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ATGM HELINA TESTED SUCCESSFULLY

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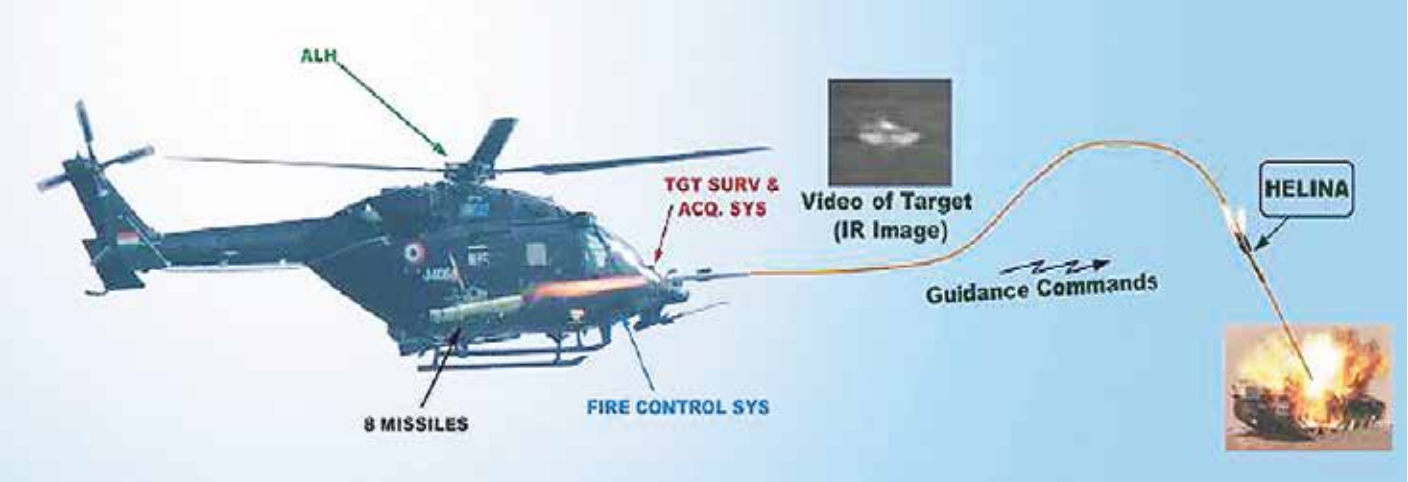

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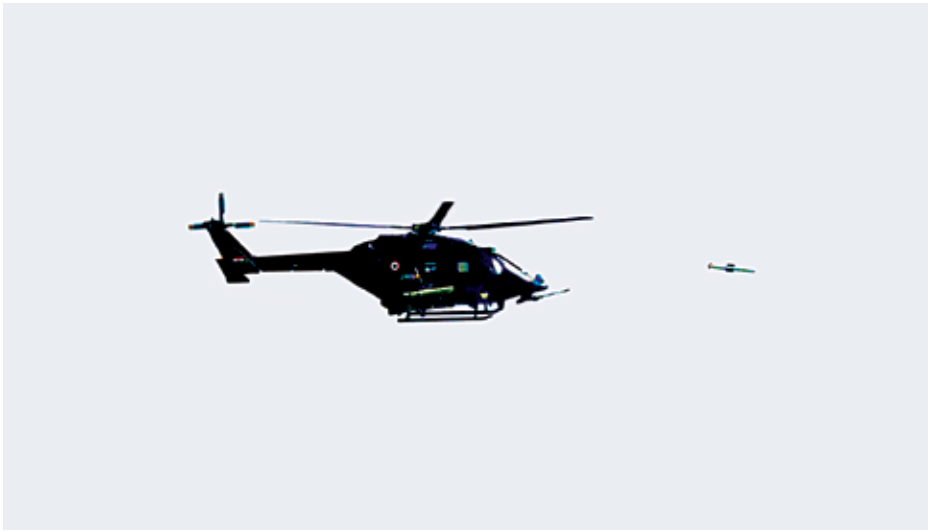
ANTI TANK GUIDED MISSILE HELINA TESTED SUCCESSFULLY

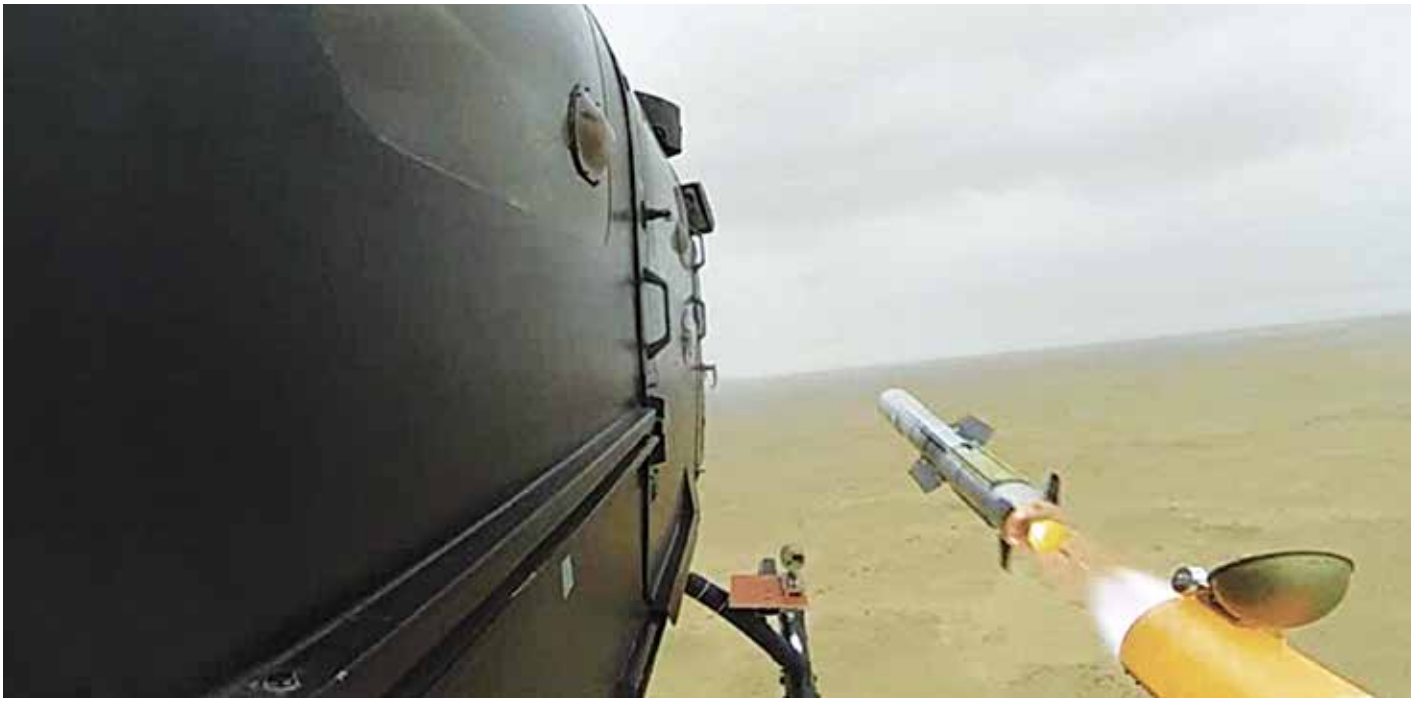
The upgraded air version of 'fire-and-forget' anti-tank guided missile (ATGM) Nag was tested for its full range.

Indigenously developed Helicopter Launched Anti-Tank Guided Missile 'HELINA' was successfully flight tested from light combat helicopter of the Army at 1400 hr in the ranges of Pokhran, on 19 August 2018. The weapon system has been tested for its full range. The 'HELINA' weapon system released smoothly from the launch platform and tracked the target all through its course before hitting it with high precision. All the mission parameters were monitored by the telemetry stations, tracking systems and the helicopters.



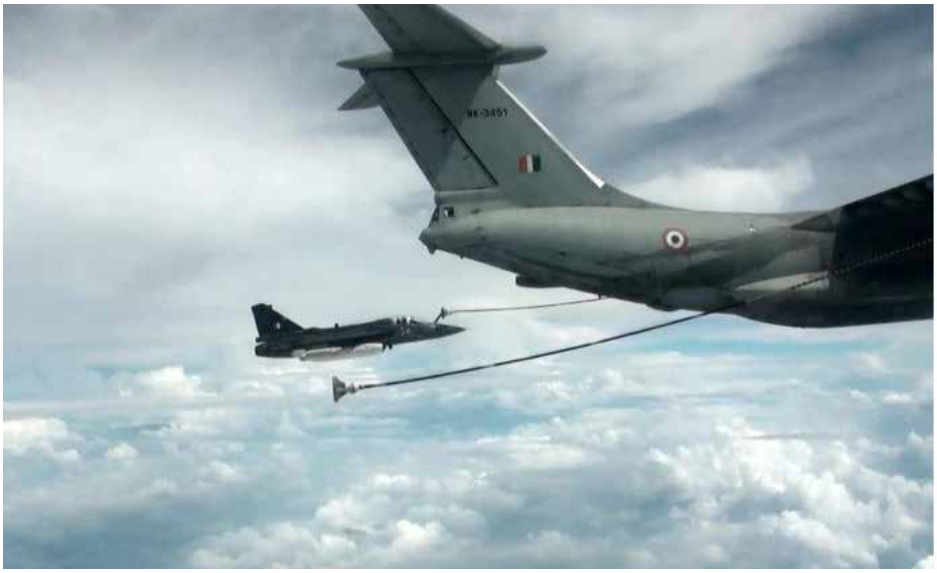
The missile is guided by an Infrared Imaging Seeker (IIR) operating in the 'Lock on Before Launch' mode. It is one of the most advanced anti-tank weapons in the world. Senior officials from DRDO and Indian Army were present during the mission.

Raksha Mantri Smt Nirmala Sitharaman congratulated DRDO and the Indian Army on the successful flight test and for further strengthening the defence capabilities of the country.



INDIAN AIR FORCE CARRIES OUT FIRST EVER MID AIR REFUELLING OF THE TEJAS MK 1

Indian Air Force successfully carried out the first ever mid air refuelling of the indigenously build fighter aircraft Tejas Mk 1 with an IL-78 Mk 1 tanker of the 78 Squadron on 4 September 2018. The tanker flew from its base in Agra while the Tejas took off from Gwalior. The specially modified Tejas aircraft carried out a series of test profiles including a 'Dry Contact' with the tanker. A second Tejas aircraft flying in formation was used to observe the exercise closely.



