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Sun, 19 April 2020

The unsung heroes fighting coronavirus in India

With about 58 laboratories/complexes strung across the country, DRDO is a massive science and technology organisation for defence applications, which has developed thousands of products for use by the Indian Army, the Air Force, and the Navy. Its facilities are now being used to manufacture ventilators, testing kiosks, disinfection chambers, sanitisers, personal protective equipment, and even ready to eat food.

By T.S. Subramanian

It was writer's block, although it lasted only a day. For a whole day on April 15, 2020, this writer struggled to get a lead for this particular column on an unsung hero - the Defence Research and Development's Organisation's (DRDO) multi-sided contribution to battling the COVID-19 crisis in India. The facts were available, but an arresting lead would not emerge. As it happened, Shahida, who studied M.A. with this writer in Madras Christian College (MCC), Tambaram, sent a video to our WhatsApp group late in the evening of April 15. The video dealt with how Air India, without any fanfare, did a superb job of evacuating Indians stranded in Wuhan, China and Milan, Italy; it ferried medical supplies to Colombo, Sri Lanka, from India, and so on. The video dealt with how, on January 31, 2020, Air India flew two rescue flights to Wuhan to bring back stranded Indians; how on February 27, it brought back 119 Indians and five foreigners stuck on a cruise ship, off Japan's coast; how on March 15, 2020, it flew to Milan to bring back 211 stranded Indian students there; and on March 21, 2020, it rescued 263 Indians from Rome, Italy.

That was not all. After the nationwide lockdown took effect from March 25, 2020, Air India's flight crew: engineers, doctors, catering staff, and others, were engaged in organising flights to fly 300 Israelis from India to Tel Aviv; to Shanghai, China, to pick up 19.4 tonnes of medical kits; to Colombo to carry ten tonnes of life-saving medicines, and to ferry fruits and vegetables grown by farmers in India to London and Frankfurt. Besides, Air India operated 128 domestic flights to carry medical supplies to various parts of India. The video said Air India was continuing its efforts to brave the coronavirus to serve the nation and humanity at large.

Shahida, a former Air India employee who now lives in Auckland, New Zealand, declared on WhatsApp, "Yes, I am proud to be an ex-Air Indian... Air Indians are not only bringing our Indians home, but they are also reaching out to help the foreigners in India to return home safely...Air India zindabad."

DRDO is another Government organisation that has been working quietly and relentlessly to develop products to contain the spread of COVID-19. At the forefront of the battle are many DRDO laboratories, which quickly sprung into action that led to the production of crucial ventilators, five-layered masks, personal protective equipment (PPE), decontamination chambers, and a sealant for bio suits, that is, PPEs. Other equipment/products, quickly developed by DRDO and which went into production, included face shields for primary healthcare workers, sanitisers, portable and wheelable equipment for sanitising public places with a decontamination solution spray, and a kiosk for a COVID-19 sample collection from patients suspected of having contracted the virus. The kiosk is called COVSAC and stands for COVID Sample Collection Kiosk.

Not surprisingly for the versatile DRDO, it was one of its missile-development facilities called Defence Research and Development Laboratory (DRDL), situated in Hyderabad, which developed the COVSAC. DRDL forms part of the troika of the missile-development complex in Hyderabad, the other two being Advanced Systems Laboratory (ASL) and Research Centre, Imarat (RCI). Imarat is a village near Hyderabad. It was the late President A.P.J. Abdul Kalam who insisted that the village's name "Imarat" should be added to "Research Centre" to popularise this small village then. Kalam was the DRDO Director-General then. With foresight, he founded the RCI.

DRDL developed COVSAC in consultation with the doctors of the Employees' State Insurance Corporation (ESIC), Hyderabad. The patient who is being tested walks into the kiosk, and a nasal or oral swab is taken from him by a healthcare professional from the outside using built-in gloves. After the patient leaves the kiosk, the latter is automatically disinfected without human involvement, making the process free from the threat of infection spreading. After the kiosk was successfully tested, DRDL developed two units and handed them over to ESIC, Hyderabad. An industry in Belagavi, Karnataka, manufactures these COVSACs, which cost just one lakh rupees to build, per unit.

The tireless Dr G. Satheesh Reddy, Chairman, DRDO, told this writer on April 17, 2020, "The entire scientific community of DRDO jumped into action to innovate and develop many products, using the technologies they had already developed for defence systems, to combat the coronavirus. DRDO scientists and employees responded to the situation immediately, by first delivering sanitisers. Then they developed a number of products and distributed them to healthcare professionals."

Dr Satheesh Reddy, who is also Secretary, Department Defence Research and Development, estimated that about 5,000 DRDO scientists and employees across the country were taking part in the fight against the COVID-19. "I appreciate the efforts of the entire DRDO scientific community who came up with so many technologies and products to fight the coronavirus," he said. He praised the efforts of the Indian industry "in working with us in producing these products" to stringent specifications. "I appreciate the work done by our armed forces, especially the Indian Air Force in airlifting raw materials and finished products" to various products of the country, Dr Satheesh Reddy said.

With about 58 laboratories/complexes strung across the country, DRDO is a massive science and technology organisation for defence applications, which has developed thousands of products for use by the Indian Army, the Air Force, and the Navy. Its facilities develop anything from missiles, anti-satellite launch vehicles, battle tanks, Light Combat Aircraft Tejas, nuclear-powered submarines, electronic warfare systems, radars, lasers, sonars, torpedoes, and unmanned aerial vehicles, all of which require cutting-edge technologies. The DRDO labs have developed biofuels, bio-toilets, parachutes, aerostats, flying suits and gear for jet aircraft pilots, specialised military nutrition, crops that can be cultivated at high altitudes, ready-to-eat chapattis, instant vegetable pulao, instant cholay mix, ready-to-eat potato peas curry, instant sooji halwa, instant idlis, processed coconut chutney, omelette mix powder, scrambled egg mix



COVSACs being manufactured. Photo courtesy: DRDO



Dr G. Satheesh Reddy

powder, puff and serve chapattis, spiced potato chapattis, instant basmati rice, processed sweet corn and fruit juice powders.

Importantly, its labs have developed sophisticated equipment and products to combat nuclear, biological, radiation, and chemical (NBRC) warfare agents, kits for detecting swine flu, dengue, malaria, typhoid and other diseases, mosquito repellent coils and cream, anti-leucoderma cream, anti-eczema ointment, and underground storage technology for vegetables. Titanium bone plates and screws, titanium dental implants, and broiler sheep that can be reared in high altitude areas are other success stories of DRDO. The production value every year of these staggering variety of products developed by DRDO is a few lakh crores of rupees.

What happens is this. After the DRDO develops these products, it transfers the technology for manufacturing them to various industries. The industries include Ordnance Factories, Bharat Electronics Limited, Bharat Dynamics Limited, HAL, and hundreds of medium and small industries across the country.

Dr Satheesh Reddy told Defence Minister Rajnath Singh on April 1 that DRDO was engaged in making minor modifications to a ventilator it had already developed so that one machine could support four COVID-19 patients simultaneously.

This was an important development that occurred when ventilators needed by COVID-19 patients were in short supply and had to be imported. Ventilators are expensive devices which help the patients who have respiratory problems breathe more easily. Defence Bio-Engineering and Electro-Medical Laboratory - DEBEL - developed this ventilator which can be used by four patients at a time. DEBEL, a DRDO facility, is located in Bengaluru.

The DRDO Chairman told Rajnath Singh the same day that about 20,000 five-layered masks that were developed by DRDO were under production. The mask is called N99 and uses nanotechnology. At the lower end of technology, about 50,000 litres of sanitisers made by DRDO laboratories were distributed to different security agencies, including the Delhi Police, and another one lakh litres distributed in different parts of the country.

When contacted, Dr Narendra Kumar Arya, Director of Public Interface, DRDO, said on April 16, 2020: "When our country faced a grave danger from COVID-19, DRDO started making products to fight the virus, with a very fast response time. DRDO labs and its scientists are working now [during the lockdown] to develop these products. Backed by DRDO, other organisations have pitched in with their efforts. Inspired by DRDO, many sugar mills in Uttar Pradesh started making sanitisers."

On how DRDO quickly effected the technology transfer of these products to industry, Dr Arya said, "We started producing some of the products in our labs themselves. For instance, some DRDO labs started producing the sanitisers. For the production of many other products, we took the industry along...We welcome these industries."

To go back in history, Dr Ravi Gupta, former Director of Public Interface, DRDO, asserted, "Developing technologies to fight nuclear, biological, radiation and chemical (NBRC) warfare agents have been the strength of DRDO." The different laboratories of DRDO have been working



A textile engineer at Ahmedabad Textile Industry's Research Association (ATIRA) monitors an electrospinning machine, which is used to make filters for N99 masks for the Defence Research and Development Organisation (DRDO), during a government-imposed nationwide lockdown as a preventive measure against the spread of the COVID-19 coronavirus in Ahmedabad on April 17, 2020. (Photo by SAM PANTHAKY/AFP via Getty Images)

for many years, and quietly so, to protect the country's soldiers and civilian population from threats posed by these NBRC warfare agents. Dr Ravi Gupta added: "It was perceived long ago that we will face such threats sooner or later. So we set up several labs, each working in a specific area. For example, our Defence Laboratory at Jodhpur (DLJ) specialises in developing technologies against nuclear threats. The main lab working against chemical and biological warfare agents is the Defence Research and Development Establishment - DRDE - at Gwalior. DEBEL, Bengaluru, specialises in developing medical equipment. The Aerial Delivery Research and Development (ADRDE) at Agra specialises in developing aerial delivery such as parachutes and aerostats. Various DRDO labs have pooled their technologies, skills, and resources now, and developed new products or modified existing products to meet the challenge posed by the coronavirus."

When a situation arose, like the spread of COVID-19, or when there was a threat of using an NBRC warfare agent, there were four steps to be taken, Dr Ravi Gupta said. The first one was detection, the second was providing protection against the virus or NBRC warfare agents, the third was decontamination of the affected area, and the fourth was medical mitigation.

Since the detection of the first case of COVID-19 in India, reportedly on January 30, 2020, DRDO was alert. By the first week of March, when the number of affected persons in India had crossed 30, DRDO decided to accelerate the development of products and take counter-measures in its battle against COVID-19.

Dr N. Ranjana, Director, Directorate of Systems and Technology Analysis (DSTA), DRDO, said, "We focused our efforts on crafting solutions for medical requirements, within the given constraints and available resources. As a result of this approach, DRDO was ready with technology and started working with industries for volume production of critical supplies of sanitisers, N99/N95 surgical masks, PPEs, ventilators, detection kits, and vehicle/personal sanitiser solutions in the ongoing war against COVID-19."

DRDE, Gwalior, and Centre for Fire, Explosives, and Environment Safety (CFEES), DRDO, Delhi, came up with a WHO-compliant sanitisation solution for personal and surface decontamination. More than 150 lakh bottles of sanitiser solution, based on isopropyl alcohol/ethanol were produced inhouse in these labs and supplied to armed forces, Armed Forces Medical Corps, security establishments etc. Today, DRDO labs across the country are producing hand sanitisers, using the guidelines from DRDE and distributing them to local administrative bodies. Each litre of hand sanitiser costs Rs.120.

Dr Ranjana said DRDE also developed bio suits which were being produced now by three industries in Coimbatore, Ahmedabad, and Noida. Aerial Delivery Research and Development Establishment (ADRDE), Agra, and Institute of Nuclear Medicines & Allied Sciences (INMAS), New Delhi, developed bio suits for the protection of doctors and paramedics handling the coronavirus patients. In making the bio suits or the PPEs, the expertise of ADRDE in making the highly specialised light fabrics for parachutes and aerostats was helpful. Production of bio suits was being ramped up to 20,000 PPEs a day now.

