On Target Again

With successful interception of flying targets in approaching, receding and perfect crossing configurations, Akash missile is ready for induction and production.
Celebration of Spirit of Science, National Science Day

Prof. Sanjay Govind Dhande, Member UGC and National Security Advisory Board delivering oration on National Science Day at Dr Bhagavantham Auditorium, Metcalfe House, Delhi

L-R: Shri RB Singh, Chairman, CEPTAM, Shri Anil K Maini, Director, LASTEC, Dr N Prabhakar, DS & CC R&D (SAM), DRDO, and Prof. Sanjay Govind Dhande, releasing the DRDO Science Spectrum, a compilation of Science Day Orations by DRDO Scientists, published by DESIDOC, Delhi
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Indigenously developed Surface-to-Air Missile Akash test-fired Successfully

Indigenously designed and developed supersonic surface-to-air missile, Akash, underwent three consecutive flight tests with First of Production Model (FOPM) equipment for the Indian Army. In all the three tests, the tow body target of pilotless target aircraft (PTA), simulating the target, was intercepted successfully in approaching, receding and perfect crossing configurations by the Akash. In two occasions, the small sized tow body target was brought down under the influence of warhead detonation. The complete operation of weapon system, i.e., from switching on individual equipment, establishing communication between elements to pressing the fire button, was carried out by the Indian Army under the guidance of DRDO, Bharat Dynamic Limited (BDL) and Bharat Electronics Limited (BEL). Trials were witnessed by DG, Army AD; Corp Commander 11 Corp; Shri Som Sibnath, OS and Director, Defence Research and Development Laboratory (DRDL), Hyderabad; CMD, BDL and CMD, BEL. DG Army AD congratulated all the agencies for developing and producing world-class equipment and said that Army is very happy to receive the system.

Project team of Akash along with teams of Electronics and Radar Development Establishment (LRDE), Bengaluru, and Research and Development Establishment (Engrs) [R&DE(E)], Pune, guided the teams from BDL, BEL, Missile System Quality Assurance Agency (MSQAA), and public/private industry partners and achieved the rare distinction of meeting the task in time.

As a part of limited evaluation trials, the production version equipment were subjected to roadability trials at VRDE test tracks, weapon system integration trials at BEL and LRDE Kolar, and rail transportability trials from Kolar to Balasore. Other DRDO laboratories, viz., Vehicle Research and Development Establishment (VRDE), Ahmednagar, High Energy Materials Research Laboratory (HEMRL), and Armament Research and Development Establishment (ARDE), both in Pune, Advanced Systems Laboratory (ASL), and Research Centre Imarat (RCI), both in Hyderabad, Centre for Fire, Explosives and Environment Safety (CFEES), Delhi, Terminal Ballistics Research Laboratory (TBRL), Chandigarh and Integrated Test Range (ITR), Chandipore, helped the production programme at various stages.
R&DE (E) develops Mountain Foot Bridge

Through these flight trials, the bulk production clearance will be accorded to BDL by Army for further production of systems. Akash is capable of engaging aerial threats up to a distance of approximately 25 km. The multi-target, multi-directional, all weather air-defence system consisting of surveillance and tracking radars, control centres and ground support systems mounted on high mobility vehicles for the Army version is designed to enable integration with other air defence command and control networks through secured communication links. BDL is the nodal production agency along with BEL and a large number of other industries.

Two squadrons of Akash were inducted into the Indian Air Force in 2012. Further production of Akash for six more squadrons is in progress. Indian Army has also placed an order for two regiments of Akash missile system to the tune of ₹ 14,180 Cr. The total production value of Akash air defence systems cleared for induction by Indian Army and Indian Air force is more than ₹ 23,000 crore.

Shri Avinash Chander, Scientific Adviser to Raksha Mantri (SA to RM), Secretary, Department of Defence R&D, DG DRDO and Dr VG Sekharan, DS and DG (MSS) congratulated team Akash for the successful test.

R&DE (E) develops Mountain Foot Bridge

Research and Development Establishment (Engrs) [R&DE(E)], Pune, has developed lightweight mountain foot bridge (MFB) to bridge dry/wet gaps up to 35 m with a pathway of 0.8 m width. The bridge is made of high-strength aluminium alloy components and man-portable triangular panels. It also includes a man-portable launching system and can be constructed from near-bank without any access to the far-bank. MFB is capable of withstanding conditions prevailing in glacial regions.

To launch the bridge, a lightweight nose is first launched from near-bank in cantilever mode. After the nose is lowered across the gap, bridge panels are attached to the nose and pushed across the gap. The system is made compact considering limited availability of back space during launching in mountain regions. The joints of the bridge facilitate easy assembly in cold conditions. Thirty-five meter bridge can be launched in about one hour; the time of launch will reduce proportionately for shorter spans. The bridge will normally not allow any appreciable accumulation of fresh snow due to provision of gaps in the deck, however it still can withstand accumulation of 250 mm of fresh snow with a density of 200 kg/m³. Bridge can be negotiated by people with a spacing of about 3 m.

