DRDO NEWSLETTER

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READY TO SERVE

INDIA JOINS EXCLUSIVE CLUB

AGNI-V FINAL DEVELOPMENT TRIAL SUCCESSFUL

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FROM THE DESK OF THE CHAIRMAN

Dr S Christopher
CHAIRMAN
Defence Research & Development Organisation
&
SECRETARY
Department of Defence Research & Development

Milestones Reached and Miles to go...

Dear members of my DRDO family, I wish you all a Happy and Prosperous New Year 2017. Dawn of a New Year is an occasion to retrospect on our achievements in the year that has passed by and look ahead to the tasks to embark upon in the coming year. We can proud that all the seven clusters of DRDO laboratories have significantly contributed to Nation's defence preparedness in the year 2016 and are aspiring to do more in the following year. Let me then on a very positive note summarise our landmark achievements in 2016.

Armament & Combat Engineering Cluster

The Armament and Combat Engineering Cluster has reached a landmark with production of about ₹ 8,525 crore worth of armament systems. The products worth ₹ 15,650 crore are on the pipeline.

The indigenous Advanced Towed Artillery Gun System (ATAGS) realised by this cluster is an important product of the calibre of imported Bofors gun. The ATAGS has promising export potential. Indian Army has procured two regiments of Pinaka Mk-1 Multi Barrel Rocket Launcher System and six more regiments are on order. Development of Pinaka Mk-2 and Mk-3 versions with enhanced capabilities is already in progress. A family of six Ammunitions have been developed out of which four have reached the production stage.

The 46 m Modular Bridge has been realised and has completed internal trials. The bridge is capable of being deployed in about 90 minutes. The Wheeled Armoured Platform with amphibian capability has multiple applications including as 30 mm Infantry Combat Vehicle.

To be continued...

Agni-V, India's Long-Range Ballistic Missile tested Successfully

Agni-V, India's long-range surface-to-surface ballistic missile was successfully flight tested by DRDO on 26 December 2016 at 1100 hr from Dr Abdul Kalam Island, Odisha. The full range test flight of the missile has further boosted the indigenous missile capabilities and deterrence level of the country. Radars, tracking systems and Range Station tracked and monitored the flight performance. The missile successfully met all the mission objectives.

This was the 4th test of Agni-V missile and the second one from a Canister on a Road Mobile Launcher. All the four missions have been successful.

"The successful test firing of Agni-V is the result of the hard work of DRDO & its scientists. I congratulate them."

