PXE employees**

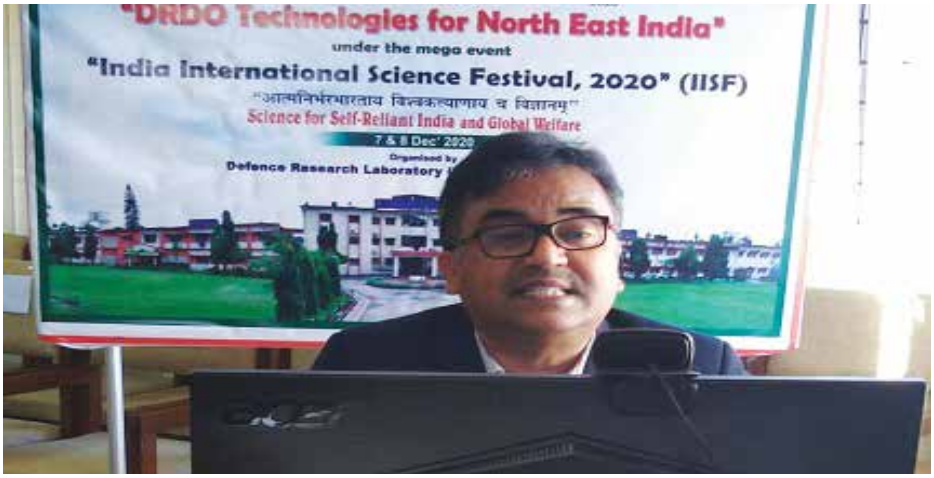
# PXE ORGANISES HINDI WORKSHOP

Proof and Experimental Establishment (PXE) organized 80th Hindi Workshop for the STA 'B' & TA 'B' from 21 December 2020 to 23 December 2020. The workshop was inaugurated by Shri D K Joshi, Director, PXE. In his inaugural address, Shri Joshi said that the workshop would be more useful to do the official work in Hindi. Twenty-five technical staff participated in the workshop. The working methodology on Hindi, the Official Language Rule and Rule about LTC & TA/DA in Hindi too were discussed in detail by the faculties. In technical sessions information was given in Hindi about safe handling and transportation of armament, electrical safety and uses of radar and sensor in proofs and trials. The Director distributed certificates to the participants in the valedictory function.


**Shri DK Joshi, Director, PXE (right), presenting certificate to the participant**

# WEBINAR ON DRDO TECHNOLOGIES FOR NORTH EAST INDIA

Defence Research Laboratory (DRL), Tezpur conducted a webinar on "DRDO Technologies for North East India" during 7-8 December 2020 in coordination with Directorate of Information Technology and Cyber security (DIT&CS), DRDO. Dr Sanjai K Dwivedi, Director, DRL, inaugurated the event and delivered the introductory talk. He highlighted the technologies and products, developed by DRL for the Armed Forces posted at remote and forward area of NE India and the civil society. Nine lectures were delivered by scientists from the DRL on technologies and products developed by the laboratory, covering topics on COVID-19, nanotechnology based water decontamination, bio-toilet, mosquito-borne diseases, wild edible plants, animal testing, green




**Dr Sanjai K Dwivedi, Director, DRL, delivering inaugural talk via video conferencing**

house and mushroom cultivation technology. Nine-hundred participants were registered, which includes UG, PG student, faculties and researchers from 28 states of India and also abroad. The event was co-ordinated by Dr Prasanta Raul, Sc 'D' and Dr Bodhaditya Das, TO 'B', along with the scientists, staff and research scholars of DRL.

# ONLINE COURSE ON CONTEXTUAL SKILLS FOR TECHNOLOGY INTENSIVE ORGANISATION

A five-day online course on 'Contextual Skills for Technology Intensive Organisation' was conducted by Institute of Technology Management (ITM), Mussoorie during 7-11 December 2020 for Centre for Military Airworthiness and Certification (CEMILAC), Bangaluru. Forty-one DRDS officers from CEMILAC and 17 from different RCMAs participated in the course. Presentations by ITM faculty were delivered via online platform.

**Online course on Contextual Skills for Technology Intensive Organisation**

The course was inaugurated by Shri Sanjay Tandon, OS & Director ITM. He briefed about the course. Shri APVS Prasad, Chief Executive, CEMILAC, deliberated upon the importance of the course. Sessions on various topics, viz., Role and Scope of Technology Management, Technology Life Cycle Management, Technology Development and Technology Transfer, Essential Soft Skills for Project Execution and Team Building, Leadership Skills, etc., were delivered by the ITM faculty.

During the valedictory ceremony Shri APVS Prasad, appreciated the efforts put in by ITM for conducting the course. Shri Tarun Mohindra, Sc 'G' & Officiating Director, ITM delivered valedictory address and thanked participants for their active participation. Smt Anita Mohindra, Sc 'F' and the Course Director, gave inputs about the course and also delivered the vote of thanks.