The advantage of this bridge is in its modularity. It can be easily modified to account for higher span and/or higher loads by adding additional components. It can therefore be upgraded to higher-load classes. User associated technical trials of the bridge have been successfully completed by Engineering Regiment. It can be effectively used during civil emergencies also.
India realised the importance of photonics early. At DRDO our thrust in photonics has been to develop technologies for surveillance, fire control, guidance, navigation computing, secure networking for defence and homeland security applications”, said Shri Avinash Chander, SA to RM, while inaugurating International Conference on Optics and Optoelectronics-2014 (ICOL-2014) at Instruments Research and Development Establishment (IRDE), Dehradun, on 5 March 2014.

Shri Avinash Chander highlighted the indigenously developed fibre optic gyro with integrated optic chip, wing laser gyro for inertial navigation system for guided missiles, handheld thermal imagers, laser range finders, etc., as the initial successes and micro length arrays for high resolution imaging, Light Detection and Ranging (LIDAR) for detection of chemicals, commander’s thermal imaging sights for T-72, T-90 and BMP vehicles as the recent development achieved by DRDO. “We have the challenges that include night enablement of all our fighting platform and surveillance of our entire border and coast lines by electrooptic sensors in secured network environment that will require deployment of sensors in all available wave bands of optical and infrared regions”, added SA to RM. He also emphasised that the need for 24/7 surveillance using geostationary satellite has necessitated large optics with high resolution and also highlighted the achievements of other scientific departments in the area of photonics.

Talking about the emerging areas of photonics, Shri Avinash Chander said that hyper spectral imaging and blue-green lasers for underwater communication are the new challenges. “To realise all this, technologies for mass-scale and efficient fabrication of optical components including spherical, aspheric and binary components need to be evolved”, he emphasised. Pointing towards future directions, Shri Avinash Chander said, “Moore’s law is now saturating and further progress is expected by bringing together multiple processors linked to optic channels on the same chip”. Speaking about the role of ICOL-14, he said, “DRDO has been successful in bringing together the niche community of photonics in our country. A lot has changed since the international community of researches met at IRDE in last ICOL in 2005”. He urged the photonics community to take stock
and chart out directions for future progress. “I would recommend each organisation to identify an area of excellence and launch enabling programmes of directed research”, exhorted Shri Avinash Chander. He also emphasised for an urgent need for national level facility for fabrication of photonic and integrated components and need of educational institutions that can teach optics as career opportunities to sustain growth.

Shri Avinash Chander also inaugurated an integrated facility at IRDE for design, fabrication and evaluation of large diameter optics. The facility is the most modern and one of its kind in India. He also inaugurated an exhibition where IRDE and number of public sector and private industries showcased their latest products related to optics and optoelectronic systems from India and abroad. Shri SS Sundaram, DS and DG (ECS), DRDO, who shouldered the major responsibility from ‘concept to induction’ of electronic warfare programme, Samyukta, for Indian Army, briefed about the theme of the Conference. Professor BP Pal, President, Optical Society of India (OSI), during his address briefed about the OSI, which is stepping in 50th year in 2014. He informed that besides DRDO and Department of Science and Technology (DST), the Conference has also been technically cosponsored by Optical Society of America (OSA), International Commission of Optics (ICO), SPIE—the International Society for Optics and Photonics, and Optics and Photonics Society of Singapore (OPSS).

Earlier, Dr AK Gupta, OS and Director, IRDE and Vice Chairman, OSI, welcomed the delegates. Dr Gupta informed that ICOL-2014 has received an overwhelming response and 600 national and international delegates are participating in the deliberations. The Conference was organised during 5-8 March 2014 on the occasion of Golden Jubilee of OSI.

National Workshop on Renewable Energy System for Mountainous Regions

A national workshop on Renewable Energy System for Mountainous Regions: Issues and Challenges (ReMount-2014) was jointly organised by the Ministry of New and Renewable Energy (MNRE), and Snow and Avalanche Study Establishment (SASE), Manali, on 14 February 2014 at Research and Development Centre, SASE. The workshop was supported by the Society of Cryospheric Sciences and the Indian Society of Remote Sensing, Chandigarh Chapter. More than 100 delegates attended the workshop.

Shri Ashwagosha Ganju, Director, SASE, welcomed the Chief Guest, Dr Shailesh Nayak, Secretary, Ministry of Earth Science; Guest of Honour Prof. Manoj K Arora, Director, Punjab Engineering College, University of Technology, Chandigarh and all the delegates. In his welcome address, Shri Ganju emphasised on the importance and need of the renewable energy for social and economic prosperity and sustainable development of the country. He highlighted SASE’s effort in tapping the non-conventional energy in mountainous region through installation of a wind turbine at Banihal Top, J&K, and exploring the possibility of geothermal technology for space heating at Manali. In his inaugural address, Dr Shailesh Nayak appreciated efforts put in by SASE to conduct such workshop. He advised scientists, academicians, and technologists to make the best use of the platform by discussing various issues of renewable energy sectors.