INMAS and DIPAS, another DRDO centre in New Delhi, were functioning as test centres for the detection of COVID-19. These labs can do 700 tests a day. DIPAS stands for Defence Institute of Physiology and Applied Sciences.

Defence Bio-engineering and Electro-Medical Laboratory (DEBEL), Bengaluru, and Society for Biomedical Technology (SBMT) quickly developed a ventilator. The technology for production of these ventilators has been transferred to a private industry. Bharat Electronics Limited (BEL), a defence public sector undertaking, has pitched in for large-scale production of these ventilators. Production is reaching a capacity of 10,000 ventilators a month. An innovation has been added to this ventilator. A multi-patient ventilation kit was developed so that four COVID-19 patients could use it simultaneously during an emergency. The kit was tested in two hospitals and is said to be working well.

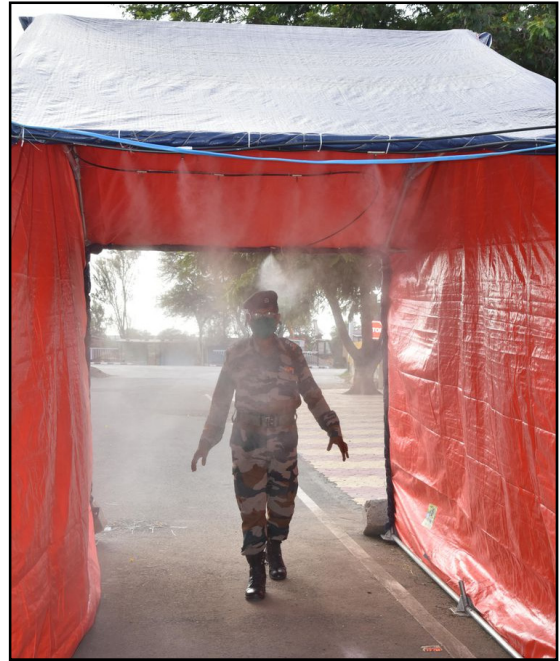
RCI and Terminal Ballistics Research Laboratory (TBRL), Chandigarh, went into action and developed a face protection shield for healthcare professionals handling the COVID-19 patients. "Its lightweight construction makes it convenient for comfortable wear for a long duration," a DRDO official noted.

A DRDO lab called Vehicle Research and Development Establishment (VRDE), located at Ahmednagar, Maharashtra developed a full-body disinfection chamber. Dr Ranjana said, "This walk-through chamber is designed for personnel decontamination but one person at a time. This is a portable system equipped with a sanitiser and a soap dispenser." The decontamination begins when a person entering the chamber uses a foot pedestal. Then, an electrically operated pump creates a disinfectant mist of hypo sodium chloride for disinfecting the person. The mist spray will operate for 25 seconds and will stop automatically. The system has two tanks with a total capacity of 700 litres of disinfectant solution. About 650 personnel can pass through the chamber for disinfection until a refill is required. The chamber is under production in an industry in Ghaziabad, near New Delhi.

As a spin-off from technologies it developed for battling deadly fires, the Centre for Fire, Explosives and Environment Safety (CFEES), Delhi, came up with two variants for spraying decontamination solution for sanitising a suspected area. The CFEES developed these with an industry partner. While one is a portable piece of equipment that can be carried by a person on their back, the second one can be wheeled on a trolley. So the latter's tank has a larger capacity for decontamination solution. The variants can be used for spraying the solution over an arc of 15 metres and disinfecting quarantine centres, railway stations, bus termini, airports, residential complexes, shopping malls and office/hospital spaces.

Dr Satheesh Reddy said, "DRDO also provided food to people who were not able to earn their livelihood" due to the coronavirus lockdown. Obviously, the Defence Food Research Laboratory (DFRL), a DRDO facility in Mysuru, must have played a big role in this. For it has developed fully automated chapatti-making machines and a staggering variety of ready-to-eat products. The latter include puff and serve chapattis, spiced potato chapattis, preserved and flavoured chapattis, instant khichdi, instant vegetable pulao, instant rajma curry mix, instant bisi bele bath, dehydrated curry dal, instant uppma mix, instant vermicelli kheer, omelette, and scrambled egg mix powder. As a Tamil proverb goes, "Those who provided food to the hungry are those who gave them life."

<https://www.asiavillenews.com/article/the-unsung-heroes-fighting-coronavirus-in-india-40276>



Full-body Disinfection Chamber (Photo: DRDO)



Vehicle disinfection Chamber (Photo: DRDO)



DRDO personnel distribute food at the Connaught Place Hanuman Temple, on day fourteen of the 21 day nationwide lockdown against coronavirus in New Delhi, India. (Photo by Sonu Mehta/Hindustan Times via Getty Images)

Sun, 19 April 2020

DRDO technology to counter Covid

By Dr Sudershan Kumar

Ever since the first case of Corona virus was detected in Wuhan city of Hubei province in the People's Republic of China, there seems no end to this ever growing pandemic which has now spread its deadly wings to the whole world. As per the latest reports, nearly 208 countries have already been affected by this deadly corona virus. More than 2 million people around the globe have been infected and nearly more than one lac have lost their lives. This number is varying rapidly.

As per latest reports there are nearly 13000 COVID-19 positives cases in India and these numbers are continuously soaring, nearly more than 450 deaths have occurred and more than 1036 people have been cured from this deadly disease. The largest number of cases are from Maharashtra, Tamil Nadu and Delhi. These numbers seem to be small if one views it against the backdrop of the size and population of India. Also the picture doesn't look that dismal when one



compares these numbers with those of the most advanced countries like US, UK or France etc. This has been possible only due to bold, proactive measures taken by Central Government under the visionary leadership of Prime Minister Narendra Modi, who is leading the nation from the front at this critical time and also by setting an example. Moreover constant advice by the medical fraternity and the prime minister to advocate various preventive measures are social distancing, avoiding hand shakes and embracing our greeting style of namaste, frequently washing hands at regular interval, avoiding community, religious meetings and conglomerations adhering to junta curfew and lockdown laws need to be abided by every one.

Moreover strictly following 21 days lock down in houses, and also taking care of a section of population who live on daily wages by providing them food and shelter is the collective responsibility of the whole country. Various sections and stratas can do and are doing their bid to contain this virus. Scientists are working at a war footing day and night to develop the required vaccine. Any time the break through is expected but it again has to under go a series of clinical trials that will certainly take time. There fore the only way is to adopt preventive measures .The Government of India with the cooperation and support of State Governments has evolved a strategy to deal with this precarious situation. .These measures are first find out, than isolate, conduct test for confirmation of COVID-19 positive cases treat them in designated hospitals simultaneously trace out their history in terms, contact, travel location and quarantine those with whom they were in contact. Parallely government of India in consultation with state governments is laying emphasis for the up gradation of health care infrastructure to deal with corona virus like contingencies. A step in this direction is the development of technologies which can be used as preventive measures to curtail the spread of corona virus. To win over this corona menace, premier institutes of the country like IIT,s, CSIR, ICMR, DRDO and many other private institutes/industries have jumped into the fight for development of a number of technologies for front line warriors of COVID-19 as per the requirement. IITs across the country are helping India to fight against corona virus pandemic. The systems /technologies developed by them are drone based sanitizers for sanitizing the public places, PCR (polymeric Chain Reaction) based machine for analysing the samples , mobile app to trace suspected carriers, a cheaper COVID-19 testing kit, face shield prototype, infection proof fabrics and many others. Similarly scientists from DRDO laboratories

are leaving no stone unturned to develop and manufacture equipment / systems based on innovative technologies. The mandate of DRDO is to indigenously develop cutting edge technologies for the armed forces. But looking in to the nation's call at the critical time. DRDO scientists have dedicated them selves to provide critical technologies to warriors of COVID-19 war fighters. As a result number of innovative cost effective products have been developed. First, is the five layered N99 Masks for doctors treating COVID-19 patients in designated hospitals. These N99 masks have two layers embedded with in organic nano structured two dimension material similar to graphine, which makes them full proof against corona virus. Second, the most important is Personnel Sanitizer Enclosure commonly known as "Full Body Disinfection Chamber". This is a portable system which can disinfect 700 persons at a time .The chamber is fitted with electric pump with provision of showers to generate mist with sodium hypo chloride solution for 20 seconds. Water tank with capacity of 600 litre is placed at the roof of the chamber. The individual has to be in the enclosure for 20 seconds under 360 degree rotation with eyes closed. Third is the bio suit (commonly known as Personnel protective equipment). This suit is designed with high quality textile with nano embedded coating layers. This suit has potential application for health care workers involved in dealing with COVID-19 patients. Fourthly, the most unique is to customize man packed fire fighting equipment as area sanitizer, multi patient ventilators, hand sanitizers, body suits , face shields and many others. Although DRDO scientists are working round the clock to accomplish the development and production in large numbers. But looking into the present scenario the requirement is going to manifold and colossal.

Therefore, becomes imperative for the Government to step in for arranging and facilitating production at a very large scale within a shortest possible time by cutting short the lengthy procedures. Also the issues like maintenance of quality in production, availability of spare parts, life time support for running the equipment and other details need also to be addressed. The author is of the view that through a multi prong approach adopted by Narendra Modi's Government with active support from state Governments and with the cooperation of 1.34 billion people of India, will not only emerge victorious against this COVID-19 war but also lead the world in fighting against COVID-19 pandemic.

(The author is former Director General & Special Secretary DRDO MoD GoI)

<https://www.dailyexcelsior.com/drdo-technology-to-counter-covid/>

The Tribune

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Sun, 19 April 2020

DRDO comes up with 2 products to kill viral microbes

By Vijay Mohan

Chandigarh: As part of its ongoing innovations to counter the threat of COVID-19 pandemic, the Defence Research and Development Organisation (DRDO) has come up with two products which can enhance safety at public places neutralising viral microbes.

Two laboratories at New Delhi, the Defence Institute of Physiology and Allied Sciences (DIPAS) and Institute of Nuclear Medicine and Allied Sciences (INMAS), have designed and developed an ultraviolet C-light based sanitisation box and hand-held device, which are good at destroying genetic material in COVID-19.

The radiation warps the structure RNA which prevents the viral particles from making more copies of them. The C-light kills the microbes quickly. Sanitisation of the items by employing C-light avoids the harmful effects of the chemicals used for the disinfection. This is environment friendly and is a contact-free effective sanitisation method.

The C-light box is designed for disinfecting personal belongings like mobile phone, tablets, purse, currency, cover of office files, etc. By placing them in the box and exposing them to the ultraviolet light for about a minute.

The hand-held device having an 8 watt UV-C lamp disinfects office and household objects like chairs, files, postal delivered items and food packets with an exposure of 45 seconds. This measure can reduce the transmission of coronavirus in office and public environment which is required to work in all conditions.

The other product is an automatic mist-based sanitiser dispensing unit developed by the Centre for Fire Explosive and Environment Safety (CFEES), Delhi. It is a contactless sanitiser dispenser which sprays alcohol-based hand rub sanitiser solution for sanitisation of hands while entering the buildings and office complexes. It is based on water mist aerator technology, which was developed for water conservation.

The unit operates without contact and is activated through an ultrasonic sensor. A single fluid nozzle using an atomiser, only 5-6 ml sanitiser is released for 12 seconds in one operation and it gives the full cone spray over both palms so that disinfection operation of hands is complete.