All flight parameters of Tejas aircraft were transmitted live to a ground control unit set-up at Gwalior airbase, wherein scientists from Aeronautical Development Agency (ADA)—an autonomous society of DRDO—constantly monitored the technical parameters of the mission. Prior to the test flight, extensive ground trials were conducted in all possible conditions under the supervision of ADA scientists. The aircraft is being manufactured by Hindustan Aeronautics Limited.

The success of these trials is a major leap for the indigenous fighter and has enhanced its mission capability by increasing its range and payload. The ability to carry out air-to-air refuelling is one of the critical requirements for the LCA to achieve 'Final Operational Clearance'.

SUCCESSFUL FLIGHT TESTS OF SMART ANTI AIRFIELD WEAPON

Indigenously designed and developed Smart Anti Airfield Weapon (SAAW) guided bomb was successfully flight tested from IAF aircraft at Chandan range. The weapon system, integrated with live warhead, destroyed the targets with high precision. The telemetry and tracking systems captured all the mission moments. The weapon is capable of destroying variety of ground targets using precision navigation. A total of three tests with different release conditions were conducted during 16-18 August 2018 meeting all the mission objectives.

The weapon has undergone eight developmental trials till date and its performance for different ranges under multiple launch conditions has been demonstrated. Senior officials from DRDO, HAL and Indian Air Force participated and witnessed the flight tests.

Raksha Mantri Smt Nirmala Sitharaman congratulated DRDO, IAF and HAL on the successful flight tests and for further enhancing the defence capabilities of the country.

ROTARY MIXER COMPLEX INAUGURATED AT ACEM

The Rotary Mixer Complex was inaugurated at Advanced Centre for Energetic Materials (ACEM), Nasik, on 13 July 2018 by Shri Pravin Kumar Mehta, DS and DG (ACE), DRDO, making ACEM a unique facility with capability of processing HD 1.1 class of solid rocket propellant in the country. The mixer complex houses two rotary mixers of 1000 litre working volume with utilities like hot and cold water system, vacuum system, hydraulic power pack and compressed air system. The system would be used for mixing highly energetic propellant compositions. Shri Srinivasan Seshadri, General Manager, ACEM, explained the requirement and advantages of the rotary mixer over conventional vertical planetary mixers.

Various unique features of the rotary mixer like rotor and mixer wheels with variable speed drive unit, vacuuming unit for rotor chamber, liquid charging system, solid charging system, discharge system, cleaning system, safety interlocks, operational mechanism, PLC/SCADA-based automation were explained to DG (ACE) by Dr SC Bhattacharya, Sc 'G', ACEM, and his team.

As a part of the 'Green India initiative', the function concluded with tree plantation by the Chief Guest, and cluster Directors, Integrated Financial Advisor, Chief Construction Engineers (R&D) West, and representatives of ACE cluster.

V-REALITY SYSTEM INAUGURATED AT ITR

Dr BK Das, OS and Director, Integrated Test Range (ITR), Chandipur, inaugurated V-Reality System developed by the range. The range elements including flight vehicle tracking sensors and allied instrumentation along with the environment have been simulated in the V-Reality platform, using a distributed simulation framework to accurately assess the performance of the range elements during mission before conducting the same. The system will help ITR in deciding the optimal resource deployment required for a given mission geometry. This will be equally helpful in training range personnel by providing a real-time environment for training under different mission scenarios. This is the first of its kind system in the country.

DMRL ORGANISED INTERNATIONAL STRUCTURAL INTEGRITY CONFERENCE & EXHIBITION

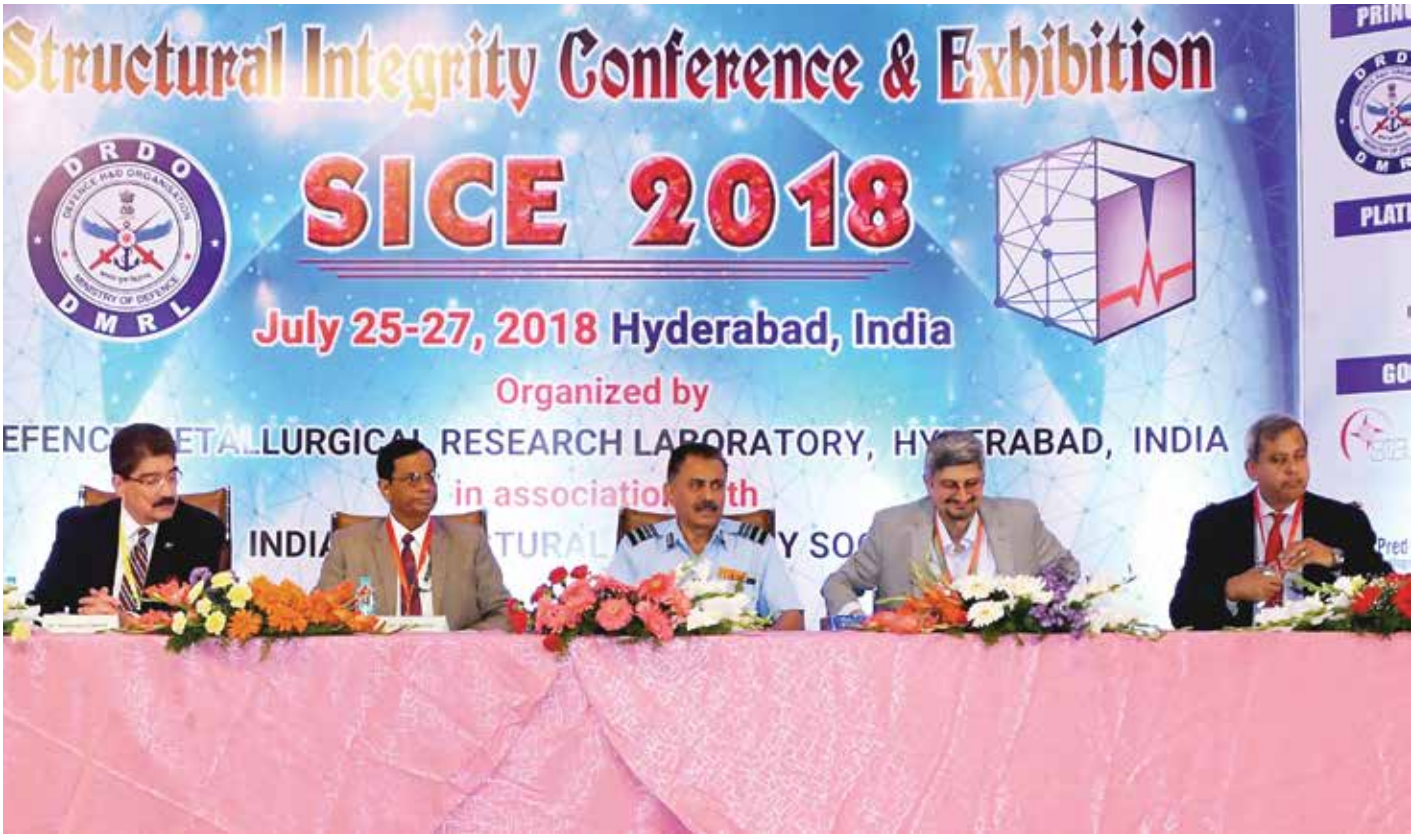
Defence Metallurgical Research Laboratory (DMRL), Hyderabad, organized the 2nd International Structural Integrity Conference and Exhibition (SICE–2018) under the aegis of Indian Structural Integrity Society (InSIS) during 25-27 July 2018. The objective of the conference was to bring together structural integrity and design experts in key disciplines that together determine safety and durability of critical structures.

Dr Vikas Kumar, DS and Director, DMRL, in his opening remarks emphasized on the importance of structural integrity for critical applications to ensure performance, durability, safety and also its reliability and economics of operation.

The Chief Guest Air Marshal Kuldeep Sharma, AVSM, VSM, delivered the inaugural address. Guest of Honour Dr SV Kamat, DG (NS&M), DRDO, inaugurated the technical exhibition. The technical highlights of the opening day included a keynote address by Dr Ravinder Chona, AFRL, USA, and plenary sessions attended by Dr Ashok Saxena, University of Arkansas, USA; Dr Luc Remy from MINES ParisTech, France; Dr Masahiro Endo from Fukoka University, Japan; Dr S Gopalakrishnan and Dr Vikram Jayaram from Indian Institute of Science (IISc), Bengaluru, Dr Alberto Carpenteri from Politecnico di Torino, Italy and Dr HJ Christ from University of Siegen, Germany.

Over 400 delegates including 30 eminent foreign delegates representing the academia, research laboratories and industry attended the conference. The global event attracted a host of excellent orations, keynote addresses, plenary sessions, more than 250 contributory lectures and more than 50 poster presentations. Twelve exhibitors showcased their products in the conference.

A pre-conference workshop on 'Elements of Mechanical Behaviour and Structural Integrity' was organized during 23-24 July 2018 to benefit young research scholars. The workshop systematically explored various elements of mechanical behaviour between basic and the applied research.



DIHAR ORGANIZED LADAKHI KISAN-JAWAN-VIGYAN MELA

Defence Institute of High Altitude Research (DIHAR), Leh, an agro-animal R&D institute of DRDO located in the high altitude cold trans-Himalayan region of Ladakh, organized the 25 Ladakhi Kisan-Jawan -Vigyan Mela during 11-12 August 2018. The mela is being organised every year to disseminate technical know-how of various agro-animal technologies developed by DIHAR among the local farmers and troops deployed in Ladakh sector.

The event was inaugurated by Lt Gen SK Upadhya, AVSM, SM, VSM, General Officer Commanding, HQ 14 Corps. Gen Upadhya appreciated the scientists and local farmers for providing quality organic fresh foods to the troops. Over the years, the Mela has grown in it size and scope and evolved as a platform for interaction among farmers, troops and scientists. It not only aids in dissemination of technologies developed by the scientists at DIHAR but also portrays the harmony between scientists, army and civil population in the remote and strategic Ladakh sector.

The valedictory ceremony was presided over by Shri Dorjay Motup, Hon'ble Chief Executive Councillor, Ladakh Autonomous Hill Development Council. In his address, Shri Motup advised local farmers to take benefit from DIHAR's technologies to make Ladakh self-sufficient in fresh food production. He also urged farmers to pay frequent visits to the lab and obtain guidance for adoption of new and appropriate technologies.

