

ATAGS ACHIEVES RECORD TARGET RANGE



TOT >> p05

DRDO TRANSFERS TECHNOLOGY FOR BULLETPROOF JACKETS

TBRL INKS LATOT FOR INDUSTRIAL SCALE PRODUCTION PROCESS OF
FINE B-HMX & FINE RDX

EVENTS >> p08

HRD ACTIVITIES >> p11

DRDO IN PRESS >> p20

CONTENTS

NOVEMBER 2017
VOLUME 37 | ISSUE 11
ISSN: 0971-4391

COVER STORY

04

ATAGS Achieves Record Target Range



TOT

05

EVENTS

08



HRD ACTIVITIES

11

DRDO SERIES

18

DRDO IN PRESS

20

Editor-in-Chief: Dr Alka Suri
Senior Editor: B Nityanand; Editor: Manoj Kumar
Asst Editor: Geeta Sharma; Multimedia: RK Bhatnagar
Printing: SK Gupta, Hans Kumar; Distribution: Tapes Sinha, RP Singh
For feedback, please contact: director@desidoc.drdo.in
Tel: 011-23902403; 23902474; Fax: 011-23819151

LOCAL CORRESPONDENTS

Ahmednagar: Lt Col. AK Singh, Vehicles Research & Development Establishment (VRDE); **Ambarnath:** Dr Susan Titus, Naval Materials Research Laboratory (NMRL); **Balasure/Chandipur:** Shri Santosh Munda, Integrated Test Range (ITR); Dr AK Sannigrahi, Proof & Experimental Establishment (PXE); **Bengaluru:** Shri Subbukutti S, Aeronautical Development Establishment (ADE); Smt MR Bhuvanewari, Centre for Airborne Systems (CABS); Smt Faheema AGJ, Centre for Artificial Intelligence & Robotics (CAIR); Ms Tripty Rani Bose, Centre for Military Airworthiness & Certification (CEMILAC); Smt Josephine Nirmala M, Defence Avionics Research Establishment (DARE); Shri Kiran G, Gas Turbine Research Establishment (GTRE); Shri KM Veerabhadra, Electronics & Radar Development Establishment (LRDE); Dr Vishal Kesari, Microwave Tube Research & Development Centre (MTRDC); **Chandigarh:** Dr HS Gussain, Snow & Avalanche Study Establishment (SASE); Shri Ashok Kumar Dahiya, Terminal Ballistics Research Laboratory (TBRL); **Chennai:** Shri PD Jayaram, Combat Vehicles Research & Development Establishment (CVRDE); **Dehradun:** Shri Abhai Mishra, Defence Electronics Applications Laboratory (DEAL); Shri JP Singh, Instruments Research & Development Establishment (IRDE); **Delhi:** Shri Ashutosh Bhatnagar, Centre for Personnel Talent Management (CEPTAM); Dr Rajendra Singh, Centre for Fire, Explosive & Environment Safety (CFEES); Dr KP Mishra, Defence Institute of Physiology & Allied Sciences (DIPAS); Dr Dolly Bansal, Defence Institute of Psychological Research (DIPR); Shri Navin Soni, Institute of Nuclear Medicine and Allied Sciences (INMAS); Smt Anjana Sharma, Institute for Systems Studies & Analyses (ISSA); Dr Indu Gupta, Laser Science & Technology Centre (LASTEC); Shri Sanjay Pal, Recruitment & Assessment Centre (RAC); Ms Noopur Shrotriya, Scientific Analysis Group (SAG); Dr Rupesh Kumar Chaubey, Solid State Physics Laboratory (SSPL); **Gwalior:** Shri RK Srivastava, Defence R&D Establishment (DRDE); **Haldwani:** Dr Atul Grover, Defence Institute of Bio-Energy Research (DIBER); **Hyderabad:** Shri Hemant Kumar, Advanced Systems Laboratory (ASL); Shri Pramod K Jha, Centre for Advanced Systems (CAS); Dr JK Rai, Advanced Numerical Research & Analysis Group (ANURAG); Shri JP Singh, Centre for High Energy Systems & Sciences (CHESS); Shri ARC Murthy, Defence Electronics Research Laboratory (DLRL); Dr Manoj Kumar Jain, Defence Metallurgical Research Laboratory (DMRL); Dr K Nageswara Rao, Defence Research & Development Laboratory (DRDL); Shri N Venkatesh, Research Centre Imarat (RCI); **Jagdalpur:** Dr Gaurav Agnihotri, SF Complex (SFC); **Jodhpur:** Shri Ravindra Kumar, Defence Laboratory (DL); **Kanpur:** Shri AK Singh, Defence Materials & Stores Research & Development Establishment (DMSRDE); **Kochi:** Shri S Radhakrishnan, Naval Physical & Oceanographic Laboratory (NPOL); **Leh:** Dr Dorje Angchok, Defence Institute of High Altitude Research (DIHAR); **Mussoorie:** Dr Gopa B Choudhury, Institute of Technology Management (ITM); **Mysuru:** Dr M Palmurugan and Shri NV Nagraj, Defence Food Research Laboratory (DFRL); **Pune:** Dr (Mrs) JA Kanetkar, Armament Research and Development Establishment (ARDE); Dr Vijay Pattar, Defence Institute of Advanced Technology (DIAT); Shri AM Devale, High Energy Materials Research Laboratory (HEMRL); Shri SS Arole, Research & Development Establishment (Engrs) [R&DE (E)]; **Tezpur:** Dr Jayshree Das, Defence Research Laboratory (DRL); **Visakhapatnam:** Dr (Mrs) V Vijaya Sudha, Naval Science & Technological Laboratory (NSTL)



FROM THE DESK OF THE CHAIRMAN



Dr S Christopher

CHAIRMAN

Defence Research & Development Organisation

&

SECRETARY

Department of Defence Research & Development

Dear friends,

Times moves on leaving behind the trail of experiences we attain with each passing moment. We learn what we desire to learn, achieve what we desire to achieve, and produce what we desire to produce. There is no binding on us to achieve the quantum desired to succeed in life. We only have to keep motivating ourselves constantly to improve our threshold standards. And that shows in our outputs and contributions to organisation. Excel yourself in whatever you do. No work is big or small. "Rome was not built in a day." Everybody in an organisation contributes brick-by-brick to create a splendour structure, and DRDO today is proud of the contributions from every member for making it an international brand name.

