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SUBMERSIBLE PLATFORM FOR ACOUSTIC CHARACTERISATION AND EVALUATION INAUGURATED AT IDUKKI

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SUBMERSIBLE PLATFORM FOR ACOUSTIC CHARACTERISATION AND EVALUATION INAUGURATED AT IDUKKI

The inauguration of the cutting-edge infrastructure facility 'Submersible Platform for Acoustic Characterisation and Evaluation (SPACE)' to be set up at the Underwater Acoustic Research Facility (UARF), Kulamavu, Idukki, by the Naval Physical & Oceanographic Laboratory (NPOL), Kochi, a constituent laboratory under the DRDO, marks a milestone in naval technology advancement. Designed as a premier testing and evaluation hub for sonar systems destined for Indian Navy onboard various platforms, including ships, submarines, and helicopters.

Secretary, DDR&D & Chairman, DRDO, Dr Samir V Kamat, inaugurated this world class facility on 17 April 2024 at UARF Kulamavu, Idukki, heralding a new era of Anti-Submarine Warfare (ASW) research capabilities. During his inaugural address, Dr Kamat requested that NPOL should highlight the capabilities of this facility to other DRDO laboratories and eventually open up this facility for Indian industries and other laboratories outside the DRDO ecosystem.

Dr Y Sreenivas Rao, DG (NS&M), in his felicitation speech highlighted our India's capability to build an indigenised large engineering facility and suggested having additional facilities like AI-based predictive algorithms, simulations, etc. to minimize the number of sea trials.

Dr K Ajith Kumar, Director, NPOL, stated that the facility consists of two distinct assemblages: one a floating platform that floats on the water surface, and the other a submersible platform that can be lowered to any depth up to 100 m using winch systems. Once the operations are complete, winch up the submersible platform and dock it with the floating platform.

The facility will mainly be utilised for the evaluation of the total sonar system, allowing for quick deployment and easy recovery of scientific packages such as sensors and transducers. The facility will be suitable for survey, sampling, and data collection of air, surface, mid-water, and reservoir floor parameters using modern scientific instrumentation. It will cater to the needs of data processing and sample analysis in modern, well-equipped scientific laboratories.

The facility was constructed incorporating 'Green Concepts' to the extent possible, including provisions for bio-toilets and solar power generation. The design and construction of the platform meet all the necessary requirements of the Indian Register of Shipping, the vessel classifying authority, as well as strictly adhere to the inspection and registration criteria of the Director of Ports, Govt. of Kerala. The facility is constructed by M/s. L&T Ship Building, Chennai, based on the concept design and requirements projected by NPOL. Director NPOL, congratulated the project director and team members, and lauded the effort put forward by L&T Shipbuilding in designing such a system.

Shri Rajeel Anand, PM (SPACE)-L&T Ship Building, briefed the SPACE project. Shri Pankaj Chaddha, Head (Marine Platforms, Equipment, & Systems), L&T Precision Engineering & Systems, and previous Project Director, Sri Sameer Abdul Azeez, offered felicitation. A short movie on SPACE highlighting the various features of the facility was played.

On this occasion, Chairman DRDO handed over hydrographic software to Smt Leena NP, Executive Engineer, Dam Safety Division, KSEB. NPOL special issue of DRDO '*Technology Focus*'; Compendium on NPOL R&D Activities on ASW Surveillance (2022–24); and special technical edition of NPOL Hindi magazine 'Lahar' were also released by Dr Kamat, and other dignitaries during the inaugural event.

During the valedictory speech, Shri Shan Victor Pereira, PD (SPACE), acknowledged the support of all stakeholders, like L&T, Kerala Dam Safety Authority, Forest and Wildlife Departments, District Administration, Kerala State Electricity Board (KSEB), Kerala Police Department, Pollution Control Board, local body representatives, people of Kulamavu, the UARF team, etc., whose timely efforts made possible the realisation of this one-of-a-kind facility in the world.

Rear Adm (Retd) GK Harish, Head L&T Ship Building, Shri Ninan, Oorumoopan, Kulamavu, Sri Vishnu Pratheep IPS, Police Chief of Idukki District, Shri N Rajesh IFS, DFO, Kottayam, Shri Manoj IAS, Dy. Collector, Shri Eby Varghese, Environment Eng. Pollution Control Board, and other senior officials of NPOL also witnessed the event.

INDIGENOUS TECHNOLOGY CRUISE MISSILE SUCCESSFULLY FLIGHT-TESTED

The DRDO conducted a successful flight test of the Indigenous Technology Cruise Missile (ITCM) from the Integrated Test Range (ITR), Chandipur, off the Coast of Odisha, on 18 April 2024. The missile's performance was monitored by several range sensors, like radar, an electro-optical tracking system (EOTS), and telemetry, deployed by ITR at different locations to ensure complete coverage of the flight path. The Indian Air Force's Su-30-Mk-I aircraft also monitored the missile's flight.

The missile followed the desired path using way-point navigation and demonstrated very low-altitude sea-skimming flight. This successful flight test has also established the reliable performance of the indigenous propulsion system developed by the Gas Turbine Research Establishment (GTRE), Bengaluru. The missile is also equipped with advanced avionics and software to ensure better and more reliable performance.

The missile was developed by the Aeronautical Development Establishment (ADE), Bengaluru, along with contributions from other laboratories and Indian industries.

The Hon'ble Raksha Mantri congratulated DRDO for the successful flight-test of the ITCM and stated that the successful development of indigenous long-range subsonic cruise missiles powered by indigenous propulsion is a major milestone for Indian defence R&D.

NEW GENERATION BALLISTIC MISSILE AGNI-PRIME SUCCESSFULLY FLIGHT-TESTED

Strategic Forces Command (SFC), conducted the successful flight-test of the New Generation Ballistic Missile Agni-Prime from Dr APJ Abdul Kalam Island off the Coast of Odisha on 03 April 2024.

The test met all the trial objectives, validating its reliable performance, as confirmed by the data captured by a number of range sensors deployed at different locations, including two downrange ships placed at the terminal point. The launch was witnessed by the Chief of Defence Staff, Chief of Strategic Forces Command, senior officials from DRDO, and the Indian Army.

(File Photo)

Hon'ble Raksha Mantri congratulated DRDO, SFC, and the Armed Forces for the successful flight test. He stated that the missile's successful development and induction will be a great force multiplier for the Armed Forces.

The Chief of Defence Staff, General Anil Chauhan, and Secretary, DD R&D, & Chairman, DRDO Dr Samir V Kamat, appreciated the efforts of SFC and DRDO for the successful flight test.