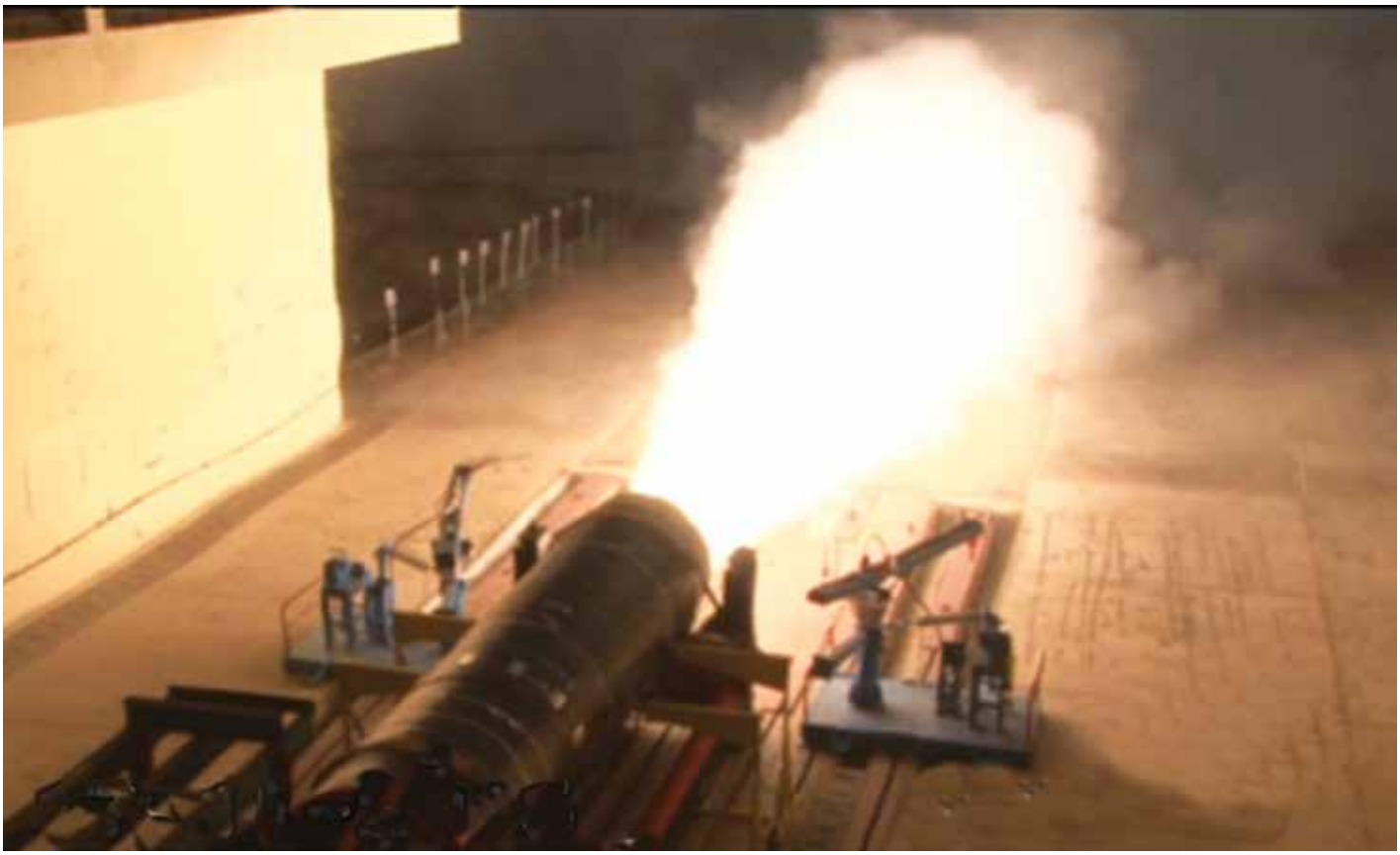
Hon'ble President of India Shri Pranab Mukherjee congratulated DRDO for the successful test flight of Agni-V, which will enhance the country's strategic and deterrence capabilities.

Hon'ble Prime Minister, Shri Narendra Modi congratulated DRDO on successful test firing of Agni-V and said that it is the result of hard work of DRDO, which makes every Indian proud and adds tremendous strength to our strategic defence. Hon'ble Raksha Mantri Shri Manohar Parrikar also congratulated DRDO for the successful test firing of Agni-V.

Agni-V in Nutshell

- The latest in India's Agni family of medium to intercontinental range missiles, Agni-V gives India the strategic depth it needs.
- Ready to be deployed, surface-to-surface missile has range of over 5,000 km and can carry about a 1,000 kg warhead.
- The 17-metre long Missile weighs about 50 tonnes.
- Its fire-and-forget system cannot be easily detected as it follows a ballistic trajectory.
- In the series, Agni-I has a 700 km range, Agni-II has a 2,000 km range, and Agni-III and Agni-IV have a 2,500 km to more than 3,500 km range.

Static Testing of Large Solid Rocket Motor



A large case-bonded rocket motor of 12 T class was static tested successfully on 17 November 2016 at Advanced Centre for Energetic Materials (ACEM), Nasik. The composite case rocket motor was designed and realised indigenously and belongs to the Mark III version. The main objective of the static test was to validate the design for optimised EPDM insulation where a reduction of 80 kg was carried out compared to the Mark I version, and to evaluate the augmentation factors. The motor has a submerged nozzle with provision for actuation, which is also realised indigenously.

The 12 T class solid rocket motor is one of the largest rocket motors with EPDM liner in a composite casing being processed in India. The propellant is based on hydroxyl terminated polybutadiene (HTPB)—Ammonium Perchlorate (AP)—Aluminium (Al)-based composition.

The complete process technology for realisation of the solid rocket motor has been developed and matured at ACEM. The processing involves critical steps such as mixing of propellant in multiple-bowl programme, viscosity management during the long casting period, confinement based pressure curing without application of inert gas etc. Compliance with stringent quality requirements ensured a defect-free propellant grain as revealed by the non-destructive inspection.

The static testing of motor involved data acquisition of 34 channels for temperature, 27 channels for strain, 2 channels for thrust, 4 channels for pressure in addition to instrumentation for displacement, pyro currents, actuator signals and high speed videography.

The data were recorded and displayed in real time along with the prediction curve. Pressure-time and thrust-time profiles matched the prediction data.