'DRDO@60' is progressing well, the Logo Competition has been successfully organized. My compliments to all the participants who envisioned the logo from their perspective. "DRUSE" has taken off with the launching of web-portal by Hon'ble Raksha Mantri, Smt Nirmala Sitaraman at CVRDE, Chennai. Lecture series started at DIAT, Pune, is another notable initiative taken by the young scientists. I am satisfied with the team work and efforts being put up by one and all.

Friends, the country has bestowed their faith on our capabilities in the defence of the nation. The hopes and aspirations are unlimited. But so are our abilities. I am optimistic that each day, each moment, some young member of our dynamic team, sitting in some corner of our diverse labs, is producing some idea, which would get converted some day in a functional model, the country would feel proud of. Keep up the tempo.

Jai Hind.

ATAGS ACHIEVES RECORD TARGET RANGE

Advanced Towed Artillery Gun System (ATAGS), designed and developed by Armament Research and Development Establishment (ARDE), Pune, along with other DRDO labs, viz., Instruments Research and Development Establishment (IRDE), Vehicle Research and Development Establishment (VRDE), Proof and Experimental Establishment (PXE), Centre for Artificial Intelligence and Robotics (CAIR), and Defence Electronics Applications Laboratory (DEAL), created history by achieving target range above 48 km with the existing ammunition in trials held at Pokhran Field Firing Range (PFFR) during 24 August 2017 to 7 September 2017. The maximum ranges of 38.5 km and 48 km with in-service ERFB Boat Tail (BT) and ERFB Base Bleed (BB)

Hon'ble RM Smt Nirmala Sitharaman, Gen Bipin Rawat, Chief of the Army Staff, Dr S Christopher, Chairman DRDO & Secretary, DDR&D, Shri PK Mehta, DG (ACE), Lt Gen PK Shrivastava, DG Arty, Lt Gen PS Rajeshwar, Corps Commander (12 Corps) and other senior DRDO and Army Officers witnessed the firing demonstration on 23 September 2017.

projectiles, respectively, are at least 20 per cent more than ranges achieved by contemporary guns in the category.

The compatibility of Bi-Modular Charge System (BMCS) Zone 7 with gun system and in-service High Explosive

(HE) ammunitions was established during the trials. The guns met essential as well desirable parameters as per specifications in PSQR. Furthermore, minimum range of 4.7 km was achieved from the systems meeting the critical parameter of minimum range at high angle. Along with fire power demonstration, operability and deployability in adverse desert conditions was also tested. Two gun systems have been designed, developed and tested within a short span of 4 years. The endeavour has been supported by Army through the Weapon Design and Development Team. Private Industrial Partners such as Tata Power SED, Bharat Forge Limited, Mahindra Defence, Punj Lloyd and Ashok Leyland are involved in the development. BEL and OFB also actively contributed in realisation of critical items.



DRDO TRANSFERS TECHNOLOGY FOR BULLETPROOF JACKETS

The technology is challenging and one of the most significant matured personal protection systems developed by DRDO.

DRDO transferred the technology of Bullet Proof Jackets (BPJ) to M/s MKU Limited, Kanpur. The jackets will be manufactured for the Indian Army and paramilitary forces personnel.

Dr S Christopher, Chairman, DRDO, and Secretary, Department of Defence R&D, handed over the technology at a function held in DRDO Bhavan where documents and related licence agreement between DRDO and MKU Limited, Kanpur, were exchanged.

The BPJ technology has been developed by Defence Materials and Stores Research and Development Establishment (DMSRDE), a Kanpur-based premier materials laboratory of DRDO, as per Indian Army General Staff Qualitative Requirement (GSQR) No. 1438. The technology is challenging and one of the most significant matured personal protection systems developed by DRDO among the various GSQRs of Indian Army meeting National Institute of Justice (NIJ), US, III+ Standard.

Speaking on the occasion, Dr Christopher, urged the company to absorb the technologies developed by DRDO and maintain a strict vigil on the quality of the Jackets.

Dr SV Kamat, DG, (NSM); Dr CP Ramanarayanan, DG (Aero); Dr Shashi Bala Singh, DG (LS); Dr S Guruprasad, DG (PC&SI); Shri PK Mehta, DG (ACE); Dr N Eswara Prasad, Director, DMSRDE; Shri Neeraj Gupta, MD, MKU Limited and Corporate Directors of DRDO attended the function.



TBRL INKS LATOT FOR INDUSTRIAL SCALE PRODUCTION PROCESS OF FINE β -HMX & FINE RDX

Terminal Ballistics Research Laboratory (TBRL), Chandigarh, signed two Licensing Agreements for Transfer of Technology (LAToT), with M/s Solar Industries India Ltd, Nagpur, and M/s Premier Explosives Ltd, Secunderabad, for the industrial scale production process of Fine β -HMX and Fine RDX, respectively, on 11 September 2017. Dr Manjit Singh, Director, TBRL, and industry representatives signed the agreements.

Dr S Christopher, Chairman, DRDO and Secretary, Department of Defence R&D; Dr G Sathesh Reddy, SA to RM and DG (MSS); Shri Subir Mallick, Addl FA and JS; Dr S Guruprasad, DG (PC&SI); Dr Hina Gokhale, DG (HR); Shri MSR Prasad, Director, DRDL;



Dr Tessa Thomas, Director, ASL; Shri BHVS Narayana Murthy, Director, RCI; Shri Mayank Dwivedi, Director, DIITM, Shri Satyanarayan Nuwal,

Chairman, SIIL and Shri Vikram Mahajan, Director (Marketing), PIL and senior scientists from TBRL were present on the occasion.

DFRL SIGNS 29 LATOT WITH INDUSTRIES

Defence Food and Research Laboratory (DFRL), Mysuru, signed 29 LAToT with industries at 'Industry Conclave on Food Technologies' held at Panaji, Goa, during 21-22 September 2017. The conclave was organised by DRDO in collaboration with Goa State Industries Association (GSIA). One hundred and forty-two food technologies and products, which were initially developed for the Armed Forces, were showcased in the conclave for large-scale adoption by entrepreneurs. Dr Shashi Bala Singh, DG (LS), DRDO, along with Shri Rajkumar Kamat, President, GSIA, Dr GK Sharma, Officiating Director, DFRL, and Dr Mayank Dwivedi, Director, Industry Interface and Technology Management, DRDO



HQ, were present during the event. Dr Shashi Bala Singh, gave glimpses of processed food technologies of DFRL to the media.

