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# समाचार पत्रों से चयित अंश Newspapers Clippings

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Fri, 22 May 2020

## **DRDO radar comes to Odisha government's rescue in late hour of confusion**

*The Doppler Weather Radar (DWR) which has been tracking trajectory of the cyclone for the last 24 hours reconfirmed the IMD prediction providing a sigh of relief for all*

*By Hemant Kumar Rout*

Bhubaneswar: The Defence Research and Development Organisation (DRDO) came to the rescue of the State administration that was in a dilemma over landfall of Cyclone Amphan after one of the global models predicted it to hit Odisha coast, nearly 13 km away off Digha.

As Special Relief Commissioner PK Jena alerted the Collectors of three districts in the wee hours of Wednesday over the sudden possible development, a panic-stricken Balasore administration approached Integrated Test Range (ITR), a premier DRDO laboratory at Chandipur to cross-check whether there is any deviation of the track predicted by IMD.

The Doppler Weather Radar (DWR) which has been tracking trajectory of the cyclone for the last 24 hours reconfirmed the IMD prediction providing a sigh of relief for all. "The ITR has its own fully equipped weather station.

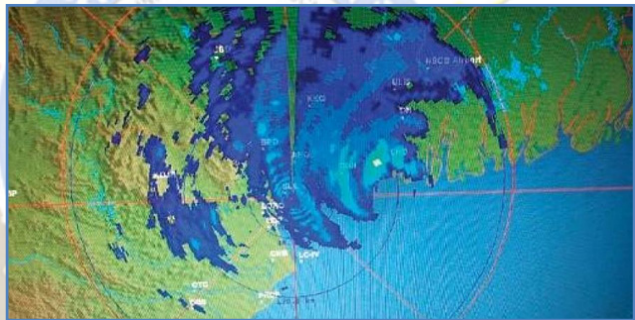
We had been constantly tracking the cyclone and sharing the data with IMD. As we received queries if the system could change its track, we started collecting fresh data on its coordinates. But there was nothing like that. The system was behaving exactly as per prediction," ITR Director BK Das told 'The Express'.

ITR meteorological department started tracking the cyclone using its radar from 8.30 am on Tuesday, a distance of more than 500 km.

All data related to the trajectory of cyclone, wind speed and other forecast parameters obtained from the radar was shared with IMD and Balasore administration on hourly basis till landfall. At about 4 am, ITR doppler radar tracked the eye of the cyclone at a range of about 250 km along with prediction of wind parameters.

Led by Das, the analysis team was constantly updating district administration about the progress of cyclone in real time. The cyclone went past APJ Abdul Kalam Island at a distance of about 100 km from the coast inside sea at about 11.30 am. The maximum wind speed observed there was about 115 kmph as predicted by the radar.

Amphan continued its movement north-north easterly, heading to go past Balasore at about 12.30 am with reported wind speed of about 100 kmph as per DWR data confirmed by measurements from digital anemometers. The landfall of the cyclone started at about 2 pm near Sundarbans, an event again tracked and confirmed by ITR weather radar. The wind speed at landfall was measured as 150 kmph with gusting upto 185 kmph. "As per the predicted trajectory



and possible wind speed due to the cyclone, all important defence installations and instruments were safe guarded well in advance against any sort of damages,” added Das.

<https://www.newindianexpress.com/states/odisha/2020/may/21/drdo-radar-comes-to-odisha-governments-rescue-in-late-hour-of-confusion-2146017.html>



Fri, 22 May 2020

## IMD used latest technology to give accurate forecast on Amphan: DG M Mohapatra

New Delhi: The India Meteorological Department used all the latest information available to give an accurate prediction on cyclone Amphan, Director General Mrutunjay Mohapatra said on Thursday.

He said the IMD gave accurate forecast on the cyclone's track, its intensity, storm surge, landfall time and weather associated with it.

"The IMD used latest technology to give the accurate forecast on Cyclone Amphan. We had predicted about its track 3.5 days before," Mohapatra said at an online briefing.

He added that besides satellites, the cyclone was also monitored by a network of Doppler radars along the eastern coast at Visakhapatnam, DRDO facility at Chandipur, Gopalpur, Paradip and Kolkata.

Mohapatra, who headed the Cyclone Warning Division prior to his elevation as IMD chief, said the cyclone's actual track and what the IMD had predicted was more or less identical.

He said the extremely severe cyclonic storm weakened and moved to Bangladesh at 11:30 p.m. on Wednesday.

There is currently no impact of the cyclone in West Bengal and it will help the rescue and relief work, he said.

Amphan had intensified into a super cyclonic storm, but weakened marginally before battering West Bengal on Wednesday.

At least 72 people were killed and thousands were left homeless in the fiercest cyclone to hit West Bengal in 100 years. It also wreaked havoc in Odisha damaging power and telecom infrastructure in several coastal districts.

The cyclone has now weakened into a deep depression, Mohapatra added. By Thursday night, it will weaken further into a depression.

The IMD said Assam, Meghalaya, Himachal Pradesh are likely to receive light to moderate rainfall at most places. Heavy to extremely heavy falls at isolated places are very likely in these two states.

Squally wind speed reaching 50 to 60 kilometres per hour gusting to 70 kilometres per hour are very likely over western Assam and western Meghalaya.

*(Disclaimer: This story has not been edited by Outlook staff and is auto-generated from news agency feeds. Source: PTI)*

<https://www.outlookindia.com/newscroll/imd-used-latest-technology-to-give-accurate-forecast-on-amphan-dg-m-mohapatra/1842036>

## **Rajnath exhorts MSMEs to make India 'Atma Nirbhar' in defence tech, products**

New Delhi: Acknowledging that defence manufacturing has been adversely affected due to the coronavirus-induced lockdown, Defence Minister Rajnath Singh on Thursday exhorted MSMEs to make India 'Atma Nirbhar' (self-reliant) in defence technology and products.

Addressing MSMEs E-conclave via video conferencing, Singh termed micro, small and medium enterprises (MSMEs) the backbone of the Indian economy that accelerate GDP growth, earn valuable foreign exchange through exports and provide employment opportunities.

Asserting that keeping MSMEs strong is one of the priorities of the government, he said there are more than 8,000 MSMEs, tiered partners of many defence organisations - ordnance factories, DPSUs and service organisations.

They contribute more than 20 per cent of the total production of these organisations, Singh said at the conclave jointly organised by Society of Indian Defence Manufacturers (SIDM), Confederation of Indian Industry (CII) and Department of Defence Production.

Citing the example of the United States where the domestic defence industry developed within a short span of two years during World War-II, Chief of Defence Staff General Bipin Rawat said India should have its own defence industry.

He urged the MSMEs to work for placing India among the top 10 nations in defence technologies.

The defence minister hailed the role played by SIDM and other MSMEs in the nation's fight against global coronavirus pandemic.

"I am very happy to know that SIDM has accelerated the manufacturing of DRDO (Defence Research and Development Organisation) designed PPE (Personal Protective Equipment) kits, masks, ventilator parts in the field of defence industry by efficient coordination and channelisation," Singh was quoted as saying in a statement.

"Within less than two months, we have not only met our domestic demand, but we can also think of helping neighbouring countries in the coming time," he said.

Acknowledging the hardships faced by the defence industry, Singh said, "The manufacturing sector has been affected the most due to lockdown and disruption in existing supply chains and the defence sector is no exception to this."

"Rather, it can be said that the defence sector is more aggravated than other sectors as the only buyer of defence products is the government," he said.

Singh assured that the "Aatma Nirbhar Bharat" campaign, inspired by Prime Minister Narendra Modi will provide many opportunities to Indian industry and will help in restoring millions of jobs.

"Prime Minister Narendra Modi has called for being "vocal for local" in this direction. I would like to say that we have to have our indigenous products, i.e. "vocal for local", but before that in our own life, "local" has to be focal. That is, we have to adopt "swadeshi" products in our life," he said.

His comments came days after Prime Minister Modi pitched for making India self-reliant by turning the coronavirus crisis into an opportunity through sustained focus on making the Indian economy globally competitive.

There is no doubt that MSMEs have a very important role in the goal of indigenous manufacturing, and in the goal of making India self-reliant, he said.

Singh highlighted some of the measures announced by Finance Minister Nirmala Sitharaman under the "Aatma Nirbhar Bharat" scheme such as collateral free loan of 3 lakh crores for MSMEs - which he said will be effective in re-establishing about 45 lakh units and saving employment.

Subordinate debt provision of Rs 20,000 crore has been announced for two lakh MSMEs, this will help stressed MSMEs, Singh said.

Equity infusion of Rs 50,000 crore will be provided through 'Mother-Daughter Fund' for the purpose of benefiting the needy MSMEs, he said.

A Rs 10,000 crore "Fund of Funds" will be set up to help increase the capacity of these units and for marketing, he said.

The theme of the E-conclave was 'Business Continuity for MSMEs in Defence & Aerospace Sector' in which more than 800 Defence MSMEs participated.

Secretary (Defence Production) Raj Kumar, in his address, highlighted the measures taken to alleviate the hardships faced by the defence manufacturing industry due to COVID-19.

He said the DPSUs have been asked to clear payments of MSMEs, and also announced that their production targets have not been scaled down.

