

# DRDO

NEWSLETTER



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# RAKSHA MANTRI CALLS FOR INDIA TO BECOME A NET EXPORTER OF TECHNOLOGY AS DRDO CELEBRATES NATIONAL TECHNOLOGY DAY

**R**aksha Mantri Shri Rajnath Singh stressed the need for India to become self-reliant and “net exporter of technology”. He was addressing the scientists of DRDO on the occasion of National Technology Day (NTD) on 11 May 2020 through video conference. In his address RM said, “In the last five years, we have set new targets, and worked hard to formulate the right policy framework to achieve them. I am sure that you can see this change in every field of defence research, development and manufacture.” He added, “We always have to keep in mind that there is no alternative to indigenous technology and indigenous manufacture. We will be truly self-reliant only when India succeeds in becoming a net exporter instead of a net importer of technology.” While calling upon the country’s pool of experts to contribute to make India a technological powerhouse, Shri Rajnath Singh said the Government and people fully support their future endeavours in this direction.

Shri Rajnath Singh said, India’s defence forces and R&D efforts have contributed significantly in finding solutions to the challenges posed by this invisible enemy and DRDO has developed more than 50 products like bio suit, sanitiser dispenser, PPE kits, etc., in the last 3-4 months through its continuous efforts to contribute to the fight against COVID-19. “The indomitable spirit of our defence industry has increased the opportunity for mass production of these high



quality products in record time”, he further added.

The NTD is observed on 11 May commemorating the nuclear tests conducted at Pokhran in 1998 that symbolised successful achievements of home grown technologies and stressed the need for self-reliance in critical areas. Speaking on the significance of the occasion, RM said, “This day is dedicated to the knowledge, talent and perseverance of Indian scientists, especially those who have made valuable contribution in finding solutions to the complex national security challenges of the country”. He further said, “NTD is an opportunity to take stock of our technological advancements and if we are to emerge as a technological force then we should know what to do. Such introspection is necessary because science and technology have become the most important drivers of a nation’s economy.” The day reminds us of the continuous effort to achieve self-reliance

in important technologies, encourage innovations and maintain technology flow for product realisation, he added.

National Technology Day 2020 was celebrated at DRDO to commemorate and pay tribute to the dedication, determination, and sacrifice of scientists and engineers, who worked for achieving a national technological identity with the success of Pokhran 2.

Dr VK Saraswat, Member Niti Aayog, in his address congratulated DRDO for outstanding work done during the first 45 days in fight against COVID-19 and advised DRDO

to give more focus on life sciences laboratories and must revive work on bio-defence programme. He emphasised the need for the development of more robotic devices where DRDO has strong base.

Principal Scientific Advisor (PSA) to the Government of India Prof. K Vijay Raghavan in his speech appreciated DRDO and said that it is extraordinary for it to rise to the occasion in the fight against COVID-19 and emphasised the need of developing indigenous IT enabled technologies and applications.

Secretary DDR&D & Chairman DRDO Dr G Satheesh Reddy congratulated DRDO scientists for their innovative efforts for developing 53 products in record time to fight COVID-19. He further urged the scientists to rededicate themselves to the service of the nation by providing cutting-edge technologies for making the country strong and self-reliant.



# DRDO COMBATS COVID-19

**D**RDO has been in forefront of fight against COVID-19 since its detection in India. The premier R&D organisation has innovated and configured many products required immediately to control the pandemic from its existing arsenal of technologies and experience. These ingenious efforts has lead to the development of many mitigation solutions, which have been passed on to the industry for mass production. Some of the products developed by DRDO to enhance operations and to control spread of the infection has been covered herein.

## Kavasam

Providing adequate healthcare to all during the pandemic is not possible due to limited health resources. Setting priorities and efficiently rationing resources in the context is of utmost importance. Combat Vehicles Research and Development Establishment (CVRDE), Avadi has developed a software Kavasam and its Android App for effective and efficient collection of data to ease the work of frontline workers, enable street-level surveillance and aid quicker decision-making by those in charge. This unique

framework provides useful guidance in the current pandemic for tracking and resource allocation thereby identifying and suppression of COVID 19.

The Kavsam software framework consists of a web-based application for supervision and approval by the Admin and Epicentre Head. It also facilitates field level data collection and monitoring. It's App has lot of spin-off benefits. It can also be used by the health department to allocate a vaccine for COVID-19 when it is developed or by the revenue department to distribute other resources like food, water and ration.