The Hon'ble Chief Minister of Goa, Shri Manohar Parrikar, inaugurated the conclave on 21 September 2017. In his inaugural speech, Shri Parrikar lauded the DRDO and said, "After taking over as Defence Minister, initially, I thought that DRDO should work only

on weapons and missile technologies, but after visiting the borders and high altitude areas, I realized importance of food technologies and ration developed by DRDO for the Armed Forces." He also announced various incentives like reimbursement of royalty by the Government of Goa for the entrepreneurs of the region who adopts DRDO's food technologies.

Hon'ble CM also informed that his government is presently working on a

proposal to convert discarded Kadamba buses into portable toilets and mobile garbage collection containers on a trial basis. He requested DRDO to share its bio-digester technology with the Goa government.

Dr Guruprasad, DG (PC&SI), DRDO, briefed entrepreneurs about DRDO technologies and technology transfer procedures.

CAIR TRANSFERS EDDY CURRENT TESTING ROBOT MANIPULATOR TECHNOLOGY TO NPCIL

Centre for Artificial Intelligence and Robotics (CAIR), Bengaluru, a premier research laboratory of DRDO, and Nuclear Power Corporation of India Limited (NPCIL), signed LAToT of Eddy Current Testing (ECT) Robot Manipulator on 29 September 2017. This manipulator is used for Eddy Current Testing of steam generator tubes inside Nuclear Power Plants.

Dr S Christopher, Chairman, DRDO, and Secretary, Department of Defence R&D, congratulated CAIR for developing a breakthrough technology for radioactive environment inside Nuclear Power Plants and complimented NPCIL for partnering with DRDO.

Shri SF Vohra, OS, NPCIL, appreciated the team efforts of CAIR and NPCIL for the innovative solution to remotely inspect the tubes of the steam generators in Nuclear Power Plants. This task was traditionally being carried out manually and was hazardous due to radioactive environment.

Dr G Athithan, DG (MED, CoS &CS) complimented CAIR for the achievement. Smt Manimozhi Theodore, Director, CAIR, described the safe and reliable use of ECT Robot Manipulator technology for hazardous



environments. Inventor scientists Shri Sartaj Singh, Sc 'F', Shri Nikhil Mahale, Sc 'E' and Shri Babu D Jadhav, Sc 'E', along with other team members from CAIR and the NPCIL were present during the occasion.

The ECT Robot Manipulator system is a remotely controlled five Degree of freedom (5-DoF) robotic system used

for positioning the ECT probe below steam generator tube, which has to be inspected. The system has been designed with unique 2 DOF base for automatic calibration. Probe holder is equipped with camera for automatic visual position correction to compensate for mechanical errors in the system.

EXHIBITION ON SUBMARINE TECHNOLOGY

An exhibition on Submarine Technology was organized by DRDO during 22-23 September 2017 at DRDO Bhawan, New Delhi. This was one of the run-up events planned to commemorate the 60th Anniversary of DRDO's service to the nation.

The exhibition was inaugurated by Hon'ble Raksha Mantri, Smt Nirmala Sitharaman. Fifteen DRDO laboratories and more than 60 industries, including PSUs participated in this technology intensive event to highlight their capabilities and resolve for indigenous

design and development of submarines technologies.

India is one of the very few nations where all equipment and parts used in submarines can be designed, developed and manufactured in the country itself.





OFFICE OF THE DG (AERO) CELEBRATES RAISING DAY

The Office of Director General (Aero), Bengaluru, celebrated its maiden Raising Day on 25 September 2017. Ms J Manjula, DS and DG (ECS), was the Chief Guest at the function. Dr CP Ramanarayanan, DG (Aero), presided over the function. Directors of Bengaluru-based DRDO labs were also present on the occasion. A Souvenir was released on this occasion.

Ms J Manjula, in her address, lauded the achievements of the labs under Aero Cluster.

Dr CP Ramanarayanan summarized the achievements of the labs under Aero Cluster. He gave a gist of upcoming projects under 13th Five-year Plan and Long Term Technology Prospective Plan. He urged to draw upon greater conviction in adding value to the work



by doing it in a more efficient manner. He expressed his happiness about Aero Cluster being the first to introduce web-based File Tracking System, which will

enable the labs under this Cluster to track the current status of the files.

HINDI DIWAS & HINDI PAKHWADA

O/o the DG (Aero)

The Hindi Pakhwada concluded at the Office of DG (Aero), Bengaluru, on 18 September 2017. Dr CP Ramanarayanan, DG (Aero), presided over the concluding ceremony. Shri AK Goel, Sc 'G', highlighted the efforts being made to promote the use of Hindi in day-to-day office work. He also gave an overview of various competitions conducted during the fortnight. Message by the Hon'ble Union Home Minister on the Hindi Diwas was read out.

DG(Aero), in his address emphasised on how language and culture plays a vital role in connecting people. Hindi is one such language, which can bind the country so diverse in both language and culture. DG (Aero) also awarded the winners of various competitions.



CAIR, Bengaluru

Centre for Artificial Intelligence and Robotics (CAIR), Bengaluru, celebrated Hindi

Pakhwada during 1-14 September 2017. Various competitions were organized for Hindi speaking and non-Hindi speaking employees during the Pakhwada. The Pakhwada

EVENTS

concluded on 14 September 2017. Maj Gen Braj Bhushan Jha (Retd), Former ADG, DISB, DRDO HQ, was the Chief Guest of the function. Smt Manimozhi Theodore, Director, CAIR, presided over the function and underlined the importance of the Hindi and requested all to ensure compliance of Official Language Policy.

Maj Gen Jha, accentuated the importance of Hindi as a link language in the country and its relevance in Armed forces. Smt TR Usha Kumari, Sc 'E', Vice Chairperson, OLIC, read out the message of Chairman, DRDO and presented Official Language Implementation report. Prizes were distributed to the winners of the competitions by the Chief Guest and the Director, CAIR.