It is a very compact unit and the bulk fill option makes it economical and long lasting product. It is easy to install system as wall-mountable or on a platform. As an indication of operation an LED illuminates the spray.

The unit can be used for sanitisation of hands at entry and exit to hospitals, malls, office buildings, residential buildings, airports, metro stations, railway stations, bus stations and critical installations. The product is also expected to be very useful for entry/exit of isolation and quarantine centres.

<https://www.tribuneindia.com/news/nation/drdo-comes-up-with-2-products-to-kill-viral-microbes-72899>



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Sun, 19 April 2020

DRDO develops two more products to combat coronavirus

New Delhi: Amid coronavirus crisis, the Defence Research and Development Organisation (DRDO) has developed two more products—an automatic mist-based sanitiser dispensing unit and a UV sanitisation box.

“The Defence Research and Development Organisation (DRDO) in its continuous quest to contribute towards the fight against COVID-19, has been developing several solutions from its existing arsenal of technologies and experience,” the DRDO said in a statement.

These consist of innovations and quickly configuring the products for present requirements.

DRDO has now introduced two other products which can enhance operations to control spread of the infection at public places during the pandemic, it said.

“Centre for Fire Explosive & Environment Safety (CFEES), Delhi, using its expertise in mist technology for fire suppression, has developed automatic mist-based sanitiser dispensing unit,” it said.

It is a contactless sanitiser dispenser which sprays alcohol-based hand rub sanitiser solution for sanitisation of hands while entering the buildings or office complexes, among other places.

It is based on water mist aerator technology, which was developed for water conservation, the DRDO said.

The unit operates without contact and is activated through an ultrasonic sensor.

It is a very compact unit and its bulk fill option makes it economical and long-lasting product.

It is easy to install as a wall-mountable system or on a platform. As an indication of operation an LED illuminates the spray, it added.

The unit was manufactured with the help of Riot Labz Pvt Ltd, Noida, and one unit has been installed at DRDO Bhawan.

The unit can be used for sanitisation of hands at entry and exit to hospitals, malls, office buildings, residential buildings, airports, metro stations, railway stations, bus stations and critical installations.

The product is also expected to be very useful at points of entry and exit at isolation and quarantine centres, the DRDO said.

<https://nenow.in/health/drdo-develops-two-more-products-to-combat-coronavirus.html>

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RESEARCH CENTRE FOR SCIENTIFIC INFORMATION & DOCUMENTATION

Sun, 19 April 2020

DRDO scientists develop sanitizer cabinet that can prevent coronavirus

Hyderabad: Research Centre Imarat, DRDO a Hyderabad based Defence Laboratory, has developed a UVC Sanitizer cabinet which can be used to sanitize any object that cannot be sanitized with chemicals, like N-95 Masks, Mobile phones, iPad, Laptop, Currency Notes, Checks, Passbooks, Paper envelopes etc.

This product will increase the reusability of N-95 masks which will prevent its shortage during this medical emergency and hence will be very useful for the medical staff fighting Covid-19.

It is also very useful to the bankers as they are also facing the problem of sanitizing currency notes, Passbooks and other important papers.

Once the other offices also start their operations after lockdown, this UVC sanitizer will be a great help because of its chemical-free and quick sanitization feature.

A team of scientists including Saurabh Kumar and S Gopinath, Director SINT, under the guidance of BHSV Narayana Murthy, Director, RCI, DRDO, has designed and realised this product in a record time of two weeks during the lockdown period.

At present, this UVC cabinet has been handed over to ESIC, Erragadda, Hyderabad to evaluate its efficiency in inactivating the viruses.

UVC rays are found to be having germicidal effect and are being used in industry as well as commercially for disinfection purpose.

These rays attack the RNA/DNA of viruses and prevent their reproduction or in simple words deactivate the virus.



UVC is harmful not only for viruses but for all living things, hence various safety features are also incorporated in this DRDO product.

<https://english.sakshi.com/telangana/2020/04/18/hyderabad-drdo-rci-scientists-developed-uvc-sanitizer-cabinet-can-deactivate-coronavirus-without-chemical-use>



Sun, 19 April 2020

DRDO ने बनाए दो ऐसे उपकरण, जो कोरोना से निपटने में करेंगे देशवासियों की मदद

प्रधानमंत्री नरेन्द्र मोदी के नेतृत्व में पूरा देश कोरोना महामारी से लड़ने में जुटा है। कई सरकारी संस्थान, रिसर्च ऑर्गेनाइजेशन और कंपनिया अपनी तरफ से इनोवेशन कर कोरोना से लड़ाई को आसान बनाने में जुटे हैं। अब कोरोना वायरस महामारी के संकट से निपटने के लिए भारत की क्षमता में वृद्धि करते हुए रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) ने 2 नए उपकरणों का निर्माण किया है। पहला उपकरण है ऑटोमेटिक सैनेटाइजर मशीन और दूसरा है अल्ट्रावायलेट सैनेटाइजेशन बॉक्स। डीआरडीओ ने एक वक्तव्य में कहा कि कोविड-19 महामारी से लड़ने की दिशा में डीआरडीओ ने अपनी तकनीकी दक्षता और अनुभव से कई उपकरणों का निर्माण किया है और इसी क्रम में सार्वजनिक स्थलों पर संक्रमण को फैलने से रोकने के लिए दो और उत्पाद बनाए गए हैं।



बिना छुए झाग से सैनेटाइज होगा हाथ

डीआरडीओ के मुताबिक दिल्ली स्थित डीआरडीओ के विस्फोटक एवं पर्यावरण सुरक्षा केंद्र (सीएफईईएस) ने एक ऑटोमेटिक झाग आधारित सैनेटाइजर मशीन बनाई है, जिसे छूने की आवश्यकता नहीं होगी। मशीन से अपने आप अल्कोहल आधारित सैनेटाइजर निकलेगा, जिसे हाथ पर लगाया जा सकेगा। इस मशीन का इस्तेमाल कार्यालय परिसरों और इमारतों में प्रवेश करने से पहले किया जा सकेगा।



अल्ट्रावायलेट बॉक्स से सैनेटाइज होंगे मोबाइल, पर्स और रुपये

डीआरडीओ की दो अन्य प्रयोगशालाओं के सहयोग से पराबैंगनी प्रकाश से सैनेटाइज करने वाला उपकरण बनाया गया है। इस बक्से के प्रयोग से मोबाइल फोन, टैबलेट, बटुआ, मुद्रा, फाइल के कवर इत्यादि जैसी छोटे सामान को सैनेटाइज किया जा सकेगा।

इससे पहले भी डीआरडीओ कोरोना से निपटने के लिए कई उपकरणों की खोज कर चुका है। डालते हैं एक नजर:

डीआरडीओ ने विकसित की सैनेटाइज करने की तकनीक

इससे पहले कोरोना वायरस से लड़ने की भारत की क्षमता को बढ़ाते हुए रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) ने विभिन्न क्षेत्रों को सैनेटाइज करने की तकनीक विकसित की थी। डीआरडीओ ने बताया था दिल्ली स्थित विस्फोटक एवं पर्यावरण सुरक्षा केंद्र (सीएफईईएस) ने सैनेटाइजिंग उपकरण के दो प्रकार विकसित किए हैं। आग बुझाने की तकनीकों के विकास पर काम करने के दौरान यह तकनीक विकसित हुई। सैनेटाइजिंग उपकरण के दो

प्रकार विकसित किए गए हैं- एक पीठ पर लेकर चला जा सकता है और दूसरे उपकरण को ट्रॉली का आकार दिया गया है।

पीठ पर ले जा सकने वाले उपकरण को सैनेटाइज करने वाले कर्मी कहीं भी ले जा सकते हैं और इससे 300 वर्ग किलोमीटर के क्षेत्र को संक्रमण मुक्त किया जा सकता है। इसके इस्तेमाल से अस्पताल, डॉक्टर के कक्ष, कार्यालय, गलियारे, मेट्रो, रेलवे स्टेशनों इत्यादि पर छिड़काव किया जा सकता है। डीआरडीओ ने कहा कि ट्रॉली के आकार वाले उपकरण की सहायता से 3000 वर्ग किलोमीटर के क्षेत्र को संक्रमण मुक्त किया जा सकता है। वक्तव्य में कहा गया कि इन उपकरणों को तत्काल प्रयोग में लाने के लिए दिल्ली पुलिस को उपलब्ध कराया जा रहा है। जल्दी ही निजी क्षेत्र के सहयोग से इन्हें अन्य एजेंसियों को भी मुहैया कराया जाएगा।

आपको बता दें कि इससे पहले भी डीआरडीओ ने कोरोना मरीजों के इलाज में काम आने वाले सेफ्टी सूट, वेंटिलेटर और विशेष प्रकार के मास्क का निर्माण करने में सफलता अर्जित की थी।

<https://www.performindia.com/drdo-made-two-such-devices-which-will-help-the-countrymen-in-dealing-with-corona/>

THE NEW
INDIAN EXPRESS

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Assam decides to not use 50,000 PPE kits imported from China

Assam was the first state in the country to directly order the PPE kits from China

By Prasanta Mazumdar

Guwahati: Amidst a row surrounding the quality of Chinese Personal Protective Equipment (PPE), Assam's Health Minister Himanta Biswa Sarma said the state government would not, for now, use the 50,000 PPE kits that it imported from China.

Assam was the first state in the country to directly order the PPE kits from China. A Blue Dart cargo flying non-stop for five hours from Guangzhou carrying the kits had landed at Guwahati airport on April 15 evening. The consignment was received by Sarma himself. He had then said the Centre was kept in the loop on the order.

Briefing journalists in Guwahati on Saturday, the Minister rubbished reports the Defence Research and Development Organisation (DRDO) "rejected 50,000 Chinese PPE kits".

He also said the government had not released any money against the consignment. The advance payment for the kits was apparently made by some private parties on behalf of the government.

"When we ordered the PPE kits from China, we had barely around 2,000-2,200 of them with us. We took a bold decision and ordered the kits. Unfortunately, some people in Assam came out with the news that the DRDO rejected 50,000 Chinese kits, thereby giving an impression these were our kits. I myself checked and learnt that the DRDO never issued a statement saying it rejected the kits. It said it only tested. Testing and rejection are two different things," Sarma said.

He said as the matter was widely talked about, it had created anxiety among doctors and nurses in Assam.



For representational purpose.
(Photo | EPS)

"We already have 1.5 lakh PPE kits that were brought from different places of India. We requested the person who brought the 50,000 kits from China to keep them at his store in Guwahati. We said we will take those only when we need them. We don't want our doctors and nurses to go through any anxiety at this time. So, somebody will be losing money," Sarma said.

He said the government was not going to make any payment against the kits at this moment and that it would get the kits tested at the DRDO or any Government of India-recognised lab.

"For now, we want to maintain status quo. The kits are in Assam and in our comfort zone. We haven't said if the tests reveal that there is no fault with the kits, we will take those immediately. When the doctors are satisfied and we face a crisis, only then they will wear those. We will not pressurise them," the Minister added.

<https://www.newindianexpress.com/nation/2020/apr/18/assam-decides-to-not-use-50000-ppe-kits-imported-from-china-2132026.html>



Sun, 19 April 2020

Assam not to use Chinese PPE for now, Says Himanta Biswa Sarma amid reports of poor quality

The DRDO has already clarified through an official statement that no kit was rejected, he told a press conference

Three days after 50,000 personal protective equipment (PPE) kits reached Assam from China, state Health Minister Himanta Biswa Sarma on Saturday said those would not be used for now as rumours have been spread about their quality, creating doubt in the minds of doctors and nurses.