### Salient Features

- \* Provision for selecting an area in 1.5 km 3 km and 5 km radius from the epicentre and select streets and houses to be monitored within the area automatically or manually
- \* Efficient allocation of houses to field workers for data collection and resource allocation
- \* Planning, bidirectional and monitoring process
- \* Geofencing of the Crona patient
- \* Notification to Super Admin, Epic

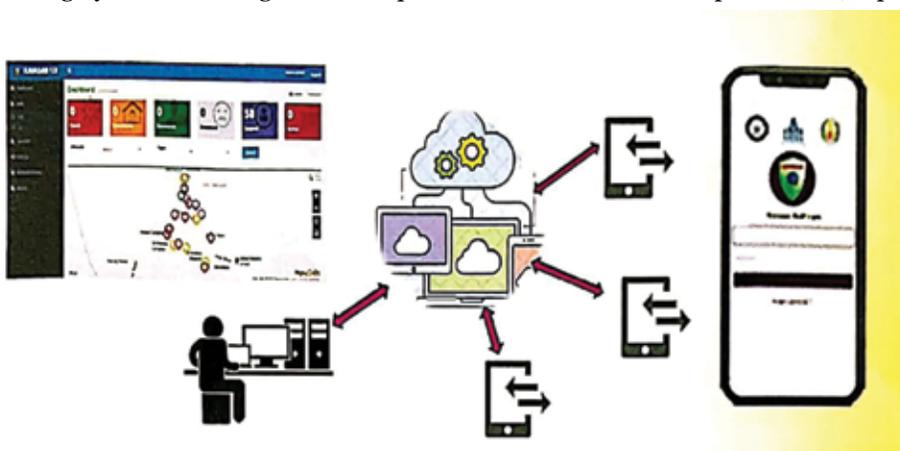
Head and Team Leader if quarantine person moves away from the home

- \* Highlighting of the houses in map with different colours
- \* SMS notification at all stages to ensure authentication
- \* Map views and generation of various reports at different levels
- \* Creation of database with Geocoding of streets

## Samparc

Bengaluru-based DRDO lab Centre for Artificial Intelligence and Robotics (CAIR) has developed an IT driven approach to enable tracking of people under quarantine or isolation. The solution, called SAMPARC (Smart Automated Management of PATients and Risks for COVID-19), is a software that includes an App to be installed on the smart phones of the patients, and a server-side application for tracking the patients by the state authorities. SAMPARC is meant only for tracking and not for contact tracing. Therefore, it does not requires any private information of the patient (only their photographs) except their location of quarantine and their current location. It would be based on authentic information fed by the state officials and not based on crowd sourced data. The system would enable Geofencing, AI-based automated face recognition between selfie taken during registration and subsequent selfie sent by the patient. It then would display the information to the state officials on a map, which can be color coded to depict hotspots and containment zones.

From the perspective of the patients, honest usage of SAMPARC could give them an option of home isolation instead of isolation in a government



Kavasam Schematic

facility. From the perspective of the state officials, SAMPARC is expected to drastically reduce the overhead of tracking every patient under home isolation. They would need to track the violators, and need to perform only random checks. The violators would be shown in Red on a map if they break the Geofence or if their selfie does not match, Blue if their smart phones stop sending periodic updates, and Green if everything is found satisfactory. Once the period of quarantine or isolation is over, the patients can uninstall the App from their smart phone.

### Modified SEIR Model-based Prediction Modelling

Institute of Nuclear medicine and Allied Sciences (INMAS) has developed modified version of Susceptible Exposed Infectious Recovered (SEIR) model to assess the effectiveness of the of various measures since the outbreak of Covid-19. The INMAS modified SEIR model introduces multi-timedlined partitioned approach to deal with the times series data containing various levels of social distancing measures. This allows the estimation of Covid 19's measures such as protection rate, infection rate, average incubation time, average quarantine time, and mortality rate separately. The model was deployed for prediction of the Covid 19 trend on 5 Apr 2020.

The model takes the time series data from the official MoHFA web site as the input parameters. It takes the total infection, total active, total recovered and total death cases as input parameters. The model provided detail prediction report since 5 Apr 2020. The variation in predicted total infection, total death and basic reproduction number ( $R_t$ ) is very less and average accuracy has been more than 98.5% since the beginning of Covid 19 epidemic



**SAMRAC Schematic**

in India. The model has the ability to estimate the impact of epidemic spread on different age group populations. This is very useful in predicting the safety mechanism to be employed for every age groups in our society.

The model is perfectly capable of handling the prediction of any other pandemic in the future. It can be deployed to the civil health organisations and allow them to feed the data on daily basis for them to understand their local health situations. The model also can be integrated with Ministry of Health and Family Affairs and ICMR database and provide them various data mining features to understand the current situation of the health status in the country. It also enables the users to vary various pandemic parameters such as protection rate, infection rate, average incubation time, average quarantine time, and mortality rate and estimate the future spread of the pandemic. This will be very useful to the health professionals to be prepared for any adverse events in the future.