DTRL, Delhi

Defence Terrain Research Laboratory (DTRL), Delhi, celebrated Hindi Pakhwada during 1-14 September 2017 with great enthusiasm. Dr MR Bhutiyan, Director, DTRL, inaugurated the event and emphasised the need of use of Hindi in all possible ways. He requested officers and staff to contribute more in Hindi. Dr LK Sinha, Associate Director, DTRL, also stressed on the usage of the Hindi in the official work. Various competitions were organised during the fortnight. Awards were distributed to the winners of the competitions by Director, DTRL.

Dr Bhutiyan also released the fifth issue of DTRL Samachar Patra. Ms Suchitra Chaudhury, Rajbhasha Adhikari, was the coordinator of the event.

ITR, Chandipur

Hindi Day was celebrated in Integrated Test Range (ITR), Chandipur, on 14 September 2017. The programme was inaugurated by Dr BK Das, OS and Director, ITR, who encouraged all to work in Hindi in day-to-day official works. He motivated



all to participate in large numbers in various competitions being organised during the Hindi fortnight.

Dr Das also read out the messages of Hon'ble Home Minister and Chairman DRDO. Hindi Pakhwada was celebrated

from 14 September to 4 October 2017. Various competitions like, essay writing, noting, drafting, memoir, poem recitation, etc., were organised during the Pakhwada. The programme was organised by Shri CR Ojha, Sc 'F'.



COURSE ON CLOUD COMPUTING SYSTEMS AND APPLICATIONS

Advanced Numerical Research and Analysis Group (ANURAG), Hyderabad, organised a course on Cloud Computing Systems and Applications during 20-22 September 2017 under Continuing Education Programme (CEP) of DRDO.

Shri CVS Sastry, Director, ANURAG, gave a brief overview of activities of ANURAG to the participants. Prof. PJ Narayanan, Director, IIIT, Hyderabad, delivered the keynote address on Artificial Intelligence and its Recent News. Shri Sanjay Burman, Director (Retd), CAIR, DRDO, also gave a talk on Bringing Cloud to the Information Age Battle Space: Challenges and Adoption Approach. Lectures on various topics



related to the course were delivered by experts from academia as well as DRDO. Twenty-nine scientists from various DRDO laboratories attended the course.

Dr Manuj Sharma, Sc `G` was the Course Director, and Dr Jitendra Kumar Rai, Sc `F` was the Course Coordinator.

COURSE ON INTEGRATION AND TESTING OF PROPULSION SYSTEMS

Advanced Systems Laboratory (ASL), Hyderabad, organised a CEP course on Integration and Testing of Propulsion Systems during 4-8 September 2017. Dr Tessy Thomas, Director, ASL, inaugurated the course

and addressed the participants. Thirty-six participants from various DRDO labs and invitees from BDL and SSQAG attended the course. Experienced faculty from DRDO and ISRO delivered 20 lectures during the course. Visit to

three integration facilities was arranged for the participants. Shri R Venugopal, Sc `G` and Technology Director, SSMI, ASL, was the Course Director and Shri Ajay Kumar Singh, Sc `F`, ASL, was the Course Coordinator.



FIRE PREVENTION & FIRE FIGHTING COURSE

Centre for fire, explosives and Environment Safety (CFEES), Delhi, conducted 62nd General Fire Prevention and Fire Fighting course from 17 July to 8 September 2017. Director, CFEES, inaugurated the course and in his inaugural address

emphasized on fire prevention, fire protection of all hazardous units of MoD. The course was attended by 40 officers from DRDO, Army, Navy, Air force, Ordnance factories and Indian Coast Guards.

The participants were exposed to

various fire fighting scenarios with the help of theory classes, practical classes, mock drills and industrial visits. Since this course is required to be qualified, hence there were midterm and final examinations, practical examination with Lecturette and viva-voice.



COURSE ON SATELLITE COMMUNICATION

Defence Electronics Applications Laboratory (DEAL), Dehradun, conducted a CEP course on Satellite Communication during 13-15 September 2017 for officers and scientists working in the area of Satellite Communication. The course was formally inaugurated by

Shri PK Sharma, OS, DEAL. The course was focussed to enable the participants to enrich their knowledge pertaining to satellite communication. The topics covered during the course included: satellite link design, satellite payload architecture, satellite navigation, design challenges in baseband, RF, antenna

and various other critical aspects like evaluation of secure communication equipment and frequency and licensing policies.

Twenty-five participants from various DRDO labs attended the course. Shri Kapil Mahawar, Sc 'E' was the Course Director.





COURSE ON DIGITAL LIBRARIES TOOLS AND TECHNIQUES IN R&D ENVIRONMENT

Defence Scientific Information and Documentation Centre (DESIDOC), Delhi, organised a CEP course on Digital Libraries Tools and Techniques in R&D Environment during 11-15 September 2017.

Dr Rajeev Vij, Sc 'G', DESIDOC, inaugurated the course and briefed the

participants about the need and purpose of the CEP. The objective of the CEP was to promote synergy among library professionals and users with emphasis on emerging LIS technologies. Twenty invited talks by the experts were organised to upgrade the knowledge of participants.

Twenty-six participants from various DRDO labs/estts participated in the course. Hands-on training was provided to the participants. Dr Rajeev Vij, who also coordinated the course, distributed certificates to the participants.



COURSE ON BASIC CBRN EMERGENCY MANAGEMENT FOR THE AIRPORT EMERGENCY HANDLERS

Institute of Nuclear Medicine and Allied Sciences (INMAS), Delhi, National Disaster Management Authority (NDMA) and Airport Authority of India (AAI) jointly organized a six-day basic training course on CBRN Emergency Management for Airport Emergency Handlers during 18-23 September 2017 at Chennai Airport.

Dr S Christopher, Chairman, DRDO and Secretary, Department of Defence R&D, was the Chief Guest at the inaugural function. In his inaugural

address, Dr Christopher emphasized the necessity of organizing such training courses and lauded INMAS for taking leadership in this domain. Dr Shashi Bala Singh, DG (LS), DRDO; Dr AK Singh, OS and Director, INMAS; Shri AK Sanghi, Joint Secretary, NDMA; Shri C Chandermauli, Director, Airport Chennai; Shri Subash Kumar, DG, Fire Services, also graced the inaugural session.