Dr Shailesh Nayak inaugurating the workshop
Anaerobic Biodigester Technology to conserve Nature at DRDO’s new Eco-friendly Residential Complex

“Nature is not something that we have inherited. Nature is what is entrusted to us to be passed on to our future generations”, said Shri Avinash Chander, SA to RM, while inaugurating Anusandhan Vihar— modern, and self-contained residential complex at DRDO Estate at Timarpur, Delhi—on 25 February 2014. An organisation succeeds when two W’s, the work and the welfare, go together and DRDO is the place where this happens, this complex is one such example, added Shri Chander. "I am happy that DRDO has been making many successes on technology front. DRDO is equally recognised for the excellent facilities it has created", he further said. SA congratulated Shri Ajay Singh, Chief Executive, Civil Works and Estates, and his team for completing Anusandhan Vihar in record time.

A Biodigester Park equipped with 1.2 kilolitre Biodigester developed by DRDO for the sewage treatment was also inaugurated by Shri Amitabh Kant, IAS, CEO and MD, Delhi-Mumbai Industrial Corridor Development Corporation. Shri Kant appreciated the layout, its novel concept and the quality of the work executed by the DRDO. The complete complex has been designed and developed under the aegis of Directorate of Civil Works and Estates, in collaboration with Directorate of Life Sciences, DRDO. The 5.4 acres eco-friendly complex has 56 Type V and 56 Type IV accommodations in a G+7 configuration along with complete sports and children park facilities. The potable water supply is based on multi-utility 8000 litre per day water treatment plant. The water is recycled for various purposes namely treated flush water for arboriculture, and soft water for bathing and washing purposes.

The Anusandhan Vihar is a compact and hi-tech complex with the state-of-the-art sports complex. The sports complex comprises a basketball court, two lawn tennis courts and three badminton courts all with epoxy flooring, full-fledged modern gymnasium, skating ring and a mini cricket-cum-football ground. It also has a well-equipped children’s park. The complete complex has been developed in 30 months by the Chief Construction Engineer (R&D) Estates, Hyderabad. The facility will be further managed and maintained by Estate Management Unit (R&D), Delhi.

Shri SS Sundaram, DS and DG (ECS), Dr Manas K Mandal, DS and DG (Life Science) and many other senior officers graced the occasion.
Inhibit the Calpain to Climb the Mountain

Defence Institute of Physiology and Allied Sciences (DIPAS), Delhi, has identified a novel mechanism for preventing thrombosis induced by high altitude environment. The thrombosis developed at regions like Siachin glaciers leads to life threatening events such as pulmonary embolism, stroke, and limb amputation.

The study, led by Dr Zahid Ashraf, using proteomic analysis of platelets and animal models, demonstrated that enhanced activity of an enzyme ‘calpain’ significantly contributes to thrombosis under hypoxic conditions. The investigations on the soldiers who developed thrombosis while serving at high altitudes also revealed an increased activity of ‘calpain’ confirming the relevance of the novel pre-clinical findings for clinical applications.

The findings have been published in the current issue (February 2014) of the medical weekly Blood, official journal of American Society of Hematology, with editorial comments. The novel finding could lead to development of therapeutics aimed at specifically preventing or treating thrombotic disorders induced at high altitude regions. The simple bioanalytic assay of ‘calpain’ could be developed for an early diagnosis test for such disorders.

DIAT forges new Partnership with Deakin University

Defence Institute of Advanced Technology (DIAT), Pune, signed a Memorandum of Understanding (MoU) with Deakin University, Australia, on 13 February 2014 to deepen research links through a range of exciting new collaborative research projects based on the strengths of both the institutions. MoU was signed by Ms Jane den Hollander, Vice Chancellor, Deakin University, Australia and Dr Prahlada, Vice Chancellor, DIAT, Pune.

The MoU will help in sharing information on potential collaborative research and development projects to facilitate an understanding of their respective expertise, capabilities and requirements; identifying collaborative research and development projects in the areas of materials and functional textiles; developing a programme of joint PhD supervision and explore an initial enrolment of two students under Deakin’s ‘in country’ PhD model; prepare jointly authored publications and providing training in postgraduate research and industrial research; and holding joint workshops, exchange faculty members and foster collaboration between PhD students.
**Raising Day Celebrations**

**CABS, Bengaluru**

The Centre for Airborne Systems (CABS), Bengaluru, celebrated its 23rd Raising Day on 21 February 2014. Dr K Tamilmani, DS and DG (Aero) and Dr SK Sharma, CMD, BEL, Bengaluru, were the Chief Guests on the occasion. The laboratory-level DRDO Awards were distributed to the meritorious employees and prizes were distributed to winners of various sports and cultural competitions conducted to commemorate the Raising Day. Smt P Santhya, Sc F and Shri K Rajaguru, Sc C shared the Laboratory Scientist of the Year Award 2013. The Mission Planning and Analysis Station software was declared as the product of the year on the occasion.

**ISSA, Delhi**

Institute for Systems Studies and Analyses (ISSA), Delhi, celebrated its 54th Raising Day on 14 February 2014. Dr N Prabhakar, DS and CC R&D (SAM), DRDO HQ, was the Chief Guest on the occasion and inaugurated the event along with Shri GS Malik, OS and Director, ISSA. In his welcome address, Shri Malik highlighted the initiatives taken by ISSA in the areas of wargaming, modelling, simulation, strategic planning and system analyses and discussed the progress made by ISSA during the last year along with his thought process on the way ahead. He also highlighted the role of ISSA in international cooperation by developing a product INFCOTT (M), a company-level tactical trainer for the Myanmar Army.