The model has been developed within existing facilities of INMAS, and hence does not require any additional funding. The deployment of existing model to any other organisation requires a maximum of week time after the basic information about their hosting platform is informed to INMAS.

### 3D Printed Multipurpose Door Opener Tool

In day to day life, the usage of objects such as door handles, cupboard handles, key pads of lifts, ATM kiosk key pads, computer keyboards, etc., are inevitable. These objects are being used by more people and it is very difficult to ensure continuous sanitization of these common objects. DRDO has designed a multipurpose door opener tool and the prototype developed at Defence Research and Development Laboratory (DRDL), Hyderabad through 3D printing process using thermoplastic material.

Multipurpose Door Opening tool is an ergonomically designed compact handy tool that provides a touch free operation of most of the commonly used objects such as door handles and key pads, etc. This tool aids in controlling





the spreading of virus by indirect method through the objects used by infected person. With the help of this tool, finger touching of surfaces that are commonly used such as key pads of lifts, ATMs, door and cupboard handles etc., can be avoided. This tool is made of two parts (i) Hook and (ii) Cover. The hook is designed ergonomically considering the common sizes of door handles. The hook is also provide with tips to operate the key pads at ATMs, Lifts and Keyboards. The cover is designed to accommodate thin layer of felt or tissue to sanitize the tool when closed.

**Handheld Non-Contact Thermal Probe**

Non-contact measurement of body temperature of employees/personnel is an important requirement in the wake of the COVID 19 pandemic. The handheld non-contact thermal probe developed by Naval Physical and Oceanographic Laboratory (NPOL), Kochi provides a quick and accurate means to measure body temperature. The probe has been designed using small infrared sensors as the sensory elements. The requisite electronic circuitry is provided for the data acquisition and processing. A small display screen shows the value of temperature and also indicates whether the person is feverish or normal. The device is light in weight. The product is designed considering Indian anthropometric parameters, thereby enhancing the ergonomics. The probe is being manufactured by Keltron Controls, Aroor.

**Technical Specifications**

- External Dimensions: 40 mm (w) × 150 mm (h) × 115 mm (d)
- Weight : ~ 300 gm
- Measurement Method : Passive IR
- Measuring Unit : Fahrenheit
- Repeatability : ± 1 °F
- Resolution : 0.5 °F
- Response Time : 0.2 s



**Non-Contact Thermal Probe**

Measurement Distance: 30 mm (from sensor)  
 Temperature Range: 85 to 105 °F

**Rapid Paper & Envelope Disinfecter**

Paper-based items like security passes, letters, currency notes, etc., have been reported to be a major source of spread of COVID-19. NPOL has designed Paper Disinfecter to meet the imminent need to disinfect daily paper-based items. The device consists of two foldable halves – an upper lid and a lower lid. The paper-based item is placed in between the two lids and then heated done by means of special thermal cloth with embedded heating wire of selected resistivity. Paper/envelopes up to A4 size can be disinfected using the device. The sanitiser is being manufactured by Keltron Controls, Aroor.

**Technical Specifications**

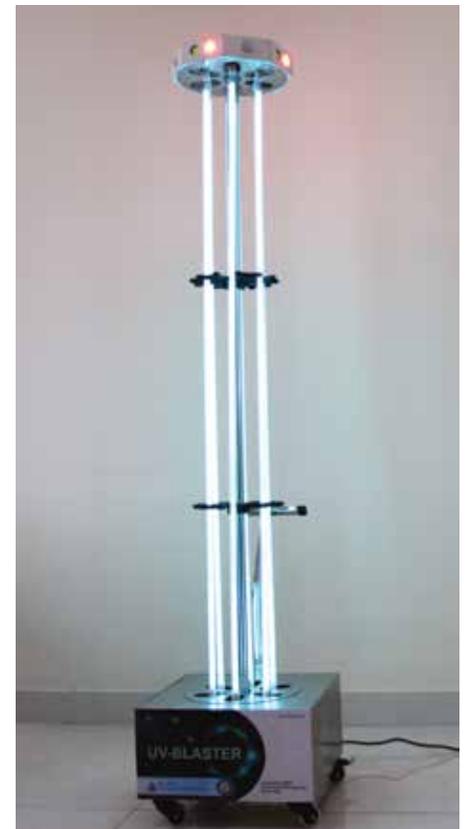
- Power : 120 W
- Operating Temperature: 110 °F
- Maximum Temperature: 120 °F

Holding Time Modes: 3 types (selectable)  
 Heating area: 350 mm (L); 260 mm (w)  
 External Dimension: 500 mm (l) × 350 mm (w) x 90 mm (h)

**Area UV Disinfection System**

Laser Science & Technology Centre (LASTEC) has developed a mobile UV Disinfection Tower with the help of Gurugram-based industry M/s New Age Materials and Instruments Pvt. Ltd for quick rapid and chemical free disinfection of areas prone of infection. The equipment is highly beneficial for places such as airports, shopping malls, metros, hotels, factories etc., and items which gets in human contact frequently and also for electronic equipment in hospital, laboratories and offices that are not suitable for disinfection with chemical methods.

