
*Critical Equipment and Technologies
Developed by DRDO for Combating Corona Virus*

DRDO has been tracking the alarming spread of COVID-19, since the world media started reporting its devastating impact in China's Wuhan Province and gearing up with technologies to support national mission to combat Covid. In anticipation of grave and potential impact of proliferation in India DRDO has been on alert since the detection of the 1st case of COVID-19 in India, reported on 30th January 2020.

By first week of March 2020 the number of affected people in India had crossed 30 and DRDO took a decision to accelerate and enhance products and countermeasures to combat the spread of COVID-19 in India. Efforts were focused on creating required solutions of critical medical requirements within the given constraints and available resources.

As a result of this approach, DRDO is ready with technology and working with industry for volume production of critical supplies viz. Sanitizers, N99/N95/Surgical Masks, PPEs, Ventilators, Detection Kits and Vehicle/Personal Sanitizer solutions in the ongoing war against COVID-19.

Hand & Surface Sanitizer

1. To address the need for WHO compliant and certified hand sanitization solution for personal and surface decontamination, DRDE, Gwalior and CFEES, Delhi have prepared hand sanitizer compliant to WHO guidelines for local production.
2. More than 1.50,000 Bottles of Sanitizer based on Isopropyl Alcohol/Ethanol has been produced in-house and supplied to:
 - Indian Armed forces, Armed Forces Medical Corps, Defence Security Corps – Approx. 5,500 Bottles
 - Ministry of Defence - 1,500 Bottles



**Hand
Sanitizer**

- Parliament - 300 Bottles
 - Delhi Police - 2500 Bottles
 - Security Establishments and High Offices – 500 Bottles
3. Ethyl alcohol base formulation and process is shared with industries and production in bulk has been initiated.
 - Expected capacity – more than 30,000 Litres per day
 - Raw material sourcing can help increase the production
 4. Cost – Approx. Rs 120 /- per Litre (including GST).
 5. Quality check of the sanitizer is carried out by DRDE
 6. DRDO Laboratories across the country, based on DRDE, Gwalior guidelines are producing a large amount of hand sanitizers and distributing to local administration for fight against the pandemic.

Face Masks

1. DRDE, Gwalior has developed five layered N-99 masks using a nano web filter layer which is being produced by two of the industry partners. Manufacturing of masks is in progress with an aim to produce 1 lakh masks over next 5/6 days. Production will be ramped up to 2 lakh N-99 masks per week through the Industry Partners.
2. INMAS, Delhi has designed 3-ply surgical masks, and producing through Industry partner.
 - 40,000 3-ply surgical masks have been supplied to Delhi Police and other agencies
3. DRDO is engaged by GOI in testing some of the test of face masks as per standards.



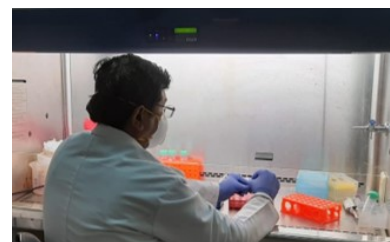
Personal Protective Equipment (PPEs)

1. DRDE, Gwalior has developed Bio Suits, which has been produced by three industry partners namely M/s Shiva Texyarn, Coimbatore, M/s Arvind Mills, Ahmedabad and M/s Aeronav, Noida and is being supplied to MOH&FW, GOI.
2. INMAS, Delhi has developed a suit for protection against liquid radionuclide which has been tested to be effective as a Bio suit. These are being produced through industry partner.
3. ADRDE, Agra and INMAS, Delhi have developed Bio suits for protection of medical professionals and paramedics handling COVID-19 patients.
4. Production of the Bio suits is being organised through two of the industry partners.
5. 20000 suits are likely to be available in a weeks' time. Production capability will be ramped up to 15-20000 PPEs per day in a week.
6. DRDE has 'synthetic blood penetration test' facility for testing and certifying facility for PPEs. This facility is supporting testing of PPEs as per standards.



Sample Testing for COVID 19

1. DRDE, Gwalior is functioning as a center for detection of COVID 19 positive cases from samples provided by Madhya Pradesh Health Service. DRDE has potential to perform confirmatory test akin to NIV, Pune on authorization by GOI.