"Baseless allegations" had come from some quarters that the Chinese kits had failed the tests and were rejected by the Defence Research and Development Organisation (DRDO), the minister said.

The DRDO has already clarified through an official statement that no kit was rejected, he told a press conference.

"Several doctors and nurses have messaged me regarding these kits as they are in doubt about their quality. We do not want them to feel demotivated or confused at this juncture. They are engaged in a battle against the coronavirus and we have decided not to use those PPE kits for now," Sarma said.

Assam had directly imported 50,000 PPE kits from Guangzhou in China and Sarma himself had received the consignment at the airport here on April 15.

"We have asked the suppliers to keep the kits in their store and in the meantime, we will send a few for testing to government-accredited laboratories," the minister said.

He said some people are indulging in politics by spreading false and baseless allegations but the authorities are now more concerned about the medical staff, who are at the forefront of the fight against the virus.

"Only they who will decide when they are ready to use the kits," Sarma said.

He said the state government had placed the order with the suppliers "when we had around 2,000 PPE kits only, but now we have 1.50 lakh kits with us. It gives a mental strength to know that these are available in our stores and can be used, if required".

The state already had one lakh PPE kits and with the arrival of this consignment, "we are nearer to our target of two lakh, at which it will be capped", Sarma said.

"Now we are using the Indian kits but we have the Chinese kits in our reserve stock. Those will be made available when required," he added.

The stock can also be sent to the neighbouring states, if they need it, the minister said.

<https://www.news18.com/news/india/assam-not-to-use-chinese-ppe-for-now-says-himanta-biswa-sarma-amid-reports-of-poor-quality-2583501.html>

नवभारत टाइम्स

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सिटरा, डीआरडीओ सर्टिफाइड पीपीई किट की बढ़ी मांग

नोएडा: जिम्स के डायरेक्टर के पीपीई (पर्सनल प्रोटेक्टिव इक्विपमेंट) की क्वालिटी पर सवाल उठाने के बाद सोशल साइट्स पर सिटरा व डीआरडीओ सर्टिफाइड पीपीई किट की डिमांड हो रही है। वहीं जो वेंडर या कंपनियां अब तक आईएसओ सर्टिफाइड किट बेच या खरीद रहे थे वे भी अब सिटरा और डीआरडीओ अप्रूवड किट खरीद व बेच रहे हैं। इससे लोकल वेंडर्स, मैनुफैक्चर्स में खलबली मच गई है।

पीपीई किट निर्माता कंपनी के एमडी ने बताया कि मैनुफैक्चर 10-20 रुपये के लालच में खराब किट सप्लाई कर सकते हैं। इसके लिए हॉस्पिटल या गवर्नमेंट को इंटरनल इन्फेक्शन कंट्रोल कमिटी बनानी चाहिए। यह कमिटी पीपीई किट की जांच करे।

इसके अलावा पीपीई किट बनने के बाद उसकी पैकिंग के लिए वैक्यूम प्रोसेस से होकर गुजरना पड़ता है। यह प्रोसेस किट को इन्फेक्ट होने से बचाता है। इन दिनों बड़े पैमाने पर बन रही किट में वैक्यूम प्रोसेस नहीं किया जा रहा है। यह किट पहनने वाले शख्स के लिए हानिकारक है।

<https://navbharattimes.indiatimes.com/state/uttar-pradesh/noida/sitra-drdo-certified-ppe-kit-increased-demand/articleshow/75220193.cms>

COVID-19: DRDO/OFB/CSIR/BEL's Contribution

ज्ञान प्रसार एवम् विस्तार
वर्ष
Business Standard

Sun, 19 April 2020

Fighting coronavirus crisis: Defence public sector firms divert production

Bengaluru-based Bharat Electronic Limited (BEL) has begun manufacturing 30,000 ventilators for intensive care units across the country

By Ajai Shukla

New Delhi: Even as 26 naval sailors have been identified as coronavirus disease (Covid-19) patients, the Defence R&D Organisation (DRDO), eight Defence Public Sector Undertakings (DPSUs), and 41 factories of the Ordnance Factory Board (OFB) have begun contributing to the fight against the global pandemic.

During wartime, these defence ministry organisations provide “surge capacity” for stepped up requirements of arms, ammunition and defence equipment. Currently, they have focused on managing the Covid-19 crisis.

Bengaluru-based Bharat Electronic Limited (BEL) has begun manufacturing 30,000 ventilators for intensive care units across the country. The order, placed by the Ministry of Health and Family Welfare, is required to be supplied within two months.

The ventilators have been designed by the DRDO and improved upon by a Mysore-based private firm, Skanray, with whom BEL is collaborating.

According to BEL, it will manufacture 5,000 ventilators in April, 10,000 in May, and 15,000 in June. Along with the DRDO, BEL is trying to indigenise as many ventilator components as possible.



OFBs have manufactured 5,870 personal protective equipment kits | Photo: Dalip Kumar

Meanwhile, Hyderabad-based Bharat Dynamics Limited (BDL), too, is developing a ventilator prototype, in collaboration with a private start-up in Pune. The defence ministry expects BDL to test and certify the prototype by the first week of May, after which large-scale manufacture will begin.

Bengaluru-based Hindustan Aeronautics Limited (HAL) has manufactured more than 300 aerosol boxes, which serve as an insulator between patients and doctors to prevent transmission of the virus. These have been distributed to government hospitals in Bengaluru, Mysore, Mumbai, Pune, Uttar Pradesh, Telangana, Andhra Pradesh and Tamil Nadu. HAL has also established an isolation ward facility for 93 persons in a building with 30 rooms.

Meanwhile, the OFB has begun manufacturing 110,000 protective coveralls for health care workers, which are required to conform to ISO Class 3 exposure standards — a measure of the degree of virus contamination. This initial order, placed by HLL Lifecare Limited (HLL) — the nodal agency appointed by the government for centralised Covid-19 related procurement — is required to be completed in 40 days. A cluster of five OFs at Kanpur, Shahjahanpur, Firozabad, and Chennai are currently manufacturing 800 coveralls per day, but the OFB is ramping up production to 1,500 daily.

OFB has also begun producing medical sanitizer fluid to meet an order from HLL. “So far, OFB has manufactured 60,230 litres of sanitizer, which has been distributed to units of HLL... besides its own hospitals in OFs,” says the OFB.

The OFB has also begun manufacturing three-ply medical masks. It has already distributed 1,11,405 masks to various government agencies. The OFB has also manufactured 5,870 personal protective equipment kits (PPEs).

OFs have also begun the supply of special two-metre tents made of waterproof fabric, mild steel, and aluminium alloy for use in medical screening, hospital triage, and as quarantine shelters. Some 420 tents of different types have already been distributed to various first responders, including the Odisha State Medical Corporation, the Arunachal Pradesh government, and Punjab Police, Chandigarh.

Meanwhile, DRDO Chief Sathesh Reddy, says his organisation is developing 15-20 products to help manage the Covid-19 pandemic.

Two Delhi-based DRDO laboratories have announced the development of a high-tech “Ultraviolet sanitization box and hand device.” This uses ultraviolet light, with a shorter, more energetic wavelength of 254 nanometres, to warp genetic material in the Covid-19 virus and prevent it from making copies of itself. Killing microbes with ultraviolet light is an environment friendly and contact-free sanitisation method that avoids the harmful effects of disinfecting with chemicals.

Another Delhi-based DRDO laboratory that deals with explosive fire suppression has used its expertise in mist technology to develop an automatic mist-based sanitizer unit. The sanitizer unit is activated through an ultrasonic sensor, and sprays alcohol-based hand rub solution without contact and with minimum wastage. "The unit can be used for sanitisation of hands at entry and exit to hospitals, malls, office buildings, residential buildings, airports, metro stations, railway stations, bus stations, and critical installations," says the DRDO.

https://www.business-standard.com/article/economy-policy/fighting-coronavirus-crisis-defence-public-sector-firms-divert-production-120041801229_1.html

THE TIMES OF INDIA

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CSIR-National Aerospace lab makes PPE to help healthcare workers fight COVID-19

New Delhi: CSIR constituent Lab in Bengaluru, CSIR-National Aerospace Laboratories (CSIR-NAL), along with MAF Clothing has developed and certified the overall protective coverall suit. The polypropylene spun laminated multi-layered non-woven fabric based coverall can be used to ensure the safety of healthcare workers fighting COVID-19. "

The Coveralls have gone through stringent testing at SITRA, Coimbatore and have been qualified for use. CSIR-NAL and MAF have plans to augment the production capacity to about 30,000 units per day within four weeks," as per the statement.

The CSIR-NAL team led by Dr Harish C Barshilia, Dr Hemant Kumar Shukla, and Mr M J Viju of MAF have worked quickly to find the solution to the problem by identifying suitable indigenous materials and innovative manufacturing processes.

"The major advantages of these Coveralls are that they are highly competitive in price as compared to other manufacturers and the import content is negligible," as per the release.

Meanwhile, the Defence Research and Development Organisation (DRDO) has made a bio suit for medical professionals to help them fight coronavirus disease. Interestingly, the bio suit made by DRDO has a unique feature. The DRDO has prepared a special sealant as an alternative to seam sealing tape based on the sealant used in submarine applications, it said.

The special sealant used for submarine applications is required because as per DRDO, the bio suit production in India by its industry partners and other industries are being hampered due to non-availability of seam sealing tapes.

<https://timesofindia.indiatimes.com/gadgets-news/csir-national-aerospace-lab-makes-ppe-to-help-healthcare-workers-fight-covid-19/articleshow/75226307.cms>



Defence PSUs, OFB ramp up their resources to fight COVID-19

Delhi: Defence Public Sector Undertakings (DPSUs) and Ordnance Factory Board (OFB) have played their part in assisting civilian administration in fight against COVID-19 pandemic. These vital institutions of Department of Defence Production (DDP), Ministry of Defence have channelised all their resources, technical knowhow and manpower to help the nation mitigate the deadly virus. Following are some of the fruits of the efforts put in by scientists and personnel of DPSUs and OFB:

The Hindustan Aeronautics Limited (HAL) Bengaluru, a Defence PSU has set up isolation ward facility with three beds in Intensive Care Unit and 30 beds in wards. In addition, a building having 30 rooms was readied. In all, 93 persons can be accommodated at HAL facility.

HAL has manufactured and distributed 25 PPEs to Doctors in various Hospitals in Bangalore which are authorised to treat Covid-19 patients. It has also manufactured 160 aerosol boxes which have been distributed to various Government Hospitals in Bengaluru, Mysore, Mumbai, Pune, Uttar Pradesh, Telangana, Andhra Pradesh and Tamil Nadu.

Bharat Electronic Limited (BEL) has come forward on the directions of Ministry of Health and Family Welfare (MoH&FW) to manufacture and supply 30,000 ventilators within two months for ICUs in the country.

The design of these ventilators was originally developed by DRDO, which was improved upon by M/s Skanray, Mysore, with whom BEL has collaborated. BEL is likely to start manufacturing of ventilators between April 20-24, 2020. As per tentative schedule, BEL is expected to manufacture 5,000 units in April, 10,000 in May and 15,000 in June 2020. It is also making efforts to indigenise these components with the help of DRDO.

Bharat Dynamics Limited (BDL) is developing a prototype of ventilator which is likely to be tested and certified by 1st week of May before it starts of with manufacturing. It is working on this project with the help of a private start-up of Pune.

Defence PSU M/s BEL has joined the efforts for large scale production of ventilators. Bharat Earth Movers Limited (BEML) has manufactured 25 sets of five components for M/s Skanray, Mysore for manufacturing of ventilators by them.