Citing the reforms recently announced by the Finance Minister, he said these measures will help realise the target of achieving a USD 25 billion defence production by 2025.

SIDM President Jayant D Patil, former SIDM president Baba N Kalyani, Director General of CII Chandrajit Banerjee, senior civil and military officials of MoD, Ordnance Factory Board and DPSUs were also present on the occasion.

*(Disclaimer: This story has not been edited by Outlook staff and is auto-generated from news agency feeds. Source: PTI)*

<https://www.outlookindia.com/newscroll/rajnath-exhorts-msmes-to-make-india-atma-nirbhar-in-defence-tech-products/1842002>



NEWS SERVICES DIVISION  
ALL INDIA RADIO

Fri, 22 May 2020

## **Defence Minister appreciates role played by SIDM, MSMEs in fight against COVID-19 pandemic**

Defence Minister Rajnath Singh has appreciated the role played by Society of Indian Defence Manufacturers (SIDM) and other Micro, Small and Medium Enterprises (MSMEs) in Nation's fight against global Coronavirus (COVID-19) pandemic. Addressing MSMEs E-conclave, jointly organised by SIDM, Confederation of Indian Industry (CII) and Department of Defence Production through video conference in New Delhi today, Mr Singh expressed happiness that that SIDM has accelerated the manufacturing of DRDO designed PPE kits, masks, ventilator parts in the field of defence industry by efficient coordination and channelisation. He said, within less than two months, not only the domestic demand has been met, but we can also think of helping neighbouring countries in the coming time.

Defence Minister termed MSMEs backbone of Indian economy that accelerate GDP growth, earn valuable foreign exchange through exports and provide employment opportunities. He said, keeping MSMEs strong is one of the priorities of the Government. He said, there are more than 8,000 MSMEs, tiered partners of many of Defence organisations - Ordnance factories, DPSUs and service organisations. They contribute more than 20 per cent of the total production of these organisations.

Acknowledging the hardships faced by the defence industry, Mr Singh said, manufacturing sector has been affected the most due to lockdown and disruption in existing supply chains and the defence sector is no exception to this. He said, it can be said that the defence sector is more aggravated than other sectors as the only buyer of defence products is the government.

The Minister assured that the Aatma Nirbhar Bharat campaign, inspired by Prime Minister Narendra Modi will provide many opportunities to Indian industry and will help in restoring millions of jobs. He said, we have to adopt swadeshi products in our life. Mr Singh said, there is no doubt that MSMEs have a very important role in the goal of indigenous manufacturing, and in the goal of self-reliant India.

<http://newsonair.com/Main-News-Details.aspx?id=389230>



*Fri, 22 May 2020*

## **US Navy wants T-45 Goshawk replacement, Can LCA Navy fit the bill?**

*By Satyajeet Kumar*

The US Navy (USN) has begun its search for a new jet trainer to replace its aging Boeing T-45 Goshawk fleet which was inducted in the '70s and with its aircraft average being aged between 10 and 31 years. T-45 Goshawk is based on British Aerospace developed Hawk Advanced Jet Trainer (AJT) with tandem dual seats meant to provide basic, advanced flying and weapons training to Navy's Carrier pilots.

As per Request for Information (RFI) issued by the US Navy (USN), it wants a non-developmental, land-based jet trainer capable of field carrier landing practice and nuclear aircraft carrier touch-and-go landings by 2028 or sooner and wants a two-pilot aircraft with ejection seats. The jet should be able to be flown from either cockpit.



Likely competitors in the USN's next-generation trainer program include the Boeing-Saab T-7A, which won the US Air Force's T-X competition; Lockheed Martin T-50A, based on the FA-50 light-attack/trainer developed with Korea Aerospace Industries; and Leonardo's T-100, based on the company's M-346.

But none of these jets have been developed for carrier landing and take off nor have they have been modified to demonstrate carrier landings and launches. LCA Navy program of India is only a modern fourth-generation fighter jet that not only has demonstrated take-off and landings onboard India's lone aircraft carrier but also has an NP-1 (KH-T3001) which is Two-seat Naval variant of LCA which also has demonstrated carrier operations.

RFI issued by the US Navy (USN) doesn't call for actually arrested landings or catapult launches from aircraft carriers but carrier touch-and-go landings but an aircraft to perform carrier touch-and-go landings still requires major changes to the lower undercarriage, landing gears, and fuselage so that it can perform such operations on actual carrier and India has invested and developed most of this technology which has worked and has been perfected over the years making LCA-Navy one for the perfect candidate if India responds to the RFI send out by the US Navy.

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<https://idrw.org/us-navy-wants-t-45-goshawk-replacement-can-lca-navy-fit-the-bill/#more-227808>

## Defence News

### Defence Strategic: National/International

THE ECONOMIC TIMES

Fri, 22 May 2020

## DPSU, private sector integration need of the day: Air Chief Marshal RKS Bhadauria

*There has been an impact on the Rafale production as well as on the training side. We expect the first batch to come by end of July, Bhadauria on Rafale delivery*

*By Manu Pubby*

The focus on Make in India and its big acquisition programmes will give a boost to indigenous industry in this hour of need, says Air Chief Marshal Rakesh Kumar Singh Bhadauria. He says even programmes with foreign content, like the acquisition of 114 medium combat jets, will evolve to maximise technology transfer and localisation. Excerpts of an interview with Manu Pubby.

### **On defence production reforms and FDI limit increase:**

Overall the steps will have a serious impact on our ability to energize Make in India. The aviation sector is capital and technology intensive and will get a lot of boost from the steps. The increase in FDI limit should be seen along with the fact that MSMEs are being supported. The 49% cap did not have the kind of impact desired but this (the new 74% limit) will create a big impact. The challenge, I see, is for DPSUs to integrate with the private sector. The whole of industry has to work together.

### **On procurement priorities:**

The order for 83 LCA Mk1A is a very big priority for us. It will naturally fit into the new regime and despite the issue of budgets, it is something we would want to go ahead with and, I am sure, it will get finalised soon. It will help HAL, the MSMEs as well as the private sector. Our focus is on this order for many reasons—the first 40 LCAs on order are more or less through and we need to have the order for continuity. We need to take the LCA programme to its max potential and for that we are already launching the Mk II programme as well.



We are targeting a bit of saving in the revenue side and re-prioritising capital spending as well, said RKS Bhadauria replying to a question on managing budget constraints.



The other priority is the HTT 40 basic trainer that is close to getting finalised. This is an area in which we want work to quickly finish. It is a priority as we have closed the issue of procuring additional Pilatus trainer, so it is important that these aircraft come.

#### **On acquiring 114 medium combat aircraft and transport planes:**

The 114 project is work in process but there would be a substantial shift towards moving the entire manufacturing to India. This will be totally under Make in India and we need to address issues so that an entire transfer of technology takes place. The manufacturing capacity of this class of aircraft has to be brought into our industry. Capability wise, this is a very important project for the air force. We will follow it up after the LCA order.

The contours of the programme will change and align with current directions and the need of the hour.

The C 295 (transport plane programme with Tata-Airbus) is at the final stages. It is under process in the acquisition wing of the ministry of defence. In the transport stream, it is again an important Make in India project and from the industry perspective, it will bring in manufacturing capability in this segment.

#### **On managing budget constraints:**

We are targeting a bit of saving in the revenue side and re-prioritising capital spending as well. This year, a lot of training (and foreign exercises) have been put off and that will help save something.

We will also have to stagger procurement projects and we want to help and support the indigenous industry in this hour of need. The challenge is to find new ways of tackling budget concerns and the industry also needs to find innovative solutions. If upfront advances and milestone payments can be reduced, it is as good as staggering payments for later years.

#### **On Rafale delivery and other fighter purchases:**

There has been an impact on the Rafale production as well as on the training side. We expect the first batch to come by end of July and in terms of production, there would be some impact but as we go along, it will get mitigated.

The Su 30 MKI upgrade programme is also being processed as HAL will soon be out of work at its production facilities. Along with that, the MiG 29 project (purchase of 21 aircraft from Russia) is also on.

<https://economictimes.indiatimes.com/news/defence/dpsu-private-sector-integration-need-of-the-day-air-chief-marshal-rks-bhadauria/articleshow/75855393.cms?from=mdr>

**DefenseNews**

*Fri, 22 May 2020*

## **Indian Air Force restructures \$17 billion fighter jet program**

*By Vivek Raghuvanshi*

New Delhi: The Indian Air Force is overhauling its plan to induct 114 medium-weight multirole fighters, with a senior service official saying the aircraft will be built in India with significant foreign technology transfer and no foreign procurement.

The effort will cost about \$17 billion under the Make in India economic policy.

The Air Force official said the project is very much alive, but that the “final nitty-gritties have yet to be worked out, and that will take time because it will require manufacturing capability building in the country.”

Daljit Singh, a retired Indian Air Force air marshal and current defense analyst, agreed that India must move quickly to create the capability to manufacture high-tech systems at home.

“The main aim should be to extract the maximum [transfer of technology] from the OEM [original equipment manufacturer] and start manufacturing subcomponents through Indian companies,” Singh said.

Finance Minister Nirmala Sitharaman announced Saturday that the government will create a separate budget for domestic procurement of weapons and equipment to help reduce the imports bill.