Dr Shashi Bala Singh, expressed her pleasure in organizing the training course with joint initiative of NDMA

and AAI. Dr AK Singh explained the objective and necessity of the course for airport staff since airport and sea port could be used to sneak in CBRN material inside the country. Shri C Chandermauli expressed his gratitude to DRDO, NDMA and AAI, for choosing Chennai Airport as the first airport for starting such strategic programme.

Participants also visited Madras Atomic Power Plant at Kalpakkam. Faculty for the training course comprised experts from INMAS,



NDMA, Emergency Response Centre, Chennai, and NIMHANS.

A team from Solid State Physics Laboratory (SSPL), Delhi, demonstrated e-Nasika, a hand-held equipment

capable of detecting chemical agents below their toxic limits, to the participants.

Fifty-four participants from different security agencies including

cargo, CISF, and Tamil Nadu Police participated in the training course. Shri Selva Kumar, Joint General Manager, Cargo, proposed the vote of thanks.

COURSE ON BASIC PROJECT MANAGEMENT

Integrated Test Range (ITR), Chandipur, organized a CEP course on Basic Project Management during 4-8 September 2017. Dr BK Das, OS and Director, ITR, inaugurated the course. The course aimed to update and enhance the knowledge of the participants on

the rules and regulations of project management. Various topics related to Project Management, viz., Role of Project Management in DRDO, Critical Success Sectors in Project Management, Project Quality Management, etc., were covered during the course. Experts from ITM, Mussoorie; RAC,

Delhi; DP&C, Delhi; IRDE, Dehradun; ITR, Chandipur and Fakir Mohan University, Balasore, delivered the lectures. Twenty participants attended the course. The course was organised by Shri CR Ojha, Sc 'F' and the Course Director, and Shri Santosh Munda, Sc 'D', and the Course Coordinator.





COURSE ON LASER TECHNOLOGY FOR LIC APPLICATIONS

Laser Science and Technology Centre (LASTEC), Delhi, organized a CEP course on Laser Technology for Low Intensity Conflict (LIC) Applications during 11-15 September 2017.

Shri HP Agarwal, Director, LIC, was the keynote speaker. The course had lectures on Laser-based Intelligent Surveillance, Laser-based Chemical, Explosive and Biological Warfare Agent Detection, Non Lethal Laser Equipment,

Cognitive Intelligence, Robotics, UAVs, Sensor Fusion and Artificial Intelligence. Participants were also demonstrated laser equipment developed by LASTEC for LIC application.



COURSE ON FUNDAMENTALS OF MICROWAVE MEASUREMENTS

Microwave Tube Research and Development Centre (MTRDC), Bengaluru, conducted a CEP course on Fundamentals of Microwave Measurement during 5-8 September 2017. The objective of the course was to provide an introductory training

to refresh the RF and microwave basic concepts and measurement fundamentals at high frequencies.

Dr Sudhir Kamath, OS and Director, MTRDC, inaugurated the course. Prof. S Balasubramanian, former Professor, BITS, Pilani, delivered lectures on fundamentals of microwave

measurements, coaxial cables and connectors, passive components, etc.

Experts from industries and MTRDC also delivered lectures on topics relevant to the course. Hands-on training on all the topics was also provided to the participants.



REGIONAL CENTRE FOR MILITARY AIRWORTHINESS CONFERENCE - 2017

Centre for Military Airworthiness and Certification (CEMILAC), Bengaluru, organized the RCMA Conference – 2017 on 19 August 2017. Dr Christopher, Chairman, DRDO and Secretary, Department of Defence R&D, was the Chief Guest and Dr CP Ramanarayanan, DG, Aeronautical Systems, DRDO, was the Guest of Honour at the inaugural function of the conference.

Dr Christopher in his inaugural address, emphasised that scientists of

CEMILAC and RCMAs, by virtue of their certification experience and knowledge, should simplify the procedures and spread the same to sister labs of DRDO and other organisations. He opined that CEMILAC should strive to achieve mutual recognition and cooperation from international certification agencies.

Dr CP Ramanarayanan lauded the role of CEMILAC in certification and described it as mini DRDO in terms of nationwide presence and

spread of technologies certified by it. The conference provided a forum for exchange of ideas, sharing of knowledge and expertise among RCMAs and letting each RCMA showcase its recent achievements.

During the conference, Airworthiness methodologies, procedures and guidelines to be adopted were discussed in detail and 'CEMILAC Directives' were evolved for uniform implementation. Dr Christopher also inaugurated the CEMILAC Technology Centre.