SUCCESSFUL TRIALS OF INDIGENOUS MPATGM WEAPON SYSTEM

The Man-Portable Anti-tank Guided Missile (MPATGM) weapon system, indigenously designed and developed by the DRDO, was field evaluated in different flight configurations several times with the objective of proving the technology's superiority. The system consisted of the MPATGM, Launcher, Target Acquisition System, and Fire Control Unit.

An adequate number of missile firing trials have been successfully conducted towards achieving compliance with the complete operational envelope as stipulated in the General Staff Qualitative Requirements (Infantry, Indian Army). The warhead flight trials were successfully conducted at the Pokhran Field Firing Range, Rajasthan, on 13 April 2024. Missile performance and warhead performance were found to be remarkable.

Penetration trials of the Tandem Warhead System of MPATGM have been successfully completed, and it has been found capable of defeating modern armor-protected Main Battle Tanks (MBTs).

The ATGM system is well-equipped with day/night and top-attack capability. Dual-mode seeker functionality is a great addition to the missile capability for tank warfare. With this, technology development and successful demonstration have been concluded, and the system is now ready for final user evaluation trials leading towards its induction into the Indian Army.

Hon'ble Raksha Mantri complimented the DRDO and the Indian Army for the successful trials of the system, terming it an important step towards achieving self-reliance in advanced technology-based defence system development.

Secretary, DD R&D & Chairman DRDO also congratulated the teams associated with the trials.

HANDING OVER OF COAST GUARD ADAPTABILITY TEST

Dr Arunima Gupta, Sc 'G' & Director, Defence Institute of Psychological Research (DIPR), Delhi, handed over 'Coast Guard Adaptability Test (CoGAT)' to DIG KL Arun, Principal Director (Recruitment), Indian Coast Guard (ICG) in an event held on 04 April 2024 at DIPR. The requirement to develop the test came from ICG to assess the suitability of candidates for Enrolled Personal (EP) entry into the Services. The current test is a screening tool that assesses candidates' suitability in seven dimensions.

ADA HANDS OVER FIRST BATCH OF INDIGENOUS LEADING EDGE ACTUATORS & AIRBRAKE CONTROL MODULE TO HAL FOR LCA TEJAS MK1A

Aeronautical Development Agency (ADA), Bengaluru, handed over the first batch of the indigenous Leading Edge Actuators and Airbrake Control Module to Hindustan Aeronautics Limited (HAL), on 19 April 2024 marking a significant leap towards self-reliance in aeronautical technologies. The HAL, Lucknow has already made preparations for the production of these units for the current 83 LCA Tejas Mk1A order.

The Secondary Flight Control of LCA-Tejas, comprising Leading Edge Slats and Airbrakes, now boasts state-of-the-art Servo-Valve-based electro-hydraulic servo actuators and control modules. These high pressure, redundant servo actuators and control module, characterised by astute design, precision manufacturing, assembly, and testing, represent a culmination of ADA's relentless pursuit of indigenous technological prowess.

Collaborating with Research Centre Imarat (RCI), Hyderabad, and Central Manufacturing Technology Institute (CMTI), Bengaluru, ADA plans to achieve self-reliance in these technologies. The successful completion of flight trials for Leading Edge Actuators and Airbrake Control Modules has paved the way for production clearance, enabling HAL to gear up for equipping the Mk-1A variant of LCA Tejas.

The production of these critical components is underway at the Accessories Division, HAL, Lucknow, marking a significant stride towards bolstering India's aerospace manufacturing capabilities. Noteworthy contributions from public and private industries, including Godrej Aerospace, Mumbai, alongside certification agencies such as CEMILAC and DGAQA, have been instrumental in this endeavor.

Secretary, Department of Defence R&D and Chairman, DRDO and DG-ADA congratulated the entire team of ADA, RCI, HAL, CMTI and all participating industries for achieving this significant milestone.

DEVELOPMENT OF BULLET PROOF JACKET AGAINST 7.62X54 R API (LEVEL 6 OF BIS 17051-2018)

Defence Materials & Stores Research & Development Establishment (DMSRDE), Kanpur, successfully developed Bullet Proof Jacket (BPJ) which provides the protection against 7.62x54 R API (level 6 of BIS 17051) ammunition. The BPJ has been successfully tested at Terminal Ballistics Research Laboratory (TBRL), Chandigarh, as per BIS 17051-2018.

The jacket is based on new design approach where novel materials along with new processes have been used. The front Hard Armour Panel of BPJ (Two options of area: 1000 cm^2 and 750 cm^2) defeats multiple hits (06 shots) of 7.62x54 R API (Sniper rounds) in both In-conjunction with (ICW) and standalone design.

The ergonomically designed front HAP is made-up of monolithic ceramic plate with polymer backing which enhances the wearability and comfort during the operation. The areal density of ICW Hard Armour Panel (HAP) and standalone HAP is less than 40 kg/m^2 and 43 kg/m^2, respectively.

Tested Hard Armour Panels

DRDO YOUNG SCIENTISTS MEET 2024

The 10th edition of the DRDO Young Scientists Meet (YSM 2024) was jointly organised by the Directorate of Human Resource Development (DHRD) and the Naval Science & Technological Laboratory (NSTL) at NSTL, Visakhapatnam, during 04-06 April 2024. The event was inaugurated by Dr Samir V Kamat, Secretary, DD R&D & Chairman, DRDO on 04 April 2024. A total of 160 young scientists from all DRDO laboratories and establishments across the country participated in the event.

The DRDO Young Scientists Meet is organised to facilitate the convergence of young minds and provide a platform to network, interact, share, and discuss contemporary and futuristic topics related to defence science, and technology. Started in 2011, DRDO YSM has endeavored to foster an environment where budding scientists can showcase their talents, exchange ideas, and collaborate.

The theme of this year's meet was 'Forging Connections to Ignite Minds'. The three-day meet included invited talks, group building activities, innovation contests, and visits to technical facilities. Mr V Srinivasa Rao, convenor of YSM 2024, briefed on the various events planned during YSM 2024.

In his welcome address, Dr Abraham Varughese, Director, NSTL, exhorted the young scientists to utilise the opportunity and innovate for the grand goals of Aatmanirbhar Bharat.

Dr (Smt) U Jeya Santhi, DG (HR), described young scientists as the torchbearers of innovation and stressed their crucial role in the DRDO.

Dr Y Sreenivas Rao, DG (NS&M) spoke on the important role of young scientists in the defence of the nation and opined that commitment and dedication will yield excellent results.

In his inaugural address, Dr Kamat emphasized the inevitability of the development of advanced world-class weapons within set timelines. He advised the young scientists to adapt to the changing global order and technology trajectory and develop best-in-class defence systems to take DRDO to greater heights.Prof. Jayaram N Chengalur, Director, Tata Institute of Fundamental Research (TIFR), Mumbai Spoke on 'Technological Innovation'.