A Ministry of Defence official said a formal budget allocation of about \$17 billion for the multirole fighters project will be granted sometime next year, and will be launched under the Strategic Partners procurement policy.

Under that policy, the multirole fighters will be manufactured by domestic private defense companies with one of the original equipment manufacturers approved by the government. The process for selecting contractors is yet to begin, but the MoD official said the businesses will be selected within three years.

No private defense company in India has made fighter jets before, but several have expressed interest in participating in the program, including Tata Advanced Systems, Adani Defence, Reliance Defence, Mahindra Defence and Bharat Forge Limited.

Reliance Defence has created a joint venture with France’s Dassault Aviation, which currently manufactures components for Rafale fighters.

Meanwhile, Tata Advanced Systems has teamed with Lockheed Martin, an American company that produces the F-35 Joint Strike Fighter. Adani Defence has announced a teaming arrangement with Sweden’s Saab AB, which makes the Gripen jet.

Another Indian Air Force official said a request for information was sent in June 2018 to foreign original equipment manufacturers for the multirole fighters. Among those who have responded to the RFI are: Boeing, Lockheed Martin, Dassault Aviation, Saab AB, Airbus Defence and Space, Russian Aircraft Corporation, and Sukhoi Company.

The Indian Air Force plans to induct all 114 multirole fighters within 12 years after the contract is awarded.

The official added that the RFI included the requirement for transfer of technology, including the transfer of design, development, manufacturing and repair expertise. It also included the requirement for the unilateral capability to integrate weapons, systems and sensors. The capability to upgrade the aircraft and a provision on exporting the aircraft is also part of the program. India is also seeking transfer of technology for stealth technology, active electronically scanned array radars, avionics, electronic warfare systems and engines.

“The advantage of making a fighter aircraft in India is that the customer can select the types of sensors, EW equipment, avionics and weapons, as per operational requirements. Subsequently, the customer is assured of full logistic and upgrade support without any restriction. However, it is important to embed most of these systems in the aircraft design itself to ensure low observability and systems compatibility,” he said.

However, Singh, the defense analyst, said any transfer of technology agreement would need to make business sense to the OEM. “Proprietary Items could still be under the control of the OEM,” he said.

<https://www.defensenews.com/global/asia-pacific/2020/05/21/indian-air-force-restructures-17-billion-fighter-jet-program/>



No private defense company in India has made fighter jets before, but several have expressed interest in participating in the multirole fighter program. (Dibyangshu Sarkar/AFP via Getty Images)

## Set military reforms in motion

*Time to revisit the 2017 report recommending comprehensive changes*

*By Rahul Bedi*

To expedite military reforms, as suggested recently by Finance Minister Nirmala Sitharaman, in times of severe recession generated by Covid-19, the Ministry of Defence (MoD) could do well to dust off a three-year-old management and services expert committee report.

Submitted to the MoD in 2017, the 200-odd-page report had recommended the establishment of a semi-independent body to streamline and accelerate materiel procurements for India's continually postponed military modernisation. Located away from New Delhi's security zone, where access to officials is controlled, its overall control, however, would remain with the MoD.

The report had advocated the establishment of a Defence Capability Acquisition Authority (DCAA) to manage all aspects of defence equipment acquisitions for all three services. It envisaged the intended authority with around 900 members to work outside the MoD, which, for decades, has been plagued by time-consuming procurement procedures, internecine rivalries and corruption scandals.

Headed by Dr Pritam Singh, formerly of the IIM, Lucknow, the eight-member committee was instituted by the MoD in 2016, and included serving and retired two and three-star service officers, financial and technical experts. Over seven months, the committee interacted with materiel procurement officials from France, South Korea, the UK and the US as well as the Indian military, Integrated Defence Staff and the Indian Coast Guard. Specialists from local think tanks, industry associations and the state-run Defence Research and Development Organisation (DRDO), too, were consulted.

Thereafter, the committee suggested dividing the DCAA into seven 'vertical' units dealing with land, air, maritime, science and technology, industrial collaborations, and commercial and legal issues. It stressed the importance of integrated project management teams or assorted programmes with strict financial and completion deadlines to reduce dependency on imported materiel, and augment self-reliance.

In short, the authority would be an independent body manned by a cadre of technical and military professionals with domain knowledge, as well as accountability and flexibility to augment India's military capabilities.

Most importantly, the DCAA would have overarching responsibility for all military procurements, including formulating qualitative requirements (QRs) for equipment, issuing requests for information (RfIs) and request for proposals (RfPs), overseeing trials, conducting price negotiations, and managing offset obligations. All such matters were presently handled or mishandled by a miasma of military and MoD departments, which either worked at cross-purposes, or not at all.

The prevailing procurement system directed by successive editions of the Defence Procurement Procedure (DPP) since 2002 is riddled with Byzantine processes, resulting in delays. The DPP-2020, for instance, that is to succeed DPP-2016, is under formulation. But the latter runs into over 700 pages, many of which in the draft version remain largely incomprehensible, bewilderingly interlacing civil and military bureaucratise.

The FM has stressed the formulation of 'realistic' general staff qualitative requirements (GSQRs) for desired equipment to fast-track procurements. It remains an open, but shameful secret that over the years, the services had impeded their modernisation by framing impracticable and poorly drafted GSQRs. In 2015, this had prompted then Defence Minister Manohar Parrikar to declare publicly that some of the military's QRs appeared to be 'out of Marvel comic books' because the technologies and capabilities they specified were 'absurd and unrealistic'.

The process of drawing up RfIs and RfPs is executed with limited knowledge and blinkered views, especially by the Army. Poorly conceived, formulated and drafted QRs create confusion and delays, resulting in the entire process either being aborted at an advanced stage or re-tendered, only to be terminated yet again.

In its report tabled in Parliament in 2012, the Defence Parliamentary Committee declared that 41 of the Army's RfPs for diverse equipment had, in recent years, been withdrawn or terminated for varied reasons, included faulty GSQRs and stringent or overambitious GSQRs.

'There are certain stages where exclusively the jurisdiction is with Service Headquarters', the committee report declared, pinning responsibility on the Army. The MoD and attendant financial advisers, it stated, had no role whatsoever in framing weapon QRs, their responsibilities coming into play much later.

The report goes on to state that all Army GSQRs are formulated jointly by the Service Headquarters in consultation with the largely uniformed Directorate General Quality Assurance (DGQA), and, at times, with input from the DRDO. GSQRs are formulated in response to RfIs, ahead of issuing the RfP. All available literature on the proposed equipment is gathered and its multiple characteristics collated, with the aim of including as many features as possible to demonstrate the exhaustiveness of the task undertaken and the enthusiasm of the officer concerned.

As the draft travels up the chain of command, it gathers additional parameters, as each officer feels compelled to suggest supplementary accompaniments. Deletions are rarely effected and the final QR takes the shape of a well-compiled wish list of utopian dimensions, which in many instances, simply does not exist.

Space constraints do not countenance the long list of terminated tenders. In 2012, the then Army Chief Gen VK Singh had stated that military procurements were a 'version of snakes and ladders, where there is no ladder, but only snakes'. He had further warned that if the snakes bite, the entire process comes back to zero.

Perhaps the current economic predicament can be an opportunity for ushering in realistic military reforms and foreclosing the possibility of notching a zero.

<https://www.tribuneindia.com/news/comment/set-military-reforms-in-motion-88096>

**ThePrint**

Fri, 22 May 2020

## **Army's Tour of Duty ill-conceived. Neo-nationalism will only create political militias**

*Leaked report of Army's internal study of a recruitment plan is basically military hierarchy using media as a sounding board for its 'hunch and gut' ideas*

*By Lt Gen H S Panag (Retd)*

The leaked excerpts from an internal study of the Army advocating the concept of three-year Tour of Duty is yet another reminder that the military hierarchy revels in using media to make politically loaded statements and as a sounding board for its 'hunch and gut' ideas, often in complete disregard of the repository of knowledge available. Most of these ideas come to a nought after detailed examination.

The Tour of Duty proposal, which aims to reduce the burden of defence pensions and make up for the shortage of officers in the Army, is more in tune with the current Right-wing flavour of the nation and carries political undertones. "Unemployment in our country is a reality, however there is a resurgence of nationalism and patriotism," reads the proposal.

It should be clear to the discerning reader that the Tour of Duty is a poorly conceived scheme, which falls short of both individual and organisational needs. Internal surveys of the armed forces

over the years have indicated that patriotism is not the main motivation for joining it. A stable, well-paid job is. Since the Israel model of three-year military service is a favourite of the right wing, it is pertinent to mention that it is conscripted mandatory national service and not driven by patriotism per se. To even think of neo-nationalism as a motivator is most dangerous. We will only end up creating potential political militias.

Also, the Tour of Duty should be for a minimum of five years to enable the individuals to earn gratuity as per government policy. It should be covered by the National Pension Scheme and 50 per cent intake should be based on this. The Narendra Modi government should make the scheme as attractive as its finances allow and through preferential treatment in all spheres of government activity post-retirement. The terms and conditions should be very clear and withstand judicial scrutiny. Here's why it's important.

### **Essentials of the leaked excerpts**

The leaked four-page excerpt from the report is silent on the actual scheme but highlights the financial savings and other benefits likely to accrue. Further details of the report acknowledged to be at a "nascent stage" were willingly amplified by the Chief of Defence Staff (CDS), Chief of Army Staff (COAS) and Army's spokesperson.