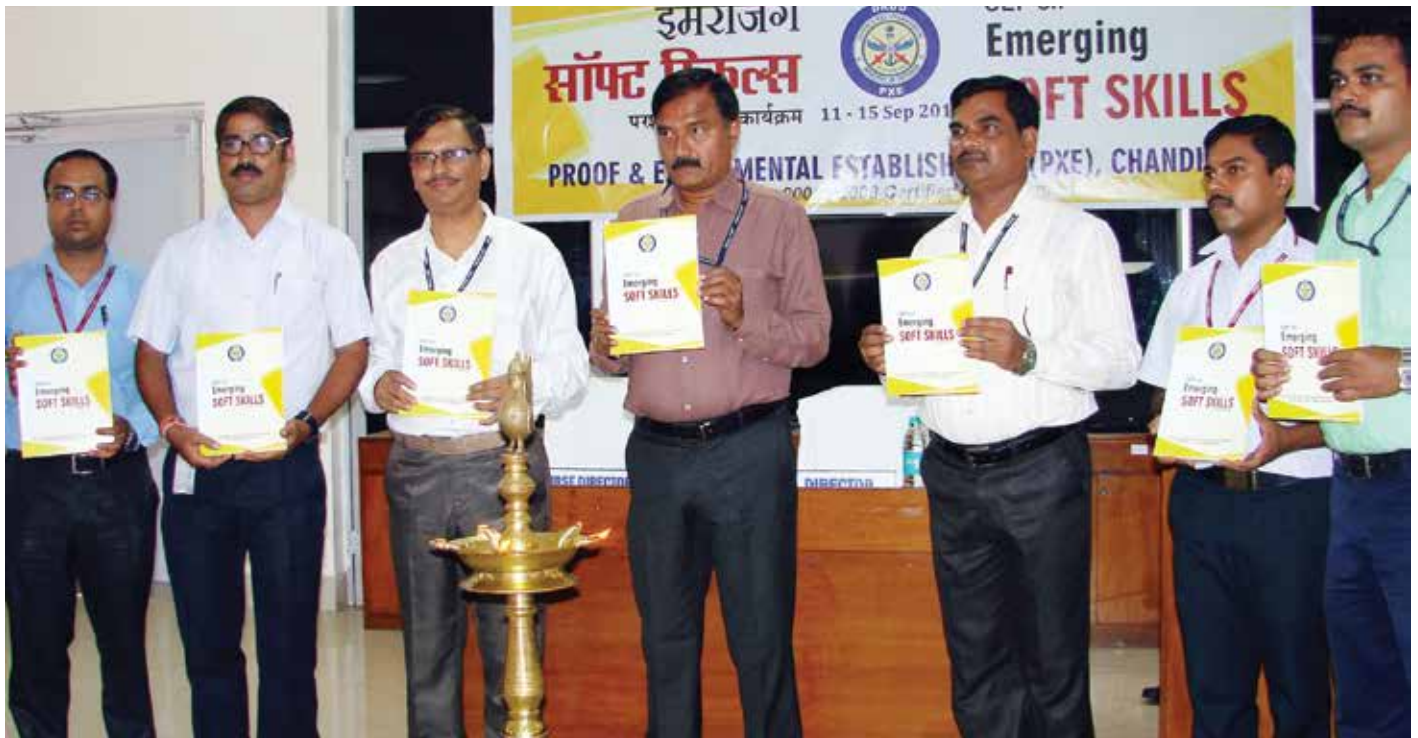


COURSE ON EMERGING SOFT SKILLS

Proof and Experimental Establishment (PXE), Chandipur, organized a CEP course on Emerging Soft Skills during 11-15 September 2017. Shri R Appavuraj, OS and Director, PXE, released the course material. Twenty-four participants attended

the course. Topics like Emerging HR Practices, Polarity Management vs Team Building, Effective Communication, Competency Mapping, Relationship Management, Six thinking Hats, Situational Awareness, EQ for Managerial Effectiveness, Transactional Analysis, etc., were covered by the

experts from IIT, Kharagpur; FM University, Balasore; Ravenshaw University, Cuttack; FM College, Balasore; DRDL, Hyderabad; DIPR, Delhi and PXE, Chandipur. '3600 Evaluation Process' was used in the CEP. Dr PK Das Gupta, Sc 'G', was the Course Director.



TRAINING PROGRAMME ON CRYPTOLOGY AND INFORMATION SECURITY

A Special Training Programme on Cryptology and Information Security (CIS 2017) was organized for users and the various DRDO labs by Scientific Analysis Group (SAG), Delhi, during 4-15 September 2017 at Nalanda Auditorium of SAG.

The aim of the programme was to make aware the participants about various information security issues and the cryptographic solutions to protect vital information and network infrastructure. Ms Anu Khosla, Director SAG, in her inaugural talk, discussed

the challenges of information security. Shri Ram Ratan, Sc 'F', and Programme Director gave the overview of CIS 2017. The interactive talks were given by scientists of SAG and invited speakers from IIIT, DTU, DIAS, DIAT, DU, CCSU, and SAU.



DRDO HARNESSING SCIENCE FOR PEACE AND SECURITY- XXII

CHAPTER 2: TRANSFORMATION—DEFENCE RESEARCH AND DEVELOPMENT ORGANISATION (1958-1969)

The article is 22nd 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).

CONSOLIDATION

Management, Review & Evaluation

Simultaneously with the formalisation of procedures for initiating projects at the laboratory", the management and review procedure was also being systematized. As long as the projects were small, the number of laboratories were less, the working of the laboratories dealing with technology was reviewed annually by the Chief Controller R&D along with the Technical Director and other functionaries from Headquarters who dealt with personnel, administration, and purchase. The Technical Director was kept abreast of the progress in projects by periodic project progress reports and during visits to the laboratories so that the CCR&D was briefed fully about the work that is being carried out. The problems and difficulties of the laboratories were presented, discussed and wherever possible decisions were taken at that point of time. Besides these, the high ranking officers from specific Services such as the Signal Officer-in-Charge, Army Headquarters or equivalent would visit the laboratory, and would be acquainted with the progress and discuss issues relating to their requirements. For science laboratories the Deputy Chief Scientist reviewed the progress and working of the laboratories. This was a simple and effective procedure but with increasing number of laboratories and projects this could no longer be continued. For the equipment oriented laboratories, development panels were introduced for monitoring and reviewing

the progress. These had representatives from the three Services, maintenance agencies, inspection agencies, main production agencies, director of the concerned laboratory, corresponding group director of DRDO and so on. These were chaired by a senior military officer of the branch and the Services that had the maximum interaction with the laboratory. These panels met at least once a year but more often twice. For each of these meetings, the concerned laboratories and the production agencies would prepare detailed briefing papers containing the actions taken on the earlier decisions of the panel, the progress done in period between two meetings and the difficulties that have been faced in progressing the work. The discussions mostly centred around the Development and Staff projects about progress made, the relaxations sought in specifications, conducting of the User trials and the results, documentation for production and the interaction between the different agencies. These were intense and interactive but extremely productive because in most cases decisions would be taken and these were implemented by the participants. In the case of laboratory projects the progress would be reviewed, User reaction as well as interest in continuing, foreclosing or furthering the work ascertained and the next logical step outlined. For example, in the electronics 'area' the Electronics Development Panel (LDP) was constituted in 1962 and held its first meeting in July 1962 with Major General BD Kapur as the Chairperson. Besides the formal development panel meetings, the periodic visits of senior ranking officers from the Services helped

in clarifying difficulties and clearing bottlenecks.

For major Staff projects for which a QR had been drawn by the Services, or those which had been authorized by the Defence Minister's Scientific Advisory Committee, Steering Committees with a top level Service Officer as Chairman and with members at the top level from the concerned Services, the production agencies, inspection agencies, the Ministry of Defence, the technical director and other functionaries in charge of finance, administration and stores the finance, and the director of the concerned laboratory, were formed. Because of top level representation, these committees were found very effective in cutting down delays that had been encountered in fabricating pre-production models at production agencies, User trials, placement of orders for bulk production and so on.