The motor produced maximum thrust of approx. 500 kN and maximum pressure of 7.25 MPa and the test duration was 74.4 seconds. Strain, temperature and displacements were within the test specifications. Based on the data recorded, the optimised insulation thickness was validated.

Seminar on Littoral Warfare Technologies and Systems

A three-day seminar on Littoral Warfare Technologies and Systems was conducted at Naval Science and Technological Laboratory (NSTL), Visakhapatnam during 4-6 November 2016. Vice Adm KO Thakre, VSM, NM, Project Director, SBC, inaugurated the seminar.

The seminar aimed to provide solution to the user for littoral warfare scenario and provided platform to deliberate on the ways and means to integrate the strengths and resources of the three DRDO naval laboratories and evolve a blueprint on the way-ahead in development of technologies and systems for littoral warfare.

35th Long Logistics Management Course

Thirty-fifth Long Logistics Management Course was conducted by Defence Food Research Laboratory (DFRL), Mysuru, during 10-11 November 2016 for the logistic officers undergoing one-year Logistics Management Course at INS HAMLA. Twenty officers from Indian Navy, one from Indian Air Force, three from Indian Coast Guard and five from foreign countries participated in the course. Apart from lectures, the student officers were shown various DFRL technologies, products, equipment, machineries, and field test kits.

Longitudinal Studies in Kyrgyzstan

Kyrgyz–Indian Mountain Biomedical Research Centre (KIMBMRC) at Bishkek, Kyrgyzstan is a joint venture between DRDO and National Centre of Cardiology and Internal Medicine, Kyrgyz Republic. The centre has its high altitude laboratories at Tuya Ashu pass (3200 m) and Syok Pass (4111 m). A team of four DIPAS scientists comprising Dr Praveen Vats, Dr Koushik Ray, Dr Krishna Kishore, and Shri Debojyoti Bhattacharyya, along with 10 Indian Army Soldiers were deputed to KIMBMRC for longitudinal studies. The studies were carried out on 10 Indian and 10 Kyrgyz volunteers at sea level and high altitude stations for recording of various physiological, biochemical/molecular variables related to high altitude acclimatization with special reference to sleep architecture, molecular mechanism of human performance promotion.

Training on Greenhouse cultivation in Ladakh

A one-day training programme on "Greenhouse Cultivation" was organized, at Defence Institute of High Altitude Research (DIHAR), Leh on 18 November 2016 for the defence personnel of 14 Corps. Training was imparted on how to establish greenhouses and practices to be followed inside the greenhouse. Exposure visit to different types of greenhouses in DIHAR premise was also conducted for the benefits of the participants. The programme was attended by 51 defence personnel from Leh, Kargil, Nubra and Karu sector.

DRDO Young Scientists' Meet 2016

The 4th Young DRDO Scientists' Meet was organized in New Delhi by the Institute of Nuclear Medicine and Allied Sciences (INMAS) along with other Delhi-based labs during 10-11 November 2016. The event was organised by the young scientists under the age of 35. The meet was attended by around 150 young participants from 50 laboratories of DRDO. The two-day event was inaugurated by Dr S Christopher, Chairman DRDO and Secretary DDR&D in the presence of DG Life Sciences Dr Shashi Bala Singh and Director INMAS Dr AK Singh. The inaugural function was attended by Chief Controllers, Director Generals and Directors of Delhi-based DRDO labs.

In his Keynote Address, Chairman DRDO, narrated a tale of two youngsters which will serve as an inspiration to all the participants to never change their plan in mid course in path of attainment of the targets and never try to take easy stand.

Enlightening talks by eminent speakers from services, industry and DRDO were organized to motivate the young minds. Air Marshal Shishir Deo, Air Officer Commanding in Chief, Western Air Command; Shri Sanjay Burman, Director, Centre for Artificial Intelligence and Robotics (CAIR), Cmde (R) CD Balaji, DS, PD (CA) and Director ADA; Shri Akash Sinha, CEO, Omnipresent Robot Technologies; Shri Praveen Sinha, Executive Director HR, Escorts Group, delivered elucidative talks to the participants.

Dr G Satheesh Reddy, SA to RM and DG (MSS) was the Chief Guest at the valedictory function. SA to RM signified the importance of mentoring by the seniors and actively interacted with the participants.

Dr Reddy awarded the winners of various competitions held on the occasion and also felicitated the organizing committee for the successful execution of the event. The event concluded with a cultural programme.