In line with DIHAR, the mela was also organized at DIHAR Detachment in Siachen Sector on 26 August 2018. Col Vikram Bhan, Dy Cdr, HQ 102 Inf Bde, presided over the function. Besides, DIHAR, various other agencies, viz., State Department of Horticulture, Agriculture, Animal Husbandry, Sowa Rigpa Unit, WWF, Farmers Cooperative Societies/Self Help Groups, and various NGOs displayed their products and technologies in the Mela. Around 21,000 visitors including farmers, military and para-military force personnel, school children, and local population visited the mela.

XXV TAMHANKAR MEMORIAL LECTURE

Defence Metallurgical Research Laboratory (DMRL), Hyderabad, in association with Indian Institute of Metals (IIM), Hyderabad Chapter, organized XXV Tamhankar Memorial Lecture on 30 July 2018 to commemorate the contributions of Dr RV Tamhankar, founder Director, DMRL, and founder CMD, Mishra Dhatu Nigam Limited (MIDHANI), Hyderabad. The Chief Guest Shri S Somnath, Director,

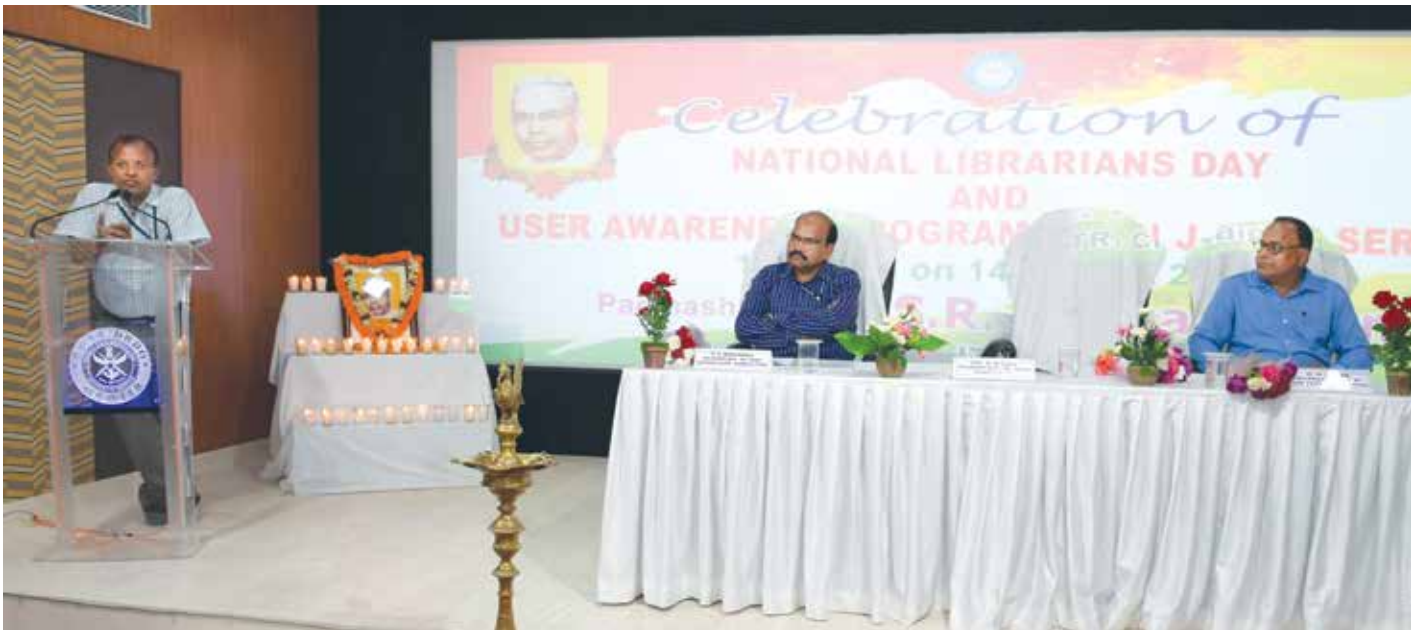
Vikram Sarabhai Space Centre (VSSC), Thiruvananthapuram, delivered the lecture on 'Synergetic Growth of Materials Science and Indian Space Programme.'

Dr Dinesh Kumar Likhi, Chairman, Indian Institute of Management, Hyderabad Chapter, and CMD, MIDHANI, welcomed the audience. Dr Vikas Kumar, DS and Director, DMRL, presented a brief introduction of Dr RV Tamhankar.

ITR CELEBRATES NATIONAL LIBRARIAN'S DAY

National Librarian's Day was celebrated on 14 August 2018 at Integrated Test Range (ITR), Chandipur. Dr BK Das, OS and Director, ITR, inaugurated the programme. He emphasised on the importance of Dr SR Ranganathan's contributions to library and information services in India. Chairman Library Committee Shri CR Ojha, Sc 'F', highlighted Dr Ranganathan's five laws of library science and its relevance. A user awareness programme on J-Gate Services was also organised on the occasion. Shri Mahinder Nath from Informatics Publishing Pvt Ltd, Bengaluru, demonstrated the uses and features of J-Gate Services.

Shri Santosh Munda, Sc 'D', Head Knowledge Centre, ITR, and his team organised the programme.



INDO-US JTG MEETING & C4ISR WORKSHOP

The 20th INDO-US Joint Technical Group (JTG) meeting was organized at Centre for Artificial Intelligence and Robotics (CAIR), Bengaluru, during 13-14 August 2018. A large delegation of around 75 personnel from US and India attended the meeting. A successful demonstration of the Small Intelligent Unmanned Aerial System (SIUAS) was given to the US and Indian delegates. This is a collaborative project between CAIR and ARL, US DoD.

A Indo-US workshop on Command, Control, Communications, Computer Intelligence, Surveillance, and Reconnaissance (C4ISR) was also held at National Institute of Advanced Studies, IISc Campus, Bengaluru, during 16-17 August 2018. The workshop started with opening remarks from Dr G Athithan, DG (MED, CoS & CS), DRDO, and Mr Dale Ormond, Deputy Director (acting), Research, Technology and Laboratories, Office of the Assistant Secretary of Defense for Research and Engineering, US.

Researchers from various DRDO laboratories and from US DoD participated in the workshop. A large spectrum of C4ISR was covered in the workshop as part of the presentations and the discussions on the tentative topics of collaborations.

The first day of the workshop focused on the open issues in the field of C4ISR and culminated in identification of tentative collaborators. The second day was focused on the detailed discussions between interested collaborators.

Twenty-two topics of likely collaboration emerged as an outcome of the workshop.

RAISING DAY CELEBRATIONS

DIC, PANAGARH

DRDO Integration Centre (DIC), celebrated its 10th Lab Raising Day on 3 August 2018. Dr G Satheesh Reddy, the then DG (MSS), DRDO, was the Chief Guest on the occasion and Shri MSR Prasad, DS and Director ASL and DRDL, and Programme Director LRSAM, was the Guest of Honour. Directors and Project Directors from various labs and senior Army Officers from various units from the base graced the occasion.

Shri M Sankar Kishore, General Manager, DIC, welcomed the guests and highlighted the achievements of the centre. He shared his future vision especially in the areas of new facility development for strategic systems.

Dr Reddy, in his address appreciated the contributions of DIC and motivated the employees to work hard and take DIC to new heights. Shri Prasad outlined the growth story of DIC and appreciated its achievements. The Chief Guest and the Guest of Honour distributed lab-level DRDO Awards, Cash awards, and Sports Awards.

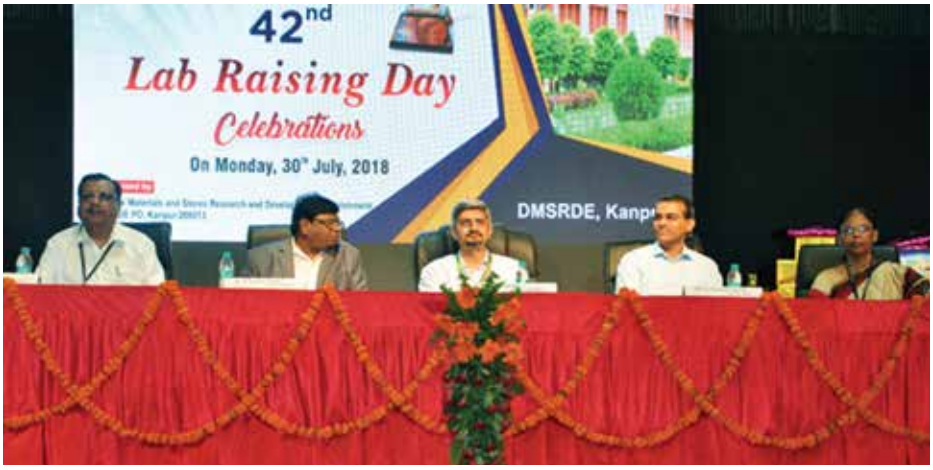
Dr G Satheesh Reddy also laid the foundation stone of New Quarter Building at DRDO Residential Complex.

DMSRDE, KANPUR

Defence Materials and Stores Research and Development Establishment (DMSRDE), observed its 42nd Lab Raising Day on 30 July 2018. Dr SV Kamat, DG (NS&M), was the Chief Guest and Shri S Kedarnath Shenoy, OS and Director, Naval Physical and Oceanographic Laboratory (NPOL), was the Guest of Honour of the ceremony. Among the other guests Dr OR Nandagopan, Director, Naval Science and Technological Laboratory (NSTL); Dr M Patri, Director, Naval Materials Research Laboratory (NMRL) and DLJ; and other senior officers were also present. The ceremony started with tree plantations by the guests and was followed by the inauguration of multi-utility facility by DG (NS&M).

Dr N Eswara Prasad, OS and Director, DMSRDE, presented DMSRDE's achievements. He also spoke about DMSRDE projects, products, technology transfer, and its other activities.

The Chief Guest in his address stressed on the necessity of interaction among the cluster laboratories. The Guest of Honour expressed his outlook regarding DMSRDE celebration. Laboratory-level DRDO Awards, DMSRDE special awards and sports awards were distributed by the Chief Guest and the Guest of Honour. The function ended with a memorable cultural programme.



RCI, HYDERABAD

Research Centre Imarat (RCI), celebrated its 30th Annual Day on 27 August 2018. Prof. K Vijay Raghavan, Principal Scientific Advisor to the Government of India, was the

Chief Guest and Shri MSR Prasad, DS and Director, Defence Research and Development Laboratory, and Advanced Systems Laboratory was the Guest of Honour. Shri L Sobhan Kumar, OS, RCI, gave an account of welfare activities organised during last one year.

'Anmol', RCI women's magazine and 'RCI 1988-2018: A Saga of Avionics in Missiles' were released on the occasion. The book provides an overview of RCI's history, achievements, and missile programmes.