The UV Blaster employs six High Output (HO) lamps with a total UVC



**UV Disinfection Tower**

power of more than 250 W arranged for 360° illumination. The equipment produces a UV intensity of 0.4 mW/cm<sup>2</sup> at 2 meters and can disinfect a typical room of 12 x 12 feet in 10 minutes. A 400 sqft area room can be disinfected in 30 minutes by positioning the equipment at different places within the room. The UV Blaster has in-built safety features. A key switch has been incorporated in the device for arming. The device is designed to be ONLY operated remotely by laptop/smart mobile phone/tablet via a wireless link. 360 degree infrared motion sensors have been incorporated to automatically shut off the device if someone enters the room during the disinfection cycle.

### Automated UV Systems to Sanitize Electronic Gadgets, Papers and Currency Notes

Research Centre Imarat (RCI), has developed an automated contactless UVC sanitisation cabinet, called Defence Research Ultraviolet Sanitiser (DRUVS). It has been designed to sanitise mobile phones, iPads, laptops, currency notes, cheque leaves, Challan, passbooks, paper, envelopes, etc. The proximity sensor switches, clubbed with drawer opening and closing mechanism, makes its operation automatic and contact less. It provides 360° exposure of UVC to the objects placed inside the cabinet. Once the sanitisation is done,



**Contactless UVC Sanitisation Cabinet**

the system goes in sleep mode hence the operator need not wait or stand near the device.

The RCI has also developed an automated UVC currency sanitising device, called NOTESCLEAN. Bundles of currency notes can be sanitised using DRUVS, however disinfection of each currency notes using it will be a time consuming process. For that purpose, a sanitising technique has been developed, where one has to just place the loose currency notes at the input slot of the device. It picks the notes one by one and makes them pass through a series of UVC lamps for complete disinfection.



**UVC Currency Sanitising Device**

### Microwave Sterilizer to Disintegrate Corona

Defence Institute of Advanced Technology (DIAT), Pune, a deemed university supported by DRDO has developed a microwave sterilizer named ATULYA to disintegrate Covid 19. The virus gets disintegrated by differential heating in the range of 560 °C to 600 °C temperature.

The product is cost-effective solution, which can be operated in portable or fixed installations. This system was tested for human/operator safety and has been found to be safe. Depending upon size and shape of various objects, time of sterilisation is from 30 seconds



**Microwave Sterilizer Atulya**

to one minute. Approximate weight of the system weighs three kg and can be used for non-metallic objects only.

### Sanitizer

Naval Materials Research Laboratory (NMRL), Ambernath has prepared and distributed sanitizer within a very short period of time. Under the guidance and motivation of Director NMRL, using the recipe of World Health Organization sanitizer technology, Around 1500 litre sanitizer was prepared as per the guidelines of WHO and distributed to NMRL employees, as well as to establishments such as Ordnance Factory, Ambernath and WNC including Naval Dockyard, Mumbai, Offices of Assistance Police Commissioner, Ambernath, Municipal Corporation, Kulgaon Nagar Parishad and Police stations of Badlapur and Ambernath and local Petrol Pumps.



**WHO complied Sanitizer**



**Portable ECONO-WISK for Safe Swab Collection**

NPOL and Government Medical College (GMC) Ernakulam, have designed an easy to assemble, low cost, portable, lightweight and feature rich WISK (Walk In Swab Collection Kiosk), named ECONO-WISK, for enabling fast and safe swab collections from anywhere in the country.

Earlier, GMC Ernakulam had designed a WISK, which was widely appreciated by health workers. NPOL had since collaborated with GMC doctors to extensively improve the design of the WISK for fast and easy assembly with more features. ECONO-WISK is a very cost-effective and easy-to-transport variant of WISK, which also mitigates ergonomics issues like stress points, limited access and bad postures. The current ECONO-WISK can be fitted in bulk on helicopters like the Advanced Light Helicopters (ALH) of the Indian Navy and on ambulances, and can therefore be mass transported to any remote location. Built over an easy to assemble one inch square frame of steel on a wooden base with linoleum sheets, the WISK can be set-up anywhere within a matter of minutes. It has been designed to have better internal air circulation and has been equipped with electrical power plugs along with glove boxes outside the kiosk and a collection tray for swab vials and comes with its own internal lighting.