The inaugural session of YSM2024 concluded with the release of the YSM2024 souvenir by the dignitaries. Directors General of DRDO, Directors of DRDO Young Scientist Laboratories, Corporate Directors from DRDO HQrs, scientists, and officers of NSTL, members of the NSTL Civil Employees Union, and the Works Committee participated in the three-day event.

NATIONAL SCIENCE DAY CELEBRATION

DFRL, Mysuru

National Science Day 2024 (NSD 2024) was celebrated at the Defence Food Research Laboratory (DFRL), Mysuru, on 28 February 2024. Dr DD Wadikar, Sc 'F', delivered the NSD oration on 'Millets for Military Ration-Palatability, Nutrition, and Technical Challenges'. In his oration, he highlighted the importance of millet in overcoming lifestyle diseases, the health benefits of millets, challenges in the storage of millet grain and flour in different operational environments, technologies, and food products developed by DFRL based on millets. Dr Anil Dutt Semwal, Director, DFRL presented the NSD medal and citation to Dr Wadikar.

DSP, Hyderabad

The Directorate of Special Projects (DSP), Hyderabad, celebrated NSD 2024 on 28 February 2024. During her address, Ms Naini Beebamma, Sc 'F', Director, HR, talked about the significance of the day. The Hon'ble Chief Guest Shri Bharth Kumar GVP, Sc 'G', DPD, NGC Simulations Chandrayaan-3, graced the occasion. Dr Anupam Sharma, Director, addressed the gathering, highlighting the importance of the day. Shri Bharth Kumar presented his oration on 'The Control System Overview of Chandrayaan 3'. He covered the mission objectives of Chandrayaan 3, satellite and rover system configuration, area selection, landing and site constraints, and new systems developed in Chandrayan 3.

INMAS, Delhi

Dr Kailash Manda, Sc 'F', delivered NSD2024 oration on 'Blast-induced Neurotrauma: Mitigation and Management' at the Institute of Nuclear Medicine and Allied Sciences (INMAS), Delhi on 28 February 2024. Dr Manda explained through his major experimental findings the potential devastating neurocognitive effect of repeated low-level blast wave exposure. While such ailments are not normally diagnosed by conventional diagnostic measures, blast wave trauma is considered a 'silent wound of war'.

The comprehensive studies and results demonstrated the deleterious neuro-behavioral consequences of blast waves in animal models. Collectively, the results obtained through these models will be further correlated with human data obtained following chronic exposure at the test site. The findings would assist in developing a safety measure in terms of vulnerability scale, over-pressure threshold, or exposure frequency. Additionally, a suitable panel of circulatory bio-markers would be helpful in the severity grading of the neuro-trauma in an austere environment where diagnostic imaging facilities are not available.

Dr Sudhir Chandna, Sc 'G' & Director, INMAS, presented the NSD medal and citation to Dr Kailash Manda.

INTERNATIONAL WOMEN'S DAY CELEBRATION- 2024

DEBEL, Bengaluru

Defence Bioengineering & Electromedical Laboratory (DEBEL), Bengaluru, celebrated International Women's Day 2024 (IWD 2024) on 28 March 2024. This year, Prof. Vasanthi Srinivasan, Indian Institute of Management, Bangalore & Chairperson, Digital Learning & Past President of Indian Academy of Management, was invited to deliver a lecture on Leadership. Prof. Srinivasan spoke at length about leadership in general and leadership with specific reference to gender. She recounted the challenges faced in achieving true gender equity and the ways that these challenges could be overcome, both by institutional effort and by individual effort. Dr TM Kotresh, OS & Director, DEBEL spoke about the role of women in STEMM from the last few decades in various sectors around the world as well as the contributions of women in DEBEL and urged everyone to contribute pro-actively for the organisation.

DFRL, Mysuru

The Defence Food Research Laboratory (DFRL), Mysuru, celebrated IWD 2024 on 18 March 2024. Smt Shylaja VR, Karnataka Administrative Service (KAS), Registrar, University of Mysore, Mysuru, was the Chief Guest and Dr Anil Dutt Semwal, Director, DFRL, presided over the function. The welcome address was given by Dr Shylaja R, Sc 'F', Chairperson of the women's cell. Smt Shylaja highlighted the importance of gender equality and presented the statistics of the women in different fields. She brought out the point that the percentage of women in the top ranks and in decision-making is very scanty. She highlighted the importance and role of women in achieving equality. A quiz programme with the theme of women achievers was conducted.

DRL, Tezpur

A workshop on 'Invest in Women: Accelerate Progress' was organised by the Defence Research Laboratory (DRL), Tezpur, to celebrate IWD on 13 March 2024. The event commenced with the welcome address and brief on the activities of the cell by the chairperson, followed by the address of the Director, Dr Dev Vrat Kamboj, who spoke on investing in women through education, which will bear fruit in terms of their socio-economic upliftment. He also stated that respect for women should start at home. Mrs Amrit Madhuri Devi, proprietor of Madhur Food Products, graced the occasion as the Chief Guest. She talked about her life journey and stressed the importance of education as a medium of empowerment for overall growth. She also shared that passionately working with determination brings forth fruition and satisfaction.

HEMRL, Pune

IWD 2024 was celebrated at the High Energy Materials Research Laboratory (HEMRL), Pune, on 15 March 2024. With great enthusiasm, nearly 350 female HEMRL employees participated in the celebration. As part of the celebrations, a book exhibition of non-technical books was organized on 14 March 2024. Dr AP Dash, Director, HEMRL, inaugurated the exhibition.

Ms Mita Banerjee, an educationist, writer, and social activist, was invited as the Chief Guest. She shared her experience and knowledge regarding waste management. She stressed the effect of excessive buying and the importance of reducing, reusing, and recycling waste. The talk was well appreciated by the audience and created awareness about environmental protection. All the participants also took the pledge to maintain an eco-friendly environment.

In addition to this, various competitions, viz., Mehandi, Drawing, Rangoli, Hair & makeup, were conducted, and the winners were awarded during the celebration of IWD 2024.

ISSA, Delhi

The Institute for Systems Studies & Analyses (ISSA), Delhi celebrated IWD2024 on 12 March 2024. On this occasion, Dr Nidhi Maheshwari, Sc 'F', Defence Institute of Psychological Research (DIPR), Delhi, was invited to deliver a talk on 'Multi-tasker Women: Stress and Balance'. In her speech, she emphasised the multifaceted role of women in society, the challenges faced, and techniques to balance work and stress in life.

MTRDC, Bengaluru

IWD 2024 was celebrated at O/o SA to CAS on 22 March 2024 at the Centre. Ms Kaiya Arora, Director Postal Services, CPMG, Bengaluru, and Ms Angela Nalini Margaret, OS & Director (PM), O/o DG (ECS), graced the occasion as the Chief Guest and the Guest of Honor, respectively.