Ordnance Factory Board, which heads 40 Ordnance Factories in the country, has started supply of coveralls conforming to ISO Class 3 exposure standards. Manufacture of initial order of 1.10 lakh from HLL Lifecare Limited (HLL) is in full swing. This order will be completed in 40 days.

Five Ordnance Equipment Group of factories located at Kanpur, Shahjahanpur, Hazratpur (Firozabad) and Chennai are engaged in manufacturing of coveralls. Present production rate is 800 per day. Efforts are on to ramp up to a level of 1,500 per day. For testing the efficacy of Coveralls and Masks, it has developed three machines which have been approved by South India Textile Research Association (SITRA) and are to be used in production to maintain the standards.

Ordnance Factory Board (OFB) has also manufactured 5,870 PPEs which have been distributed to HLL, CMO, Firozabad besides its own hospitals in Ordnance Factories.

Factories Board has also developed special two-metre tents which can be used for medical emergency, screening, hospital triage and quarantine purposes. These are made up of waterproof fabric, mild steel and aluminium alloy. Supplies have already started. About 420 tents of different types have been distributed to Odisha State Medical Corporation, Joly Grant Hospital in Dehradun, DMA, Arunachal Pradesh and Punjab Police, Chandigarh. The OFB has also taken up repairs of ventilators. So far, it has repaired about 53 ventilators and given to TSIMDC, Telangana.

Ordnance Factories (OFs) are presently producing sanitisers 7,500 litres against an order of 28,000 litres from HLL, the nodal agency appointed by Government of India for centralised procurement. The OFs have supplied 5,148 litres another 15,000 litres are ready for supply awaiting destination from HLL.

So far, OFB has manufactured 60,230 litres of sanitisers which have been distributed to units of HLL at Indore, Belgavi, Thiruvananthapuram, Central Railways, MECL, Nagpur district administration, Uttarakhand, Bihar, Cantonment Board Willington, DM Nagpur, DRM Solapur besides its own hospitals in Ordnance Factories. Two test facilities for blood penetration test has been established, one at Chennai and another at Kanpur.

The OFB has so far manufactured 1,11,405 masks which includes 38,520 3-ply medical masks. These have been distributed to Tamil Nadu Police, district civil and police authorities in Firozabad and Agra, Cantonment Board Shahjahanpur, Government of Uttarakhand, District Health Officer Shahjahanpur, Military Intelligence, etc.

<https://www.siasat.com/defence-psus-ofb-ramp-their-resources-fight-covid-19-1876271/>

COVID-19: Defence Forces Contribution

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Corona warriors: how Indian Army is contributing to battle against Covid-19

From evacuating stranded Indians from foreign countries in the middle of the pandemic to setting up quarantine facilities and distributing essential items, the Army has continuously been at the frontline

By Ramananda Sengupta

Besides healthcare workers and state police forces, the Indian Army has been in a proactive role at the forefront of fighting COVID-19 and providing assistance in various key areas across the country and beyond. From evacuating stranded Indians from foreign countries in the midst of the pandemic to setting up quarantine facilities and distributing essential items, the Army has led the task.

Evacuations and Lodging at Quarantine Facilities:

February 2-18: 248 Indian male citizens, mostly students, were evacuated from Wuhan and quarantined at Manesar Army Wellness Facility.

Feb 27 to March 12: 124 people evacuated from Diamond Princess Cruise liner in Japanese waters and quarantined at Manesar Army Wellness Facility.

March 11 onwards: 83 people evacuated from Italy and quarantined at Manesar Army Wellness Facility. These included six citizens of Indian origin from Italy and three citizens of Indian origin from US. 82 were discharged after testing negative while one positive case was referred to Safdarjung hospital in New Delhi.

March 15: 236 Indian citizens evacuated from Iran and quarantined at Jaisalmer Army Wellness Facility, the army's largest such facility. Out of these, 19 were COVID positive and were admitted at AIIMS Jodhpur. Nine of them have since recovered. Nearly two battalion strength of troops vacated their living accommodation to assist in establishing these national-level facilities for the people of India.

March 16: 53 Indian citizens evacuated from Iran and quarantined at Jaisalmer Army Wellness Facility. Three of them tested COVID positive and were admitted to AIIMS Jodhpur.

Mar 18: 195 Indian citizens evacuated from Iran and quarantined at Jaisalmer Army Wellness Facility. 22 of them tested COVID positive and were admitted to AIIMS Jodhpur.

March 25: 277 Indian citizens evacuated from Iran and quarantined at Jodhpur Army Wellness Facility.

March 29: 275 Indian citizens evacuated from Iran quarantined at Jodhpur Army Wellness Facility.

Capability Enhancement to Help Civilians:

Several Army Wellness Centres established to handle likely surge in civilian cases of COVID-19.

Three dedicated COVID hospitals for civilians with a total capacity of 490 (extendable to 590) to be set up by April 20 at Barrackpore, Shillong and Likabali.

Four Quick Reaction Medical Teams have been kept ready.

As many as 1200 Battlefield Nursing Assistants trained to augment medical resources at 300 per Corps.

Seven COVID response teams with personnel from Engineers and Army Medical Corps. Decontamination operations being carried out at Tawang, in Arunachal Pradesh, which borders China.

Around 1000 masks and 30 personal protective sets being manufactured each day by Regional Ordnance Depots for hospitals in the entire Eastern Command Theatre.

Two doctors and two paramedics were initially sent to Narela isolation camp to assist civil medical set up. Process of taking over of complete screening facility by Army commenced from April 7. Its current strength is four Medical officers and 18 support staff.

Distribution of Essential Items:

Provision of food packets at locations in Bengaluru, Delhi, Jammu, Changlangla (Assam Rifles), Kolkata, districts in Assam, Baramulla, Mokokchung (Assam Rifles), Akhnoor, Wellington, Coonoor and Tiruchy.

Provision of medical items such as PPE, masks and hand sanitisers in Bengaluru, Anantnag, Kulgam, Kupwara, West Kameng (ALP), PHC at Srinagar and Akhnoor.

Volunteers from Indian Army donated blood to assist Civil Blood Banks to maintain blood stock levels.

Multi-pronged campaign to reach out to people in remote and rural areas of J&K and educate and assist them.

Civic-military interaction to fight COVID-19 held at Bhagatpura, Srinagar.

Continuous efforts being undertaken by Chinar Corps, making announcements to ensure social distancing & distributing health advisories.

Assistance to Friendly Foreign Countries:

13-21 March: Medical team comprising five doctors, two Nursing Officers & seven Paramedics deployed in an advisory role to assist the Male govt to set up its domestic COVID protection measures.

April 11: Eight Medical Officers and seven Paramedics deployed for capability development of Kuwaiti government and setting up of Reverse transcription-polymerase chain reaction (RT-PCR) machine for testing.

Medicines and medical equipment being provided to the Nepal government.

Other Medical teams are on standby for deployment to Sri Lanka, Bangladesh, Bhutan and Afghanistan.

<https://www.outlookindia.com/website/story/india-news-corona-warriors-how-indian-army-is-contributing-in-battle-against-covid-19/350994>

Renewed focus by armed forces to insulate 15 lakh personnel from coronavirus

All the three forces have already enforced a "no movement" policy under which almost all their bases have been put under total lockdown barring the wings handling key operational matters and strategic surveillance, they said

New Delhi: The outbreak of coronavirus at a key naval facility in Mumbai where 26 sailors have been infected is a wake-up call for stricter implementation of all laid down norms to insulate around 15 lakh armed forces personnel from the pandemic, military officials said on Saturday.

All the three forces have already enforced a "no movement" policy under which almost all their bases have been put under total lockdown barring the wings handling key operational matters and strategic surveillance, they said.

Official sources said the top brass in the defence ministry is reviewing the overall preparedness of the armed forces to deal with the pandemic.

The Navy has strictly ordered all its bases to not allow any movement of its personnel and assets besides suspending all training activities after the first case of the infection was detected on April 7, a Navy official said.

The Navy has suspended all transfers and fresh postings besides ordering people on leave to stay back home. Those on board various ships and other platforms were told to extend their stay, he said.

"We are now restricting movement of people from one building to another building inside the bases and commands. We are restricting any movement to and from the bases," said another official.

An Indian Air Force official said the Air Headquarters have issued specific guidelines to all the bases and establishments to insulate the personnel as well as platforms from the virus. The IAF has not reported any case of the infection so far.

He said the aircraft sent on various evacuation missions to coronavirus-infected countries were too "quarantined" for 14 days besides being "disinfected" thoroughly.

An Army official said a "rigorous protocol" is being followed at all the bases and establishments of the force to protect the 15lakh army men from the virus.

Listing the measures, he said all the establishments are operating with skeleton staff and people coming back from leave or emergency out-station assignments are being made to stay "separately" for at least couple of weeks.

"We are even extending distance between the beds in barracks. It is an invisible war we are fighting," the official said.

About frontline bases along borders with Pakistan and China, the official said stricter norms are being followed to insulate them and that chances of the virus travelling to the areas were minimum.

The official said movement of people in 62 cantonments have also been strictly restricted as part of precautionary measures.

All the infected sailors of the Navy were serving at the INS Angre in Mumbai, a shore-based logistics and support establishment, and they are currently undergoing treatment at a Navy hospital.



The Navy has launched a large-scale contact tracing operation to track people who may have come in contact with the sailors. Almost all the residents of the building inside INS Angre are being tested, the sources said.

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The Western Naval Command is considered a strategic establishment as it takes care of India's maritime interests in the the Arabian Sea as well as parts of the Indian Ocean. The Naval dockyard in Mumbai is only few hundred metres away from INS Angre.

The outbreak of the coronavirus cases in Western Naval Command comes at a time when a number of navies globally are grappling with the pandemic.

Over 660 sailors on board the USS Theodore Roosevelt, an aircraft carrier of the US Navy, reported coronavirus infection. A third of the nearly 2,000 sailors onboard French Navy's aircraft carrier Charles-de-Gaulle and its support ships are also infected with the virus.

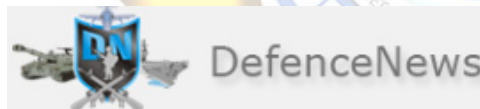
The Indian Army on Thursday directed all its military establishments, cantonments, formation headquarters and field units to totally restrict movement of forces till April 19 in view of the government's fresh lockdown related guidelines.

The order also mentioned that offices in Army headquarters, command headquarters and formation headquarters would start functioning with 50 per cent manpower from April 19 to May 3.

It said all training activities and temporary duties will remain suspended till May 3, adding directions on actions to be taken post the lockdown period will be issued on receipt of fresh orders from the government.

<https://economictimes.indiatimes.com/news/defence/renewed-focus-by-armed-forces-to-insulate-15-lakh-personnel-from-coronavirus/articleshow/75224656.cms>

Defence Strategic: National/International



Sun, 19 April 2020

From barter to partner in the Russia–India arms trade

In the last week of March 2020, Dmitry Shugayev of the Russian Federal Service for Military and Technical Cooperation revealed that India would purchase 400 T-90S tanks, along with a number of MiG-29 fighter jets. While Russian arms exports to India have seen a decline of 47 per cent in 2019, new orders might change the scenario in 2020.

India's demand for foreign technology is transforming its relations with arms exporting nations. Prime Minister Narendra Modi wants to indigenise defence production and establish joint ventures with foreign defence manufacturers through his 'Make in India' initiative. Alongside changes to India's arms trade with Russia, this is designed to attract foreign direct investment in defence production.