Dr N Prabhakar highlighted the importance of system analyses in new DRDO structure. He said that ISSA is the sole laboratory tasked with providing quantifiable analysis for decision makers. He stressed that ISSA should look at future concepts of operations, space-based technologies, information warfare and should guide the users in preparing QR for modern day combat. He emphasised the need of conducting a national seminar on System Analysis/System Engineering by ISSA to bring together System Engineering community at one platform. Laboratory-level DRDO Awards were given by Dr Prabhakar to the meritorious employees. Various sports events were organised to commemorate the Raising Day. Prizes were distributed to the winners of these events.
R&DE (E), Pune

Research and Development Establishment (Engrs) [R&DE (E)], Pune, celebrated its 52nd Raising Day on 7 February 2014. The celebrations commenced with a function held on 6 February 2014. Dr Anil M Datar, DS and Director, ARDE, Pune, was the Chief Guest of the function. Mementos were distributed to employees who completed 25 years of service. Laboratory-level DRDO Awards and Cash Awards were given to the meritorious employees. This was followed by a colourful cultural programme by the employees of the establishment. Annual sports were also organised during the week and prizes were distributed to the winners of the various sport competitions. As a part of annual day celebrations, Aga Memorial Lecture was also organised in honour of Brig. Aga, the founder Director of R&DE(E). The second lecture in this series was delivered on 7 February 2014 by Vice Admiral SPS Cheema, AVSM, NM, Commander-in-Chief, Strategic Force Command.

Personnel News

**Awards**

**DIHAR, Leh**

Dr RB Srivastava, OS and Director, Defence Institute of High Altitude Research (DIHAR), Leh, was felicitated by Hon’ble Governor of J&K, Shri NN Vohra during 101st Indian Science Congress, held during 3-7 February 2014, in recognition of his efforts for providing technologies that can transform the economy of people of cold and arid Ladakh. Shri Vohra appreciated the ‘Pancha Tatwa Model’ proposed by Dr Srivastava and adopted at DIHAR that has resulted in a visible socioeconomic development of the strategic Ladakh region.

**INMAS, Delhi**

Dr Rajeev Vij, Sc F, Institute of Nuclear Medicine and Allied Sciences (INMAS), Delhi, has been awarded DRDO Best Librarian Award for adopting most original and innovative techno-managerial practices for library management.
Conference of DRDO TIRC Heads and DRDO Newsletter Correspondents

Defence Scientific Information and Documentation Centre (DESIDOC), Delhi, organised a two-days workshop of Heads of DRDO Technical Information Resource Centres (TIRCs) and DRDO Newsletter Correspondents during 24-25 February 2014 at Conference Hall, Metcalfe House, Delhi. Dr AK Singh, OS and Director, Directorate of Personnel (DOP), DRDO HQ, inaugurated the conference. Shri SK Jindal, Director, DESIDOC, in his welcome address, spoke about the background and the purpose for holding the conference and urged participants to discuss various technical and contiguous issues threadbare. DRDO’s TIRC Heads and DRDO Newsletter Correspondents from various DRDO labs/estts attended the conference.

The conference started with a technical talk on Scientific Reporting by Shri Hasan Jawaid Khan, Editor, CSIR News. Lectures from experts from University of Delhi and Hyderabad, were also delivered on issues related to library and information fields. During the technical sessions, important issues pertaining to material collection and reporting for DRDO Newsletter, DRDO library manual, rate contract for subscription of periodicals, union catalogue of books, security system in the library, web 2.0 and RSS, DRDO institutional repository and knowledge repository, DRDO e-resources development were discussed at length.

Hindi Workshop-cum-Orientation Programme

A workshop-cum-orientation Programme to promote use of Hindi in day-to-day official work was organised by Official Language Implementation Committee, Gas Turbine Research Establishment (GTRE), Bengaluru, on 19 February 2014. Forty-one participants from various DRDO labs/estts participated in the workshop. Dr SB Singh, Director, Institute of Technology Management (ITM), Mussoorie, delivered an invited talk on Understanding the Quality Concepts and Adoption in Scientific Projects on the occasion. In his presentation, Dr Singh brought out the need for adapting standards in scientific works. He elucidated on how one can make inroads in the working culture to have direct and noticeable effect by adopting suitable quality policies.

CEP Course on System Engineering Concepts to New Product Development

GTRE, Bengaluru, conducted a five-day Continuing Education Programme (CEP) course on Application of System Engineering Concepts to New Product Development from 17-21 February 2014. Prof. NJ Rao, Indian Institute of Science (IISC), Bengaluru, delivered the inaugural talk on Systems Engineering and Product Development. He enlightened the gathering as to how good engineering practices would enable one to realise a successful working system in an interdisciplinary
environment. Expounding the challenges involved in handling complex systems, he brought out in a multi-minded or social system conceptualisation non-zero-sum entity and meta-cognitive knowledge are the prerequisites. He quoted several examples and explicated how the life cycle of a product evolves from determination of a mission to its deployment.