Rajbhasha House Magazine 'Umang' was also released by the Chief Guest.

NPOL, Kochi

Naval Physical and Oceanographic Laboratory (NPOL), Kochi, celebrated IWD 2024 on 15 March 2024. Smt Hema M, Sc 'G' & Coordinator, Women's Cell, welcomed the Chief Guest and the audience. Dr K Ajith Kumar, OS & Director, NPOL, reiterated in his address, the continuous support from women in all walks of life.

A talk was organised on 'Invest in Women—Accelerate Progress' by Smt Sujata Madhav Chandran, Head, Strategic Initiatives, Digital Transformation Services for NGM, TCS. She emphasied that, when women themselves are inspired to be included, there is a sense of belonging and a feeling of inclusion, and she explained how inclusion has changed her life.

Ms Aswani Sreedhar, Senior Translation Officer & member of the Women Cell, proposed the vote of thanks.

SSPL, Delhi

IWD 2024 was celebrated at the Solid State Physics Laboratory (SSPL), Delhi, on 10 March 2024. On the occasion, a series of events were organised to honour the achievements and contributions of women in the workplace. The session was marked by a captivating motivational lecture by the Chief Guest Mrs Vartika Shukla, CMD, Engineering India Ltd., highlighting the importance of gender equality and women's empowerment. Captivating cultural performances followed, showcasing the talent and creativity of female colleagues. The celebration continued with engaging games and activities.

The SSPL family united to celebrate women's achievements and to strengthen their commitment to gender equality at work.

Dr BR AMBEDKAR'S BIRTH ANNIVERSARY CELEBRATION AT NSTL

The 133rd birth anniversary of Dr BR Ambedkar was celebrated in a grand manner by the Naval Science & Technological Laboratory (NSTL), Visakhapatnam on 14 April 2024.

The dignitaries started the event by garlanding Dr BR Ambedkar's portrait. In the opening remarks, Shri Ravi Ananda Kumar, Sc 'F' briefed about the program and activities conducted on the occasion; Shri U Urban Kumar, Sc 'D' & President, NSTL SC/ST Employees Welfare Association; and JN Verma, General Secretary, NSTL Civil Employees Union, addressed the gathering.

In his keynote address, Dr S Karuna Raju, IAS, Chief Vigilance Officer, RINL, Visakhapatnam, spoke about Dr Babasaheb's vision and the base of the Indian Constitution, the four pillars, i.e., justice, liberty, equality, and fraternity. He appealed to all to become followers of Ambedkar and eradicate social and fraternity imbalances.

Chief Guest Dr Y Sreenivas Rao applauded by saying that Dr Ambedkar is an incarnation of God to establish equality and save humanity, which is justified by Bhagavat Geeta Sloka for the upliftment of society.

RAISING DAY CELEBRATION AT SSPL

Solid State Physics Laboratory (SSPL), Delhi, celebrated its 62nd Raising Day on 08 April 2024. The event was inaugurated by Air Marshal Sandeep Singh PVSM, AVSM, VM (Retd.), the Chief Guest of the occasion, and Dr Meena Mishra, OS & Director, SSPL. During his address, the Chief Guest congratulated all employees for the celebration and highlighted the importance of SSPL for the country. He emphasised that SSPL should be proud of the technologies it is dealing with, citing that the miniaturization of semiconductor devices has changed the forces over the course of time. On the occasion,

Director, SSPL expressed her gratitude and appreciation to all of SSPL's employees for completing activities during the year 2023. The SSPL Annual Report 2023 and the Hindi magazine 'Pratibimb' with technical and literary articles were released on the occasion.

As part of the celebration, various events like the NB Bhat Vision to Reality, slogan competition, quiz competition, and various sports events like cricket, chess, carom, badminton, table tennis, and volleyball were organised where all members of the SSPL family participated with zeal and enthusiasm. Winners of the events were awarded by the Director, SSPL. Dr Sunil Kumar Sc 'F' delivered the vote of thanks.

DGRE ORGANISED FIRE SAFETY WEEK-2024

Fire Safety Week (FSW)-2024 was observed at Defence Geoinformatics Research Establishment (DGRE), Chandigarh, during 14-20 April 2024 on the theme 'Ensure Fire Safety to Contribute Towards Nation Building' to understand the importance of a safe and fire resistant environment for the long term advancement of the nation. As a part of FSW, Shri MK Kalra, Associate Director, DGRE, addressed the gathering about the safety of lives under the devastation of fire and explosions, safety precautions and exploring the ways to make the office a safer place for employees. Lt Col Vasul Sharma, Safety Group Head &

Fire Section, Shri Harikrishnan G, Fire & Safety Officer with DGRE Fire personnel's Shri Surjeet, Shri Amar Malik, and Shri Naveen Kumar coordinated and carried out the mock drill of fire situation with evacuation drill at DGRE premises.

NATIONAL SAFETY WEEK-2024

HEMRL, Pune

To promote a positive safety culture in the laboratory, High Energy Materials Research Laboratory (HEMRL), Pune, celebrated National Safety Week (NSW) during 04-10 March 2024.

A NSW celebration was organised on 07 March 2024. Shri Ruskin Damani, VP & Safety & Operational Risk of Reliance Industries, Mumbai, was the Chief Guest of the occasion. All employees took a safety pledge. Director, HEMRL, addressed the gathering stressed the importance of a very positive safety culture among the employees to keep safety a priority at the workplace and that there will be zero tolerance for safety violations. The 27th issue of the Safety, Health, & Environment (SHE) bulletin was released at the hands of the Chief Guest. Prizes were distributed to winners of various competitions and for the best articles in SHE bulletins 2024.

INMAS, Delhi

The National Safety Week 2024 was celebrated at the Institute of Nuclear Medicine and Allied Sciences (INMAS), Delhi, during 04-10 March 2024. The focus was on building a positive safety culture, motivating employees to make the workplace safer, and promoting participation in various safety activities. All of the establishment's employees took the safety and health pledge in accordance with the guidelines.

A technical presentation was delivered by Prof. Radheshyam Sharma, Department of Environmental Sciences, University of Delhi, Delhi, on 06 March 2024. All officers and staff attended the presentation. The program was organised by Dr Raunak, Sc 'F' & Institute Safety Officer, and her team.

MTRDC, Bengaluru

The 53rd National Safety Week was celebrated at the Microwave Tube Research and Development Centre (MTRDC), Bengaluru, during 4-10 March 2024. A safety pledge was administered by Dr SK Datta, OS & Centre Head, MTRDC, and a safety lecture was also organised. Shri Susant Kumar, Fire Officer Army (Retd) & Safety Officer, GTRE, delivered a lecture on 'Safety and Stress Management during Crisis'.