Jet Engine Technology JWG Meeting at AFRL

Second Joint Working Group (JWG) Meeting under the auspices of Indo-US Defence Technology and Trade Initiative (DTTI) was held during 14-16 December 2016 at Air Force Research Lab (AFRL) at Wright-Patterson Air Force Base in Dayton, Ohio. The Indian delegation was led by Shri MZ Siddique, OS and Director, Gas Turbine Research Establishment (GTRE), and Co-Chair Jet Engine Technology (JET) JWG and members from Aeronautical Development Agency (ADA), Indian Navy and Embassy of India.

DTTI is a flexible mechanism to ensure that senior leaders from both the nations are persistently focused on the opportunities and challenges associated with growing defense partnership.

The US delegation was led by Mr Antonio A Miguelez, Director, Propulsion & Power Engineering Department, Naval Air Systems Command and Co-Chair JETJWG with members from the US Navy, US Air Force and DoD.

At the meeting progress of items currently under discussion in the working group such as Advanced Medium Combat Aircraft (AMCA) Engine Cooperation, ToT, Component Improvement Program, and additive manufacturing etc., was reviewed.

TIRCs Coordinators' Meet at DESIDOC

Defence Scientific Information and Documentation Centre (DESIDOC), Delhi, organised a meeting of the Heads of DRDO Technical Information Resource Centres (TIRCs), Coordinators of DRDO Newsletter, Technology Focus, Knowledge Repository and Web and DRONA Administrators on 25 November 2016 at the Metcalfe House, Delhi. The meeting started with paying homage to Prof. MGK Menon, former SA to RM, who passed away on 22 November 2016. Dr Rajeev Vij, Sc F, welcomed the guests and the participants and briefed about the programme.

Shri Gopal Bhushan, Director, DESIDOC, in his inaugural address deliberated on the outcome of the last meeting held in December 2015 and action taken by the DESIDOC to further improve the services provided by the Centre. He also briefed about the status of the DRDO Library Manual and the various services provided by DESIDOC through Internet and Intranet to the user group and how these were useful to them. He insisted that the labs should pro actively extend the services to the user community. He also urged all to inculcate the reading habit.

Shri Gopal Bhushan also informed about the new initiatives taken by the DESIDOC to help boost the brand DRDO through new publications and by participation in various exhibitions.

Dr Shailendra Kumar, Head, Department of Library and Information Sciences, University of Delhi, delivered an invited lecture to the participants and shared his experience.

The issues pertaining to reporting of recent developments and various activities at DRDO labs to DRDO Newsletter and Technology Focus were discussed during the meeting. Presentations on Defence Science Journal, DESIDOC Journal of Library and Information Technology, Monographs and Samachar were made.

Seventy participants all across DRDO labs participated, discussed and shared their views in the meeting.

Medical Camp at DESIDOC

DESIDOC organised a Medical Camp on 30 November 2016 to test Vit D deficiency in its employees. In recent years, non-musculoskeletal conditions—including cancer, metabolic syndrome, infectious and autoimmune disorders—have been found to be associated with low Vit D. An informative talk on Vit D Deficiency was delivered by the doctor.

Eighty-four, out of 96 participants found to be Vit D deficient, were counselled and administrated with the medicine dose.

A follow up would be conducted at the interval of six months. The camp was coordinated by Dr Rajeev Vij, Sc F.

Raising Day Celebrations

MTRDC, Bengaluru

Microwave Tube Research and Development Centre (MTRDC), Bengaluru, celebrated its 33rd Lab Raising Day on 4 November 2016. Shri Girish Kumar, Director, BEL, Bangalore Complex, was the Chief Guest and Dr G Athithan, DS and DG (MED & CoS), DRDO, was the Guest of Honour.

Dr Sudhir Kamath, OS and Director MTRDC in his welcome address spoke about MTRDC's efforts towards 'Make in India' initiative by developing and producing microwave devices for BEL. He also briefed about the achievements of the lab during the year 2016. DRDO laboratory-level Awards were presented to the deserving MTRDC employees and some of their meritorious wards.

PXE, Chandipur

Proof and Experimental Establishment (PXE), Chandipur, celebrated its 122nd Raising Day with grandeur on 7 November 2016. Shri R Appavuraj, OS and Director, PXE welcomed the Chief Guest, Dr P Shivkumar, DS and Director, CVRDE, Chennai. Shri Appavuraj elaborated on the achievements of PXE in the past one year. The Chief Guest presented laboratory-level DRDO Awards to the employees for their meritorious contributions. PXE Newsletter, Praman, was also released by the Chief Guest.