# ONLINE COURSE ON MATERIAL MANAGEMENT

A two-day online course on 'Material Management' was successfully conducted by ITM, Mussoorie during 7-8 December 2020 for Defence Scientific Information & Documentation Centre (DESIDOC), Delhi. Twenty-four participants attended the course. The course was inaugurated by Shri Sanjay Tandon, Director, ITM, who highlighting the importance of the course. Dr Alka Suri, Director, DESIDOC, also addressed the participants. Session on various topics, viz., Principles of Public Procurement, GFR 2017, Initiation of Demand and Approval, Purchase without Bidding, etc., were delivered by the ITM Faculty. Shri Shashank Sharma, GeM Business Facilitator, Dehradun also delivered a lecture on Govt-e Marketplace. Gp Capt M Subramanian was the Course Director.

# CHAIRMAN DRDO INAUGURATES AIR LAUNCH TEST FACILITY

Secretary DDR&D and Chairman, DRDO, Dr G Satheesh Reddy, inaugurated Air Launch Test Facility at Naval Science & Technological Laboratory (NSTL), Vishakapatnam. DG (NS&M), DRDO Dr Samir V Kamat, and Dr OR Nandagopan, Director, NSTL were present on the occasion.

Shri RVS Subrahmanyam, Programme Director, Air Systems, explained various systems in the facility pertaining to aircraft and helicopters of Indian Navy. He also emphasized its usefulness towards faster execution of various defence projects of NSTL. The facility will also be made available to industry. Chairman DRDO appreciated NSTL for establishment of the unique facility.


**Dr G Satheesh Reddy at Air Launch Test Facility**

Dr Reddy, also flagged off the first Varunastra, the Heavy Weight Torpedo, being delivered to Indian Navy, at a programme held at BDL, Visakhapatnam. Varunastra has been designed and developed by NSTL and BDL is the production agency. This product is also being offered for export.

## PERSONNEL NEWS

### HIGHER QUALIFICATION ACQUIRED

Shri M Srinivas, Sc 'D', Naval Science and Technological Laboratory (NSTL), Visakhapatnam has been awarded PhD for the thesis entitled "Novel Processing Routes of Sncoc Anode for Li-Ion Battery Applications" by Indian Institute of Technology, Madras, Chennai.

### PATENT GRANTED

A Patent "Process for Preparing Lead–Free Barium Calcium Zirconate Titanate Piezoelectric Ceramic" (Patent No. 348012) has been granted to Defence Metallurgical Research Laboratory (DMRL), Hyderabad. Dr A Srinivas, Shri K Prabahar, Dr SV Kamat and Ms S Sowmya have been named as the inventors.

# VISITORS TO DRDO LABS/ESTTS

## ARDE, PUNE

The Chief of Army Staff General MM Naravane, PVSM, AVSM, SM, VSM, ADC visited the Directorate General (ACE) on 9 January 2021. He was briefed about the readiness of various important projects of three Pune-based DRDO labs under the ACE cluster, viz., Armament Research & Development Establishment (ARDE), High Energy Materials Research Laboratory (HEMRL) and Research & Development Establishment [R&DE(E)]. The Army Chief was apprised of the major weapon systems such as Advanced Towed Artillery Gun System, Joint Venture Protective Carbine, Pinaka Multi Barrel Rocket Launching System, Laser Guided Anti-Tank Guided Missile System. The General evinced keen interest in the DRDO developed products and complimented the scientific community for their efforts.

**General MM Naravane, COAS being felicitated by Shri PK Mehta, DG (ACE) in presence of Directors of ARDE, HEMRL and R&DE (E)**

## HEMRL, PUNE

Lt. Gen. MJS Kahlon, AVSM, Director General Armd Corps, New Delhi accompanied by Col. AK Bishwas, Col AC-3, Col BD Upadhyay, AC-7 & Col. Sourabh Chatterji, HQ SOTT, ACC & S, Ahmednagar visited HEMRL on 19 November 2020. During the visit, Shri KPS Murthy, OS & Director HEMRL, briefed him on the activities of HEMRL. Presentation on the updates of '81mm Anti Thermal Anti Laser Smoke Grenade' was given by the senior scientist. Lt. Gen. Kahlon shown keen interest in the activities of HEMRL.

## NMRL, AMBERNATH

Dr SV Kamat, DS & DG (NS&M), DRDO, visited Naval Materials Research Laboratory (NMRL) during 7-8 January 2020 for reviewing the progress of Air Independent Propulsion (AIP) System. He visited the Land Based Prototype (LBP) site and interacted with scientists and asked them to focus on the research activities as per user requirements and deliver the products on time. He gave strong emphasis on '*Atmanirbhar Bharat*' especially by reducing import of military items. Dr Kamat reviewed the ongoing projects and work plan for 2021 along with the new project proposals. He appreciated the efforts put up by scientists for developing various products and significant achievements made in respective areas.

**Lt. Gen. MJS Kahlon, AVSM, DGAC showing keen interest in HEMRL Exhibits**

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