A hands-on training on the operation of the CO2-based fire extinguishers was arranged by the MTRDC Safety Team for the MTRDC officers and staff on 06 March 2024. There was also a safety quiz organised on 07 March 2024, for MTRDC employees to infuse the spirit of safety with respect to the workplace. Both officers and staff of the Centre, participated actively.

HRD ACTIVITIES

DIA-COE DIRECTORS' CONCLAVE AT DRDO HQRS

A two-day DIA-CoE Directors' Conclave was organised by the Directorate of Futuristic Technology Management (DFTM) during 12-13 March 2024 at DRDO HQrs, New Delhi. The conclave was inaugurated by Dr Samir V Kamat, Secretary, DD R&D & Chairman DRDO. All sessions were conducted under the chairmanship of Dr Subrata Rakshit, DS & DG (TM & SAM) with the theme 'Strengthening Directed Research for Futuristic Technologies'. The objectives of the conclave were to strengthen the directed research collaboration for futuristic technologies critical for DRDO's present and future programs. The two-day conclave schedule focused on deliberations in specific sessions for addressing concerns and issues under the directed research policy of DRDO, with a with a focus on evolving mechanisms and the Standard Operating Procedure (SOP) in

the DRDO-Industry-Academia Centers of Excellence (DIA-CoE) in line with the futuristic technology requirements of DRDO.

Dr Kamat, in his address, emphasised to evolve the vibrant R&D ecosystem through DIA-CoEs by creating energy among academia, industry, and DRDO for a fruitful transition of research from academic institutes to industries. Dr Rakshit explained the DRDO's intent in establishing DIA-CoEs. He briefed that centers expected to improve the opportunities and promote the research at a sustainable pace.

Dr N Ranjana, OS & Director DFTM, briefed on the need for rationalising the requirements of all centers, baselining, and solving the issues and bottlenecks in directed research collaborations in a uniform way.

WORKSHOP ON AI FOR INDIAN AIR FORCE

O/o Scientific Advisor to Chief of the Air Staff (SA to CAS) organised a workshop on Artificial Intelligence for the Indian Air Force during 14-15 March 2024 at Air Force Station, New Delhi. The workshop was inaugurated in the august presence of Dr Samir V Kamat, Secretary DDR&D & Chairman DRDO, Air Marshal Ashutosh Dixit, AVSM, VM, VSM, Deputy Chief of the Air Staff, and Dr (Smt) Chandrika Kaushik, OS & DG (PC&SI). In his address, DCAS mentioned some important areas, such as piloting in the cockpit and air operations, where AI can be used by the Indian Air Force. The distinguished faculty, Dr G Athithan, DS & Former DG, DRDO presented the inaugural lecture

on 'A Perspective on Artificial Intelligence and Defence'. Lectures covering different realms of AI such as Geo Spatial AI, Computer Vision, Challenges in AI implementation for Airborne Applications, etc. were delivered by esteemed faculty from various DRDO laboratories. Valedictory session was conducted in the august presence of ACAS (Plans), ACAS (Proj), and ACAS (Fin P). AVM George Thomas, ACAS (Plans) signified the role of AI for IAF in his valedictory address and complimented the usefulness of the workshop on AI for IAF. The workshop was concluded with the vote of thanks by Smt Asha Tripathi, SA to CAS.

WORKSHOP ON EMERGING TECHNOLOGIES & CHALLENGES FOR EXOSKELETON

The first international workshop on 'Emerging Technologies & Challenges for Exoskeletons' was organised by the Defence Bio-Engineering & Electromedical Laboratory (DEBEL), Bengaluru during 16-17 April 2024. The workshop was inaugurated by Dr Samir V Kamat, Secretary, DD R&D & Chairman DRDO, in the presence of the Chief of Integrated Defence Staff to the Chairman

Chiefs of Staff Committee (CISC), Lt Gen JP Mathew. In his keynote address, Dr Kamat emphasised the importance of transformational exoskeleton technology and its immense applications in military and civilian environments. Speaking on occasion, the CISC traced back the history of exoskeleton research, its earlier prototypes, and its challenges. He pointed out that the exoskeleton technology, which is a dual-use technology, has tremendous commercial potential.

Prof. Robert Reiner of ETH Zurich and Prof. Arun Jayaraman of Northwestern University, Chicago, Illinois, delivered informative, in-depth technical talks. Dr UK Singh, DG (LS), spoke about the imminent challenges and requirements from the Armed Forces. The workshop was attended by more than 300 participants from DRDO, services, industry, academia, and researchers. Exoskeleton technology involves wearable structures that enhance the capabilities of the human body.

SEMINAR ON WARFARE SIMULATION AT DRDO HQRS

Directorate of Futuristic Technology Management (DFTM), DRDO HQrs, organised a seminar on warfare simulation on 21 March 2024 at DRDO HQrs, bringing together esteemed dignitaries, defence experts, academia and industry leaders to delve into the intricacies of modern military strategy and preparedness through the lens of simulation technologies. The seminar was chaired by Dr Subrata Rakshit, DS & DG (TM & SAM), highlighting the distinction between gaming products in the commercial and entertainment sectors and wargaming software tailored for military usage.

Dr N Ranjana, OS & Director DFTM, during her address underscored the pivotal role of simulation across various aspects of defence, including system design, testing, analysis training, and maintenance. Shri SB Taneja, OS & Director, ISSA, provided insights into naval and land warfare systems.

COURSE ON FIRE FIGHTING AT CFEES

Skill Development Centre (SDC) Pilkhuwa, is a premier training institute of Centre for Fire, Explosive & Environment Safety (CFEES), Delhi. SDC keeps on conducting various residential fire fighting courses for Army, Navy, Air Force, Coast Guard, and various other government organisations. Maximum of these courses are for promotional upgradation of Ministry of Defence (Fire Service) personnel. SDC has recently concluded 166th General Course in Fire Fighting of three

Months duration. The course was inaugurated on 08 January 2024 by Member Secretary, Naval Research Board. Total 60 trainees participated in the course, out of which 57 trainees successfully qualified the course. The course was concluded on 29 March 2024.

COURSE ON SPECIALITY POLYMERIC COATINGS OF NAVAL PLATFORMS AT NMRL

Naval Materials Research Laboratory (NMRL), Ambernath, organised a course on 'Speciality Polymeric Coatings for Corrosion Protection of Naval Platforms' during 15-19 April 2024. Shri PK Singh, Sc 'G', Officiating Director, NMRL, inaugurated the course. Speakers from various DRDO laboratories, IGCAR, Kalpakkam, UICT, Jalgaon, Mumbai University, Shalimar Paints, Nashik, Anuvi Paints, Mumbai, Gammry, Mumbai, Elkay Silicone, Pune, 20 Microns, Mumbai and Talisman Thermocure, Pune, delivered lectures during the course. The lectures were informative and updated the knowledge of participants on the latest trends on polymeric coatings for marine sector.