Systems Engineering Tools, Trade-off Analysis, TRIZ for Inventing New Product Concepts and Idea Generation were some of the topics covered during the course. Dr CP Ramanarayanan, OS and Director, GTRE, awarded certificates to the participants.

**Training Course on CBRN Emergency Management**

A specialised training course for Quick Reaction Team (QRT) and Quick Reaction Medical Team (QRMT) of Army, National Disaster Response Force (NDRF) and Central Industrial Security Force (CISF) was conducted by Institute of Nuclear Medicine and Allied Sciences (INMAS), Delhi, from 17-21 February 2014. The QRT, QRMT, CISF and NDRF stakeholders were sensitised with interactive demonstration exercises on protection, detection and decontamination of chemical, biological and radiological warfare agents.

Participants were shown TV movie 'Dirty War' on possible ramification of nuclear terrorism to make the stakeholders aware of various contaminated situations and its management. An interactive session was also held for the participants to discuss and learn new technologies targeting CBRN emergency management at operational level.

The course turned out to be an amalgamation of knowledge provision, novel ideas sharing and a powerful interface among multiple forces under a common platform of learning.
Training Programme on Application of Computers, LAN and DRONA

A special training programme on Application of Computers, LAN and DRONA for Admin and Store Assistants was organised by INMAS, Delhi, during 3-5 March 2014. The course was especially planned for those who cannot leave station owing to various official and family commitments. Twenty-seven participants attended the course.

Shri Sudhir Gupta, Director, Centre for Personnel Talent Management (CEPTAM), Delhi, was the Chief Guest of the inaugural function. Dr BS Dwarakanath, Officiating Director, INMAS, gave welcome address, and stressed on the need for application of computers and DRONA in office for improving the quality and speed of work. Dr Rajeev Vij, the Workshop Director, briefed the participants about the objectives and purpose of the training programme.

Topics covered during the course included: Application of Computers, LAN and DRONA in Office, Computer Networks: Internet and Intranet, Paperless Office, etc. Shri Navin Kumar Soni, Sc C, was Course Coordinator of the training programme. Dr Rajeev Vij distributed certificates to participants and proposed the vote of thanks.

Seminar on Military Bridging

Research and Development Establishment (Engineers) [R&DE(E)], Pune, organised a one-day seminar on Military Bridging on 26 February 2014. The seminar was intended to provide an opportunity for free exchange of ideas and better understanding of problems faced by the Military Commanders with respect to terrain, load classification, transportability, and time-demands in the area of military bridging.

Lt Gen RM Mittal, SM, VSM, Commandant, College of Military Engineering, Pune, was the Chief Guest and Shri AM Datar, DS and Director, Armament Research Development Establishment, was the Guest of Honour of the inaugural function. Dr S Guruprasad, OS and Director, R&DE(E) welcomed the delegates. Lt Gen RM Mittal, during his keynote address emphasised the need for greater synergy between users and developers. He lauded efforts of R&DE(E) for organising a seminar in this direction.

The technical sessions on Users Perspective on Military Bridging in Different Terrains and Developers Perspective on Futuristic Bridging and Innovations in Materials and Technology were well received by the delegates. A panel discussion on future requirements of military bridging was also held during the seminar.
A workshop on Futuristic Aerospace Vehicles Integration and Testing-2014 (FAVIT-2014) was organised by Research Centre Imarat (RCI), Hyderabad, during 20-21 February 2014. The objective of the workshop was to provide a platform towards sharing of knowledge and expertise among technologists working in the area of design, integration, testing and evaluation of missiles, aircraft and launch vehicles and to find a roadmap ahead for this technology of systems integration.

Shri S Gopinath, Sc G and Technology Director, Systems Integration and Chairman FAVIT-2014, gave an overview of current technology of system integration and the objectives of the workshop.

Shri KVSS Prasada Rao, former CC R&D, DRDO and former Chairman, NTRO, and the Chief Guest on the occasion, delivered an oration on Systems Integration: A Modern Perspective where he brought out the convergence of various disciplines in present day systems integration. Ten invited lectures and 40 selected technical papers were presented in two parallel sessions. The workshop also had a panel discussion on aerospace vehicle integration, testing, transferable knowledge, challenges and advances to be adopted.

Shri Adalat Ali, OS and Associate Director, RCI, presided over the valedictory programme. Dr Vijayabaskar N, Sc D, Organising Secretary of FAVIT-2014, delivered the vote of thanks. Book of Extended Abstracts and Proceedings of Full Length Papers in CD were released by the Chief Guest and the Guest of Honour, respectively.
National Science Day Celebrations

28th February is celebrated every year as National Science Day (NSD) in India to mark the discovery of Raman Effect by Sir CV Raman, the great Indian physicist and the Nobel laureate, while working in the laboratory of the Indian Association for the Cultivation of Science, Kolkata. The basic objective for celebration of NSD is to spread the message of importance of science and its application among the people. DRDO also celebrated the day to propagate the spirit of science.

**DSF, Delhi**

Defence Science Forum (DSF) organised 106th DRDO Oration on Futuristic Science and Technology for National Security by Prof. Sanjay G Dhande, Member UGC, National Security Advisory Board and former Director, IIT, Kanpur, at Dr S Bhagawantham Auditorium, Metcalfe House, Delhi. Dr N Prabhakar, DS and CC R&D (SAM), DRDO, presided over the event.