DR REDDY UNVEILS DR KALAM'S STATUE

Dr G Satheesh Reddy, the then DG (MSS) and SA to RM, unveiled the statue of Dr APJ Abdul Kalam at the Abdul Kalam Island, Odisha. Dr Manjula, DG (ECS), Shri SP Dash, DS (Retd), Shri AK Chakraborty, DS (Retd), Dr Tessy Thomas, DS and DG (Aero), Dr BK Das, OS and Director, ITR, were present during the function.

The occasion also witnessed the successful test firing of Ballistic Missile Interceptor Advanced Area Defence (AAD) in the presence of Chief of the Air Staff, Air Chief Marshal BS Dhanoa and other senior officiers. The successful test firing was the befitting tribute to Dr Kalam.

VAN MAHOTSAV

DESIDOC, DELHI

Defence Scientific Information and Documentation Centre (DESIDOC), organised Van Mahotsav on 7 August 2018 by conducting a plantation drive. Dr Alka Suri, Director DESIDOC, inaugurated the programme and highlighted the importance of clean and green environment. A large number of employees enthusiastically took part in the programme and more than 87 saplings were planted in DESIDOC premises. The event provided a golden opportunity to the employees to connect with the mother nature and to demonstrate their commitment to social responsibility.

DMRL, HYDERABAD

Defence Metallurgical Research Laboratory (DMRL), organised tree plantation drive on 20 July 2018 as a part of Green India Programme. Dr Vikas Kumar, DS and Director, DMRL, inaugurated the programme by planting the saplings. A large number of officers and staff took part in the event. Different varieties of trees including Gulmohar, Mahogany, Pipal, Neem, and Tecoma were planted.

SASE, CHANDIGARH

Snow and Avalanche Study Establishment (SASE) Officers' Wives Club (OWC) conducted tree plantation drive with zeal and enthusiasm in Sector 24, Sector 38 and Sector 42 of Chandiagrh. The aim of the drive was to sensitise the importance of plantation and cleanliness. To provide effective messaging of the campaign to the residents, banners were also displayed. President SASE OWC, Smt Renu Gupta, encouraged members to participate in 'Swachh Bharat Abhiyan' and tree plantation with the slogan of 'Go Green to make the Earth Clean'.

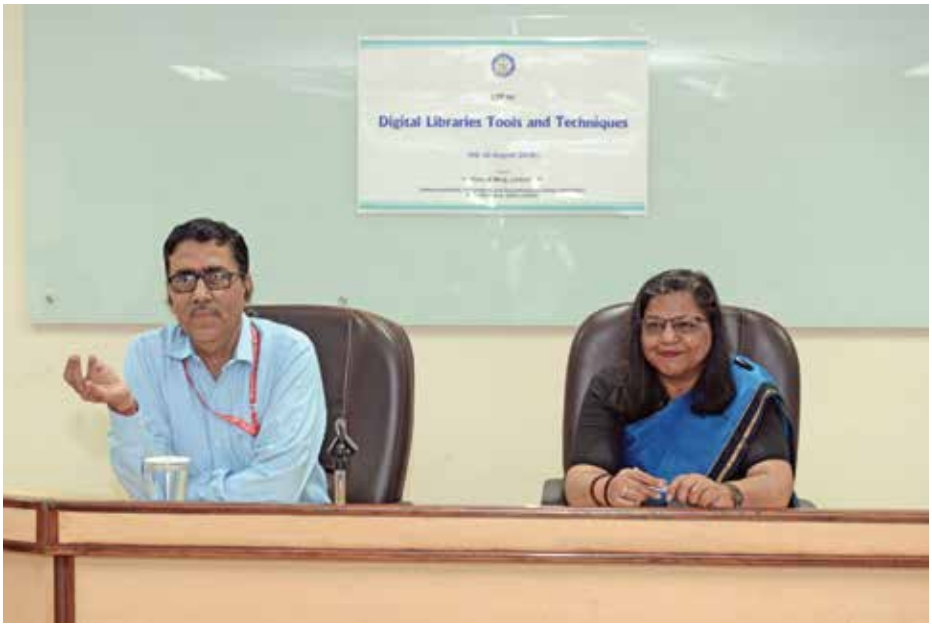
COURSE ON INTELLECTUAL PROPERTY RIGHTS FOR SOFTWARE

Centre for Artificial Intelligence and Robotics (CAIR), Bengaluru, organised a three-day course on 'Intellectual Property Rights for Software' during 8-10 August 2018 under the Continuing Education Programme (CEP) of DRDO. The objective of the course was to create awareness among the scientific community and foster the culture of IPR in DRDO by providing an insight into recent developments in the discipline of IPR (software) in DRDO and outside.

Eminent speakers in the area of IPR from academia (IIMB, NLSIU and IPTEL/IISc), industry (Samsung R&D, Origin IP Solutions and Banana IP Counsels) and DRDO (Directorate of ER&IPR and Directorate of QRS) deliberated on the various topics aligning to the CEP objectives. Forty-two participants attended the course.

COURSE ON DIGITAL LIBRARIES TOOLS AND TECHNIQUES

Defence Scientific Information and Documentation Centre (DESIDOC), organised a CEP course on 'Digital Libraries Tools and Techniques' during 6-10 August 2018. Dr Rajeev Vij, Sc 'G', coordinator of the course, welcomed and briefed the participants about the purpose of the course. Dr Alka Suri, Director, DESIDOC, inaugurated the course and stressed on the need of digitisation and digital connectivity amongst all DRDO libraries for effective resource sharing. The course comprised lectures, demonstrations, hands-on training and visit to NISCAIR. Sixteen invited talks by the experts were organised to upgrade the knowledge of participants. Twenty-one participants attended the course.



TARGETED TRAINING COURSE ON FUNCTIONAL FOODS AND NUTRACEUTICALS

A targeted training course on 'Functional Foods and Nutraceuticals' was conducted at Defence Food Research Laboratory (DFRL), Mysuru, from 24 July 2018 to 4 August 2018. The course was inaugurated by Dr Rakesh Kumar Sharma, Director, DFRL, and Dr Farhath Khanum, Sc 'G', and Head Nutrition, Biochemistry and Toxicology Division.

The training was organised in view of the new regulations and health claims of functional foods related to eating disorders like obesity, heart disease, osteoporosis, cancer, diabetes, nutrition for various terrains, foods for radiation protection, Nanoceuticals, etc. State-of-

the-art training was provided during the course.

Thirty-three participants from ASC Battalion, Arunachal Pradesh and Meerut; Armed Forces Medical College, Pune; DGMS Army, Delhi; INS Kadamba; Food Inspection Unit, Chennai; Institute of Aviation Medicine, IAF, Bangaluru; DIHAR, Leh; DIBER, Haldwani; DRL, Tezpur; and DFRL, benefited from the course.

Participants of the course on Functional Foods and Nutraceuticals

ONE-DAY HINDI WORKSHOP & REFRESHER COURSE FOR OFFICIAL LANGUAGE CADRE

High Energy Materials Research Laboratory (HEMRL), Pune, organized a one-day Hindi workshop on 'Rajbhasa Hindi and its Implementation' on 8 August 2018. The workshop was inaugurated by Dr Raj Kishore Pandey, Sc 'H', who in his inaugural address expressed that implementation of Hindi in offices is dependent on the will of individuals and it is the responsibility of the organization to support the efforts taken by the employees. Dr Himanshu Shekhar, Sc 'G' and Chairman Hindi Committee, gave a brief outline of the workshop and asked the participants to extract maximum benefits from the eminent speakers.

Research and Development Establishment (Engrs) [R&DE(E)] Dighi, Pune, in association with Centre for Personnel Talent Management (CEPTAM), Delhi, organised a 'Refresher Course' for Official Language Cadre during 25-27 July 2018. The programme was inaugurated by Director Shri VV Parlikar and Group Director Administration and Upadhyaksha, Official Language Implementation Committee. Twenty-eight participants, which included

Assistant Directors (Official Language), and senior and junior translators, working in various DRDO laboratories/ establishments. Lectures on various topics like Inspection of Parliamentary Official Language Committee, Quarterly Progress Report, Practical Difficulties in Administrative Translation, Challenges of Future and Hindi in the Present Scenario, Drafting and Noting in Hindi, Hindi in Science and Technology, etc., were delivered during the course.

COURSE ON FUNCTIONAL POLYMERS AND COMPOSITE MATERIALS

A course on 'Functional Polymers and Composite Materials for Defence Application' was organized at Defence Materials and Stores Research and Development Establishment (DMSRDE), Kanpur, during 6-10 August 2018. Dr N Eswara Prasad, OS and Director, DMSRDE, and Prof. Susanta Banerjee, Materials Science Centre, IIT Kharagpur, inaugurated the course.

The objective of the course was to impart an overview of functional polymers and composite materials, and update the knowledge of the participants on the latest developments in this class of fascinating materials. It was also aimed to discuss the fabrication and characterization of such important class of materials and their defence and aerospace applications.

Forty-three participants attended the course. Various topics covered during the course included: Functional polymers and composite materials and their characterization, Commercial polymer production of various polymers, Smart and self-healing polymers, high temperature resins and inorganic polymers, Polymer rheology and their processing, etc.

Faculty from IIT-Kharagpur, IIT-Kanpur, BIT-Mesra, HBTU-Kanpur, NB University, DMSRDE and from industry delivered the lectures. Participants visited various Divisions and Facilities of DMSRDE to become aware of various polymeric, elastomeric and composites materials and products.

Dr DS Bag, Sc 'F', was the Course Director, and Dr Gobardhan Lal, Sc 'D', was the Course Coordinator.

Participants of the course on Functional Polymers and Composite Materials

WIDENING ADMINISTRATIVE SKILLS PROGRAMME

Institute of Technology Management (ITM), Mussorie, conducted a three-day Widening Your Administrative Skills (WYAS) programme during 9-11 August 2018 for newly appointed Directors of DRDO. Twenty Directors from various DRDO laboratories/ establishments and DRDO HQ participated in the programme. The objective of the course was to enhance leadership capabilities to tackle new technological and HR challenges at strategic as well as operational level, create leadership bandwidth to lead the organisation towards realisation of its vision and to acquaint the participants with the procedures of all corporate functions.

Dr SC Sati, DRDO Chair, and former DG (NS&M), was the Chief Guest of the inaugural function. Dr Hina A Gokhale, OS and DG (HR), DRDO, was the Guest of Honour. DG (HR) deliberated upon the aim and importance of organizing the programme and expectations of DRDO from the newly appointed Directors. Dr Sati deliverd the keynote address on 'Strategies for Managing a Knowledge Intensive Organization.'