Various sports activities were conducted to mark the occasion. Mementoes were presented to employees who completed 25 years in the organization. The celebration ended with a cultural programme presented by PXE family.

DLRL, Hyderabad

Defence Electronics Research Laboratory (DLRL), Hyderabad, celebrated its 55th raising day on 19 November 2016. Shri Devendra Kumar, Chief Engineer (R&D), was the Chief Guest on the occasion.

Lab Raising Day at PXE

Dr CG Balaji, DS and Director, DLRL, highlighted the contribution of the laboratory in design and development of EW systems for airborne, naval and ground-based platforms and expressed satisfaction over self-reliance achieved in critical technologies for indigenous EW systems with the partnership of Defence PSUs, academic institutions and industry. Laboratory-level DLRL Scientist of the Year Award, Technology Group Awards and DRTC and Admin and Allied awards were presented to the employees. The employees with 20 years of service were also felicitated. The Chief Guest distributed 30 merit-cum-means scholarships to children of DLRL employees.

DRL, Tezpur

Defence Research Laboratory (DRL), Tezpur, celebrated its 54th Raising Day on 21 November 2016. Dr NC Talukdar, Director, Institute of Advanced Study in Science and Technology, Guwahati, Assam, graced the function as the Chief Guest.

Director, DRL highlighted the achievements of the laboratory. DRDO laboratory-level Awards and 'SN Dube Publication Award' for the best paper were distributed to the meritorious employees. Prizes were distributed to the winners of sport events and artists of the cultural programme.

Lab Raising Day at DRL

National Seminar on Quantum Computing

National Seminar on "Solid State Devices for Quantum Computing Applications" was organized by Solid State Physics Laboratory (SSPL), Delhi, on 26 November 2016. Shri CVS Sastry, Director, ANURAG, inaugurated the seminar and stated about the potential applications of quantum computers for specific problems.

Dr RK Sharma, Director, SSPL enumerated the role of solid state devices for quantum computing applications. Lectures on superconducting circuits for quantum computing, quantum technologies with photons and atoms for QI applications, some solid state devices for quantum computing, role of coherence and entanglement in quantum search algorithm, etc. were delivered during the seminar. A brainstorming session chaired by Dr DK Aswal, Director, NPL followed the seminar.

CEP Course on Recent Advances in Agro-Bio Threat Mitigation

A course on "Recent Advances in Agro-Bio Threat Mitigation" was conducted by Defence Institute of Bio-Energy Research (DIBER), Haldwani, during 7-11 November 2016 under the Continuing Education Programme (CEP) of DRDO. The objective of the course was to provide scientists with the update and proper grooming on current scenario of agro-biothreat. The direct relevance of the subject is seen in many field applications like identification of the pathogens, their management and eradication. Educational tours to Department of Plant Pathology, College of Agriculture, GB Pant University of Agriculture and Technology, and Mushroom Cultivation Training Center, Jeolikote were organized during the CEP course.

Course on Cyber Security & Assurance

Scientific Analysis Group, Delhi, organized a five-days CEP course on "Cyber Security & Assurance" during 7-11 November 2016 in which participants from NTRO, BrahMoS, Defence, Intelligence Agencies and DRDO labs participated.

The participants got the opportunity to enhance and enrich their knowledge and awareness about issues in cyber security and assurance. Discussions and practical hands-on session on cyber security tools developed by SAG were also organized for the participants.

Course on Hyperspectral Remote Sensing for Terrain Applications

A one-week CEP course on "Hyperspectral Remote Sensing for Terrain Applications" was conducted at Defence Terrain Research Laboratory (DTRL), Delhi, during 21-25 November 2016. The objective of the course was to disseminate the knowledge and technology in sensor acquisition, platform and processing with emphasis on defence applications through theoretical lectures and practical.

CEP course on Microwave Tubes for Defence systems

Microwave Tube Research and Development Centre (MTRDC), Bengaluru, organized a three-day CEP course on 'Microwave Tubes for Defence Systems' during 22-24 November 2016. The course was designed for service personnel who are familiar and working with systems involving microwave tubes. Shri Senthilkumar, Sc F, Course Director welcomed the Chief Guest Cdr T Jagannath, GM PTPVD, Bharat Electronics.