Basically, the proposed model of 'Tour of Duty' will induct officers and soldiers for a three-year tenure. The pay scale will be at par with the regular Army without any pension or mandated "severance package". However, battle casualties and disabled soldiers will be treated at par with regular soldiers.

The very nature of the scheme will ensure that a trained, disciplined, confident, diligent and committed workforce is available for government jobs and to the corporate world. The leaked document hopes for it to happen but accepts that the Modi government may not make the three-year Tour of Duty a mandatory criterion for central/state government jobs. Salaries may be tax free, and a token retirement grant of Rs 5-6 lakh may be given to officers and Rs 2-3 lakh to soldiers, with an advisory-for preferential consideration for jobs in academic institutions and public sector undertakings.

There is also a linked scheme — "inverse induction" — for officers/soldiers of Central Armed Police Forces (CAPFs), who will be inducted into the armed forces for a three-year Tour of Duty and then go back to the CAPF.

The main advantage of Tour of Duty is the exponential reduction in the salary and pension bill once the scheme takes off. The scheme will also improve the career prospect of regular soldiers and officers.

### **Past experience**

A soldier is the most costly element of the military budget. Governments generally provide the best for them, from the time of joining until their death. A soldier's spouse continues to get 50 per cent of their pension and other benefits.

Short service schemes, voluntary or mandated, have been in vogue for centuries. It is the most cost-effective measure to reduce military budgets. At times, when there is a shortage of people to join the force due to low population like in Israel or due to lack of volunteers during prolonged wars, governments resort to conscription — mandatory military service for a fixed tenure.

Indian armed forces have extensive experience of such schemes. In World War 2, the British Indian Army strength went up from 2 lakh to 25 lakh and was down to 3.5 lakh by 1948. The terms and conditions were kept simple — to serve as long as required by the government. Most went home with a token gratuity liable after five years of service with no pension.

After the Second World War, we had the colour service (7-10 years) and reserve service (8-15 years) scheme. During reserve service, the soldier received no pay but was paid a stipend when attending annual training for two months. At the end of 15 years, the soldier was granted a reservist pension, which was much lower than a regular soldier's pension. This was a very effective scheme but our own policies citing "retention of trained manpower" and "welfare" ended it and introduced the mandatory minimum service of 15 years to earn pension.

Even for officers, we had the Emergency Commission introduced in 1962 and Short Service Regular Commission (SSRC) in 1966. In the case of the Emergency Commission, the terms of service were clear — for as long as the service was required. For the SSRC, the mandated service was five years. Both the schemes had no pension liability. Those who were not granted regular commission were released from service with gratuity paid after five years. Again citing “retention of trained manpower” and “welfare”, the government/Army tweaked the policy to first grant extension of five years and then making it a 10-year scheme extendable up to 14 years.

### **Old wine in a new bottle**

Currently, we have a well established Territorial Army. Civilians are trained as soldiers/officers and embodied for service as and when required while their civilian jobs remain secure. Territorial Army units have performed creditably in war and counter-insurgency.

To give military experience even to the youth, we have the National Cadet Corps (NCC) with enrolment ranging between 13 and 15 lakh. Their annual day or Jamboree has been traditionally attended by the prime minister since 1948. We also had the practice of their attachment with units in operational areas.

India is a workforce-intensive country and there has never been any dearth of volunteers for enrolment as soldiers and officers. There should be no doubt that an attractive short term scheme, which strikes a balance between the standards of training and operational requirements of the armed forces and needs of the individual, is the most cost-effective method of managing military budgets. The real issue is the terms and conditions that have to be laid down by the Modi government.

*(Lt Gen H S Panag PVSM, AVSM (R) served in the Indian Army for 40 years. He was GOC in C Northern Command and Central Command. Post-retirement, he was Member of Armed Forces Tribunal. Views are personal.)*

<https://theprint.in/opinion/armys-tour-of-duty-ill-conceived-neo-nationalism-will-only-create-political-militias/426074/>



*Fri, 22 May 2020*

## **MH-60R Romeo Seahawk technical review world's most advanced maritime helicopter**

Technical review and analysis of Sikorsky MH-60R naval helicopter by Navy Recognition editorial team. The MH-60R Romeo also nicknamed Seahawk is a maritime helicopter using technologies of the SH-60B and SH-60F, a twin turboshaft engine, multi-mission helicopter based on the United States Army UH-60 Black Hawk and a member of the Sikorsky S-70 family. It is the most capable naval helicopter available today designed to operate from frigates, destroyers, cruisers and aircraft carriers.

The U.S. Navy was the first to adopt the MH-60R maritime helicopter in 2006. Since then, the Navy's fleet has grown to 289 MH-60Rs that complete missions like search for enemy submarines, conduct daring at-sea rescues and engage undersea threats.

Australia received its first MH-60R in 2013, and since then it's expanded to 24 helicopters. Primarily, MH-60R serves as its next-generation submarine hunter and anti-surface warfare helicopter. Denmark became the third country to operate the MH-60R after Australia, receiving its first aircraft of nine in 2016.

Saudi Arabia was the latest nation to join the MH-60R family. With its first delivery in 2018, the Royal Saudi Navy will receive 10 MH-60R helicopters in total. In February 2020, India and the US have signed a deal for the procurement of MH-60R Seahawk multi-mission helicopters for the Indian Navy. The MH-60R is known as “the world’s most advanced maritime helicopter.” And for good reason – there’s already more than 300 of them operating worldwide.

The MH-60R Seahawk is the next generation of submarine hunters and anti-surface warfare helicopters. It is equipped with a highly sophisticated combat system designed to employ Hellfire air-to-surface missiles and the Mark 54 anti-submarine torpedo. The primary missions of the 'Romeo' helicopter are anti-submarine warfare and anti-surface warfare. Secondary missions include search and rescue, logistics support, personnel transport, and medical evacuation.

The MH-60R avionics includes dual controls and instead of the complex array of dials and gauges in Bravo and Foxtrot aircraft, 4 fully integrated 8" x 10" night vision goggle-compatible and sunlight-readable color multi-function displays, all part of glass cockpit produced by Owego Helo Systems division of Lockheed Martin.

The Lockheed Martin Common Cockpit™ enables MH-60R and MH-60S aircrews to perform diverse missions, including anti-submarine warfare, anti-surface warfare, combat search and rescue, vertical replenishment, and airborne mine countermeasures.

Onboard sensors include: AN/AAR-47 Missile Approach Warning System by ATK, Raytheon AN/AAS-44 electro-optical system that integrates FLIR and laser rangefinder AN/ALE-39 decoy dispenser and AN/ALQ-144 infrared jammer by BAE Systems, AN/ALQ-210 electronic support measures system by Lockheed Martin, AN/APS-147 multi-mode radar/IFF interrogator, which during a mid-life technology insertion project is subsequently replaced by AN/APS-153 Multi-Mode Radar with Automatic Radar Periscope Detection and Discrimination (ARPD) capability, and both radars were developed by Telephonics, a more advanced AN/AQS-22 advanced airborne low-frequency sonar (ALFS) jointly developed by Raytheon & Thales, AN/ARC-210 voice radio by Rockwell Collins, an advanced airborne fleet data link AN/SRQ-4 Hawklink with radio terminal set AN/ARQ-59 radio terminal, both by L3Harris, and LN-100G dual-embedded global positioning system and inertial navigation system by Northrop Grumman Litton division.

For naval combat missions, the MH\_60R can be armed with AGM-114 Hellfire air-to-surface missiles to perform anti-surface warfare missions. It can be also armed with ATK mk50 or mk46 active/passive lightweight torpedoes to conduct anti-submarine warfare. For its self-defense, the MH-60R is equipped with pintle-mounted 7.62mm machine gun.

MH-60R helicopter is powered by two General Electric T700-GE-401C turboshaft engines rated at 1,425kW. It has a maximum and cruise speed of 267 km/h and 168 km/h respectively, with a maximum flying range of 834 km. It weighs around 6,895 kg and has a maximum take-off weight of 10,659 kg.

<https://www.navyrecognition.com/index.php/focus-analysis/naval-technology/8457-mh-60r-romeo-seahawk-technical-review-world-s-most-advanced-maritime-helicopter.html>



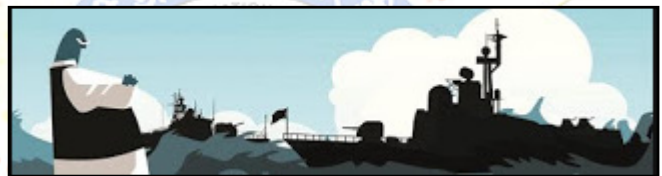
U.S. sailors assigned to the guided-missile destroyer USS Truxtun (DDG 103) conduct a simulated vertical replenishment with an MH-60R Sea Hawk helicopter attached to the Swamp Foxes of Helicopter Maritime Strike Squadron (HSM) 74, April 28, 2020. (Picture Source U.S. Navy)

## Building India's amphibious capability: Adding oomph to amph!

By Ajai Shukla

At this very moment, five of the navy's biggest warships are deployed in bringing back Indian citizens stranded abroad; and carrying food grains, medical teams and medicines to friendly countries in the littoral neighbourhood, thus boosting our image as a net security provider in the Indian Ocean Region (IOR). There is one thing these five ships – INS Jalashwa, Kesari, Magar, Shardul and Airawat – have in common: They are all amphibious assault vessels. Given that this category of warships is designed and built specifically to land large numbers of troops, combat weaponry and stores on enemy shores, they are also ideal for evacuating personnel and carrying relief material – or the tricky business of humanitarian aid and disaster relief (HADR) that is increasingly occupying the Indian Navy. For a regional power like India, which projects itself as the Indian Ocean's gatekeeper, it would be strategically and diplomatically rewarding to create a strong amphibious warfare fleet that not just safeguards our 7,500 kilometre coastline and island chains but is also usable in peacetime for the HADR operations that are frequent in our disaster-prone region. This, however, is being unnecessarily stalled.