A visit was also arranged for the participants to various divisions of NMRL to gain insights into NMRL's research areas.

WORKSHOP ON INFORMATION WARFARE AT DIPR

A one-day workshop on Information Warfare (IW) was conducted at the Defence Institute of Psychological Research (DIPR), Delhi, on 11 March 2024. Thirty-one officers (Brig, Col, Lt Col, and Major) from Army War College (AWC) participated in the workshop.

Dr Arunima Gupta, Director, DIPR, delivered a welcome address and shared the contribution of the laboratory in the officers' selection, training, operational preparedness, and effectiveness of the Indian Armed Forces.

The workshop highlighted key areas in the domain of IW

and Cognitive Warfare (CW), such as perception management, influence operations, negotiation with conflict environments, narrative and counter narratives, propaganda, and crowd behaviour analysis. The workshop also covered a wide range of emerging issues, including the applicability of propaganda strategies and understanding individuals and groups in a conflict environment.

PRACTICUM ON CYCLOTRON OPERATIONS & SAFETY OF RADIATION WORKERS IN NUCLEAR MEDICINE AND RESEARCH

Institute of Nuclear Medicine and Allied Sciences (INMAS), Delhi, organised a three-day special training programme on 'Cyclotron Operations, Handling of Theranostic Nuclides and Safety of Radiation Workers in Nuclear Medicine and Research', during 13-15 March 2024. The event was inaugurated by Dr UK Singh, DG (LS) and Dr Sudhir Chandna, Director, INMAS. Dr Puja P Hazari, Sc 'F', was the Course Director, and Dr Sukhvir Singh, Sc 'E', was the Dy. Course Director.

Nuclear medicine specialists and radiological safety officers from Army Hospital (Research and Referral), Delhi, Command Hospital (Southern Command), Pune, Command Hospital (Central Command), Lucknow, Command Hospital (Eastern Command), Kolkata, Command Hospital (Airforce), Banglore, Command Hospital (Northern Command), Chandimandir, INHS Ashvini Naval Hospital, Mumbai and from DRDO laboratories participated in the event. The course was aimed to synergise the armed forces, national & research institutes, and the Department of Atomic Energy to achieve shared goals in the national interest.

WORKSHOP ON ADVANCE CORROSION CONTROL TECHNOLOGIES AT NMRL

World Corrosion Awareness Day was celebrated at Naval Materials Research Laboratory (NMRL), Ambernath, on 24 April 2024. On the occasion, a technical workshop on 'Advance Corrosion Control Technologies for Naval Platforms' was organised by NMRL in association with Association for Materials Protection and Performance. The workshop was graced by Dr Y Sreenivas Rao, DS

& DG (NS&M) as Chief Guest and Dr V Venkateswara Rao, Director, DIA-COE, IIT Bombay as the Guest of Honour. Shri PT Rojatkar, OS & Director, NMRL, welcomed the guests and participants of the workshop. Director, NMRL in his address brought out the motivation and purpose behind organising the workshop.

Eminent personalities in the field of corrosion protection from academia, Indian Navy, and Industries delivered lectures during this workshop. The workshop was attended by about 90 participants from various Indian Naval commands, Academia, DGQA agencies, industries, NMRL, and sister DRDO laboratories.

TRAINING COURSE ON PRODUCT DESIGN & MANUFACTURING OF MISSILE SYSTEMS : TRENDS & PRACTICES AT DRDL

Defence Research and Development Laboratory (DRDL), Hyderabad, organised a two- days training course on 'Product Design & Manufacturing of Missile Systems—Trends and Practices' for Scientists B, C, & D of DRDL during 02-03 April 2024.

During the inaugural event, Shri B Hari Prasad, Sc 'G', Group Director, Engineering, welcomed all the dignitaries, invitees, and participants and gave brief of the course. Dr JVR Sagar, OS & Officiating Director, DRDL, inaugurated the course in the presence of the Chief Guest Shri AK Chakrabarti, Former Director, DRDL, Dr K Nageswara Rao, Sc 'G' & Director, DESIDOC, Dr CVS Murthy, OS & Associate Director (Engg & Testing), Shri Hari Prasad, Sc 'G', Course Director, and Dr J John Rozario Jegaraj, Sc 'F', Course Coordinator.

The monograph titled 'Innovative Practices in Product Development Through the Eyes of a Product Developer' authored by Shri AK Chakrabarti was also released. The Chief Guest Shri Chakrabarti was felicitated by the DRDL fraternity in the presence of distinguished invitees Dr R Balamuralikrishnan, OS & Director, DMRL, Dr Anupam Sharma, OS & Director, DSP and Programme Directors, Project Directors, Group Directors, and Technology Directors of DRDL for his exemplary work towards authoring the monograph.

Shri Chakrabarti also delivered the keynote address sharing his vast experience in the product development and emphasised the importance of product engineering in new product development and in mass productionisation. Finally, Dr Jegaraj delivered the vote of thanks.

INTERNATIONAL LECTURE SERIES ON RADIATION COUNTERMEASURES AND RADIATION CHEMISTRY AT INMAS

An international lecture series was organised at the Institute of Nuclear Medicine and Allied Sciences (INMAS), Delhi, on 13 March 2024. The lecture series aimed to have collaboration and discussion about the radiation protection research activities between AFRRI, Oakland University, and INMAS. The lecture series was delivered by two distinguished speakers from the USA who work in the fields of radiation countermeasures and radiation chemistry.

Prof. Vijay K Singh, SOM-AFRRI and Uniformed Services University of the Health Sciences, Bethesda and Prof. Amitava Adhikary, Department of Chemistry, Oakland University, delivered lectures on 'Development of Promising Radiation Countermeasures for Acute Radiation Syndrome: Efficacy and Biomarkers' and 'Exploring Radiation Chemistry: Implications to Radiation Biology and Radiotherapy', respectively. The speakers were felicitated by Dr UK Singh, DS & DG (LS) and Director, INMAS.

DGRE IN COLLABORATION WITH DESIDOC CONDUCTED A TECHNICAL WORKSHOP

Defence Geoinformatics Research Establishment (DGRE), Chandigarh, in collaboration with Defence Scientific Information & Documentation Centre (DESIDOC), Delhi, conducted a technical workshop on 'Writing High Quality Technical Papers and Effective Utilization of e-Resources subscribed by DRDO'on 10 April 2024 at Chandigarh to enhance the knowledge of DGRE officials for their better contribution in writing research papers. Dr PK Satyawali, OS & Director, DGRE, extended warm welcome and gratitude to Director, DESIDOC, Dr K Nageswara Rao and his team Shri Sudhanshu Bhushan and Ms Dipti Arora. Dr PK Satyawali addressed the DGRE fraternity to develop detail understanding of the technicality involved in writing and publishing research papers. DESIDOC team covered diverse topics ranging from the importance of writing technically sound research papers, navigating the pathways of high-quality publishing in journals of international repute, Scopus database, avoiding plagiarism to improve quality of papers, Utilisation of e-resources of DRDO for knowledge enhancement, DRDO e-library platform, and about DRDO publications. More than 100 participants attended the workshop.