DRDO scientists who delivered NSD orations in their respective lab/estt were presented a medallion and appreciation certificate by Dr Prabhakar. DRDO Science Spectrum, a compendium of science day orations, was also released by Dr Prabhakar, Prof. Dhande, Shri RB Singh, Chairman, Centre for Personnel Talent Management (CEPTAM), Delhi, and Shri Anil Kumar Maini, OS and Director, Laser Science and Technology Centre (LASTEC), Delhi, and Convener DSF.

To mark NSD celebrations, DSF conducted Quiz, Poster Competition on Fostering Scientific Temper, and Essay Writing Competition on Significance of Science and Technology Base in Strategic Decisions during 10-18 February 2014. The winners of these events were awarded during the function. Dr Rajeev Vij, Sc F, INMAS, and former Secretary, DSF, was also honoured for his remarkable service to the DSF.

**ASL, Hyderabad**

Shri Sharad M Gajbhiye, Sc D, delivered NSD oration on Lightweight Hybrid Composite Jet Deflector. Shri K Jayaraman, OS and, Director, Advanced System Laboratory (ASL), awarded the silicon medal and appreciation certificate to the orator.

**CABS, Bengaluru**

Shri G Pradeep Raja, Sc D, delivered NSD oration on Cloud Computing for DRDO Environment. He was also awarded the medal and certificate by Dr S Christopher, DS, Programme Director (AEW&C) and Director, Centre for Air Bornne Systems (CABS).
CAIR, Bengaluru

Shri DR Lakshminarasimhaiah, Sc E, delivered NSD oration on Towards Semantics Big Data Analytics.

CVRDE, Chennai

Smt Jayashree Sivakumar, Sc F, delivered NSD oration on Design and Development of Permanent Magnet Brushless DC Generator. Shri C Jaishankar, Sc E, also delivered a lecture on Electric Motors in Defence Applications.

DFRL, Mysore

Dr AD Semwal, Sc F, delivered NSD oration on Blended Vegetable Oils—An Emerging Trend towards Healthier Cooking Media. Dr K Radhakrishna, Additional Director, Defence Food Research Laboratory (DFRL) presented NSD medal and appreciation certificate to Dr Semwal.

DESIDOC, Delhi

Shri Yogesh Modi, Sc C, delivered NSD oration on Use of Electronic Resources by DRDO Scientific Community through Consortium Approach. He was given NSD appreciation certificate and medal by Dr N Prabhakar, DS and CC R&D (SAM), DRDO.

DLRL, Hyderabad

Shri MK Das, Sc G, delivered NSD oration on Multiple Baseline Interferometer based Passive RF Seeker for Anti Radiation Homing. Shri AS Murthy, CDAC, Hyderabad, delivered a guest lecture on Latest Trends and Technologies on Cyber Security. Shri SP Dash, DS and Director, Defence Electronics Research Laboratory (DLRL), presented NSD appreciation certificate and memento to both the speakers.
DMSRDE, Kanpur

Defence Materials and Stores Research and Development Establishment (DMSRDE) organised various competitions like essay, quiz and poster making to celebrate the NSD. Awards and certificates were distributed to the winners Shri Abhishek Singh, Shri Prashant Shukla and Shri Saurabh Singh Gautam.

GTRE, Bengaluru

Shri Nitin Bhaurao Balsaraf, Sc E, was presented Silicon medal in recognition of his contributions in designing of Multi-stage Transonic Axial Flow Compressor with Higher Surge Margin.

LRDE, Bengaluru

Shri VA Abid Hussain, Sc F, delivered NSD oration on Development of Maritime Patrol Airborne Radar—Technology challenges. Director, Electronics and Radar Development Establishment (LRDE) presented medal and certificate to Shri Abid Hussain.

MILIT, Pune

National Science Day was celebrated with immense passion at Military Institute of Technology (MILIT). Air Vice Marshal PP Khandekar, Commandant and Director, MILIT, gave opening address followed by talks on Depleted Uranium, Energy Efficiency for Marine System, Fuel Cell and Fuzzy Logic and its Applications by the faculties of MILIT.

MTRDC, Bengaluru

Dr Anurag Srivastava, Sc D, delivered NSD oration on Overview of Terahertz Vacuum Microelectronic Devices. He was awarded the oration medal and certificate by Dr Lalit Kumar, OS and Director, Microwave Tubes Research and Development Centre (MTRDC).
NMRL, Ambernath

Dr Sangram K Rath, Sc D, delivered NSD Oration on Polymers Nanocomposites for Marine Applications.

NSTL, Visakhapatnam

Prof. JS Rao, President, Academics, Kumaraguru College of Technology, Coimbatore, and Dr Joseph Agarapu, Professor (retired), Department of Zoology, Andhra University, delivered invited talks on Evolution of Science and Applied Aspects of Defence Systems in Animal Kingdom, respectively. Shri Kirtan Sahoo, Sc D, delivered NSD oration on Development of High Power 5V Li-ion Rechargeable Cell with Cathode Nanomaterial for Torpedo Applications. Shri CD Malleswar, Director, Naval Science and Technological Laboratory (NSTL), presented medal and appreciation certificate to Shri Sahoo.