Ms Latha Christie, Sc G, Head HRD (Trg), gave a glimpse of the course and its significance to service personnel. Dr Sudhir Kamath, OS and Director, MTRDC, gave an overview of activities and various products developed by MTRDC and being produced by BEL. Chief Guest stressed that the interaction with Design teams will improve the maintenance and troubleshooting areas of Microwave tubes of the systems.

Course on Integrated Combat Suite

A CEP course on Integrated Combat Suite (ICS) was conducted during 21-25 November 2016 at Naval Science and Technological Laboratory (NSTL), Visakhapatnam, with an aim to focus on sub-systems of ICS right from the sensors to weapons. Lectures covered included: Sub-systems/components, design aspects of ICS including sensors (Sonar, Radar, electrooptical systems, AUVs and non-acoustic detection), weapons and weapon launchers (torpedoes, missiles, decoys), tactics evaluation, and anti-submarine warfare operations.

Course on Functional Composites

A CEP course on Functional Composites was conducted at Research and Development Establishment (Engineers), [R&DE(E)], Pune, during 21-25 November 2015. Eminent speakers from DRDO and Defence Institute of Advanced Technologies (DU), Pune, delivered lectures on various aspects of functional composites.

The participants were also given a hands-on training on Vacuum Assisted Resin Transfer Molding (VARTM) and Resin Film Infusion (RFI).

CEP on Reliability and Life Prediction Studies on Polymers & Composites

Naval Physical and Oceanographic Laboratory (NPOL), Kochi, conducted a CEP course on Reliability and Life Prediction Studies on Polymers and Composites during 21-25 November 2016 to update the knowledge of the participants.

The topics covered during the course included: Life Prediction Studies on Composite Structures and Rubber Components, Stress and Fatigue Analysis of Transducers, Non Destructive Testing of Composites, Statistical Concepts in Reliability, Reliability studies on Micro Sensors and Composite Structures and Issues and Methodology in Polymer Product Reliability, etc.

Course on Embedded Systems Programming & Applications

Research Centre Imarat (RCI), Hyderabad, and Centre for Personnel Talent Management (CEPTAM), Delhi, jointly organized a course on Embedded Systems Programming and Applications during 21-25 November 2016. The topics covered during the course included: Introduction & Overview to Embedded Systems, FPGA-based Embedded System Design, Internal Architecture, Instruction set Assembly Language Programming, etc.

CEP course on Electrical Integration & Checkout for Aerospace Vehicles

RCI organised a CEP course on Electrical Integration and Checkout for Aerospace Vehicles. Dr SB Gadgil, OS, Associate Director, inaugurated the course and highlighted the importance of electrical integration and check out in missile systems. Shri P Varadhraj, OS, RCI, gave complete picture about the importance of electrical integration with respect to power supply, telemetry supply, communication systems and pyro systems. Shri BHVS Narayana Murthy, OS and Director, RCI, presided over the valedictory function and stressed on the importance of grounding, shielding, bonding involved in electrical integration.

Personnel News

PROMOTIONS

CAIR, Bengaluru

Shri Sanjay Burman, OS and Director, Centre for Artificial Intelligence and Robotics (CAIR), Bengaluru, has been promoted to the grade of Distinguished Scientist wef 26 October 2016. An MTech in Signal Processing from IIT Kanpur, Shri Burman is an expert in the fields of communication, networking, security, and allied subjects.

TBRL, Chandigarh

Dr Manjit Singh, OS and Director, Terminal Ballistic Research Laboratory (TBRL), Chandigarh, has been promoted as Distinguished Scientist. He Joined TBRL as Sc B on 10 December 1984 and took over as Director TBRL on 29 July 2011. He is the leading expert in the country in the field of high pressure and shock physics, detonics, design of explosive systems and high strain rate characterization of materials.

Dr Dev Raj Saroha, Additional Director, TBRL, has been promoted as Outstanding Scientist. He joined TBRL on 9 January 1985 as Sc B. His expertise is design and development of shaped charge, Multi-EFP and concrete penetrating warheads, flash radiography and blast structure interaction.

AWARDS

Desh Gaurav Samman

Dr BK Das, OS and Director, Integrated Test Range (ITR), Chandipur, was awarded prestigious Desh Gaurav Samman by Ruchi Prativa Foundation, Cuttack, for his outstanding contribution towards Indian missile programme and his international recognition in the field of defence science and technology. Dr Das received the award from Shri R Balkrishnan, Development Commissioner and Additional Chief Secretary, Odisha.