AVALANCHE AWARENESS TRAINING FOR ARMY PERSONNEL AT SIACHEN BATTLE SCHOOL BY DGRE MMC SASOMA

To enhance the troops preparedness towards safer mobility on operational duties and commitments in Siachen of Indian Himalaya, snow-meteorological data collection and avalanche awareness training were conducted by MMC Sasoma, Defence Geoinformatics Research Establishment (DGRE), Chandigarh, in April 2024 for Officers (09 Nos), JCOs (08 Nos), and OR (175 Nos) of units undergoing training before induction at Siachen Battle School (SBS). Capt. Sumit Ojha, Met Officer made them aware about different forms of snow and avalanches, snow-meteorological data collection from instruments and installed

AWS and its transmission. Troops were also detailed about various avalanche safety-rescue procedures and operational issues in snow glaciated region of Siachen that are prone to snow, ice avalanches.

HINDI WORKSHOP AT NPOL

Naval Physical and Oceanographic Laboratory (NPOL), Kochi, organised a one-day Hindi workshop for all Scientists 'F' on 07 March 2024. Shri VS Shenoi, Sc 'G', Member, Official Language Implementation Committee (OLIC), inaugurated the workshop and delivered the inaugural address. Shri VS Shenoi highlighted the importance of official language and emphasised its use in official activities.

The lectures were delivered by Dr Madhusheel Ayilliath, Manager and in charge of Rajbhasha Cell, RBI, Kochi.

The topics covered were 'Role of Executives in Implementation

of Official Language Policy, Parliamentary Committee on Official Language, and New Trends in Technology Available for Hindi'. Shri Ramlochan Awasthi, Sc 'E & Member Secretary, OLIC, welcomed the gathering and proposed the vote of thanks.

HINDI WORKSHOP AT MTRDC

One day Hindi Workshop was organised at the Microwave Tube Research and Development Centre (MTRDC), Bengaluru, on 12 March 2024.

Shri SK Srivastava, Chief Administrative Officer (Retd.), Electronics & Radar Development Establishment (LRDE), Bengaluru, delivered a talk on 'Rajbhasha Nitiniyam and CCS Conduct Rules'.

DESIDOC'S PARTICIPATION IN NATIONAL CONFERENCE AT NIT-WARANGAL

Defence Scientific Information & Documentation Centre (DESIDOC), Delhi, participated in 'National Conference on Emerging Library & Information Technologies' at NIT, Warangal, during 26-27 April 2024. Dr K Nageswara Rao, Director, DESIDOC, was the Guest of Honour during the inaugural event. Director, DESIDOC during his speech spoke about the crucial role of libraries in the present changing scenarios and the association of DRDO and NIT-Warangal through various projects and assignments. Prof. Bidhadyar Subudhi, Director, NIT, Warangal, Prof. B Ramesh Babu, Visiting Professor, Mahasarakham University, Thailand, Prof. K Anand Kishore Kola, Chairman, LAC, NIT Warangal, Dr G Rathinasabapathy, Conference Director, and Dr Veerananeyulu, Organising Secretary, and Librarian, NIT, Warangal, were also present on the occasion. The dignitaries also released the conference proceedings with 150 research papers and a Festschrift Volume in the honour of Dr Veerananeyulu. Dr Faizul Nisha, Technical Officer 'B' also received the best paper award during the two-day conference

HIGHER QUALIFICATION ACQUIRED

Shri Lokesh Srivastava, Sc 'F', Advanced Systems Laboratory (ASL), Hyderabad, has been awarded a PhD from the Department of Mechanical Engineering, National Institute of Technology (NIT), Warangal, Telangana, for his thesis titled 'Studies on Life Aspects of Filament Wound Composites for Aerospace Applications'.

Smt Rema Devi M, Sc 'G', Naval Physical and Oceanographic Laboratory (NPOL), Kochi, has been awarded a PhD for the thesis titled, 'Investigation on Cancellation of Self-noise-Induced Interference Effects in Passive Towed Array Sonar for Shallow Ocean Operations' under the faculty of technology from Cochin University of Science and Technology.

PATENTS GRANTED

DGRE, Chandigarh

A patent number 477473 for 'A Device for Determining and Recording Parameters Related to Snowfall' has been granted by the Indian Patent Office to Prem Datt, Pramod Kumar Satyawali, Praveen Kumar Srivastava, Jagdish Chandra Kapil and Vinod Kumar.

NPOL, Kochi

❄ A patent No. 452513 for 'System and Method for Determining Far Field Transmission and Reception Characteristics of Sonar System' has been granted by the Indian Patent Office to DD Ebenezer, et al., Naval Physical & Oceanographic Laboratory (NPOL), Kochi.

❄ A patent No. 467222 for 'Modular and Scalable Data Acquisition System for Thin Line Towed Array' has been granted by the Indian Patent Office to Nirmal Mohan, Samuel Theophilus M and Shamkumar S, NPOL, Kochi.

NSTL, Visakhapatnam

A Patent No. 510504 for 'A Marine Propeller' was granted by the Indian Patent Office to Dr Rama Krishna Varanasi, Shri Venkata Satya Ganesh Kumar Pakki, Shri Sankara Rao Challa, and Dr Suryanarayan Cheepurupalli, inventors from Naval Science & Technological Laboratory (NSTL), Visakhapatnam, and Dr Bangaru Babu Popuri, from NIT, Warangal.

VISITORS AT DRDO LABORATORIES

DGRE, MMC Sasoma

School students (16Nos) and Teaching staff (10Nos) of Govt Middle School, Tongsted (Nubra), Ladakh visited DGRE MMC Sasoma on 30 March 2024 on educational trip. Students were briefed about hazards associated with snow, dangers of avalanches in snow bound region of Indian Himalaya, snow-meteorological data instruments of DGRE and their operational working, AWS and its transmission of data utilization for avalanche forecasting to troops by DGRE.

They were also detailed about various avalanche safety-rescue procedures in snow glaciated region of Siachen that are prone to snow, ice avalanches.