The prime minister's initiative of SAGAR, the acronym for "security and growth for all in the region" is credibly underpinned by the navy's admirable HADR pedigree, dating back to the 2004 tsunami, when its prompt



assistance to IOR countries led the US Navy to realize that here was a maritime partner worth having. That realization jump-started the Indo-US defence relationship, but that is another story. In just the last year, India's small amphibious warship fleet has earned kudos across the IOR. In March 2019, when Cyclone Idai struck Mozambique, INS Shardul, was quickly diverted to the ravaged Beira Port. Meanwhile, INS Magar sailed from Kochi to Mumbai, loaded hundreds of tonnes of food, medicines and supplies and took those to Beira, hugely boosting relations with Mozambique. In January, even as Covid-19 loomed, Cyclone Ada hit Madagascar. Fortunately INS Airawat was en route for Seychelles, and its quick diversion to Madagascar earned thanks from its president. The impact such assistance creates was especially evident in May 2017, when INS Sumitra, then deployed in the Bay of Bengal, followed Cyclone Mora into Bangladesh. After it rescued 33 Bangladeshi fishermen who had been swept away by the storm 100 nautical miles off Chittagong and given up for lost, a grateful Bangladeshi media played up that saga of survival with India in the role of the Good Samaritan.

Yet the navy, which has accumulated an enviable heritage of aircraft carrier operations and a rich submarine tradition, is still moving hesitantly in building up capabilities in the essential realm of amphibious warfare (and, therefore, HADR). After 1934 when the Royal Indian Navy was raised, there was some appetite for amphibious capability, including some never-implemented plans for amphibious landings in the Arakans during the Burma Campaign in World War II. After independence in 1947, India's Nehruvian policy of fraternal harmony linked amphibious warfare unfavourably with expeditionary aggression. Besides, the new Indian Navy had little money for anything more than building a basic fleet and amphibious warfare was low in priority. Not until the late 1960s did we buy our first amphibious ships – built in Gdansk, Poland. In the 1971 war, an attempted amphibious landing near Chittagong turned out to be a fiasco that was obscured only by the overall victory. Not until the mid-1980s did bigger amphibious craft enter service – the so-called Landing Ship Tank (Medium), or LST (M), from Poland; and bigger LST (Large) that were built in India. These were flat-bottomed vessels that carried tanks and infantry close to enemy



beaches, where they would dismount and wade ashore. These ships were successfully used in Operation Pawan (1987-90), when the Indian Peacekeeping Force (IPKF) in Sri Lanka employed LST (M)s and LST (L)s extensively for transporting troops in hostile conditions. But amphibious warfare and HADR remained a sideshow.

All this changed after 2004-05, when the Indian Ocean tsunami gave the Indian Navy a sense of its capabilities and shortcomings in HADR. Moreover, the new relationship with the US refocused strategic thinking onto the Indo-Pacific and – crucially – Washington sold India one of its used amphibious warfare ships, the “landing platform dock” (LPD) that was named INS Jalashwa in 2007. It was a bargain basement deal for India, which paid just \$50 million for the ship and another \$50 million for six helicopters that came with it. This was less than one-tenth the price of a new, fully functional LPD.

Even more important than the cost saving was the huge difference INS Jalashwa triggered in amphibious warfare doctrine. Instead of “beaching” in the face of enemy fire and debouching troops directly onto the beach like an LST (L), the

Jalashwa brought in the US Marine Corps concept of “Operational Maneuver from the Sea (OMFTS)”. In this, the LPD stays 30-40 kilometres out at sea, from where the attack begins with “aerial envelopment”, in which the six helicopters on board carry 10-12 marine commandos each onto the objective. Since the LPD does not have to enter the shallow waters close to the shore, nor to expose itself to coastal fire, it can have a deeper draught and much more carrying capacity. From its safe perch out at sea, the Jalashwa launches four “landing craft mechanized” (LCM), each carrying to the shore 150 fully kitted infantrymen, or 50 soldiers and an armoured vehicle. That allows the Jalashwa to carry and launch a full infantry battalion in a single wave in what is doctrinally termed a “ship to objective maneuver” (STOM).

When used for HADR operations, a 16,600-tonne LPD like INS Jalashwa can evacuate 1,000 people in a single trip. It is equipped with extensive medical facilities including four operation theatres, a 12-bed ward, a laboratory and a dental centre. It can also be modified into a hospital ship for hundreds of casualties, when being deployed in an extreme HADR situation.

Given the dual-use capabilities of LPDs, the navy decided in 2008 to build four more LPDs that would be even larger than Jalashwa. These are needed to embark the army’s 3,500 man amphibious brigade, which is earmarked and trained for such operations. The navy floated a tender that year but, true to the defence ministry’s procurement tradition, it remains stalled a dozen years later for fear that certain private shipbuilders with worrying records of non-delivery might win the contract as the lowest bidder – and then once again fail to deliver. The navy, therefore, is going back to the start line and issuing a fresh tender in which new procurement rules – as per the Capacity Assessment Guidelines of 2019 – would rule out those shipyards.

If this new tender were not treated with special urgency, the three LPDs would only enter service by the end of the decade. Typically such a contract, starting from issuance of the RfP, technical evaluation of bids, commercial bid evaluation and cost negotiation typically takes three-to-four years. Thereafter, it would take at least three years to build the first LPD and then another three years for the follow-on vessels. It is, therefore, essential to progress this as a fast track tender. Simultaneously, with INS Magar and Gharial approaching the ends of their service lives, there must be another fast-track tender for two new LST(L)s. Only then will there be real oomph in India’s amph.

<http://ajaishukla.blogspot.com/2020/05/building-indias-amphibious-capability.html>

### Gaganyaan trainees back at astronaut classes in Moscow

*The four pilots from the Indian Air Force were sent in early February  
To train at Russian facilities for India's maiden human space mission*

Moscow: Four Indian astronaut candidates currently at Moscow have resumed theory classes and physical training for the maiden Indian human space mission.

They resumed their training on May 12 at the Gagarin Research & Test Cosmonaut Training Center (GCTC).

Russian space company Glavkosmos said in a statement on Thursday, "This week, GCTC specialists are giving theoretical classes on the basics of astrogation [or space travel], the basics of manned spacecraft control and the Russian language to the Indian [trainees]."

It said, "The [trainees] are in good health and feel fine. Their health is carefully protected."

The four pilots from the Indian Air Force were sent in early February to train at Russian facilities for India's maiden human space mission. They had to isolate themselves in March end when the novel corona virus pandemic broke out.

#### **Rs.10,000 crore mission**

The finalists will be chosen from among the four pilots to circle earth for 3-7 days as part of the maiden Indian human space flight, Gaganyaan, around 2022.

Gaganyaan is the Rs.10,000 crore mission being readied by Indian Space Research Organisation (ISRO.)

Glavkosmos and ISRO's Human Spaceflight Centre signed a contract in July 2019 to train four prospective astronauts in space

<https://www.thehindu.com/sci-tech/technology/gaganyaan-trainees-back-at-astronaut-classes-in-moscow/article31645731.ece>

### India's space programme: A role for the private sector, Finally?

*By Rajeswari Pillai Rajagopalan*

India's finance minister Nirmala Sitharaman announced last week that India's private sector will play a key role in augmenting India's space programme, and that the government intends to share the facilities of the Indian Space Research Organisation (ISRO) with the private sector. This announcement was part of the Narendra Modi government's call for new and bold reforms in an effort to promote its 'self-reliant India' mission. It is the fourth segment of the Rs 20 lakh crore Aatma Nirbhar Bharat Abhiyan special economic stimulus.

Sitharaman's announcement entails a role for the private sector, possibly with the goal of greater investments in technology development and acquisition, capacity-building and space exploration, including planetary exploration. The minister, while announcing these reforms, appeared to understand that the private sector can help augment India's space capability. While praising the work done by ISRO, she also pointed out that the private sector is also doing a lot of work in developing space technology. She also acknowledged that the existing regulations prevent private entities from using or even testing their products.

Therefore, to level the playing field, the government "will make a provision for the private sector to benefit from the assets which are available to ISRO and for India (in general) to benefit from." The minister also said the new reforms would allow the private sector to play an active role in "satellites, launches and space-based services".

But as always, implementation is key. Properly executing these reforms will require enabling policies and appropriate regulatory frameworks.