Instead of seeking licenses to produce arms — where the importer purchases the rights to manufacture all or part of a weapons system — the stress now is more on the transfer of technology. This involves evaluating the life cycle costs of a weapons system from training to software and spare parts before any purchase is made. A feasible joint venture program with a foreign nation or firm can then be worked out.

Sensing change in one of the world's largest defence markets, Russia is now pitching joint ventures, collaborative R&D programs and even offering to produce state of the art weapons in India itself.

During the 1970s the weapons trade between India and the Soviet Union was conducted through a barter system. The disintegration of the Soviet Union was an eye opener for the Indian establishment — it struggled to obtain spare parts and equipment from factories suddenly located in Eastern European countries.

As a result the Indian defence establishment went scouting for alternatives and found Israel the best source of spare parts and advanced equipment. US arms exports could not find markets in India from 1990 through to 2000. Indian policymakers were hesitant to rely on US weapons with stringent end user agreements — and Indian armed forces personnel had adapted to Soviet-era weapons.

In the meantime, India embarked on developing its own naval platforms and other advanced weaponry through its defence research establishments. But the success rate in devising new products was stunted by US sanctions following India's 1998 nuclear tests.

The slow-down in Russian imports over the last decade and the lack of accompanying technology transfers are forcing the two countries to look at other possible options for retaining their arms trade.

It was proposed that the two countries undertake joint projects such as Brahmos (a medium-range cruise missile that can be launched from air, sea and land), licensed production of aircrafts such as the Sukhoi-30MKI, and structural support for maintenance and other service requirements. These proposals underline four changes in the post-2010 phase of the Russia-India defence relationship.

First, it is more commercial and active in nature. This is manifested in the negotiations for the procurement of the Admiral Gorshkov-class frigate now known as Vikramaditya.

Second, there are now joint venture projects such as Brahmos where the two countries have worked together to build a state-of-the-art system with sophisticated radar evasion and low flying capability.

Third, under the 'Make in India' program, Russia has been invited to manufacture weapons systems in India. The possibility of manufacturing 200 of the Kamov KA-226 light helicopters with Indian manufacturer Reliance Defence was proposed in 2018, but the insolvency of the Indian company puts the project under doubt.

India has commissioned low-value projects with Indian private defence manufacturers such as L&T, Mahindra, Tata and many others. But the problem with international joint ventures between private firms is that they need confirmed orders for longer periods of time. Foreign firms have also sought the relaxation of India's offset policy — which mandates foreign companies spend at least 30 per cent of the contract value in India — for any given defence purchase.

Finally, Russia and India are exploring opportunities for joint defence exports manufactured in India and sold to a third country. The major hindrance to this initiative is agreeing on a common end user agreement and the finalisation of India's defence exports policy.

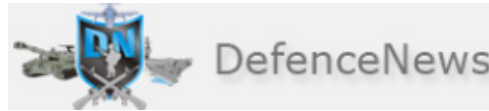
The publicly-owned Ordnance Factory Board is the largest producer of defence-manufacturing equipment in the country and is at the forefront of Indian defence exports. Despite functioning under the Indian Ministry of Defence, it too is restrained by the government's vague defence export policy that encourages exports to 'friendly countries' only.

Joint ventures between Indian public sector units and private manufacturers in defence are also struggling to take off because of issues related to confidentiality.

The new era of arms trade between India and Russia envisages the eventual sale of the S-400 missile defence system to India despite US sanctions against Russia under the Countering America's Adversaries through Sanctions Act (CATSAA). But the S-400 is only one aspect of India's diversification of its defence inventory and systems.

India needs technologically superior weapons systems and to this end is setting new terms of trade with its long-time friend Russia. But Modi's 'Make in India' initiative is aimed at the bigger goal of attracting enough technology transfer and investment to build up India's own arms production.

<https://www.defencenews.in/article/From-barter-to-partner-in-the-Russia%e2%80%93India-arms-trade-830234>



Sun, 19 April 2020

Pakistan criticizes proposed sale of US missile systems to India

Pakistan said Friday that a proposed new multimillion-dollar sale of American missile systems to Islamabad's archrival, India, would destabilize an already "volatile" situation in South Asia.

The U.S. Department of State on Tuesday cleared the delivery of 10 AGM-84L Harpoon Block II air-launched missiles, 16 MK 54 lightweight torpedoes and related equipment to India.

New Delhi has not commented on the \$155 million deal, which is still subject to congressional approval. "Pakistan has articulated its concerns regarding the sale of sophisticated weapons to India, which would further destabilize the region," Foreign Ministry spokesperson Aisha Farooqui told her weekly news conference.

The deal is "particularly disturbing" at the time when global efforts are focused on fighting the COVID-19 pandemic, Farooqui said, while responding to a question from VOA.

"There is a high possibility of India conducting a false flag operation while global efforts are directed towards combating the pandemic."

Tensions are High

Pakistan's military tensions with India remain high and both nuclear-armed nations have been locked in intense skirmishes across their border in the divided region of Kashmir. The tensions over the Himalayan territory have sparked two of the wars between them and continues to be the primary source of bilateral tensions.

Pakistan accuses the Indian armed forces of staging fake militant operations on India's side of the border and using them as an excuse to orchestrate cross-border military attacks on the "baseless" grounds that the militants were sent and backed by Pakistan. New Delhi denies the accusations.

Farooqui said Islamabad has repeatedly "alerted" the international community about India's "aggressive designs" toward Pakistan and other neighboring countries in South Asia.

U.S. Defends Proposed Sale

Washington, however, says, "The proposed sale of this equipment and support will not alter the basic military balance in the region."

It said the weapon systems will be integrated into the Indian Navy's Boeing P-8I advanced maritime patrol and anti-submarine warfare aircraft to improve India's capability to meet current and future threats from enemy weapon systems.

"This proposed sale will support the foreign policy and national security of the United States by helping to strengthen the U.S.-Indian strategic relationship and to improve the security of a major defensive partner, which continues to be an important force for political stability, peace, and economic progress in the Indo-Pacific and South Asia region," a U.S. statement said.

<https://www.defencenews.in/article/Pakistan-Criticizes-Proposed-Sale-of-US-Missile-Systems-to-India-830230>



Sun, 19 April 2020

Does Pakistan rely on China for high-tech armour in decades-old stand-off with India?

While China remains one of the major suppliers of defence equipment to Pakistan along with the US, in recent years, Beijing has enhanced the military capability of India's arch rival with upgrades and supplied state-of-the-art equipment.

On 12 April, shells fired by a Pakistani weapons system damaged several houses and injured people in the Indian part of Kashmir. The ongoing firefight between the two arch-rivals started on 6 April but surprised many this time, as shells fired from the Pakistani side landed deep inside the villages of Kupwara in Indian-administered Kashmir.

A former Indian Army Brigadier and defence analyst, Rahul Bhonsle, believes that it is China which completely overhauled the capability of Pakistan and the 'China Pakistan axis' presents a formidable challenge.

"The China Pakistan axis is no doubt a major challenge for India, given the close integration of Chinese weapons systems such as tanks, combat aircraft and the sharing of technology on tactical nuclear weapons, amongst others. Pakistan in some ways has become a test lab for the Chinese weapons," the military observer told Sputnik.

Defence trade figures published by the Stockholm International Peace Research Institute have revealed that China has solely replaced the entire fall in US-Pakistan defence trade in the past five years. China has been supplying defence equipment to Pakistan since the 1960's and increased its share in the total Pakistani defence arsenal to around 60 percent in recent years. Besides nuclear-capable missiles, armoured capability has gained prime importance in collaboration between the two countries.

Pakistan's capacity in terms of main battle tanks (MBT), with approximate 2,400 in the field, is said to be diverse, with three Chinese-made tanks. Pakistan's MBTs include 1,100 Al-Zarrar tanks, based on the Chinese Type 59 MBT, as well as 50 T-54/T-55, 400 Type-69 tanks, 350 Al-Khalid tanks, and the country is set to roll out Chinese-made VT-4 tanks. Pakistan is also working on a more advanced version of the al-Khalid III MBT.

"China may at times to come provide Pakistan with front line Type 99 tanks but Pakistan may not have the resources to acquire the same. Pakistan's inventory of a large mix of tanks from Al Zarrar to Khalid T-80 etc, is an outcome of a lack of funds and a mix-and-match approach, which will remain a major challenge in the future as well," Bhonsle added.

A review of weapons classifications shows that Pakistan is militarising its skies (48 percent of total arms import) at an unprecedented rate but at the same time, armoured vehicles and artillery have constituted around 20 percent of total arms imports since 2010. It is also upgrading most of the tanks and enhancing their capability to attack any time of day, while India is playing catch-up.

"India is mainly relying now on the tried and tested T-90 S and upgraded T-72. These are versatile and have the capability to meet the challenge posed by the Pakistan armour. Gradual upgrades of these in terms of night fighting, fire control and armament may be the way ahead," Bhonsle replied when asked whether the Indian Army should also diversify its tanks.

Last December, media reports claimed that Pakistan's army had inked a deal with China's Northern Industries Corporation (NORINCO) to procure artillery guns for deployment along the Indian border. The two countries also inked a deal to overhaul Pakistan's main battle tank, the Type 85-IIAP.

“India had a good option of developing indigenous Future Ready Combat Vehicles (FRCV) but at present there are no current developments that are known. While upgrading the current generation on the fly for enhanced capabilities, India may also look at the Russian Armata in case it is not serious about the FRCV project,” Rahul Bhonsle said, suggesting ways to improve the nation’s armoured capability.

India has approximately 3,300 main battle tanks: 1,900 T-72M1, 1,000 T-90S, and around 500 T-90SM. The Indian army has also inducted the domestically-produced Arjun MK-I but hopes to address some technical issues before rolling out a more capable version of the Arjun.

Nevertheless, Indian Army chief M. M. Naravane has indicated that country is moving away from the “military icons of the 20th century”, like tanks, fighter aircraft and primarily looking at the possible induction of laser and directed-energy weapons.

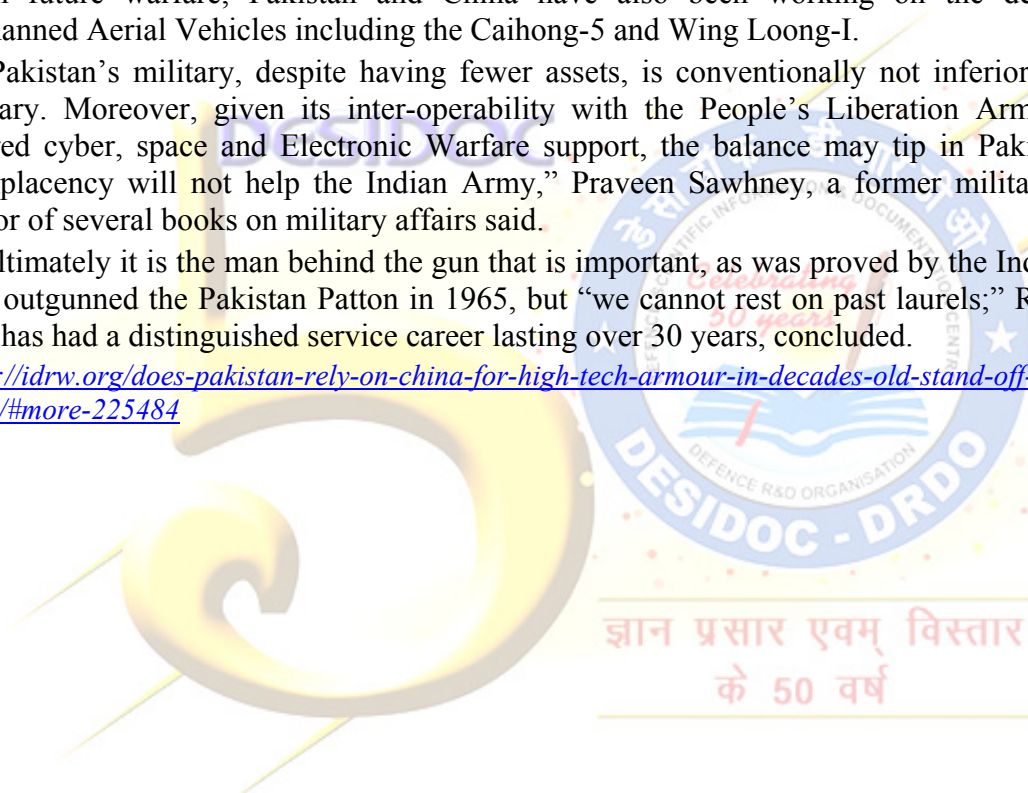
“In the five-odd decades since — in Iraq, Lebanon, Georgia, Chechnya and Syria, armoured formations have either followed, supported the application of air power and artillery, or else their units and sub-units have been committed in smaller tactical groupings as part of infantry-armour assaults in urban terrain,” Naravane said in March of this year while speaking at an event in Delhi.