For the techniques/research oriented laboratories, Advisory Committees or Research Committees were set up with an eminent scientist as Chairperson, the membership comprising of specialists from other science and technology organisations, academic institutes, group directors and other functionaries from DRDO HQ and representation from the three Services. The atmosphere in these meetings was more relaxed and somewhat collegial as there were fewer projects of immediate interest to the Services and the topics discussed were also not of immediate interest to them. The periodicity and the regularity of meetings of these committees, however, varied widely. For example, in the case of the Defence Science Laboratory, the first meeting of the DSL Advisory



Committee met in July 1966 with the Scientific Adviser as the Chairperson. In this case, the Committee reviewed the progress of research and development projects undertaken by the laboratory and scrutinized the requirements of the laboratory in respect of electronic materials and equipment needed for conducting R&D in this area. Dr Bhagavantam took advantage of this occasion to give direction to the work of the scientists by reminding them that purely basic research which had no bearing on defence is not to be pursued. On this occasion, he made it clear that only two types of projects could be undertaken by the laboratory and these were, User Projects initiated by the Services after interaction and R&D projects initiated by the scientists based on the forecast requirements of the Services for the next 5 or 10 years.

Based on the recommendations of the Scientific Advisory Committee to the Cabinet, the mechanism of a Governing Council was introduced in the last years of the 1960's for nine laboratories. The Governing Council was chaired by an eminent scientist outside of DRDO with specialist members from academic institutions, other Science & Technology Organisations, the concerned technical director and other functionaries dealing with finance, personnel and stores at the DRDO Headquarters, director's representatives from the Services and the defence public sector undertakings.

From the point of view of top management, evaluation of the performance of each laboratory would help in locating the science and technology areas as well as the laboratories that would need more attention from the Scientific Adviser, the CC R&D and the DCS. Performance evaluation of the laboratories based on input/output ratio, that is, inputs being cost of equipment, materials, components, direct manpower employed and the output being the value of the hardware successfully developed and produced, was accepted as the starting point for equipment oriented laboratories. It was also recognized that a different evaluation method would have to be devised for technique/science oriented laboratories since there would be difficulties in quantifying their output

in terms of orders placed on production agencies. In view of the doubts expressed by some Directors that even for equipment oriented laboratories, the input/output criterion could discourage the scientists to take up projects with higher technical uncertainty even though the Services might benefit more, and that further strain would be imposed on the scientists for maintaining up-to-date and detailed records of hours spent by the scientific and technical personnel on the projects, it was decided that evaluation based on the present criterion would be applicable only to equipment oriented laboratories and a review would be carried out after gaining experience. It is not surprising that DRDO faced difficulties in evolving a common metric for the output of its laboratories. Even in the 21st century a common metric that applies across the R&D continuum is yet to be evolved.

Interaction with other Organisations

The integrated procedure for development and production of military store did not specifically contain provisions for involving the private sector industry in development. When such a necessity arose in 1968, DRDO had to evolve a procedure for development contract with private sector and get the approval of the Government of India. If it had not done so it would have been subjected to the normal procedure of involving the Director General Supplies and Disposal (DGS&D) of the Ministry of Supplies who were considered as the experts in contracts. The DGS&D had their own procedures and rules which were not suited for development contracts and their time schedules normally did not accord priority for development contracts of DRDO. The draft contract was discussed at the 11th Annual R&D Conference in May 1968 and finalized. The guiding principles advocated a procedure that encouraged competition and required on the part of the DRDO laboratory to make full enquiries into the capability of the firms to undertake the development work of the desired quality within the time frame and their financial soundness to manufacture the desired numbers. It also outlined the review and monitoring

mechanism, the financial limits and other general conditions governing placement of development contracts. The contract also permitted the DRDO laboratory to assure the potential partners that on successful completion of development, they would be awarded of 80 per cent of the initial bulk orders. On subsequent orders, the government was free to encourage competition to get optimum price for the Services.

The linkages with Universities and other R&D institutions were maintained through Grants-in-Aid-Schemes which enabled the DRDO to get specific experts/specialists at these institutions to take up investigations in topics of interest to defence. During the Chinese aggression of 1962 a steering committee was set up with CSIR to carry out investigations and develop processes and products having defence applications so that indigenous production was made possible. This resulted in pilot plant production of 28 items of defence interest by CSIR. In the 11th Annual R&D Conference, the overall results of the Grants-in-Aid Schemes was reviewed and it was found that while the collaboration with CSIR was successful, it was not so with the academic institutions. Since most major projects were classified as SECRET, difficulties were experienced by the DRDO laboratories to take the investigators into full confidence and provide details. This also resulted in the dearth of worthwhile projects with clearly defined objectives for the academic specialists to work upon. In addition, there was lack of enthusiasm on the part of the investigators at the educational institutions due to the complexity of administrative procedures and consequent additional paper work. The fact that DRDO would not be able to build expertise in all areas of science and technology that was of relevance to defence, dependence to some extent on scientists outside of DRDO will be needed. Thus, it was decided to continue the Grants-in-Aid Schemes with simpler administrative procedures, clearly defined objectives, higher financial limits, and closer linkages with the DRDO laboratories.

To be continued...

FnBnews.com

Fri, 13 Oct, 2017
(Online)

DFRL-DRDO inks 29 licence agreements with F&B cos for transfer of tech

By Nandita Vijay

DFRL-DRDO inked 29 licence agreements for technology transfers (LA ToT) to spur food entrepreneurship in the country. A business-to-business (B2B) interaction was held with entrepreneurs to explore the possibility of establishing food processing industries in Goa.

The pact inked with the entrepreneurs included Tropical Fruits and Agro Products, Kerala, and Sushma and Co (Electricals), Mumbai, for curd making machines and digitalised hot plate.

There were six edible cutlery companies. These included Prime Foods (Mysuru); two from Bengaluru (Padmavathi Ramona, Rashi e-Waste Solution and Seveneves); Vijay Gas Agencies (Salem) and Frumar Food Products (Hyderabad).