Lectures on various topics, viz., Leadership, Do's and Don'ts for Directors, administrative as well as project related function, CCS Conduct and Disciplinary Procedures, etc., were delivered.

Participants of the Widening Your Administrative Skills programme

ITM also conducted a four-day course on 'Procurement Manual 2016' during 23-26 July 2018. Forty officials from various DRDO labs/estts attended the course. The objective of the course was to discuss and acquaint the participants with the provisions contained in PM 2016 so as to ensure timely procurements.

The course was inaugurated by Shri Sanjay Tandon, OS and Director, ITM. In his welcome address, Director ITM, deliberated upon the importance of understanding the PM 2016 for effectively performing the procurement activities.

Shri Saurabh, Integrated Financial Advisor, Dehradun, was the Guest Speaker and delivered a lecture on 'Aspects to be Considered while Seeking IFA Concurrence'.

COURSE ON MATERIALS AND PROCESSES FOR UNDERWATER VIBRATION AND NOISE CONTROL

ACEP course on 'Materials and Processes for Underwater Vibration and Noise Control' was conducted at Naval Physical Oceanographic Laboratory (NPOL), Kochi, during 3-7 September 2018. The objective of the course was to introduce the participants to the existing and emerging noise and vibration control technologies, especially for underwater applications and to develop skills and competence in this field. Shri S Kedarnath Shenoy, OS and Director, NPOL, inaugurated the course. Dr PVS Ganesh Kumar, OS, NSTL, delivered the keynote address on 'Emerging Trends in Vibration and Noise Control of Marine Platform'.

The topics covered in the course included: Principles of Sound and Vibration, Measurement Techniques, Vibration Damping, Passive and Active Vibration Control, Principles of Sound Absorption, Modelling and Simulation of Vibration and Control, Characterization of Polymeric Materials, etc.

Twenty-nine participants attended the course. Dr NR Manoj, Sc 'F', and Dr Rahna K Shamsudeen, Sc 'E', were the Course Coordinator and Deputy Course Coordinator, respectively.

Participants of the course on Materials and Processes for Underwater Vibration and Noise Control

COURSE ON SAFETY PRACTICE IN INDUSTRIAL PROCESS

Proof and Experimental Establishment (PXE), Chandipur, organised a course on 'Safety Practice in Industrial Process' from 30 July 2018 to 3 Aug 2018.

Topics like DRDO Safety Policy and Culture, Radiological and Electromagnetic Safety Measures, Safety from Failure Analysis, Environmental Safety, Occupational Health Safety, Compressed Air/Gas (Cylinder) Safety, Industrial Safety Practices, Electrical Safety, Fire Safety, Workshop Safety, etc., were covered by expert faculties from DQRS, DRDO HQ; INMAS; ITR; Birla Tyres, Balasore Alloys Ltd; Fire Office, Balasore, and PXE.

Twenty-seven participants attended the course. Shri DK Behera, Sc 'E', was the Course Director.

Participants of the course on Safety Practice in Industrial Process

PERSONNEL NEWS

PROMOTIONS

Distinguished Scientist

DMRL, Hyderabad

Dr Vikas Kumar, OS and Director, Defence Metallurgical Research Laboratory (DMRL), has been elevated to the grade of Distinguished Scientist (DS) wef 26 July 2018. He obtained his Bachelor's degree in Metallurgical Engineering from IIT, Roorkee (earlier University of Roorkee) in 1980, MTech from IIT, Kanpur in 1982 and PhD from IIT, Madras in 1995. He has been a Visiting Scientist for two years at Centre Des Materiaux, ENSMP, Paris, France and has worked under the framework of an Indo-French collaborative research programme on development of advanced materials for aero engines.

Dr Vikas Kumar joined DMRL in 1982. He has developed expertise in the area of Fatigue and Fracture Mechanics in DMRL for more than three and half decades developing several application software codes for online testing and analysis. He has made pioneering contributions to several projects in DMRL related to development of materials for aerospace, armour and naval application. Presently, he is involved in thermomechanical fatigue, damage mechanics, life prediction and structure integrity analysis of military aero engines and weapon systems.

He has been responsible for setting up of various collaborative research programmes within India with IITs and abroad with US, France, Russia and Canada. He has initiated a multi-disciplinary project on development of life prediction technologies for aero engine components for Indian Air Force (IAF). Realising IAF's urgent requirements, he undertook a multidisciplinary task of life extension studies of military aero engines of AN-32 and Sukhoi-30 Mk 1 aircraft. Recent successful implementation of life extension programme for AI-20D aero engines of AN-32 aircraft has been a first major joint indigenous effort by DRDO within the country.

His fundamental and applied research work has led to several Indian and International patents, and awards such as SAIL Gold Medal, National Research and Development Corporation's NRDC Award, United Nation's WIPO Gold Medal for meritorious invention, DRDO's Technology Group Award and Agni Award for Excellence in Self Reliance.

RCI, Hyderabad

Shri BHVS Narayana Murthy, OS and Director, Research Centre Imarat (RCI), has been promoted as DS wef 26 July 2018. He is an Aerospace Scientist well renowned for his R&D in missile technologies and sustained contributions towards advancement of aerospace industries in India. He is spearheading the development of avionics technologies in critical areas of navigation, embedded computers, control, guidance, simulation, RF and IR Imaging Seekers, Telemetry for Indian missiles and other defence programmes.

He has made significant

national contributions towards design, development and delivery of onboard computers, missile launch processors, real-time mission software with novel fault tolerant schemes and System-on-Chip (SoC) for missions of national significance. Shri Murthy has pioneered the development of embedded computers and other critical avionics sub-systems, which have been successfully flight tested in all the three missions of the country's first ICBM class Agni 5 missile. His technological contributions have left a lasting imprint on the technology map as well as the defence preparedness of the country. He led the development and production of miniaturized SatNav receivers and SoC bringing in quantum jump in miniaturization of onboard avionics.

Shri Murthy graduated in Electronics and Communication Engineering from REC, Warangal and received his MTech from JNTU, Hyderabad. For his significant lifetime contributions to Aerospace Engineering, Mr Murthy has been inducted as Fellow of the Indian National Academy of Engineering. He is also a Fellow of IETE, senior member of IEEE, Life Member of Aeronautical Society and Computer Society of India.

For his pioneering contributions to Defence R&D, he has been bestowed with Rocket and Related Technologies Award by the Astronautical Society of India. As a team leader, he received the prestigious Agni Award for Excellence in Self Reliance. He is also a recipient of DRDO Scientist of the Year Award, Path Breaking Research/Outstanding Technology Development Award and DRDO Performance Excellence Award.

Outstanding Scientist

DMRL, Hyderabad

Dr VV Satya Prasad, Sc 'G', has been elevated to the grade of Sc 'H' (Outstanding Scientist) wef 26 July 2018. Dr Prasad obtained BTech (Metallurgy) from National Institute of Technology, Warangal and PhD (Metallurgy) from IIT Mumbai. He joined DMRL in 1982 and started pursuing research in the area of Electroslag Remelting (ESR).

Dr Satya Prasad's extensive scientific studies on this important process has culminated in the development and facile production of very high quality speciality ESR grade steels for 30 mm anti-aircraft gun barrels, torsion bars for T-72 tanks and Pinaka rocket tubes. He is also instrumental in establishing advanced electro-slag casting facilities in DMRL. In the absence of known methods to recycle light/fine scrap of metals and alloys,

Dr Prasad has designed and developed non-consumable electrodes to produce oxygen free high conductivity copper and nickel-base super-alloy ingots from scrap. He is a pioneer in developing electroslag cladding technique to make stainless steel lined low alloy naval steel to protect the latter from sea water corrosion.

He currently heads a project for development of materials for hypersonic vehicles with a special commitment to develop very high temperature niobium based alloys for use in combustion chambers. Dr Satya Prasad has been awarded IIM-SAIL Gold Medal, National Technology Day Oration Medal and DRDO Laboratory Scientist of the Year Award. He has guided a number of BTech and MTech projects and is presently guiding three scientists for their doctoral programme.

HEMRL, Pune

Dr RK Pandey, Sc 'G', has been promoted to the grade of Sc 'H' wef 26 July 2018. Dr RK Pandey obtained BTech (Chem. Engg.) from HBTI, Kanpur, and PhD in Environmental Science from Savitribai Phule Pune University. He has more than 37 years of professional experience both within and outside DRDO including industry (Production), R&D and Project Management.

He has made outstanding contributions in the area of propellants, high explosives and related technologies, process engineering and environmental studies of High Energy Materials (HEMs) and their eco-friendly disposal. He has played key role in creating propellant processing facility at Ordnance Factory, Itarsi. He has undergone special short course in Chemical Weapon Convention (CWC) at RMCS, UK in 1997 and subsequently made contributions in execution of OPCW (UNO Body) norms for demilitarization of munitions/products in DRDO. He was deputed to UK, France, China, Ukraine, and Russia for various DRDO assignments.

Dr Pandey has made significant contributions in the domain of process development and scale-up of high performance HEMs and nanomaterials for application in various armament and missile systems. He was instrumental in conceptualizing, designing, development and installation of state-of-the-art Universal Pilot Plant facility for scale-up of HEMs at HEMRL.

He has published more than 100 papers in reputed international and national journals, conferences/seminars and has nine patents to his credit.

He is the recipient of many prestigious awards including DRDO Laboratory Scientist of the Year Award-2006, DRDO Technology Group Award-2008, DRDO National Science Day Oration Award-2010 and Special Award for Contribution to Strategic Systems as a team member. At laboratory-level, he has received Safety Rolling Trophy and Swachchh Bharat Abhiyan Trophy.

He is a recognized guide for postgraduate research in Environmental Science at Savitribai Phule Pune University. He has supervised three PhD thesis.

APPOINTMENT

Commander Anuj Sharma took over the Command of INS Sagardhwani, the ocean research vessel of Naval Physical Oceanographic Laboratory (NPOL), Kochi, on 7 August 2018. INS Sagardhwani is equipped with state-of-the-art facilities to carry out marine acoustic research as well as trials of system components of Sonar in coastal as well as deep ocean waters and is operated by the Indian Navy for DRDO.

AWARDS

Young Alumnus Achiever Award

Dr Praveen Kumar B, Sc 'E', Armament Research and Development Establishment (ARDE), Pune, has been conferred Young Alumnus Achiever Award by NIT, Trichy, for his contributions in the field of functional materials and devices for defence applications.