NPOL is also working on a high-end version of the WISK that is conceived as installations that can be set up in hospitals and other screening locations such as airports and seaports. This advanced WISK is expected to have integrated provisions for sanitization and decontamination, easy non-contact communication facilities between health examiner and patient, internal air conditioning, LCD based information



**WISK installed at Indian Navy Hospital INHS Sanjivani at Kochi**

displays and facilities for data logging and archival.

**UV BAGGAGE DISINFECTOR**

NPOL has developed a baggage disinfecting facility for disinfecting passenger baggages at Cochin International Airport Ltd (CIAL). The facility consists of two cubic enclosures fixed on to the existing conveyors at CIAL, with a configuration of UV lights so placed as to illuminate the volume

to the maximum. The UV circuitry was established by NPOL as per the required dosage, intensity and exposure, whilst ensuring sufficient protection of the baggage handling personnel.

The facility has been set up at the entry point of the air-side baggage conveyor belt at the International Arrival Terminal. By positioning the facility at this point, it was ensured that the baggage gets disinfected even before it reaches the Customs area.



**UV Disinfector at Cochin International Airport Ltd**

# FIGHT AGAINST COVID-19: DRDO LABS EXTEND HELPING HAND

Even as DRDO labs are engaged in providing technological solutions and have developed a number of mitigation products many of its labs are engaged in providing help to local administration in combat against COVID-19. DRDO's Defence Food Research Laboratory (DFRL), Mysuru has processed and supplied various Ready-to-Eat (RTE) food products, fruit juices, and instant quick cooking food products to the personnel involved in the containment of COVID-19. The RTE food products are packed in multi-layer retort pouches and processed in a special retort to internationally accepted food standards. After processing, the food products are tested for their microbiological quality and cleared for supplies. The shelf life of these products is one year under room temperature. The laboratory has made the following contributions:

- ✧ Supplied 1.5 ton of RTE meals comprising Tomato Rice, Vegetable Pulav, Sooji Halwa, Khichidi, Combo Meals (White Rice + Dal Fry) and Ready-to-Drink Pineapple juice. The food supply was handed over to Shri VS Sunil Kumar, Hon'ble Minister of Agriculture, Govt of Kerala.
- ✧ Supplied 2000 bottles (100 ml) of hand sanitizer and two ton packets of RTE foods and juice to Mysore City Corporation
- ✧ Supplied 1000 bottles of (100 ml) hand sanitizer and one ton of RTE food products to O/o Superintendent of Police, Mysuru
- ✧ Supplied 500 bottles of (100 ml) hand sanitizer and 500 RTE food products to Home Guards and 500 bottles of hand sanitizer to BSNL staff at Mysuru circle.

Defence Research Laboratory (DRL), Tezpur is extending full support to local key functionaries both in civil



**Dr Anil Dutt Semwal, Director, DFRL (left) handing over Ready-to-Eat meals to Shri Sashikumar, Additional Commissioner, Mysuru City Corporation**

and Armed forces to combat COVID-19 in District Sonitpur, Assam. Extensive sanitization and fumigation drives have been executed in various public places/establishments Other key areas, which are regularly engaged in the supply of animal feed (essential commodities) in the entire Assam, were covered under this sanitization drive. Sanitization was also performed in Niz Haleswar, village,

Sonitpur inhabited by around 16000 people. Apart from civil and rural areas, DRL is also continuously engaged in sanitizing the military establishments located in the Solmara Cantonment area. Hand sanitizer, more than 2500 bottles, made by the lab as per WHO standard, were distributed to all local major civil organizations as well as Defence establishments.



**Sanitization of military establishment by team DRL**

# INMAS AUTHORISED TO TEST & CERTIFY PPE

**S**hortage of Personal Protective Equipment (PPE) during the ongoing COVID-19 pandemic is of serious concern as it imperils the well-being of the frontline healthcare personnel, apart from adversely impacting their security and morale. The PPE is required to meet stringent testing benchmarks set by the Indian Council of Medical Research (ICMR) and the Ministry of Health and Family Welfare (MoHFW), Govt of India.

DRDO's Institute of Nuclear Medicine & Allied Sciences (INMAS), Delhi has been authorized by Govt

of India for laboratory testing of PPE Body Coverall samples for COVID-19, submitted by prospective manufacturers in India. A laboratory test Synthetic Blood Penetration Resistance Test is conducted and a Test Report is issued for the same by INMAS.

INMAS has recently certified PPE designed and produced by Indian Navy for mass production and use in clinical COVID situations.