R&DE(E), Pune

Shri Vinod Kumar Pandey, Sc D, gave NSD oration on Manufacture and Characterisation of Aluminium Alumina Functionally Graded Material. Dr Premnath Venugopalan, Head Innovation Centre, National Chemical Laboratory, Pune, presented him appreciation certificate and medal.

RCI, Hyderabad

Shri Aparatim Talukdar, Sc C, delivered NSD oration on Design and Development of a Jet Pipe Electro-Hydraulic Servo Valve. Dr MYS Prasad, DS and Director, SHAR, Nellore, ISRO, presented medal and appreciation certificate to Shri Talukdar.

SAG, Delhi

Ms Roopika Chaudhary, Sc F, delivered NSD oration on Function Field Sieve Method for Solving Discrete Log
Problem. She was given NSD appreciation certificate and medal by Dr N Prabhakar, DS and CC R&D (SAM), DRDO.

SASE, Chandigarh

Shri Piyush Joshi, Sc D, delivered NSD oration on Artificial Neural Network Model for Location Specific Weather Forecasting over Western Himalaya. He was awarded NSD medal and certificate by the Chief Guest Prof. Manoj K Arora, Director, PEC, University of Technology, Chandigarh. Prof. Arora also delivered a talk on Use of ICT in Teaching and Learning in Higher Education.

VRDE, Ahmednagar

Shri Vinit V Jagirdar, Sc D, gave NSD oration on Performance Prediction of 8x8 Armoured Wheeled Vehicle. He was awarded NSD medal and certificate by Dr Manmohan Singh, Director, Vehicle Research and Development Establishment (VRDE).

DIAT establishes Video Conference & Virtual Classroom Facility

A data centre facilitated video conferencing with dedicated 32 Mbps speed to communicate among the DRDO scientists across the India and a data centre facilitated virtual classroom with 100 Mbps dedicated line to receive direct instruction from a qualified professor/expert in an interactive environment have been established at Defence Institute of Advanced Technology (DIAT), Pune. The video conferencing facility will facilitate video conferencing by a set of telecommunication technologies which allow two or more locations to communicate simultaneous using high definition two-way video and audio transmissions. Virtual classroom will provide students direct and immediate access to their instructor for instant feedback and direction. Virtual classroom will also provide recording facility and has high definition audio-video call facility which provides opportunity to join live interactive audio-visual lectures across the globe.
ECM Integration Facilities established at DLRL

ECM-Integration Facilities have been established at Defence Electronics Research Laboratory (DLRL), Hyderabad. Shri SP Dash, DS and Director, DLRL, inaugurated the facilities on 6 February 2014. These centralised facilities will be used for research and development activities of various project teams of DLRL.

Addressing on the occasion, Shri Dash emphasised the need of optimal utilisation of the facilities by scientists. Shri J Shanker Rao, Sc G, and PD Sarwagna, Shri DD Sarma, Sc G, Group Director and senior scientists were present at the inaugural function.

DG (ACE) inaugurates Arjun Auditorium at CVRDE

Shri S Sundaresh, DS and DG (ACE) and CC R&D (PC&SI), DRDO, inaugurated the Arjun Auditorium on 21 February 2014 at Combat Vehicle Research and Development Establishment (CVRDE), Avadi. Dr P Sivakumar, OS and Director, CVRDE, presided the inaugural function.

The fully air-conditioned state-of-the-art auditorium has sitting capacity of 465 and is built at a cost of 361 lakhs. The construction project was coordinated by the Chief Construction Engineer (South), Secunderabad. The Chief Engineer, MES, Secunderabad, executed the external services such as roads, electric supply, 250 kVA standby generator, water supply, drainage for this auditorium. The auditorium was planned by late Dr Hanumanna, the then Director, CVRDE.

The auditorium will be used for mass communication among officers and staff of CVRDE, as well as to conduct seminars/workshops on the latest topics of project interest.

Brig. JK Rao, Chief Engineer, MES, Hyderabad; Shri Umesh Kumar, Additional Director (Works), Directorate of Civil Works and Estates, DRDO HQ; Shri Sridhar Devagiri, CCE (South); Shri R Ravichandran, Sc F, CCE (Estate) and Shri Chandrasekar, MD, M/s Hi-Tech Infrastructure, Hyderabad, also attended the inaugural function.

Shri K Loganathan, Additional Director (Admin and MS), CVRDE, welcomed the distinguished guests. Lt Col AK Jain, Head (MS), delivered the vote of thanks.
**Societal Mission**

**MKM-INMAS organised Health Camp**

DRDO Mahila Kalyan Manch (MKM) and Institute of Nuclear Medicine and Allied Sciences (INMAS), Delhi, jointly organised a Health Check-up Camp on 13 March 2014 at INMAS. Women employees of the DRDO and spouses of male employees of Delhi-based DRDO laboratories benefited from this programme.

Smt Samjukta Mandal, Vice President of Mahila Kalyan Manch, and wife of Dr Manas K Mandal, DG (LS), Smt Krishna Tripathi, Secretary MKM and wife of Dr RP Tripathi, OS and Director, INMAS, inaugurated the camp. Dr RP Tripathi welcomed the august gathering and informed them about the health services provided by INMAS. Dr Rajeev Vij, PRO, INMAS, shed light on the importance and schedule of the health camp and future initiatives of INMAS.