Other companies were Indoglobal Ingredients, Bengaluru, for flax-oat tasty oat bar, ergogenic bar, cocoa delight bar, omega 3 rich bar and composite cereal bar; Nidhi Foods, Puttur, for flaxseed-based products and millet products; Pearl Pulps, Bengaluru, for fruit beverages (grapes); Christy Friedgram, Trichengode, for Jiffy Halwa and Jiffy Upma; Rajaganapathy Food Industries, Mysuru, for Jiffy Upma; Zerbera Foods, Goa, for millet ragi products; Lawrenceedale Agro Processing India, Nilgiris, for minimally-processed vegetable. Pristine Tropical Fruits and Agro Products, Kerala, for osmo-dehydrated fruits (pineapple); Plus Instant Beverages and Vending, Mumbai, for ready-to-reconstitute coffee mix; R K Foods, Salem, for vacuum-fried fruit and vegetable chips; Jain Agro Food Products, Maddur, Karnataka, for vacuum-fried fruit and vegetable chips; MM Food Products, Bengaluru, for vacuum-fried fruit and vegetable chips; FTP Food & Beverages Mangaluru, for vacuum-fried fruit and vegetable chips; Goan Fruit Processors, Bicholim, for vacuum-fried fruit and vegetable chips, and Anil Engineering, Betki, North Goa, for vegetabilised bhujia.

At the recently-concluded Industry Interface and Technology Management (DIITM), the Defence Research and Development Organisation (DRDO), in collaboration with the Goa State Industries Association (GSIA) conclave on food technologies, the platform showcased DRDO/DFRL products and spin-off technologies for large-scale adoption by entrepreneurs.

THE HINDU

Tue, 17 Oct, 2017

Tejas jets to get French-made radars

Company completes flight test

Thales, a French multinational that makes aerospace and defence equipment, has flight-tested an active array radar built specifically for Tejas, the indigenously built light combat aircraft.

The radar is based on the company's successful RBE2 radar installed on Rafale fighter jets, 36 of which India is buying from Dassault. It meets the specific requirements of the Hindustan Aeronautics Ltd. to equip the 80 Tejas-Mk1A aircraft under development.

"In just four months, thanks to our solid, proven experience with the RBE2, we've been able to carry out successful flights to test the performance of the key features of the radar we're offering for the Tejas Mk1A light fighter," Philippe Duhamel, executive vice-president, Defence Mission Systems, Thales, said in a statement on Monday.

The tests were conducted during summer this year at the Cazaux air base in France, on a test-bench aircraft, focussed on metrological analyses of the radar performance, Thales said.

"These test flights proved that the radar is fully operational and perfectly corresponds to the specific requirements of the HAL for its combat and air-superiority missions. It is therefore ready and able to adapt to the tight schedule imposed by the Mk1A LCA," the statement said.

A Tejas Mk-1A variant with specific improvements is under development and HAL had earlier this year floated a tender for Advanced Electronically Scanned Array (AESA) radar and Self-Protection Jammer. The Defence Ministry has already approved 83 Mk1A for the Air Force, in addition to the 40 basic variants.

THE FINANCIAL EXPRESS

Mon, 16 Oct, 2017
(Online)

Nirmala Sitharaman visits Combat Vehicles Research and Development Establishment, Chennai

Defence Minister Nirmala Sitharaman today visited the Combat Vehicles Research and Development Establishment (CVRDE) at Avadi near here.

Defence Minister Nirmala Sitharaman today visited the Combat Vehicles Research and Development Establishment (CVRDE) at Avadi near here. In her first to the city after assuming office, Sitharaman evinced keen interest in the Arjun Main Battle Tank Mk-II, Arjun Armoured Recovery and Repair Vehicle, Arjun Catapult, unmanned ground vehicles, sub-systems of Light Combat Aircraft-Tejas and 180hp engine of Ruston-II displayed at the facility. On the occasion, the first prototype of the Arjun Armoured Recovery and Repair Vehicle (ARRV) was handed over by BEMIL Ltd chairman and managing director Deepak Kumar Hota to CVRDE distinguished scientist-director P Sivakumar, in the presence of Sitharaman. In her brief address, the defence minister congratulated members of DRDO and CVRDE for their "unsinister efforts" and contributions for the "defence self-reliance of the nation," an official release said. She expressed confidence that the DRDO will strive hard to empower the nation further with 'Make in India' concept.

Sitharaman released a book titled 'Arjun MBT (Main Battle Tank) — an Indian Success story' on the occasion. The BJP leader also launched a website inviting young engineering graduates to take part in Defence Challenging Applications, the release said. Defence Research and Development Organisation (DRDO), Chairman S Christopher and Sivakumar made a presentation on the achievements and on-going programmes at the facility, it added.

THE HINDU

Mon, 16 Oct, 2017
(Online)

DRDO will empower nation with 'Make in India': Nirmala Sitharaman

Defence Minister visits Combat Vehicles Research and Development Establishment in Avadi

Defence Minister Nirmala Sitharaman visited the Combat Vehicles Research and Development Establishment in Avadi on Sunday, where she was given a presentation on the ongoing national programmes in combat vehicles and technologies.

The Defence Minister, during her maiden visit to the facility, was also shown around various technology centres. S. Christopher, Chairman, DRDO & Secretary, Department of Defence, R&D, and P. Sivakumar, Director, CVRDE, gave a presentation about the unit, a press release said.

The Defence Minister evinced keen interest in the advanced systems like Arjun MBT Mk-II, Arjun Armoured Recovery and Repair Vehicle (ARRV), Arjun Catapult, Unmanned Ground Vehicles, Sub-systems of Light Combat Aircraft -Tejas, Landing Gear, 180 hp engine for Ruston-II, 1000 hp Engine for T-72, 400 hp for BMP-II, besides Armoured Ambulance Tracked, Carrier Command Post Tracked, Bridge Laying Tank

india

Mon, 16 Oct, 2017
(Online)

Defence Ministry to Have Cyber Wing, Special Operations Division Soon

New Delhi: The Ministry of Defence (MoD) is likely to get three new agencies to tackle growing challenges in the fields of the cyber world, space and special operations. Their formation was announced by the MoD in July. The proposal is pending with the government. A source told the Indian Express that the ministry was awaiting responses from the law ministry and other allied ministries.

The approvals for the formation of Defence Cyber Agency, Defence Space Agency and a Special Operations Division are expected within a couple of months, a report in the national daily said. Similar agencies will be raised in Air Force and Navy. These divisions will be headed by officers of the rank of Major General.