Sir Mokshagundam Visvesvaraya Award

Dr Tessy Thomas, OS and Director, Advanced Systems Laboratory (ASL), Hyderabad, was awarded Sir Mokshagundam Visvesvaraya Award-2016 by the Institution of Engineers (India), Telangana State Centre, in recognition of her outstanding contributions in the field of Engineering towards design, development and realization of indigenous missile systems.

Best Paper Award 2016

Dr Rajeev Vij, Sc F, Defence Scientific Information and Documentation Centre (DESIDOC), Delhi, was awarded the Best Paper Award-2016 at National Conference on 'Role of Libraries in Social Empowerment' held at Gandhi Peace Foundation, New Delhi. The Conference was organised by Compact Society for Social Welfare in association with Library Professionals Association, and Association of Media Libraries and Archives, New Delhi.

Visitors to DRDO Labs

CAIR, Bengaluru

Dr S Christopher, Chairman DRDO and Secretary DDR&D; Dr G Athithan, DS and DG (MED & CoS); Smt J Manjula, DS and DG (ECS); Shri Hari Babu Srivastava, OS and Director, LASTEC; Shri SS Nagaraj, Director, LRDE visited CAIR on 20 November 2016. There was a briefing by DS and Director, CAIR followed by discussion and demonstration of technologies developed by CAIR in the area of Smart Fence Solution using Laser Fence and Camera.

DEBEL, Bengaluru

Dr (Mrs) Shashi Bala Singh, DS & DG (Life Sciences) visited DEBEL, Bengaluru, on 23 November 2016. Dr UK Singh, Director, DEBEL, briefed her on the laboratory's mandate to the Services in the field of life support systems, protective clothing & equipment and biomedical instrumentation.

NPOL, Kochi

Vice Admiral AR Karve, AVSM, FOC-in-C, Southern Naval Command visited Naval Physical & Oceanographic Laboratory (NPOL), Kochi on 28 November 2016. He was briefed about the NPOL products by Shri S Kedarnath Shenoy, OS and Director, NPOL.

DRDO HARNESSING SCIENCE FOR PEACE AND SECURITY- XI

CHAPTER 1: THE BEGINNING - DEFENCE SCIENCE

The article is Eleventh 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).

EFFECT OF NUCLEAR EXPLOSIONS

This pioneering study was undertaken at the instance of the Prime Minister. In the foreword to the book, "Nuclear Explosions and their Effects" authored by the Scientific Adviser to the Ministry of Defence, and published in 1956, the Prime Minister stated, "About a year ago, I suggested to the Defence Science Organisation that an objective study might be made with the material available of the consequences of the use of nuclear, thermonuclear and other weapons of mass destruction." The book antedated by over two years, the publication, "The Effect of Nuclear Weapons" by the United States Atomic Energy Commission.

At the time of writing of the book, due to the Cold War, a large amount of data on fallout and radiation health hazards were classified by the super powers. In spite of the fact that Dr Kothari had access to only the published literature, the book authored by him was considered as an authoritative volume concerning all aspects of nuclear weapons. The book won worldwide acclaim for its thoroughness and completeness, went through two English editions, and was translated into German, Russian and Japanese languages. Among other things, the book provided a detailed analysis of the hazards of Strontium-90 fallout and pointed out that it was nearly four times more hazardous for vegetarians.

OTHER ASPECTS

Encadreing the Scientists

In 1953, the Government of India established the Defence Science Service (DSS), which covered the civilian scientists and engineers employed in the Defence Science Organisation, in the TDEs and their counterparts in the Navy and the Air Force, in the training institutions within the Defence Ministry. By this move, the scientists were encadred and derived the benefits of defined salary grades, periodic salary increments, annual leave, permanency of job, provident fund, pension and so on. The DSS was mostly Class I gazetted service by which the Government conveyed that it welcomed and desired to have talented and qualified scientists and engineers in the Organisation. There was also a provision for taking qualified Service Officers on deputation against Class I gazetted posts of scientists in the DSS. However, the DSS also had one level of Class II gazetted rank called the Junior Scientific Officer (JSO) but it did not affect persons with higher qualifications and experience as there was provision for direct level entry at all levels of the Class I gazetted posts of the DSS. In carrying out the fitment of persons to posts the Junior Scientists of the Defence Science Organisation found to their dismay that they were fitted into JSO grade which was Class II gazetted cadre.