Talks on Skin problems by Dr Anil Ganju, on Thyroid Disorders by Dr Rashmi Agarawal, and on Cancer by Dr Manju Popli were organised on the occasion for the benefits of the participants.

Free lipid profile test, TSH, ECG, blood pressure, blood sugar, echocardiography, bone densitometry, mammography, ultra sound and pap smear tests were conducted. Expert medical advice was also provided on case to case basis. The programme ended with vote of thanks by Dr Pradeep Chugh. The camp was coordinated and organised by Dr Rajeev Vij and Dr Mitra Basu.

**MILIT conducts Health Camp**

The Defence Wives Welfare Association (local) [DWWA (L)], Military Institute of Technology (MILIT), Pune, conducted a health camp in Gorhe Bhudruk village, Pune for under privileged children of Zilha Parishad Primary School of Gorhe Bhudruk during 25-26 February 2014. Gorhe Bhudruk which is in rural part of Pune is deprived of health-care facility. A total of 150 students and 30 teachers were examined by the staff of Health Centre, MILIT. Smt Manisha Khandekar, President, DWWA (L), emphasised on importance of hygiene and encouraged children to adopt a healthy lifestyle. She also emphasised on higher education especially for girl students. Healthy girl and healthy boy of the school were awarded on the occasion.
Sports Round-up

DRDO North Zone Volleyball Tournament

Snow and Avalanche Study Establishment (SASE), Chandigarh, won the North Zone Volleyball tournament held at Defence Laboratory (DL), Jodhpur, during 24-26 February 2014. Consecutively second time finalist SASE won a tough battle in the final against Defence Electronics Applications Laboratory (DEAL), Dehradun, after defeating TBRL, Chandigarh in the semi finals. Shri Vikas Bharti was adjudged the best player.

Final match between DEAL and SASE in progress

DRDO North Zone Cricket Tournament

Terminal Ballistics Research Laboratory (TBRL), Chandigarh, organised DRDO North Zone Cricket Tournament from 5-9 February 2014. Eight teams comprising around 20 laboratories participated in the tournament. Combined team of Defence Research Laboratory (DRL), Tezpur and DMSRDE, Kanpur, represented by five players from DRL and six from DMSRDE emerged as winner of the tournament defeating combined team of Centre for Fire, Environment and Explosives Safety (CFEES) and Solid State Physics Laboratory (SSPL) combined team in the final. Dr AK Singh, OS and Director of Personnel, DRDO, and Chief Guest for the prize distribution function, in his valedictory address, emphasised on improving the sports infrastructure in DRDO laboratories and to provide sports kit to the players.

Winner team with the trophy

MILIT organised Run for Fun

Military Institute of Training (MILIT), Pune, organised Run for Fun on 2 March 2014 for army wives of officers in two categories, i.e. Walk and Run and Walk Only to promote the spirit of adventure and to emphasise the need of physical fitness in our everyday life. Thirty-seven ladies participated in the event conducted within a distance of 4.5 km in MILIT campus.

Air Vice Marshal PP Khandekar, Commandant and Director, MILIT flagging off the run
Visitors to Labs/Estts

ARDE, Pune

Maj Gen AKS Sengar, YSM, VSM, ADG, Mechanized Forces, visited Armament Research and Development Establishment (ARDE), Pune, on 28 February 2014. He was accompanied by Col Paritosh Misra, Director, ISE (Mech). Shri Anil M Datar, DS and Director, ARDE, presented the overview of ARDE to the visitors. Dr SV Gade, Sc G, presented the status of ongoing infantry projects. Visit to static display and Pinaka Rocket System was arranged for the dignitaries.

ISSA, Delhi

Lt Gen Sanjeev Madhok, VSM, GoC-in-C, HQ ARTRAC, along with a team of officers visited Institute of System Studies and Analyses (ISSA), Delhi, on 5 March 2014. Dr N Prabhakar, DS and CC R&D (SAM) and Shri GS Malik, OS and Director, ISSA, held a brief discussion on ways to strengthen the ties between DRDO and ARTRAC. The team visited the new facilities created for Project SAMAR (Land Wargames) and Project NOES (Naval Wargames) where they were briefed about the various wargaming activities being undertaken for land, air and naval combat.

CAIR, Bengaluru

Maj Gen SK Pillai, VSM, ADGSI and ACIDS(SI) visited Centre for Artificial Intelligence and Robotics (CAIR), on 27 February 2014. Shri Sanjay Burman, Director, CAIR, briefed visitors about the technologies developed by CAIR in the area of High Assurance Information System.

VRDE, Ahmednagar

Maj Gen AKS Sengar, YSM, VSM, ADG, Mechanized Forces, visited Vehicle Research and Development Establishment (VRDE), Ahmednagar, on 26 February 2014. He was briefed on various ongoing projects by Dr Manmohan Singh, Director VRDE. The General Officer took keen interest in Armoured Amphibious Dozer (AAD) and Counter Mine flail (CMF) projects.