As per the guidelines vide letter F.No. 8/4/2020-R&D dated 22 April, 2020 issued by the Ministry of Textiles, Government of India,

for implementing Quality Control Mechanism, the test sample are accepted only on submission of a Notarized Affidavit by authorized signatory of the intending firm as per a prescribed format. The test sample in a sealed cover along with original affidavit may be deposited at Reception Office of INMAS from 0900 hrs to 1730 hrs on all 7 days of week. A scanned copy of affidavit shall also to be sent to [techcoord@inmas.drdo.in](mailto:techcoord@inmas.drdo.in)



**Clockwise from top left: PPE Coverall Sample Coding; Synthetic Blood Penetration Tester TN140; SBPT Test and Report Generation**

# DIPAS SIGNS LATOT FOR DIP-GFIT: A NATURAL PERFORMANCE ENHANCER FOR HIGH ALTITUDE PROPHYLAXIS AND RAPID ACCLIMATIZATION

**D**efence Institute of Physiology and Allied Sciences (DIPAS), Delhi, signed Licence Agreement for Transfer of Technology (LAToT) of DIP-GFIT with M/s Sarvotham Care Limited, Secunderabad. A Natural Performance Enhancer, it is useful as prophylaxis for high altitude illnesses. Dr Bhuvnesh Kumar, Director, DIPAS, handed over the LAToT documents to

representative of the firm in presence of the technology developer, Dr Rajkumar Tulsawani, Sc 'D'.

Ascent to high altitude results in hypobaric hypoxia, which is associated clinically with triad of disorders from acute mountain sickness to life threatening high-altitude cerebral edema and high-altitude pulmonary edema. DIP-GFIT act as a nutraceutical

intervention for countering high altitude maladies. It is effective natural performance enhancer, potent adaptogen and helps in alleviating day-to-day stress. It promotes faster adaptation, prevents loss of physical and cognitive performance under hypobaric hypoxia environment and is safe for its sub-chronic administration with shelf life of two years.



Dr Bhuvnesh Kumar, Director, DIPAS (2nd left), handing over the LAToT documents to representative of M/s Sarvotham Care Limited



# DRDO HARNESSING SCIENCE FOR PEACE & SECURITY

## CHAPTER 4: MARCHING FORWARD

The article is 51th 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).

### MISSILES

#### Defence Research & Development Laboratory

##### Project DEVIL

When the exploration for a higher technology take-off in missiles did not materialise, the project for indigenisation of the SA-75 missile was initiated in 1972 at the earlier estimated cost of Rs.16 crore to be completed within a period of about 7 to 8 years. In this process, the necessary infrastructure and test facilities were created. The philosophy of one-to-one substitution led to the designer creating at the major units level a hardware/ software which would be different in composition from the original but functionally identical. The major units of the SA-75 SAM system were assigned to specialist groups for determination of theory of operation, physical parameters, and the material/ components. Wherever possible, the

design of replacement units was based on current technology/components. Prototype engineering drawings were prepared, fabrication processes were stipulated and production agencies were approached for assistance in fabrication. This was done by unit-by-unit substitution during the regular training flights of IAF.

Some within the Organisation were not happy. They held the opinion that unit-by-unit substitution did not really enhance capability for new system development, because the system constraints of the original design due to older technology, would be retained whereas the route of technology development and then system upgrading though slower initially, would definitely be more effective in developing next generation systems. In August 1974, when Professor Menon became the Scientific Adviser, he decided to resolve the issue by constituting a Review Committee with Professor Brahm Prakash of the

Department of Space as Chairman for the purpose of assessing the progress of development activity, competence generation, infrastructure and facilities build up<sup>37</sup>. The Review Committee made its findings known to the DRDO with respect to systems analysis, system specification, technology development, hardware, facilities that were established, computer centre, testing facilities, quality assurance and project management. The Committee was of the opinion that hardware design and engineering was truly of a high order. The comments of Dr APJ Abdul Kalam, who was a member of the committee and who would later head the DRDL in the IGMDP, programme reflected quite accurately the opinion of the Committee. He has stated that, "at DRDL, ....one-to-one substitution philosophy had taken precedence over the generation of design data. Consequently, many design engineers had not been able to pay adequate attention to the necessary analysis which was the practice followed by us at VSSC. The system analysis studies carried out up to then had also been only of a preliminary nature. In all, the results accomplished were outstanding but we still have a long way to go... . The Committee made a strong recommendation to the government to give Devil a further go-ahead"<sup>38</sup>. Overall, it was the opinion of the Committee that while the progress on the project was excellent in respect of hardware fabrication on a one-to-one basis, systems analysis needed to be given greater emphasis in the next phase of the project. It lauded DLRL for having achieved the twin goals of hardware fabrication and systems