In future warfare, Pakistan and China have also been working on the development of Unmanned Aerial Vehicles including the Caihong-5 and Wing Loong-I.

“Pakistan’s military, despite having fewer assets, is conventionally not inferior to the Indian military. Moreover, given its inter-operability with the People’s Liberation Army, when it is offered cyber, space and Electronic Warfare support, the balance may tip in Pakistan’s favour. Complacency will not help the Indian Army,” Praveen Sawhney, a former military officer and author of several books on military affairs said.

Ultimately it is the man behind the gun that is important, as was proved by the Indian Centurion who outgunned the Pakistan Patton in 1965, but “we cannot rest on past laurels;” Rahul Bhonsle, who has had a distinguished service career lasting over 30 years, concluded.

<https://idr.org/does-pakistan-rely-on-china-for-high-tech-armour-in-decades-old-stand-off-with-india/#more-225484>



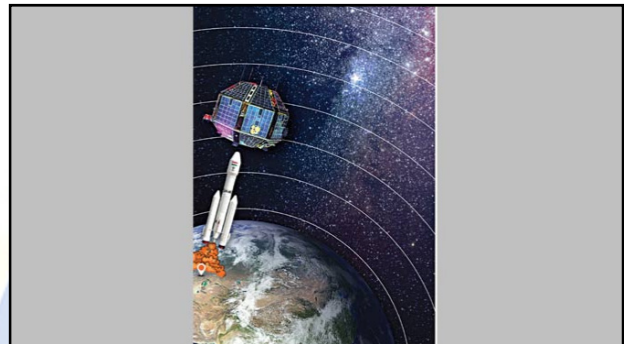
Our first signature in space

The successful launch of India's first indigenous satellite, Aryabhata, on this day 45 years ago, marked India's arrival as a space power among the comity of nations

By Martand Jha

April 19th marks a special occasion in India's journey as a space power. On this special day, India's first indigenous satellite, Aryabhata, was successfully launched from the Soviet Union by a Russian-made rocket in 1975. This year marks the 45th anniversary of that glorious achievement.

The primary aim of Aryabhata was to establish a sound base in satellite technology on which future operation satellites could be built. This objective was fully realised with its successful launch into a near earth circular orbit. The satellite was named after India's greatest mathematician, Aryabhata, who propounded the concept of Zero in the fifth century AD. The name of this satellite was handpicked by then Prime Minister Indira Gandhi.



When Project Aryabhata was taking concrete shape, the Indian space programme was passing through a rough phase, especially after the demise of the Father of the Indian space programme, Dr Vikram Sarabhai, in 1971. The loss of a stalwart like him meant a huge blow to young engineers and scientists who lost not only a great leader, an able administrator but also a great scientific mind and teacher.

India was looking for a 'leapfrogging moment' after his death in outer space, which could stamp both India's intent and capability to be counted as a space power among the comity of nations.

Nascent Steps

Before Aryabhata, the Indian space programme was largely a rocket-based programme with sounding rockets being launched regularly from Thumba in Thiruvananthapuram. It was in the early 70s that the Indian satellite programme started to take nascent steps.

The pioneers of the Indian space programme were of the firm belief that for India to be recognised by other space powers like the United States and the Soviet Union, the country had to not only make an indigenous satellite but also launch it successfully in the first attempt. The reason being that for a third world country like India, with a large amount of poor population, a failed mission just isn't affordable. Secondly, the Indian scientists had to do so with extremely limited resources. For this mission, Rs 3 crore was sanctioned by the Government of India, with Rs 1 crore in foreign exchange as the total cost for the project.

Project Aryabhata also became a symbol of Indo-Soviet cooperation in Outer Space affairs. Dr UR Rao, former Isro chairman, in his book, 'India's Rise as a Space Power', recalls this episode and states, "Once the money was sanctioned for this project, regular review meetings started to take place between the Indian and Soviet scientists at regular intervals to ensure the progress of this project. A structural model of the satellite simulating the physical characteristics of all the systems and subsystems were tested and qualified along with the dummy last stage of the rocket in USSR". The preparations for designing Aryabhata were in full swing since 1974 itself.

Personal Inspiration

Indira Gandhi was personally interested in this mission. She, therefore, visited the Indian Scientific Satellite Project (ISSP) site in Peenya Industrial Estates, Bengaluru, (established in 1972), where the project was being conceived. Her personal interest in the project boosted the confidence of scientists, who were putting their hearts and souls into this project.

But as happens in any great project or a mission, the journey of Aryabhata also faced hiccups. Even six months before the launch, Isro did not have a facility for dynamically balancing the satellite, which is an important prerequisite for a space-based satellite. However, looking at the gravity of the situation, the Karnataka government came to the rescue and provided 20,000 square feet to Isro to establish the required facility.

As per Isro, “The spacecraft was quasispherical in shape containing 26 sides and carried three experiments for the measurement of cosmic X-rays, solar neutrons and Gamma rays together with a sensor for the study of the Ionosphere. The spacecraft weighed 360 kg, used solar panels on 24 sides to provide 46 watts of power, used a passive thermal control system, carried Ni-Cd batteries and a spin up gas jet system to provide a spin rate of not more than 90 rpm. There was a set of altitude sensors comprising a tri-axial magnetometer, a digital elevation solar sensor and four azimuth solar sensors. The data system included a tape recorder at 256 bits per second with playback at 10 times that rate. The PCM-FM-PM telemetry system operated at 137.44MHz”.

Red-Letter Day

After months of hard work, when the red-letter day of April 19 arrived, the scene of action shifted from Bengaluru to Kapustin Yar cosmodrome in Russia. Then Isro chairman Prof Satish Dhawan, along with Dr UR Rao who was the project director of Aryabhata, and 30 other Indian scientists were present at the launch pad to witness history in the making.

India truly entered its space age on that day when the satellite Aryabhata was launched successfully. This success literally changed the entire course of the Indian space programme as it gave India the belief that it too could both realise and materialise its space dreams.

Aryabhata became the benchmark of success on which Isro got the confidence to conceive ‘Bhaskara’, an experimental remote sensing satellite. The spirit and culture of Aryabhata project continues to symbolise an ideal environment for fostering scientific and technological excellence.

A Special Journey

Today, when the Indian space programme is scaling great heights, the story of Aryabhata has a lot to offer to young scientists. Last year, when Chandrayaan 2 failed to make a successful landing on the lunar surface, it became a moment of grief for every Indian. What everyone can learn from Aryabhata is that success and failures are a part and parcel of life and necessary for the growth of a robust institution like the Indian Space Research Organisation (Isro).

Momentary success and momentary failures don’t determine the overall calibre of an institution and its people. For instance, had Aryabhata not been successful in its first attempt, the Indian scientists would have tried again and again until the mission was successful, much like how Isro learnt from the failure of SLV 1 (Satellite Launch Vehicle) in its first attempt.

Moreover, the feat of Aryabhata should not be seen as an isolated episode of success in India’s space history because a space programme becomes successful in its continuity of small and large successes. This is precisely how Isro has learnt to function over 50 years of its existence. Therefore, it came as no surprise when immediately after the failure of mission Chandrayaan 2, Isro announced that it would make another attempt in 2021 with mission Chandrayaan 3.

Next Quantum Leap

Last year on August 15, Isro celebrated its silver jubilee as an institution. The Indian space programme is a result of sheer dedication and the dream of visionaries, who were at the peak of the professions. Nehru, Sarabhai and Bhabha were the three stalwarts behind the genesis of the Indian space programme.

Isro learns very fast from its failures and rectifies its mistakes. This is on very similar lines of Dr Homi Jehangir Bhabha who said while he was inaugurating a six-day seminar on ‘Space Physics’, a first-of-its-kind to be held in India. He urged that a beginning must be made in the field of space research in order to not fall behind other countries in practical technology. He said, “If we do not do it now, we will have to depend later on buying the know-how from other countries at much greater cost”.

Today, Indian space ambitions require another quantum of a leap to start a new chapter of India’s space journey. A successful Chandrayaan 3 mission will boost the confidence of Isro for its biggest ever project ie, Mission Gaganyaan, which is India’s first manned mission to space, where India plans to send astronauts to outer space and bring them back home safely.

The successful launch of Aryabhata represents the golden moment in India’s space history. As a nation, we only need to keep looking back to this triumph to draw inspiration to scale higher peaks.

Moment of Glory

- The satellite was named after India’s greatest mathematician, Aryabhata, who propounded the concept of Zero
- The name of the satellite was handpicked by then Prime Minister Indira Gandhi
- Rs 3 crore was sanctioned by Government of India, with Rs 1 crore in foreign exchange, as the total cost for this project
- Project Aryabhata was conceived at the Indian Scientific Satellite Project site in Peenya Industrial Estates, Bengaluru, (established in 1972)
- Aryabhata was launched from Kapustin Yar cosmodrome in Russia on April 19, 1975
- This success literally changed the entire course of the Indian space programme as it gave India the much-needed belief in its abilities.

(The author is a SRF at School of International Studies, Jawaharlal Nehru University, New Delhi)

<https://telanganatoday.com/our-first-signature-in-space>

Science

Sun, 19 April 2020

Gravitational waves reveal unprecedented collision of heavy and light black holes

By Adrian Cho

April 19th marks a special occasion in India’s journey as a space power. On this special day, India’s first indigenous satellite, Aryabhata, was successfully launched from the Soviet Union by a Russian-made rocket in 1975. This year marks the 45th anniversary of that glorious achievement.

Researchers with the world’s gravitational wave detectors said today they had picked up vibrations from a cosmic collision that harmonized with the opening notes of an Elvis Presley hit. The source was the most exotic merger of two black holes detected yet—a pair in which one weighed more than three times as much as the other. Because of the stark mass imbalance, the collision generated gravitational waves at multiple frequencies, in a harmony Elvis fans would recognize. The chord also confirms a prediction of Einstein’s theory of gravity, or general relativity.

Such mismatched mass events could help theorists figure out how pairs of black holes form in the first place. “Anything that seems to be at the edge of our predictions is most interesting,” says Chris Belczynski, a gravitational theorist at the Polish Academy of Sciences in Warsaw, who was not involved in the observation. But the one event is “not quite in the regime where you can tell the different formation [routes] apart.”