TOLIC Award

Centre for Personnel Talent Management (CEPTAM), Delhi, was awarded first position for outstanding contribution in Official Language implementation and third position for its in-house magazine 'Pratibha Prasoon' by TOLIC (North Delhi), in the 'Small Office' category for the year 2017-18. Shri Ashok Kumar, Assistant Director (OL), CEPTAM, was also felicitated for his outstanding contribution to OL implementation as a co-ordinating member of TOLIC.

GOC-in-C, ARTRAC Commendation

Shri Sanjeev Kumar, TO 'A', Institute for Systems Studies and Analyses (ISSA), Delhi, has been awarded GOC-in-C, ARTRAC Commendation Card.

CISC Commendation Card

Dr D Vijay Rao, Sc 'G', Smt Aparna Malhotra, Sc 'G' and Shri Babloo, Sc 'D', from ISSA, have been awarded Chief of Integrated Defence Staff Commendation Card.

HIGHER QUALIFICATION ACQUIRED

ASL, HYDERABAD

Shri M Thirumoorthy, Sc 'E', Advanced Systems Laboratory (ASL), has been conferred PhD by IIT Madras, Chennai, for the thesis entitled 'Experimental Investigation of Acoustic Oscillations induced by Flow Past Cavities in a Circular Duct.'

RCMA SUNABEDA

Shri Benudhar Sahoo, Sc 'F', Regional Director, RCMA (KPT), Sunabeda, was awarded PhD by the Defence Institute of Advanced Technology (DU), Pune, for the thesis entitled 'Experimental Investigation of Nickel-base Alloys for Turbine Rotor Blades of a Military Aircraft Engine.'

NPOL GETS NABL ACCREDITATION

Naval Physical and Oceanographic Laboratory (NPOL), Kochi, has been granted accreditation by National Accreditation Board for Testing and Calibration Laboratories (NABL) in accordance with ISO/IEC 17025: 2005 for its facilities in the field of testing with effect from 18 May 2018.

The scope of accreditation includes: Underwater Acoustic Measurements of Transducers and Passive Acoustic Materials and Vibration Testing of Transducers & Passive Sonar Components. The accreditation activities were initiated and coordinated by the Transducer Measurement Division of NPOL.

ISO 9001-2015 TO ITR

Integrated Test Range (ITR), Chandipur, was certified ISO 9001-2015 in an award ceremony conducted at ITR on 4 July 2018. Shri Tapas Bandopadhyay from Electronics Regional Test Laboratory, Kolkata, presented the certificate to Dr BK Das, OS and Director, ITR, in recognition of establishment and maintenance of quality management system. A quality hand book was released on the occasion.

Dr BK Das, appreciated the work done by ITR fraternity leading to a world-class test range.

ARJUN ARMOURED RECOVERY AND REPAIR VEHICLE

This column covers the pathbreaking and successful projects and programmes of the DRDO.

PROGRAMME DETAILS

Indian Army required an Armoured Recovery and Repair Vehicle (ARRV) to render requisite recovery and repair cover for its Main Battle Tank Arjun throughout its life span. For realizing this, a Mission Mode project was sanctioned to Combat Vehicles Research and Development Establishment (CVRDE), Avadi. Bharat Earth Movers Limited (BEML) Ltd, Bengaluru, was nominated the co-development and production agency.

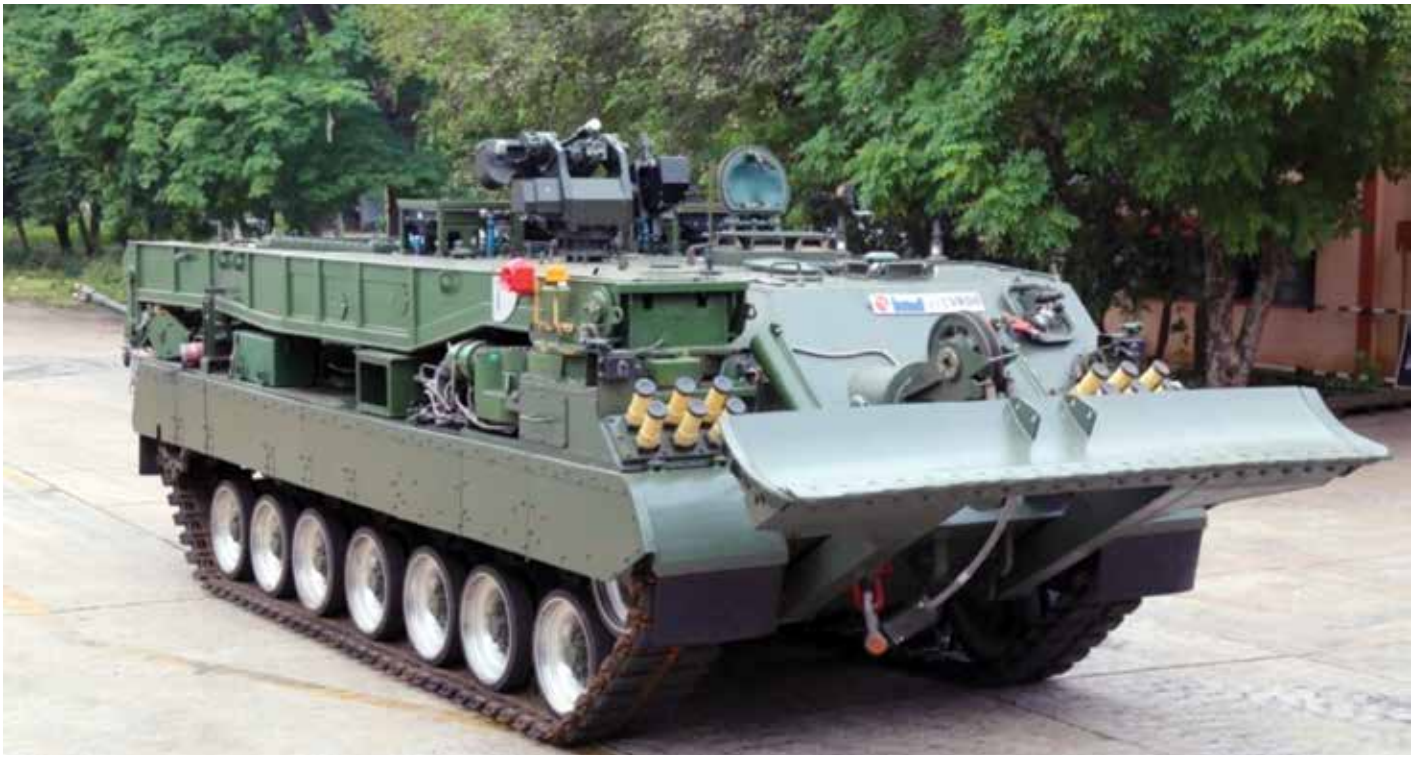
ARRV is the primary supporting vehicle for the mechanized forces. It's functions are comprehensive and multifaceted and include winching, towing and pushing, lifting load and moving with load, anchoring, dozing, welding, cutting, replenishing, maintenance and repair services in the field, spares supply, power supply for operating tools and battery charging. As Arjun ARRV is a dedicated vehicle for recovery and repair cover, only a machine-gun and crew weapons were required for local defence. In addition to Arjun MBT, the vehicle was also planned to use it as a recovery and repair cover for other heavy military equipment in service with Indian army.

DEVELOPMENT APPROACH

CVRDE followed the concurrent engineering for development of Arjun ARRV keeping production agency BEML and users (Project Monitoring Group ARRV) on-board right from the design stage itself to reduce the lead time for productionization.

The vehicle is derived from Arjun MBT Mk II tank. Its hull structure is Sponson type for accommodating various aggregates and sub-systems. Most of the systems and sub-systems of ARRV are identical and derived from the parent gun tank. This commonality ensures simplified spares inventory, crew training, maintenance, etc., leading to easier and more efficient logistics and maintenance.

CVRDE has successfully designed, developed and rolled out the vehicle in the shortest possible time. The systematic approach in design and development with concurrent engineering concept resulted in realization of user specific product. The dedicated efforts resulted



in the development of a state-of-the-art vehicle leading to considerable saving of foreign exchange.

PARTNERS IN THE DEVELOPMENT

Various Indian academic institutions and several Indian industries helped in the indigenous development of first of its kind vehicle in India.

BEML, the nodal co-development agency, developed the following:

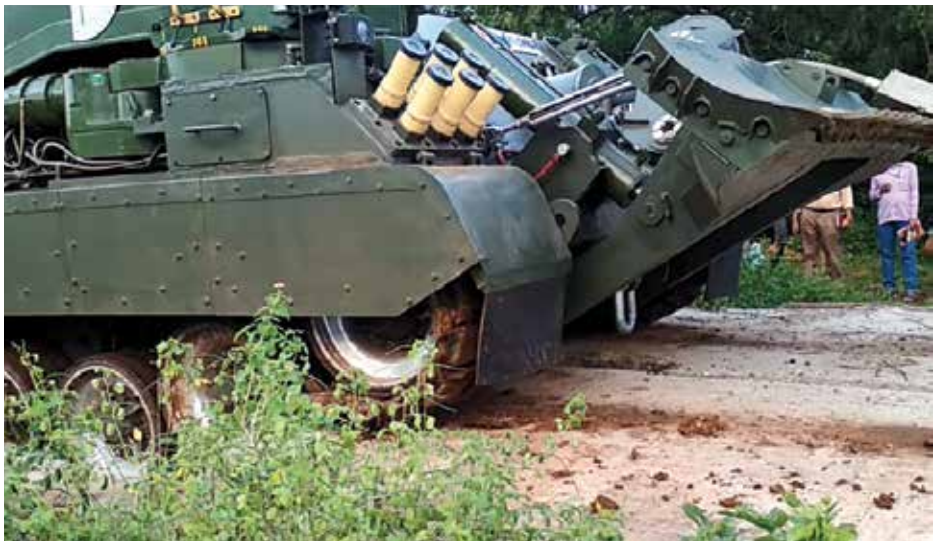
- Customized sponson type hull for housing all the systems and sub-systems meeting the requisite ballistic protection after carrying out the structural strength and rigidity analysis for both static/ dynamic loads and also complete vehicle dynamics for ensuring its performance.
- Anchor-cum-Dozer (ACD) for providing anchorage to the recovery vehicle while winching, and stability to the vehicle while handling loads by the crane, as well as the earth work.
- Suspension lock to arrest the movement of axle arm in-turn rolling of the vehicle for ensuring stability of the vehicle while handling heavy loads. The suspension lock can be operated by the driver without dismounting from his seat, and is assisted by the hydraulic system.
- As nodal co-production agency, BEML integrated full fledged equipment, carried out development trials and rolled out the prototypes.