That the new reforms will allow private sector players to use ISRO facilities is a big deal. This indeed must be music to the ears of commercial players who have been seeking to get a fair share of the pie in terms of manufacturing of satellites and propellant technologies, among other areas. It should not be too difficult for India's private space sector because there is a sizeable talent pool available outside ISRO. More importantly, the entry of the private sector, as in the telecom sector, can bring several advantages in terms of cost and access.

Following the announcement, ISRO tweeted that it will follow the government's guidelines to allow the private sector to undertake space activities in the country. Though this did not seem particularly welcoming of the government's initiative, ISRO's support is critical to making it a success.

ISRO has in the last few years been opening up to the Indian private space sector in a gradual manner – mostly as a matter of compulsion because ISRO simply does not have the in-house capacity to address India's growing requirements. Today, the Indian space programme is not just about civilian applications for remote-sensing, meteorology and communication, as in the early decades. India's space sector and its requirements have grown enormously in the last decade to include television and broadband services, space science and exploration, space-based navigation and, of course, defence and security applications.

Among others, Ambassador Rakesh Sood has articulated the need for legislation to facilitate ISRO's partnership with industries and entrepreneurs. Narayan Prasad and Prateep Basu, two prominent faces in the Indian space start-up segment, have argued that despite ISRO's successes, "India's space competitiveness has suffered from the absence of a globally reputed, private space industry."

The private sector, especially the NewSpace industry and start-ups, have an advantage in terms of low-cost operations, which itself should be a big incentive for the government to make it an active stakeholder. A certain amount of democratisation of space technology with the participation of the private sector can ensure costs are kept low. And expanding the number of stakeholders will also ensure more transparency and better accountability and regulatory practices. This has been missing in India's space sector. The same agency has undertaken promotion, commercialisation and regulatory functions – which is not healthy.

Following the minister's announcement, I spoke to a few key players in the private sector to capture their sense of the reforms in the pipeline. Sadly, the general mood is not one of excitement but rather to wait and watch. To them, as stated earlier, the key is implementation. One of them, who did not wish to be named, argued that unless there is a conducive structure for the private sector to engage with, the announcement is more lip service. Narayan Prasad said that there need to be basic changes for the reforms to be effective. The private sector is particularly concerned about issues such as sharing intellectual property for products developed by the private sector. Prasad argued that IP-centric policymaking has to be taken for real reform.

Right now, ISRO thinks they will use the suppliers only as manufacturing or services partners. So all IP is controlled by ISRO and suppliers just replace ISRO technicians and production facilities. This means most suppliers have no real IP of their own, and just depend on cost plus contracts from ISRO for business. The only way to change that is to create reforms where local industry can invest in building their own IP and/or products that can match global standards.

This in turn means that policymakers will need to view industry as more than sweatshops and look at what steps can be taken for IP/product development by private industry. This is the only way to integrate India's private sector into the global supply chain. Prasad adds that if the ISRO is serious about partnering with the private sector, it must spell out the requirements and select the best available. Several private-sector actors have articulated the need for an independent regulator.

This is an area that has been a common thread in many of my conversations with Indian entrepreneurs. Rohan M. Ganapathy, CEO and CTO of Bellatrix Aerospace in Bengaluru, also made a strong case for an autonomous regulator, and acknowledged a need for the government to clarify R&D risk funding, which is crucial to realise new technologies.

It is not that the ISRO has not engaged the private sector. The ISRO has had long association with private firms such as Larsen & Toubro, Godrej and Walchand Nagar Industries. It is just that the mode of participation envisaged through the new reforms is very different. The current mode of work, more of an outsourcing model, is becoming inadequate. In the last few years, because of significant capacity deficit, ISRO began to work with a few in the private sector such as the Bengaluru-based Alpha Design Technologies, contracted to build satellites. Similarly, Bellatrix Aerospace began to work with ISRO on advanced in-space propulsion systems. But these remain exceptions.

But ISRO does recognise the new compulsions and has been trying to change. The newly formed commercial enterprise called the NewSpace India Limited (NSIL), under the Department of Space, is an initiative to engage the private sector. NSIL is meant to help the private sector with transfer of some technologies to the private sector, especially the small satellite launch vehicle that is being developed and even the older PSLV. But the pace of ISRO's engagement with the private sector needs to quicken.

Followed up effectively, the new government initiatives could help. Indeed, ISRO needs to expand its operations significantly if it has to remain competitive, both from a domestic and international outlook. The Indian space programme has several advantages, the most important being cost: the ability to provide reliable launches in a cost-effective manner is a big advantage. The Polar Satellite Launch Vehicle remains a tried and tested launch vehicle and has managed to remain the cheapest for launching small satellites into space. But competition in this sector is picking up.

Jeff Bezos' Blue Origin, Elon Musk's SpaceX and start-ups from China want a share of the global commercial market, estimated to be worth around \$350 billion (Rs 26.46 lakh crore). If ISRO does not improve its launch infrastructure and increase the number of launches, it will be at a disadvantage. And despite India's cost advantages, it has a mere 2% share of this, worth \$7 billion. India can gain significantly if ISRO and the country's private space sector can cooperate effectively and synergistically. This requires the government to actually act on the initiatives it announced.

*(Rajeswari Pillai Rajagopalan is a Distinguished Fellow and Head of the Nuclear and Space Policy Initiative at Observer Research Foundation.)*

<https://science.thewire.in/space/nirmala-sitharaman-indian-space-programme-isro-private-sector/>

## धरती पर ही चांद की मिट्टी तैयार करेगा ISRO, होंगे कई फायदे

प्रमोद कुमार

- भारतीय अंतरिक्ष अनुसंधान संगठन (ISRO) ने पृथ्वी पर चांद की कृत्रिम मिट्टी बनाने का पेटेंट हासिल कर लिया है।
  - यह प्रक्रिया बेहद कम लागत वाली होगी और इसके जरिये बड़े स्तर पर काम आने के लिए ऐसी मिट्टी बनाई जा सकेगी।
  - ऐसा होने के बाद ISRO कई ऐसे प्रयोग धरती पर ही कर सकेगा, जो अब तक चांद पर जाये बिना संभव नहीं थे।
  - इसे ISRO की एक और बड़ी उपलब्धि के तौर पर देखा जा रहा है।
- चांद पर जाने वाले मिशन के लिए स्टडी में होगी आसानी

ISRO को इस कृत्रिम मिट्टी से असली चांद की मिट्टी के बारे में कई बातें जानने को मिलेंगी। साथ ही ISRO इस मिट्टी पर अपने रोवर का भी प्रयोग कर सकता है।

भारत ने चंद्रयान-2 के तहत चांद पर लैंडर और रोवर भेजे थे, लेकिन तकनीकी खामी के चलते यह मिशन पूरी तरह सफल नहीं हो सका था।

अब ISRO इस मिट्टी पर रोवर की मोबिलिटी से जुड़े प्रयोग कर सकता है, जो उसे आगे के मिशन में काम आएंगे।

### सेलम की चट्टानों से बनेगी मिट्टी

ISRO चांद की कृत्रिम मिट्टी बनाने के लिए तमिलनाडु के सेलम के नजदीक स्थित सित्तामपुंडी अमर्थोसाइट कॉम्प्लेक्स से चट्टानें लेगा।

पेटेंट एप्लिकेशन में बताया गया है कि ISRO द्वारा बनाई जाने वाली यह कृत्रिम मिट्टी पूरी तरह से चांद की असली मिट्टी के बराबर होगी। दोनों की मिनरलॉजी, दाने का आकार, केमिस्ट्री और दूसरे गुण एक समान होंगे।

यह मिट्टी चांद पर सरंचनाएं बनाने के प्रोजेक्ट की स्टडी के लिए भी काम आ सकेगी।

### दूसरे देशों से बेहतर होगी ISRO की मिट्टी

खास बात यह है कि ISRO अब चांद की हाइलैंड सतह की नकल करने में कामयाब रहेगा।

हाइलैंड चांद पर स्थित वो जगहें होती हैं, जहां चट्टानें और खाईयां पाई जाती हैं। चांद की कुल सतह में से 80 प्रतिशत ऐसी है।

अभी से पहले दुनिया के कई देशों में चांद की कृत्रिम मिट्टी बनाने का काम चल रहा है, लेकिन इनमें से कोई भी हाइलैंड की मिट्टी जैसे गुणों वाली नहीं है। ISRO अब बिल्कुल ऐसी मिट्टी बनाएगा।

### हाइलैंड इलाकों में लैंड होंगे भविष्य के मिशन

ISRO ने अपनी ऐप्लिकेशन में कहा कि भविष्य में चांद पर जाने वाले अधिकतर मिशन हाइलैंड इलाकों में लैंड करेंगे। इसलिए बड़ी मात्रा में ऐसी कृत्रिम मिट्टी की जरूरत होगी, जो इस इलाके में पाई जाने वाली मिट्टी के बराबर हो।

चंद्रयान-2 के प्रयोग के लिए भी सेलम से लाई गई थीं चट्टानें

याद दिला दें कि ISRO ने चंद्रयान-2 के लिए रूस से तकनीकी मदद मांगी थी, लेकिन रूस ने ऐसा करने से मना कर दिया था।

इसके बाद संगठन ने अपने लैंडर और रोवर को सेलम से लाई गई चट्टानों पर टेस्ट किया था। सेलम से लाकर इन चट्टानों की पीसकर चांद की सतह जैसी मिट्टी बनाई गई थी।