Devil Missile on Launcher

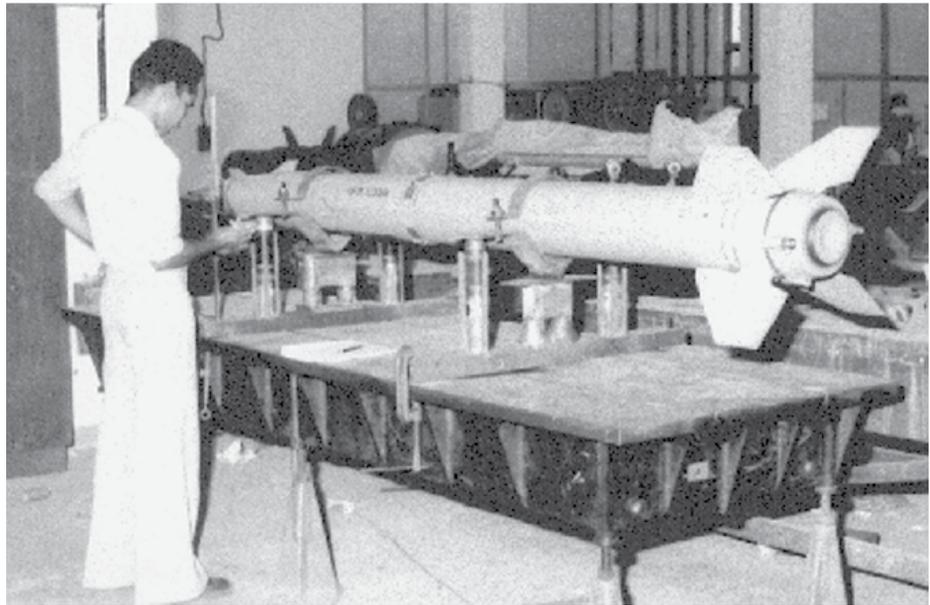
analysis in the design and development of ground electronics. The Committee's recommendation for further release of funds to DRDL to bring project to successful completion was accepted by the Government.

Seven flight trials were conducted in which three were with indigenously developed fully integrated DRDL missiles. Of this, one was completely successful and the other two were partially successful. By the time the trials were completed, that is by 1979, the Indian Air Force had taken the decision to phase-out the SA-75 system, as a result of which there was no requirement to continue further development.

Besides building the infrastructure, the major spin-offs from the project were supply of SA-75 booster propellant grains by Bhandara Factory and propellant grains for Pechora missiles; automatic checkout facility for SA-75 autopilot, RCRS and radio fuze; and development of batteries for VT fuze, silver oxide-zinc battery for P-15 missile.

### **Project Blunt**

In 1969, DRDL had proposed a competence building project, which would ultimately result in the development of semi-active homing head for the K-13A air-to-air missile system as a demonstrator. The scope of the project had to be enhanced to develop an operational homing head for getting the consent of the Indian Air Force for the development to begin. The work involved the development of the semi-active seeker, radome, microwave receiver, muting antenna for the system, modification of the aircraft launcher, modifications in the cable looms and wiring of the aircraft. The institutions closely associated with DRDL in this project were DLRL and the Hyderabad and Nasik units of HAL. On completion of the development, four modified K-13 missiles were fitted with indigenously developed homing heads. During the trials, the missiles worked well in the height band 5 km to 12 km at an acceleration of 3 g and speed of 0.7 Mach. The reliability of the performance of the homing heads was proved in these trials. Before two more missiles with indigenous homing heads



**Blunt Anti-tank Missile**

and two with infrared could be tested, the project was closed.

### **Missile Policy Committee Report**

In December 1974, the MoD voiced concern at the level of the Raksha Mantri about the workload for Bharat Dynamics Ltd, which was founded in 1970 to manufacture missiles with foreign collaboration. According to the Ministry sources, the Services had not put forward their requirements and this would cause the Factory to be out of work in about two years. Professor Menon, who was the Scientific Adviser and who was present at the meeting, opined that, "the temporary lull in production at the factory should not blind us to the reality that missile was a whole new warfare technology and weapon system and therefore, a strategic perspective of the strike capability that the Services do need from the new weapon system should first be decided upon before details of individual requirements were taken up". The Raksha Mantri fully concurred with this view and constituted a Committee with Professor Menon as Chairman to analyse and determine the likely needs of the Services in the future and also outline the further investments needed to be made by the Government. The Committee Report is a comprehensive document that stated in great detail the strike capability that was desirable to be achieved, the