2. Testing has been successfully completed for 36 samples from five districts out of which four have been found positive.
3. INMAS and DIPAS, Delhi of DRDO are ready to function as test centers for detection of Covid19. Once approved, these laboratories can undertake 700 tests per day.

Ventilators

1. Society for Biomedical Technology (SBMT) - A DRDO funded and managed initiative) & DEBEL, Bangalore have developed a ventilator and technology is transferred to Industry. Defence PSU, M/s BEL has joined the efforts for large scale production of ventilators.
2. DEBEL, Bangalore has undertaken the initiative to develop the critical components of the ventilators which are not available in the country. These will be produced with the help of industry.
3. Production can reach a capacity of 10,000 ventilators per month.



METRICS

1. Institute for System Studies and Analysis, Delhi has developed METRICS (Mathematical Estimation for Tracking Infections of COVID-19 Spread in India) and is generating a daily estimation report based on data available.

Personnel Sanitization Enclosure

1. VRDE, Ahmednagar, a DRDO Laboratory has designed full body disinfection chamber called as Personnel Sanitization Enclosure. This walk through enclosure is designed for personnel decontamination,

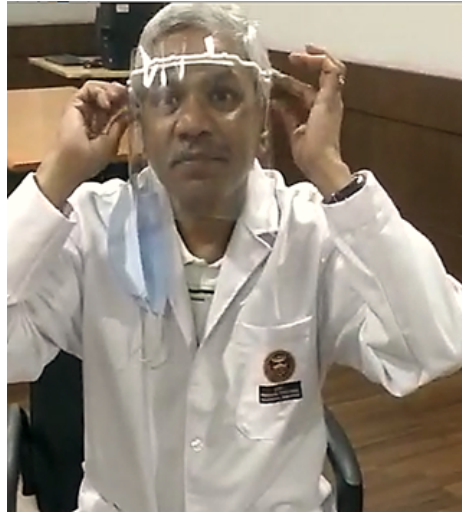
one person at a time. This is a portable system equipped with sanitizer and soap dispenser.

2. The decontamination is started using a foot pedal at the entry. On entering the chamber, electrically operated pump creates a disinfectant mist of hypo sodium chloride for disinfecting.
3. The mist spray is calibrated for an operation of 25 secs and stops automatically indicating completion of operation.
4. As per procedure, personnel undergoing disinfection will need to keep their eyes closed while inside the chamber.
5. The system consists of roof mounted and bottom tanks with a total of 700 liters capacity. Approximately 650 personnel can pass through the chamber for disinfection until the refill is required.
6. The system has see through glass panels on side walls for monitoring purpose and is fitted with lights for illumination during night time operations. A separate operator cabin is provided to monitor overall operations.
7. The system has been manufactured with the help of M/s Dass Hitachi Ltd, Ghaziabad, within a time span of four days. This system can be used for disinfection of personnel at the areas of controlled ingress and egress such as entry and exit to hospitals, malls, office buildings and critical installations.



Full Face Mask

1. RCI, Hyderabad and TBRL, Chandigarh, have developed face protection mask for health care professionals handling COVID-19 patients. Its light weight construction makes it convenient for comfortable wear for long duration.
2. This design uses commonly available A4 size Over-Head Projection (OHP) film for face protection.
3. The holding frame is manufactured using Fused Deposition Modeling (3D printing). Polylactic Acid filament is used for 3D printing of the frame. This thermoplastic is derived from renewable resources such as corn starch or sugarcane and is biodegradable.
4. The face mask will be mass produced using injection moulding technique for volume production.
5. 100 face shields are being produced daily in TBRL and provided to PGIMER, Chandigarh. Similarly 100 are produced at RCI and has been handed over to ESIC, Hyderabad. A demand of 10,000 Nos. has been received from PGIMER and ESIC Hospitals based on successful user trials.



New Initiatives

1. Multi Patient Ventilation (MPV) Kit has been developed which can convert single ventilator to be used for multiple patients at the time of emergency. The MPV kit is already tested in two hospitals and working satisfactorily.