अब ISRO चंद्रयान-3 की तैयारियों में जुटा है। इस बार केवल लैंडर और रोवर ही चांद पर भेजे जाएंगे।

<https://hindi.newsbytesapp.com/timeline/Science/17422/87457/isro-now-makes-lunar-soil-in-india>



Fri, 22 May 2020

## NIST researchers boost microwave signal stability a hundredfold

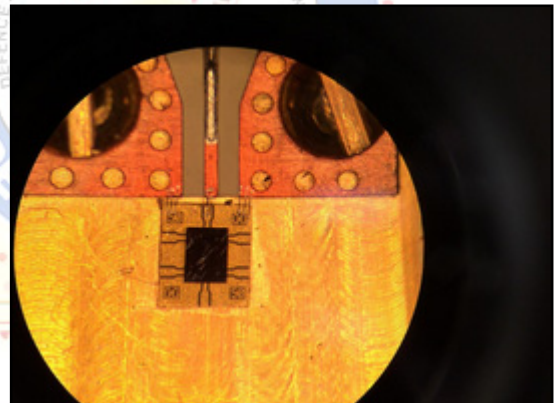
Researchers at the National Institute of Standards and Technology (NIST) have used state-of-the-art atomic clocks, advanced light detectors, and a measurement tool called a frequency comb to boost the stability of microwave signals 100-fold. This marks a giant step toward better electronics to enable more accurate time dissemination, improved navigation, more reliable communications and higher-resolution imaging for radar and astronomy. Improving the microwave signal's consistency over a specific time period helps ensure reliable operation of a device or system.

The work transfers the already superb stability of the cutting-edge laboratory atomic clocks operating at optical frequencies to microwave frequencies, which are currently used to calibrate electronics. Electronic systems are unable to directly count optical signals, so the NIST technology and techniques indirectly transfer the signal stability of optical clocks to the microwave domain. The demonstration is described in the May 22, 2020, issue of *Science*.

In their setup, the researchers used the "ticking" of two of NIST's ytterbium lattice clocks to generate light pulses, as well as frequency combs serving as gears to translate the higher-frequency optical pulses accurately into lower-frequency microwave signals. Advanced photodiodes converted light pulses into electrical currents, which in turn generated a 10 gigahertz (GHz, or a billion cycles per second) microwave signal that tracked the clocks' ticking exactly, with an error of just one part in a quintillion (1 followed by 18 zeros). This performance level is on par with that of both optical clocks and 100 times more stable than the best microwave sources.

"Years of research, including important contributions from NIST, have resulted in high-speed photodetectors that can now transfer optical clock stability to the microwave domain," lead researcher Frank Quinlan said. "The second major technical improvement was in the direct tracking of the microwaves with high precision, combined with lots of knowhow in signal amplification."

Optical waves have shorter, faster cycles than microwaves do, so they have different shapes. In converting stable optical waves to microwaves, the researchers tracked the phase--the exact timing of the waves--to ensure they were identical, and not shifted relative to one another. The experiment tracked phase changes with a resolution corresponding to just one millionth of a cycle.



**Image:** The black rectangle (center) is a high-speed, semiconductor photodiode that converts laser pulses to super-stable microwave frequencies. The diode is surrounded by a gold-coated border in which electrical leads are... [view more](#)

"This is a field where just doubling microwave stability can take years or decades to achieve," group leader Chris Oates said. "A hundred times better is almost unfathomable."

Some components of the NIST system, such as the frequency combs and detectors, are ready to be used in field applications now, Quinlan said. But NIST researchers are still working on transferring state-of-the-art optical clocks to mobile platforms. The ytterbium clocks, which operate at frequencies of 518 terahertz (trillion cycles per second), currently occupy large tables in highly controlled laboratory settings.

Ultra-stable electronic signals could support widespread applications, including future calibration of electronic clocks, such as electric devices powered by oscillating quartz crystals. This is an important consideration for the redefinition of the international time standard, the SI second, now based on the microwave frequencies absorbed by the cesium atoms in conventional clocks. In the coming years, the international scientific community is expected to select a new time standard based on optical frequencies that other atoms, such as ytterbium, absorb. Super-stable signals could also make wireless communications systems more reliable.

Optically derived electronic signals could make imaging systems more sensitive. Radar sensitivity, particularly for slow-moving objects, is now limited by microwave noise and could be greatly enhanced. New photodiodes, produced in a collaboration between NIST and the University of Virginia, convert the optical signals to microwave signals more predictably and with lower noise than earlier designs. In addition, microwaves could carry signals from distant optical clocks for applications in navigation and fundamental physics research.

Astronomical imaging and relativistic geodesy, which measures the Earth's gravitational shape, are now based on detecting microwave signals at receivers around the world and combining them to form images of objects. Remote calibration of these receivers could make it possible to move the network from Earth into space, which would enhance image resolution and avoid atmospheric distortions that limit observation time. With hours of observing time instead of seconds, researchers could image many more objects.

The research was supported in part by the Defense Advanced Research Projects Agency.

Paper: T. Nakamura, J. Davila-Rodriguez, H. Leopardi, J.A. Sherman, T.M. Fortier, X. Xie, J.C. Campbell, W.F. McGrew, X. Zhang, Y.S. Hassan, D. Nicolodi, K. Beloy, A.D. Ludlow, S.A. Diddams and F. Quinlan. Coherent Optical Clock Down-Conversion for Microwave Frequencies with  $10^{-18}$  Instability. *Science*. May 22, 2020.

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[https://www.eurekalert.org/pub\\_releases/2020-05/nios-nrb051220.php](https://www.eurekalert.org/pub_releases/2020-05/nios-nrb051220.php)



*Fri, 22 May 2020*

## **3d-Printed nuclear reactor: faster, economical path to nuclear energy**

Researchers at the Department of Energy's Oak Ridge National Laboratory are refining their design of a 3D-printed nuclear reactor core, scaling up the additive manufacturing process necessary to build it, and developing methods to confirm the consistency and reliability of its printed components.

The Transformational Challenge Reactor Demonstration Program's (TCR) unprecedented approach to nuclear energy leverages advances from ORNL in manufacturing, materials, nuclear science, nuclear engineering, high-performance computing, data analytics and related fields. The lab aims to turn on the first-of-its-kind reactor by 2023. The program has maintained its aggressive timeline during the COVID-19 pandemic, using remote work to continue design and analysis efforts. For further information see the IDTechEx report on 3D Printing 2019-2029: Technology and Market Analysis.

"The nuclear industry is still constrained in thinking about the way we design, build and deploy nuclear energy technology," ORNL Director Thomas Zacharia said. "DOE launched this program to seek a new approach to rapidly and economically develop transformational energy solutions that deliver reliable, clean energy."

Reactor development and deployment have traditionally relied on materials, fuels and technology pioneered in the 1950s and '60s, and high costs and decades-long construction times have limited the United States to building only one new nuclear power plant in the last 20 years. TCR will introduce new, advanced materials and use integrated sensors and controls, providing a highly optimized, efficient system that reduces cost, relying on scientific advances with potential to shape a new path in reactor design, manufacturing, licensing and operation. The TCR program has completed several foundational experiments including selection of a core design, and a three-month "sprint" that demonstrated the agility of the additive manufacturing technology to quickly produce a prototype reactor core.



Researchers will now focus on refining the selected design and the processes that will ensure an optimal and reliable energy system. Monitoring technologies continually assess the manufacturing process, providing live data streams that enable real-time qualification of the printed material and performance analysis through artificial intelligence. The team also conducts extensive post-build testing to assess component performance and establish links between the behavior of each unique part and its live manufacturing data.

"We have been aggressively developing the capability to make this program a reality over the last several months, and our effort has proven that this technology is ready to demonstrate a 3D-printed nuclear reactor core," said Kurt Terrani, the TCR technical director. "The current situation for nuclear is dire. This is a foundational effort that can open the floodgates to rapid innovation for the nuclear community."

As part of deploying a 3D-printed nuclear reactor, the program will also create a digital platform that will help in handing off the technology to industry for rapid adoption of additively manufactured nuclear energy technology.

"The entire TCR concept is made possible because of the significant advances in additive manufacturing process technology," Terrani said. "By using 3D printing, we can use technology and materials that the nuclear community has been unable to capitalize on in the last several decades. This includes sensors for near autonomous control and a library of data and a new and accelerated approach to qualification that will benefit the entire nuclear community."

Through the TCR program, ORNL is seeking a solution to a troubling trend. Although nuclear power plants provide nearly 20 percent of U.S. electricity, more than half of U.S. reactors will be retired within 20 years, based on current license expiration dates.

"The TCR program will provide a new model for accelerated deployment of advanced nuclear energy systems," Zacharia said. "If cost and construction times are not addressed in the very near future, the United States will eventually lose its single largest source of emissions-free power."



ORNL is partnering with Argonne and Idaho national laboratories and engaging with industry to enable rapid adoption for commercial use. The Transformational Challenge Reactor builds on ORNL's 77-year history of international leadership in nuclear science and technology development. The lab began as home to the world's first continuously operating reactor, and its scientists and engineers pioneered technology and expertise in the first decades of the Atomic Age.