DIPAS, Delhi

Surg. Comde J Sridhar, Director, Institute of Naval Medicine (INM), Mumbai, visited the Defence Institute of Physiology and Allied Sciences (DIPAS), Delhi, on 04 April 24. He was received by the Director, DIPAS, Dr Rajeev Varshney, followed by deliberations and interactions with senior scientists. He discussed

the physiological requirements of naval services pertaining to divers, their ergonomic studies, nutritional demands, and audio-sonics. The outcome of the discourse was reflected in the need for study projected by INM on commando divers, submariners, and the exoskeleton (upper torso). INM expressed the need for a joint program targeting the changes in divers physiologies based on different depths and temperature ranges. Director, INM expressed his desire for simulation tanks where the temperature of the water can be controlled and the depth should preferably be around 30 meters. It was proposed that DIPAS and INM could jointly work on areas related to non-lethal sonic weapons, naval exoskeletons, and personalized physiological factors for determining susceptibility to sea sickness.

DLRL, Hyderabad

Admiral Karambir Singh, PVSM, AVSM (Retd), Honorary Advisor to the Department of Defence R&D visited the Defence Electronics Research Laboratory (DLRL), Hyderabad on 02 April 2024, to review the running projects. He was accompanied by Cmde. Sunil Pandey and other senior officers of the Indian Navy. Shri N Srinivas Rao, DS & Director DLRL, welcomed Admiral Karambir Singh and accompanying senior officers of the Indian Navy.

The review meeting was attended by additional directors of technology and systems groups and project directors. Shri Tapas Kumar Hazra, Sc 'G', gave a presentation on the status of projects in progress, milestones achieved, and action taken on issues highlighted during previous interactions. Critical technical issues concerning the EW domain were also discussed in the meeting.

Surg. Comde J Sridhar, Director, Institute of Naval Medicine (INM), Mumbai, during his visit at DIPAS, Delhi

DMSRDE, Kanpur

Lt Gen Upendra Dwivedi, PVSM, AVSM, VCOAS visited Defence Materials and Stores Research & Development Establishment (DMSRDE), Kanpur, on 23 April 2024. He was accompanied by Maj Gen C S Mann, VSM, ADG Army Design Bureau (ADB). Dr Mayank Dwivedi, OS & Director, DMSRDE welcomed VCOAS and briefed him about DMSRDE technical activities and ongoing R&D activities followed by demonstration of products and technologies developed by DMSRDE in the area of ceramics

Lt Gen Upendra Dwivedi, during his visit at DMSRDE, Kanpur

& Ceramics Matrix Composites (CMCs), stealth & camouflage materials, nanomaterials, coatings, polymers & rubbers, fuels & lubricants, technical textiles and personal protection systems. He also interacted with DMSRDE team consisting Associate Directors & Divisional Heads and planted a Ashoka sapling in DMSRDE premises.

ISSA, Delhi

❄ Rear Admiral Kunal Singh Rajkumar, VSM, Flag Officer (Doctrines & Concepts), Indian Navy, visited ISSA on 19 March 2024 for familiarisation with ISSA's project activities. ISSA provided him with a comprehensive overview of its projects and activities. This was followed by a demonstration of products developed by ISSA in the area of wargaming and simulation and discussion on the way ahead for future naval projects.

❄ Vice Admiral Sanjay Vatsayan, AVSM, NM visited Institute for Systems Studies & Analyses (ISSA) on 16 April 2024 for familiarisation with ISSA's activities. He was briefed about ISSA's System Analysis Studies and Projects related activities.

MTRDC, Bengaluru

An industrial visit and demonstration of various facilities of the Microwave Tube Research and Development Centre (MTRDC), Bengaluru, was organised for Air Force personnel from 16 TETRA School, AF, Jalahalli East. Three directing staff along with 29 airmen trainees visited the Centre.

Vice Admiral Sanjay Vatsayan, at ISSA, Delhi on 16 April 2024

Rear Admiral Kunal Singh Rajkumar, during his visit at ISSA, Delhi

Industrial visit and demonstration at MTRDC, Bengaluru

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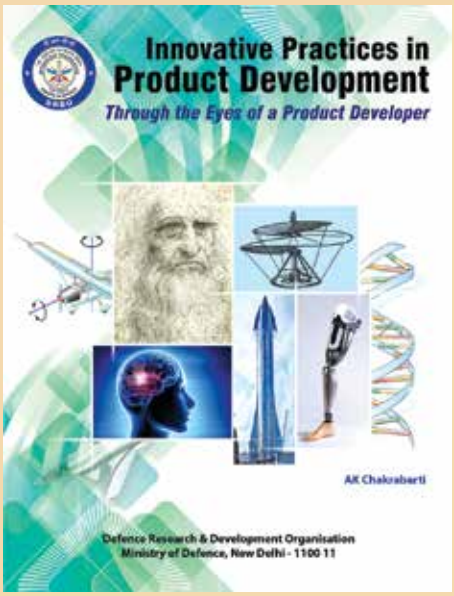

About the Author: Shri Amal Kumar Chakrabarti dedicated forty years to advancing high-end aerospace products and systems. He specialized in rocket propulsion, control actuation systems, and project management for aerospace missions. He pioneered the Bird's Nest Diagram, enhancing connectivity in complex systems. Presently, he delves into research on value-based product development and the philosophical dimensions of engineering design and technology advancement.

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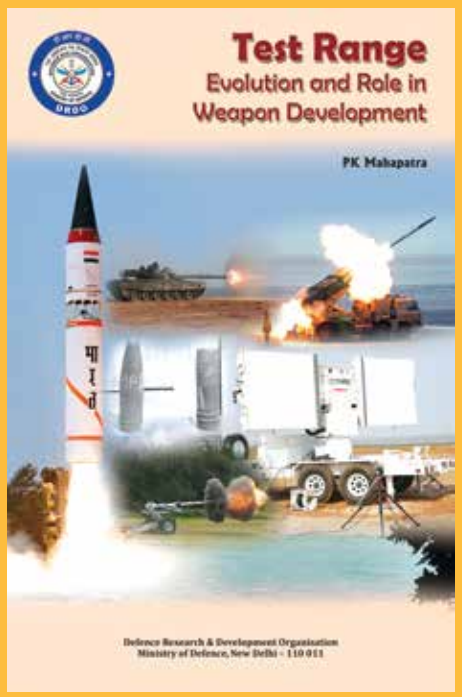

About the Author: Shri PK Mahapatra has worked in the fields of Computer, Propellant Proof, Instrumentation, Materials Management, Administration, and HRD. He completed a 3 month's course in "Programming and Applications of Electronic Computers" from the ISI, Kolkata in 1971-72 on his own. He brought in Computer era to PXE in 1982. His notable achievements were compiling propellant proof reports bypassing reference to all Tables. Another was conversion of angle measurements in range to linear equations to determine spatial coordinates of the point of impact of projectiles. These were besides softwares for finance, materials management and ammunition management.

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