Physicists first detected gravitational waves in 2015, when the Laser Interferometer Gravitational-Wave Observatory (LIGO), a pair of detectors in Washington and Louisiana, spotted two black holes spiraling into each other, generating infinitesimal ripples in spacetime. Two years later, the Virgo detector near Pisa, Italy, joined the hunt, and by August 2017, the detectors had bagged a total of 10 black hole mergers.

All involved pairs of black holes with roughly equal masses, says Maya Fishbach, a physicist and LIGO member at the University of Chicago. But on 12 April 2019, the three detectors detected a black hole merger 2.4 billion light-years away in which one weighed 30 solar masses and the other just eight, says Fishbach, who reported on the event at the American Physical Society's online April meeting. "This is the first event in which we can confidently say the mass-ratio is not one," she says.

Ordinarily, two spiraling black holes pump out gravitational waves concentrated at a single frequency: double the rate at which they orbit each other. That doubling arises because of the matched masses of the black holes. Every half orbit they return to a position that's effectively identical to their original one. But if the black holes have distinctly different masses, then general relativity predicts that they should also generate weaker waves at higher frequencies, or overtones.

The next-strongest note sung by the pair should vibrate at three times the orbital frequency, or one and half times the main gravitational-wave frequency. If the main frequency were a C on a piano, the overtone would be the next higher G—a perfect fifth, and the interval of the first two notes in the melody of Elvis Presley's hit "I Can't Help Falling in Love with You." That is what the LIGO and Virgo researchers detected, says Maximiliano Isi, a physicist and LIGO member at the Massachusetts Institute of Technology, who also spoke at the meeting. The overtone rang roughly as loudly as predicted by general relativity, Isi says. "Einstein prevails again."

Such oddball events might help researchers figure out how the black holes pair in the first place. That's a puzzle because it's not obvious how such big black holes can form so close together. Theorists have two general ideas. The pairs could originate from a pair of orbiting massive stars, which each collapse into black holes at the ends of their lives. Alternatively, in so-called dynamical models, the black holes might form completely separately and find each other across space and time, a scenario more likely in globular clusters, the dense clumps of stars found in the outer reaches of galaxies.

Either scenario can probably account for the mismatched black holes in this event, Belczynski says. "If it [the mass ratio] had been 10-to-1 I would have bet on the dynamical models," he says, as binary star systems generally don't form with such skewed ratios. Fishbach agrees that the single event isn't enough to rule out one scenario or the other. But she says that if LIGO and Virgo spot more mismatched events, the statistical distributions could suggest which scenario is more likely.

However, the event could have a more complex origin, says Emanuele Berti, a gravitational wave astronomer at Johns Hopkins University. The fact that the one black hole is so much heavier than the other and appears to be spinning fast suggest that it, too, was the product of a merger. "It looks quietly like the product of a multiple-generation merger," he says.

More peculiar collisions might be waiting among the dozens of recorded events that researchers have yet to analyze. LIGO and Virgo's observing run 3, which went from 1 April 2019 until 26 March, picked up 56 new gravitational wave events, more than five times the previous total. LIGO and Virgo researchers had hoped to finish a global analysis of roughly half that data set by now, but the coronavirus pandemic delayed them, says Patrick Brady, a physicist at the University of Wisconsin, Milwaukee, and spokesperson for the LIGO scientific collaboration. Belczynski says he's anxious to see those results. "I'm just sitting here with my students, my entire group, waiting for this paper."

<https://www.sciencemag.org/news/2020/04/gravitational-waves-reveal-unprecedented-collision-heavy-and-light-black-holes>

माइनस 20 डिग्री में कोरोना की जेनेटिक सिक्वेंसिंग पता लगाने में जुटे वैज्ञानिक, 40-40 लीटर के तीन शॉवर लेने के बाद ही आते हैं बाहर

योगेश पाण्डे

- भोपाल की लैब बनी वॉर रूम , 20 वैज्ञानिक और 10 रिसर्च फैलो दिन रात कर रहे काम
- नेशनल इंस्टीट्यूट ऑफ हाई सिक्वोरिटी एनिमल डिजीजेस में चल रही यह महत्वपूर्ण रिसर्च

भोपाल: आनंद नगर स्थित हाई सिक्वोरिटी एनिमल डिजीजेस लैब का स्पेशल वार रूम। माइनस 20 डिग्री तापमान में दिन-रात रिसर्च में जुटी वैज्ञानिकों की टीम। यहां इन दिनों कोरोना वायरस की जेनेटिक सिक्वेंसिंग का पता लगाने में जुटी है, ताकि इस महामारी का वैक्सीन बनाया जा सके। जोखिम बड़ा है तो नियम भी सख्त हैं। लैब का ऑटोमेटेड गेट सिर्फ उन्हीं वैज्ञानिकों को भीतर जाने की अनुमति देता है, जो इस मिशन के लिए नामांकित हैं। इतना ही नहीं जब ये वैज्ञानिक लैब से बाहर निकलते हैं तो 40-40 लीटर के अलग-अलग टैंपरेचर के तीन शॉवर से होकर उन्हें गुजरना होता है। सिस्टम इतना ऑटोमेटेड है कि एक शॉवर लिए बिना दूसरे का दरवाजा नहीं खुलता। इसके बाद ही वैज्ञानिक बाहर आते हैं। ऐसे ही एंट्री के दौरान भी डिसइंफेक्शन की पूरी प्रोसेस के बाद ही वैज्ञानिक लेबोरेटरी में दाखिल होते हैं।

निदेशक डॉ. वीपी सिंह की अगुवाई में चल रहा है यह मिशन

दरअसल पशुओं के वायरस पर काम करने वाली एशिया की इकलौती लेबोरेटरी नेशनल इंस्टीट्यूट ऑफ हाई सिक्वोरिटी एनिमल डिजीजेस में पहली बार कोविड-19 पर रिसर्च चल रही है। शहर के 20 वैज्ञानिक और 10 रिसर्च फैलो इसमें जुटे हैं। लैब में कोरोना वायरस के डीएनए को प्युरीफाई कर बार-बार सिक्वेंसिंग एनलाइजर में डाला जा रहा है। इसमें डालने से पहले हर बार इस वायरस को प्युरीफाई किया जाता है, ताकि उसकी गुणवत्ता कम न हो। गुणवत्ता यानी उसकी पूरी मारक क्षमता के साथ ही उसे एनालाइज किया जा रहा है ताकि उसी क्षमता का वैक्सीन बनाया जा सके। इंडियन काउंसिल फॉर एग्रीकल्चर रिसर्च की इस लैब में संस्थान के निदेशक डॉ. वीपी सिंह की अगुवाई में यह मिशन चल रहा है। यह इतना गोपनीय है कि संस्थान में किसी भी बाहरी शख्स को एंट्री नहीं है।

कोरोना सैंपलों से काम आसान

डायरेक्टर सिंह इस बारे में कुछ भी बोलने से बच रहे हैं। लेकिन दूसरे वैज्ञानिक यह मान रहे हैं कि बीते तीन दिनों से टेस्टिंग के लिए यहां पहुंच रहे कोरोना पॉजिटिव सैंपलों से उनका काम आसान हो गया है। अब उनका कोविड-19 को लैब में मैग्नीफाय करने का दबाव कम हुआ है। पॉजिटिव सैंपल से उनका यह काम पूरा हो रहा है। जेनेटिक सिक्वेंस का काम कब तक पूरा होगा। इसका जवाब ड्यूटी कर बाहर निकल रहे वैज्ञानिकों के पास नहीं है, लेकिन उनकी चमकती हुई आंखें यह जरूर बयां कर रही हैं कि बहुत जल्द ही इसके परिणाम सार्वजनिक किए जाएंगे। ताकि वैक्सीन के क्लीनिकल ट्रायल की प्रक्रिया आगे बढ़ सके।

स्वाइन फ्लू के समय भी देश-दुनिया के सैंपलों की जांच हुई थी यहां

जब बर्ड फ्लू की आमद हुई थी, तब देश और दुनियाभर के हर सैंपल की यहां जांच हुई थी। इसके अलावा कोई और लेबोरेटरी नहीं थी। तत्कालीन वैज्ञानिकों का कहना है कि हजारों की संख्या में बर्ड फ्लू के सैंपलों की रोजाना यहां जांच होती थी। स्वाइन फ्लू के संक्रमण के दौरान भी हाई सिक्वोरिटी लेबोरेटरी के वैज्ञानिकों ने महत्वपूर्ण भूमिका निभाई थी।

खास यह भी...

ष 2000 से शुरू हुई इस लेबोरेटरी में अब तक कोई लीकेज सामने नहीं आया है। यहां से रोजाना 30 हजार लीटर लिक्विड वेस्ट निकलता है। ये पूरा वेस्ट स्टरलाइज किया जाता है। बायोसेफ्टी मेजर्स ऐसे हैं कि लेबोरेटरी में इस्तेमाल होने वाला एक-एक सामान स्टरलाइज कर डिसइन्फेक्ट किया जाता है। यह ऐसी पहली लेबोरेटरी है, जिसमें 20 साल में कोई लीकेज सामने नहीं आया है।

<https://www.bhaskar.com/local/mp/bhopal/news/scientists-engaged-in-genetic-sequencing-detection-of-corona-in-minus-20-degrees-come-out-only-after-taking-three-showers-of-40-40-liters-127189020.html>



हाईलाइट

- वैक्सीन का चल रहा क्लीनिकल ट्रायल
- सितंबर तक उपलब्ध होगी वैक्सीन

डिजिटल डेस्क, नई दिल्ली : नोवल कोरोना वायरस दुनिया को धीरे-धीरे बर्बाद करने में लगी हुई है। इस जानलेवा वायरस से अबतक 22 लाख से अधिक लोग संक्रमित हैं। वहीं डेढ़ लाख से अधिक लोगों की मौत हो गई है। कई देशों के वैज्ञानिक कोविड-19 (COVID-19) का इलाज खोजने दिन-रात रिसर्च कर रहे हैं। इस बीच ब्रिटेन के ऑक्सफोर्ड यूनिवर्सिटी (Oxford University) में वैक्सीनोलॉजी डिपार्टमेंट की प्रोफेसर सारा गिल्बर्ट (Sarah Gilbert) ने कोविड-19 की वैक्सीन (Vaccine) बनाने का दावा किया है।

उन्होंने कहा कि सितंबर तक कोरोना वायरस के लिए वैक्सीन आ जाएगी। गिल्बर्ट ने कहा, ChAdOx1 तकनीकी का इस्तेमाल कर रहे हैं। जिससे हमें एक डोज में ही अच्छे परिणाम मिले हैं। ऑक्सफोर्ड की टीम वैक्सीन पर इतना भरोसा है कि उन्होंने क्लीनिकल ट्रायल से पहले ही मैनुफैक्चरिंग शुरू कर दी है। इस संबंध में प्रोफेसर एड्रियन हिल ने कहा हमारी टीम को पूरा विश्वास है, इसलिए हम इंतजार नहीं कर पा रहे।

उन्होंने कहा, हमने बड़े पैमाने पर वैक्सीन की मैनुफैक्चरिंग शुरू कर दी है। कुल सात मैनुफैक्चर्स के साथ मैनुफैक्चरिंग की जा रही है। एड्रियन हिल ने कहा कि सितंबर तक या साल के अंत तक वैक्सीन की एक करोड़ से अधिक डोज उपलब्ध होंगे।

<https://www.bhaskarhindi.com/international/news/corona-virus-research-oxford-university-vaccine-manufacturing-sarah-gilbert-122720>