Tractors India Ltd, Kolkata, developed indigenously fixed boom type crane to handle 20 ton (maximum) of mass within 3 meter of working radius for handling Major Unit Assemblies like powerpack, turret, winch, etc., of the vehicle in the field. This crane can be operated by the driver without dismounting from his seat using the joy sticks and also by using pendant from outside the vehicle.

Jakson Ltd, Noida, developed 15 kVA Auxiliary Power Unit for supplying power for welding/gouging,

SALIENT FEATURES

- Crew 2+4
- 50 ton main winch, 2 ton auxillary winch and 20 ton crane operation with wired pendant
- Capable to recover bogged down vehicles from different terrains and also handle MUAs
- Anchoring and ground preparation with anchor-cum-dozer (100 ton capacity)
- Repair operations through APU during emergency
- Workshop and maintenance facilities
- Evacuation of wounded soldiers and providing first aid and medical care
- Pushing and towing facility
- In-built remote control weapon system



Arjun ARRV—Step Climbing and Main Winch Trial (top)

Arjun ARRV—demo at DefExpo 2018

electrical power tools, and charging batteries and auxiliary hydraulic pumps for operating auxiliary winch and crane in emergency This indigenous development would help in considerable savings and would ensure self-reliance.

Rexroth, Bengaluru, provided axial piston pumps, gear pump, hydraulic lines, etc. BEML, Bengaluru in association with Rexroth developed complete hydraulic systems for effective functioning of the recovery aggregates. AMESim, Chennai, analysed the hydraulic systems for ascertaining its functionality.

M/s Plano Drives, Hosur, developed Power-Take-Off (PTO) unit. The step up gear box draws mechanical power from powerpack for functioning of the recovery aggregates through hydraulic system. PTO has been designed taking into account lateral and axial movements of the crank shaft of the powerpack and its easy removal.

Two winches, main winch with 50 ton direct pull with 180 meter effective rope length and auxiliary winch with 2 ton direct pull with 360 meter effective rope length, have been customized as required and supplied by M/s Rotzler, Germany. Main winch is capable to recover the bogged down tanks and also to upright the toppled tanks up to 50 ton in 1:1 rope lay and 100 ton in 2:1 rope lay and take them to the nearest place where the damaged tanks can be made operational and put in use. Auxiliary winch is for handling the main winch rope and also to handle the load of 2 ton mass.

Besides, Centre for Fire, Explosives and Environment Safety (CFEES), Delhi, for Instant Fire Detection and Suppression System (IFDSS); Instruments Research and Development Establishment (IRDE), Dehradun, for vision systems; Defence Metallurgical Research Laboratory (DMRL) for structure materials, Defence Terrain Research Laboratory (DTRL), Delhi, for soil investigations; and OFBs, DPSUs, private industries and MSMEs also chipped in the development.

MAJOR MILESTONES

Project was sanctioned in September 2011 with PDC of 36 months. Based on the revised GSQRs for change of scope of work, the extension has been obtained till 3 March 2019. The prototype of the Arjun ARRV was rolled out in the presence of Hon'ble Defence Minister Smt Nirmala Seetharaman, on 14 October 2017. The vehicle re-christened as 'ARV and AVT (LR/FR)' by army was displayed and demonstrated in Def Expo 2018 at Chennai.

INTERNATIONAL COMPARISONS

It is understood that similar international vehicles like Buffel from Germany, Challenger from UK, Abrams from USA, Namer from Israel, have taken about five years for development of prototypes and about 10 years for induction into services with due development and user trials.

For the development of the Arjun ARRV, all the required sources like technology, infrastructure, manufacturing technique, trial and evaluation, etc., were harnessed synergically with the resources available in India. Academia and industries also extended their valuable knowledge.

Arjun ARRV has met all the specifications as laid down in the PSQR by the Indian Army. The state-of-the-art vehicle has higher capacity recovery aggregates and both maintenance and workshop facilities on one vehicle. Whereas the contemporary vehicles of eastern Europe design have a concept of dedicated vehicle for recovery role (ARV) and repair role AVT (Light Repair/Field Repair).

CURRENT STATUS AND WAY FORWARD

Two prototypes have completed development trials. Upon successful completion of the DRDO internal trials and demonstration to users, the vehicle will be subjected to user trials.

Indian Army has indicated requirement of 28 Arjun ARRV considering both Arjun MBT Mk-I and Mk-II. Process for orders/AoN is under progress. The vehicle also has export potential.

VISITORS TO DRDO LABS/ESTTS

ARDE, Pune

Air Marshal JK Singh, AVSM, VSM, DG (Systems), IAF, visited Armament Research and Development Establishment (ARDE), on 24 August 2018 for a review of Air Power Cartridges.

CAIR, Bengaluru

Lt Gen Amarjeet Singh Bedi, DG, DI and DCIDS (INT), visited Centre for Artificial Intelligence and Robotics (CAIR) on 17 August 2018. There was a briefing by Director, CAIR, followed by discussion and demonstration of technologies developed by CAIR in the area of Secure Systems and Intelligent Systems and Robotics.

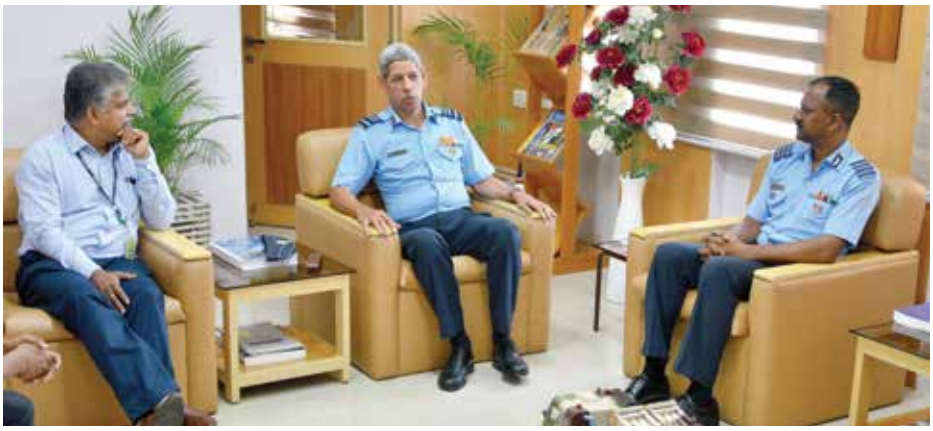
DRL, Tezpur

Maj Gen RK Jha, GOC 5 Mtn Div, visited Defence Research Laboratory (DRL) on 31 July 2018. Maj Gen Jha, held interaction with Dr SK Dwivedi, Director, DRL, on different activities being carried out at the laboratory along with activities being covered under programme Arunodaya.

SASE, HQ Manali

Honourable Union Minister of State for Home Affairs, Shri Kiren Rijiju visited HQ SASE Manali on 15 August 2018. Shri Naresh Kumar, Director, SASE, welcomed the Hon'ble Minister and briefed him about the various technical activities of the lab including Avalanche Forecasting to the troops in the Himalayan region.

Shri Kiren Rijiju stressed upon the need to provide timely avalanche forecast to Paramilitary Forces, deployed in avalanche prone areas, in addition to the Indian Army.



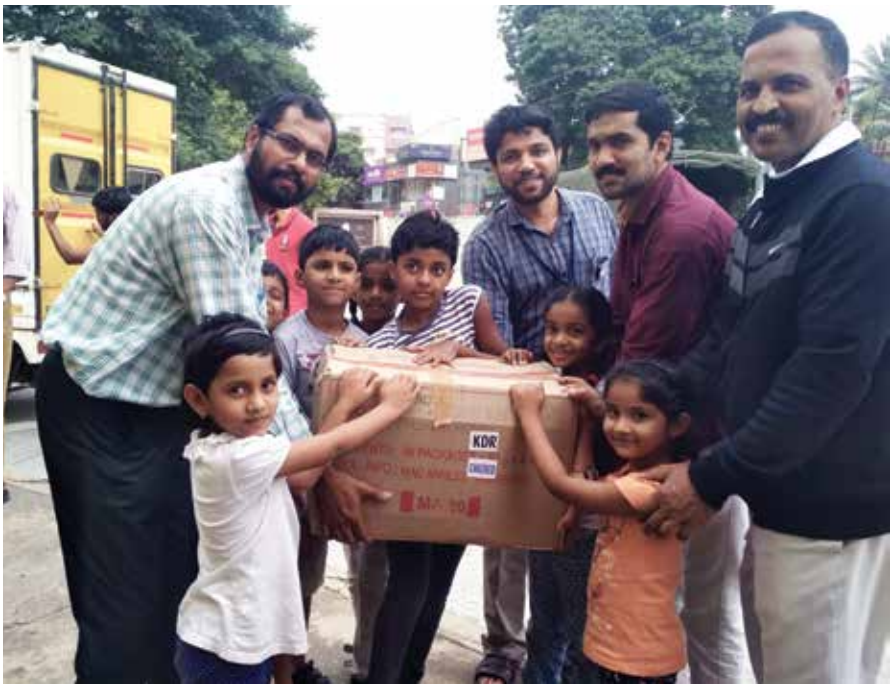
Air Marshal JK Singh at ARDE, Pune

Maj Gen RK Jha at DRL, Tezpur

Shri Kiren Rijiju at SASE, Manali

DRDO SUPPLIES MATERIAL FOR FLOOD RELIEF

Centre for Artificial Intelligence and Robotics (CAIR), Bengaluru, initiated a camp for collection of relief material for flood affected areas of Kerala from employees and families of DRDO Township, CV Raman Nagar, Bengaluru. Employees and families of Bengaluru-based DRDO labs, viz., LRDE, DARE, GTRE, ADE, CABS, CEMILAC, DEBEL, ADA, EMU, MES generously contributed around 500 kg ready-to-eat (RTE) food packets, medicines, sanitary napkins, energy drinks, water bottles, clothes, household and cleaning material. Around 50 employees of various labs volunteered to collect segregate, properly pack and dispatch the items through DFRL, Mysuru and Army Supply Core (ASC), Bengaluru to different parts of Kerala. Kids, ladies, gents, elderly people, retired employees as well as IT professionals and local people of in and around DRDO Township enthusiastically participated for the societal benefit.



Kids with relief material collected at CV Raman Nagar

Defence Food Research Laboratory (DFRL), Mysuru, also extended support with supply of 12 tonnes of processed food materials to the flood-hit Kerala and Kodagu (Coorg) Region of Karnataka during 17-22 August 2018.