View From Outside

The personality of Dr DS Kothari was such that in spite of his closeness to the Prime Minister he did not promote his own interests. Thus, though Dr Kothari was held in respect for his intellectual accomplishments and for his human qualities by the Service Chiefs and the top bureaucrats of the Ministry as well, the post of the Scientific Adviser to the Defence Ministry remained subordinate to the Defence Secretary and the Scientific Adviser was not made a regular member of the Defence Minister 's Committee where all important matters concerning the Services were dealt with. Firstly, the absence of a regular spokesman for science and technology at the highest level of the Ministry slowed down the penetration of science and technology and scientific methods into the higher echelons of the Services. This is borne out by Khera's statement that, "...the scientific inoculation of the armed forces was not going to be easy, and in fact proved exceedingly difficult. The difficulty was not on account of deliberate opposition but largely through inertia and ignorance, which is the universal characteristic of establishments everywhere. And ignorance is truly the quality of resistance." Secondly, as the heads of the two other S&T organisations, Dr SS Bhatnagar was already Secretary to the Government of India and [Dr Bhabha had fought

successfully for autonomy and freedom from bureaucratic control (he would become Secretary to the Government of India, Department of Atomic Energy in 1954)], it appeared to the outside world, that " in terms of organisational linkages, the defence research and development effort in India is given a lower place in the organisational hierarchy."

SUMMING UP

Major General BD Kapur, who later became the First Chief Controller of the Defence R&D Organisation and who worked closely with Dr DS Kothari perhaps summarises the general view held at that time about the performance of the Defence Science Organisation. "The basic science laboratory Dr DS Kothari had raised provided the nucleus for the formation of the Defence Research and Development Organisation. It was here that the outstanding scientists in defence in various disciplines including operational research, weapons evaluation techniques, came into form, who held their own in the world of science by offering papers at the Commonwealth Defence Science Conference, where they were very much appreciated, some of them were also published in the leading journals of the world. The nuclei of physiologists, of applied psychologists and nuclear medicine specialists, all his trainees, were the foundation of the present major units." In addition to physiology, psychology and nuclear medicine, there were other areas of technology, such as electronics, ballistics, and explosives in which scientists of the Defence Science Laboratory had gained a measure of proficiency, experience and confidence in applying scientific knowledge and procedures in different applications to defence. The advisory role to which the Organisation had positioned itself: however, limited it to reactive response and the expertise to that of analysis. Thus, while the scientists had the knowledge of the technology, techniques, and analytical tools, they were lacking in the knowledge of and working experience in design of weapon systems which is essential to effectively transform technology into a force multiplier. As the first decade of the Defence Science Organisation was drawing to a close, the intensity of Cold War would be felt at our national borders due to our neighbour Pakistan joining the US-backed military pact against the Eastern Block and acquiring new arms from the USA. The next decade would usher in new challenges to the organisation as a result of restructuring, expansion, and changes in workload.

To be continued...

Vigilance Awareness Week

Vigilance Awareness Week 2016 was observed at Combat Vehicles Research and Development Establishment (CVRDE), Chennai, from 31 October 2016 to 5 November 2016 for creating awareness of vigilance among employees. To promote awareness of vigilance, pamphlet on corruption and the importance of vigilance were distributed to all employees. Posters displaying messages against corruption (in English & Hindi) were displayed at prime locations and the notice boards of all Divisions. An invited lecture was delivered by Shri N Krishnamurthy, Superintendent of Police, Anti Corruption Branch, CBI, Chennai on Vigilance and Anti Corruption. He elaborated on the theme and various aspects of public participation in eradicating corruption. He explained about good governance and ways and means to adopt the same in Govt organizations.

Yoga Reached to Antarctica

DIPAS, Delhi, in collaboration with Swami Vivekananda Yoga Anusandhana Samsthana (SVYASA), Bengaluru, conducted a scientific project on Yoga in Antarctica. The project is first ever endeavour in yoga research by DIPAS. The aim of the project was to analyze the effects of yogic practices on human physiology during 10 months stay in Indian Research Base, Antarctica. Shri Mohit Nirwan, JRF, DIPAS conducted regular morning yoga classes and collected various physiological data of the team members. He also collected samples for evaluation of bio-chemical, metabolic and immunological variables.


DRDO
Securing the nation with Swadeshi Technologies...
स्वच्छ भारत
एक कदम स्वच्छता की ओर