translation of the capabilities into likely requirements for all classes of missiles, the type of performance characteristics these weapon systems should possess, the class of missiles to be developed within the country, the technologies to be developed and/or acquired from abroad, the needs of production and that of DRDO for such development to be effective. This document was of great help later (1980s) for drawing the blue print for the IGMDF programme. Besides the activities enumerated in the earlier paragraphs, the Laboratory continued the build-up of competence in various technologies related to rockets and missiles as well as in systems analysis. Competence building in development of inertial navigation system, solid and liquid propulsion systems, control systems, lasers, short range rockets and missiles and warheads, etc. were undertaken. Simultaneously, augmentation of range test facilities, general build-up for development of rocket and missile technology was taken up. The setting up of sophisticated and high-precision fabrication technology, like vacuum brazing, flow turning, electron beam welding, high-precision machining, Meteorology and other inspection facilities were completed. Test and evaluation facilities were also built-up.

*To be continued...*

# INTERNATIONAL WOMEN'S DAY CELEBRATIONS

## ANURAG, HYDERABAD

The program began with address by Dr Manuj Sharma, Officiating Director, ANURAG. The Chief Guest Dr Mamatha Raghuv eer Achanta, Founder & Executive Director of Tharuni (NGO) gave a talk on "Parenting and Social Interaction" on this occasion. An extempore speech for male employees of ANURAG was conducted and the best three speeches were awarded by the Chief Guest.

## LRDE, BENGALURU

Ms Pamela Kumar, Director General, TSDSI and Dr Smita Premchander, Founder and Secretary, Sampark (NGO) were the Chief Guests for the programme. Shri SS Nagaraj, Director, LRDE presided over the function. The Chief Guests spoke on the achievements of women across the world. Shri Nagaraj, distributed prizes to women employees who won in various competitions organized as part of Women's Day Celebrations. The function concluded with cultural events by women folk of LRDE.

## NSTL, VISAKHAPATNAM

IWDC-2020 was celebrated in a befitting manner in Mohapatra Manasi Auditorium, NSTL Complex with the active participation of women employees of NSTL. Smt. Lalithamai Nandagopan, President Mahila Kalyan Manch (MKM), NSTL, inaugurated the function. Chairperson of IWD-2020 celebrations Smt N Usha Rani, Sc 'F', welcomed the participants. She briefed about IWD, its genesis and growth. She spoke about women employees in DRDO and the vital role they are playing in making policies.

Chief Guest of the programme Smt S Sumitra, Professor & Principal, Dr BR Ambedkar College of Law, Andhra University, Visakhapatnam



Chief Guest being felicitated at ANURAG IWD Celebration



IWD Celebrations at LRDE

and the Guest of Honour was Lt. Cdr. P Swathi, Air Traffic Controller, Indian Navy.

Lt Cdr P Swathi, member team INS Tarini, the all-women circumnavigation team who travelled around the world in a small boat, with the help of the wind. She shared her 196 days experience and motivated the audience to give freedom to girl children to achieve success in their fields of interest.

Prof. Sumitra gave an insightful talk on the strengths of women and

their achievements. She strongly felt that education gives self-confidence to women and hence appealed that every girl should be well educated.

Dr OR Nandagopan, OS & Director NSTL, enumerated how DRDO is encouraging women employees by providing opportunities in enhancing their careers. He applauded women's role in various phases of life. Prime Minister's Bal Puraskar Awardee Ms Akula Sai Samhitha, and Ms M Sharanya were felicitated on the occasion.

NSTL women employees and members of MKM donated Rs 25000/- worth clothes, Heavy Duty Mixer-Cum-Grinder and pulses to 'Bangarutalli Vriddhashramam' at Srinivasa Nagar, Simhachalam.

Also, as part of IWDC-2020, a free medical camp was organized for the

women employees and spouses of male employees of NSTL.

Chief Guest and Guest of Honour, along with Smt Lalithamai Nandagopan, distributed prizes to the winners of Essay Writing, Elocution, Rangoli, Antakshari, Solo Dance and Songs competitions conducted by women

employees as well as spouses of male employees.

Women employees and family members of male employees, Members of Works Committee, JCM, NSTL Civil Employees Union and other NSTL employees and other personnel participated in the programme.



Prime Minister's Bal Puskar Awardee Ms Akula Sai Samhitha being felicitated at NSTL IWD Celebration

## SOCIAL ACTIVITY

**G**TRE in association with Micro Labs and Netradhama Eye Speciality Hospital, Bengaluru organised a four-day Eye Check-up and Awareness Camp. Screening was done for eye diseases like Cataract, Myopia, Hypermetropia, Pterygium, Computer Vision Syndrome and Diabetic Retinopathy. Fundoscopy was done for diabetics.



Over Six hundred individuals were screened including contract labourers and contract employees. Many cases of Cataract, Pterygium and Retina Lattices were identified and referred for further treatment.