The supply included 2125 kg of ready-to-eat Lemon Rice, 1375 kg of RTE Sooji Halwa, 1200 kg RTE Upma, 1142.5 kg of Tomato Rice, 1000 kg Sambar Rice, 127.5 kg of Vegetable Pulav, 2330 kg of Instant Halwa mix, 900 kg of Instant Upma mix, and 1875 litres of potable sterilized water.

Preparation of food material for flood relief at DFRL

DRDO HARNESSING SCIENCE FOR PEACE & SECURITY

CHAPTER 3: OVER TO SYSTEMS DEVELOPMENT (1970–1982)

The article is 32nd in the Series of extracts of the monograph, "Defence Research & Development Organisation: 1958-1982", by Shri RP Shenoy, former Director of Electronics and Radar Development Establishment (LRDE).

DR RAJA RAMANNA ASSUMES OFFICE OF THE SCIENTIFIC ADVISER

The transition from Professor Menon to Dr Raja Ramanna as the Scientific Adviser to Raksha Mantri was unlike the previous changes. It was known ahead of time that Professor Menon would be leaving the post of Scientific Adviser and that Dr Raja Ramanna had been appointed in his place. A Conference of the Heads of the Laboratories, the chief controllers and the Technical Directors was convened and over a period of two days, the incoming Chief was briefed about the accomplishments, current status of projects, and on issues and problems that needed his attention.

Dr Raja Ramanna had his early education in Bangalore and took his Honours degree in physics from the University of Madras, and PhD degree from the University of London. Following a brilliant academic career, he joined the TIFR, Mumbai, in 1949 where he held the post of a professor at the time of his appointment as the Scientific Adviser. He was transferred to Bhabha Atomic Research Centre (BARC), Mumbai, as Head of the Nuclear Physics Division. He made significant contributions in the field of neutron thermalisation, reactor design, experimental and theoretical studies of low energy nuclear reactions with special reference to nuclear fission. India's first reactor Apsara was designed under his guidance. He became the Director of the Physics group in December 1962 and was awarded the Shanti Swarup Bhatnagar Memorial Award for physical sciences in 1963 and Padma Shri in 1968. In June 1972, he became Director, BARC, Mumbai and Member for Research & Development, Atomic Energy Commission. He was in-charge for the utilisation of three reactors, Apsara, Cirus and the fast reactor Purnima as well as of the 5.5 MeV Van de Graaff accelerator. He also headed the group working on the in elastic scattering of neutrons for the study of the condensation of matter and recording and interpretation of seismic events, including the underground and atmospheric nuclear explosions. For his continuing contributions, Dr Ramanna was awarded Padma Bhushan in 1973. He was the prime architect of our first peaceful nuclear explosion in 1974. The Country recognised his contributions with Padma Vibhushan in 1975. At the time of his appointment to the post of the Scientific Adviser to the Minister for Defence, he was Chairman, Board of Governors, IIT Bombay, and held membership of the National Committee on Science and Technology, of the Executive Council of Jawaharlal Nehru University, and of the Indo-Soviet Joint Commission. Besides these, he was also Chairman of two international committees Nora Committee of IAEA with Norway, and India-Philippines Agency Project Committee.

Though in the beginning of his tenure as Scientific Adviser, Dr Ramanna, who was still Director of BARC, commuted between Mumbai and Delhi regularly but soon he became full-time Scientific Adviser. Besides being a scientist of eminence, Dr Ramanna, is also a great musician and musicologist, an excellent piano player who regularly gave concerts. He was also interested in comparative study of Indian and western musical styles. He made it a point to visit all the laboratories and field stations of the DRDO more than once and this gave him opportunity to explore different manifestations of nature in places like Kumaon, Lahul, Pygmalion Point, Andaman-Nicobar islands, and feel rejuvenated. In this process, he had the time and opportunity to appreciate the good work being done by the small laboratories and the field stations at Manali, Almora, Jodhpur and other places. The scientists of these institutions were encouraged by the visits and interaction with the Scientific Adviser, and showed it with an upward trend in quality and quantity of their output. His passionate desire to preserve the Nation's historical heritage found expression in the renovation and maintenance of the historic building in Delhi, the Metcalfe House.

Dr Ramanna was not a stranger to DRDO. His first acquaintance with the Organisation was around 1957 when he attended the Defence Science Conference convened by Dr DS Kothari the Scientific Adviser at that time. He had close interaction with Dr BD Nag Chaudhuri, and Mr NS Venkatesan, who was Director, TBRL, in the pre-1974 days when DRDO collaborated with the Department of Atomic Energy for the peaceful nuclear explosion. From these experiences, he was well aware of the essential cultural dissimilarities between the DRDO and the BARC/DAE.

The DRDO Conference of the senior scientists and Service officers convened by Professor Menon and also attended by Dr Ramanna, alerted him to some of the outstanding issues which required immediate attention and action.

DRDO HEADQUARTERS AS COORDINATING AGE

Immediately after assuming the office of the SA to RM, Dr Ramanna swung into action and in about a fortnight, issued a letter to all the laboratories and field stations of DRDO about the restructuring of DRDO Headquarters and distribution of work among the CCR&Ds to reduce the bureaucratic overheads and ensure faster response to the needs of the laboratories. On technical activities, the link between the Heads of the Laboratories and the Director General

R&D would be direct. The Heads of Laboratories would keep their respective CCR&Ds in the picture so that the latter would be able to effectively interface with the Services. The CCR&Ds would be the single point contacts for their laboratories on all issues requiring clarification/action from multiple directorates at DRDO Headquarters. The role of Headquarters personnel would be to assist the laboratories in all possible ways by providing scientific and administrative support and data not available to the laboratory personnel. In addition, they would keep the Scientific Adviser informed of all the modern developments in their respective areas and effectively liaise with the Services and concerned Ministries of the Government. Two Committees were formed of which the Headquarters Committee consisting of the three CCR&Ds and IFA and chaired by the SA to RM would deal with all problems faced by the laboratories. The Committee would meet every week. The second committee was called the Technical Committee with two CCR&Ds other than CCR&D(A), all Headquarters directors and laboratory heads who were present in Delhi and chaired by the SA to RM would review progress on projects, deal with requirements of the Services, slippage of completion dates of major projects, and problems of procurement. This Committee would meet once a month. To improve communication and integration of work between the laboratories working in the same or allied disciplinary areas, the CCR&D would chair an Advisory Committee with the respective heads of the laboratories of each group as members to bring an interdisciplinary perspective on the projects pursued by the group. In addition, the directive from the SA to RM contained specific instructions for laboratories to promote participation of younger scientists in decision- making and their training to improve their skills. It is a tribute to Dr Raja Ramanna's managerial acumen that the Advisory Committee and the Technical Committee continued to function for many years after he had left the Organisation.

NEW PERSONNEL POLICY

There were apprehensions in the minds of many scientists at DRDO Headquarters and at the Laboratories about the impact of new personnel policy on their careers, the methodology of implementation, and the delays that might arise due to legal challenges. Speed was of essence and here again, Dr Ramanna showed his penchant for action to reduce the agony of uncertainty.

In September 1978, a communication was issued by the Director of Personnel forthwith forbidding the Heads of Laboratories from recruiting Master's degree holders in science and BE/ BTech graduates in engineering for posts in the non-gazetted cadre, and banning direct recruitment to the post of Foreman. This put a stop to creation of more posts of foreman (highest echelon in the non-gazetted cadre). The communication effectively reserved the NGO cadre for diploma holders and graduates in science thus preventing entry in future into the scientists' cadre through the departmental route. Second, the measure ensured better chances of career advancement for the serving non-gazetted officers at lower levels by stopping direct recruitment at the Foreman level. If the scientists' cadre of the future, Defence Research and Development Service (DRDS) had to be Class I service, then the post of junior scientific officer (JSO) would have to be abolished and a means would have to be found whereby the existing personnel could have an opportunity to move into the scientists cadre.

Further, since the existing Defence Science Service (DSS), was common for scientists serving in DRDO and Inspection Organisations, it would be necessary to de-link the two cadres, especially as the earlier efforts by Prof. Menon had indicated that the Department of Defence Production was not enthusiastic to adopt the flexible complementing scheme for promotion of the scientists serving in their organisations. Further interactions at the levels of DGI and Secretary, Defence Production resulted in their not standing in the way of DRDO to opt out of DSS and form the new Service, DRDS, with provision for one-time option for the scientists serving in the inspection organisations to enter the DRDS. The decks were cleared after the scrutiny by Government legal experts and a detailed communication was sent to all laboratories/establishments, field stations, detachments, and technical directorates at the DRDO Headquarters in January 1979. The die was cast and there would be no looking back. The DRDS rules were clearly a step forward and a way out of the morass that the DRDO had slipped into in the 1960s. No doubt, the response from the scientists of DRDO was by and large enthusiastic and positive. They could all look forward to merit based promotions, no vacancy-based constraints, regular and annual holding of assessment boards and all promotions given effect to from a specified date.

The Scientific Adviser made certain that the promise held forth by DRDS to the scientists was fulfilled at the earliest. The effort needed was enormous but the Directorate of Personnel lived up to the expectations of the Scientific Adviser and of the scientists with help from senior scientists in preparing the panels of experts in each discipline for clearance by UPSC and in ensuring that annual confidential reports were updated and despatched on time for assessment boards to be held.

The DOP on its part had to decide on the centres for the Assessment Boards, on the laboratories in each centre where the Boards would assemble, decide with selected laboratories on the dates, days for assessment and the daily lists of candidates to be assessed, the total logistics of getting the relevant experts for each day, intimating the laboratories and the scientists about the dates and so on. It was an effort of herculean proportions but it was accomplished with minimum disarray and confusion. In 1980 the exercise of completing the assessment of more than 1000 scientists in five centres was begun and the promotions across the Organisation were made effective from 1 July 1980.

The terms and conditions of service of the Service Officers permanently seconded to DRDO was also revised. The non-gazetted cadre too benefited considerably as a result of the quick implementation of the DRDS. The combined efforts of three Scientific Advisers spread over a period of nearly ten years bore fruit. Dr BD Nag Chaudhuri initiated, Professor MGK Menon actively pursued and Dr Raja Ramanna firmly put in place the new personnel policy for which the scientists of DRDO owe them a debt of gratitude.

To be continued...

DOWN THE MEMORY LANE

The then Raksha Mantri KC Pant speaking on the occasion of 20th DRDO Directors' Conference and showing keen interest in DRDO product.