Today, the lab operates the High Flux Isotope Reactor, a DOE Office of Science user facility that provides a world-leading source of neutrons for a variety of research and produces isotopes for medicine, industry, and space exploration. TCR will be the 14th reactor built and operated by ORNL.

<https://www.3dprintingprogress.com/articles/20725/3d-printed-nuclear-reactor-faster-economical-path-to-nuclear-energy>

## COVID-19 Research News



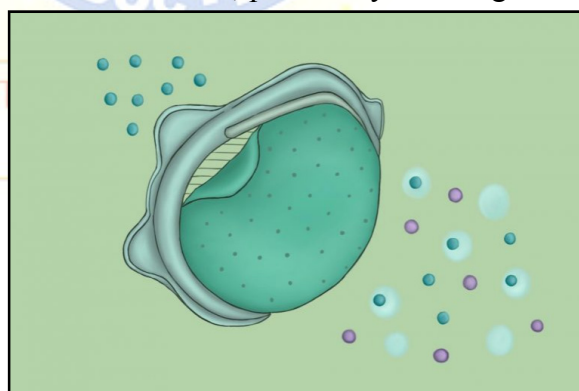
Fri, 22 May 2020

### Researchers develop a replaceable, more efficient filter for N95 Masks

Since the outbreak of COVID-19, there's been a world-wide shortage of face masks — particularly, the N95 ones worn by health care workers. Although these coverings provide the highest level of protection currently available, they have limitations. Now, researchers reporting in *ACS Nano* have developed a membrane that can be attached to a regular N95 mask and replaced when needed. The filter has a smaller pore size than normal N95 masks, potentially blocking more virus particles.

N95 masks filter about 85% of particles smaller than 300 nm. SARS-CoV-2 (the coronavirus that causes COVID-19) is in the size range of 65-125 nm, so some virus particles could slip through these coverings. Also, because of shortages, many health care workers have had to wear the same N95 mask repeatedly, even though they are intended for a single use. To help overcome these problems, Muhammad Mustafa Hussain and colleagues wanted to develop a membrane that more efficiently filters particles the size of SARS-CoV-2 and could be replaced on an N95 mask after every use.

To make the membrane, the researchers first developed a silicon-based, porous template using lithography and chemical etching. They placed the template over a polyimide film and used a process called reactive ion etching to make pores in the membrane, with sizes ranging from 5-55 nm. Then, they peeled off the membrane, which could be attached to an N95 mask. To ensure that the nanoporous membrane was breathable, the researchers measured the airflow rate through the pores. They found that for pores tinier than 60 nm (in other words, smaller than SARS-CoV-2), the pores needed to be placed a maximum of 330 nm from each other to achieve good breathability.



A replaceable nanoporous membrane, illustrated above, attached to an N95 mask filters out particles the size of SARS-CoV-2 (purple circles), allowing only clean air (blue circles) through. Credit: ACS Nano 2020, DOI: 10.1021/acsnano.0c03976

The hydrophobic membrane also cleans itself because droplets slide off it, preventing the pores from getting clogged with viruses and other particles.

Reference:

“A Flexible Nanoporous Template for the Design and Development of Reusable Anti-COVID-19 Hydrophobic Face Masks” by Nazek El-Atab, Nadeem Qaiser, Huda S Badghaish, Sohail Faizan Shaikh and Muhammad Mustafa Hussain, 20 May 2020, *ACS Nano*. DOI: [10.1021/acsnano.0c03976](https://doi.org/10.1021/acsnano.0c03976)  
<https://scitechdaily.com/researchers-develop-a-replaceable-more-efficient-filter-for-n95-masks/>

**TIMESNOWNEWS.COM**

Wed, 20 May 2020

## **Cannabis for COVID-19: Canadian research claims extracts from the psychoactive drug could fight coronavirus**

*The study found that extracts from cannabis can affect the ACE-2 receptors in the host cells. ACE2 receptors are proteins that have been found to be the "entry points" for coronavirus in the host's body.*

*By Anushree Gupta*

### **Key Highlights**

- *The coronavirus pandemic has been plaguing the world for months now*
- *Researchers from all over the world are looking for effective treatments against the novel coronavirus*
- *A team of researchers from Canada has found that extracts from cannabis may help fight the coronavirus*

A team of medical doctors from Bangladesh have, reportedly, had “astounding” success in treating patients suffering from COVID-19 with two commonly used drugs, Doxycycline and Ivermectin.

The study was published in peer Journal Preprints. It was conducted by the scientists in April, but the results were released in a non-peer-reviewed, preclinical study. The title of the study was - “In Search of Preventive Strategies: Novel Anti-Inflammatory High-CBD Cannabis Sativa Extracts Modulate ACE2 Expression in COVID-19 Gateway Issues.”

The study was conducted by researchers from Alberta, Canada. They used artificial 3D models of oral, airway and intestinal tissues. High CBD Cannabis sativa extracts were found to modulate ACE2 gene expression and ACE2 protein levels. The results of the study indicated that hemp extracts high in CBD may help block proteins – the ACE-2 receptors, which have been found as the “entry point” for coronavirus into host cells in the body.

“Angiotensin-converting enzyme 2 (ACE2) has been generally accepted by the scientific community as a receptor required for the entry of SARS-CoV-2 into human cells,” said Dr Igor Kovalchuk, CEO of Pathway Rx and holder of a Health Canada License for Cannabis Research, as reported by AJC. He added, “Our initial findings warrant further investigation but it’s possible that medical cannabis products could become a safe adjunct therapy for the treatment of COVID-19.”



**Cannabis for COVID-19: Canadian research claims extracts from the psychoactive drug could fight coronavirus | Photo Credit: iStock Images**

However, more than 1,000 Cannabis sativa varieties have been screened by Pathway Rx, and only a small number have shown medicinal properties. The research company is further seeking funds to support its efforts to address COVID-19.

The coronavirus pandemic began in Wuhan, China, last December. The deadly virus has now spread all over the world, infecting more than 4.8 million people around the world, and claiming more than 3,00,000 lives. Various drugs including the anti-malaria drug Hydroxychloroquine, anti-HIV medicines, and others are being tested for treatment against the coronavirus.

<https://www.timesnownews.com/health/article/cannabis-for-covid-19-canadian-research-claims-extracts-from-the-psychoactive-drug-could-fight-coronavirus/594455>

# अमरउजाला

Fri, 22 May 2020

## ब्रायोनिया एल्वा-200 दवा से कोरोना मरीज सात दिन में ठीक होने का दावा

सार

- ब्रायोनिया एल्वा-200 दवा से कोरोना मरीज 7 दिन में ठीक होने का दावा
- नेमीनाथ होम्योपैथी मेडिकल कॉलेज ने दवा बनाई, भारत सरकार को भेजी रिपोर्ट

आगरा: आगरा के नेमिनाथ होम्योपैथिक मेडिकल कॉलेज, हॉस्पिटल एवं रिसर्च सेंटर ने कोरोना वायरस की औषधि ब्रायोनिया एल्वा-200 की खोज का दावा किया है। कोरोना से संक्रमित मरीज इस दवा से पांच से सात दिन में ठीक होने की बात कही जा रही है। इसकी रिपोर्ट सेंट्रल रिसर्च काउंसिल ऑफ होम्योपैथी भारत सरकार को भेजी गई है। इंडियन मेडिकल रिसर्च सेंटर (आईसीएमआर) को भी रिपोर्ट भेजी जाएगी।

आईसीएमआर से पांच मई को शोध की अनुमति मिलने के बाद कोविड-19 के मरीजों के लिए दवा बनाने का कार्य शुरू किया गया था। तैयार हुई दवा का नाम ब्रायोनिया एल्वा-200 रखा गया है। इस दवा का पहले चरण में टूंडला स्थित एफएच मेडिकल कॉलेज में भर्ती 42 मरीजों पर परीक्षण किया गया।

### 40 मरीजों पर सफल परीक्षण

इनकी उम्र दस से 65 साल की रही। इसमें दो से तीन दिन में मरीजों को जुकाम-खांसी, बुखार जैसे लक्षण समाप्त होने लगे। 40 मरीजों को सात दिन तक लगातार दवा खिलाई गई। पांच से सात दिन में इनके नमूने लेकर कोरोना वायरस की जांच कराई तो सभी की रिपोर्ट निगेटिव थी। अभी दो मरीजों की रिपोर्ट आना बाकी है।

नेमिनाथ होम्योपैथिक मेडिकल कॉलेज के प्राचार्य डॉ. प्रदीप गुप्ता ने बताया कि इस दवा से सात दिन के अंदर मरीज ठीक होकर घर जा रहे हैं। दवा का परीक्षण सफल होने पर सेंट्रल रिसर्च काउंसिल ऑफ होम्योपैथी को भेज दिया है।

यह दवा निःशुल्क उपलब्ध कराई जाएगी। दिल्ली, गुजरात, महाराष्ट्र और पश्चिमी बंगाल में कोरोना वायरस के मरीज सबसे ज्यादा पाए जा रहे हैं, वहां के प्रमुख सचिव को ईमेल भेजकर निःशुल्क दवा उपलब्ध कराने का प्रस्ताव किया है।

### 200 मरीजों पर तीन महीने चलेगा शोध

प्राचार्य ने बताया कि दवा का 200 मरीजों पर परीक्षण होना है। तीन महीने तक शोध चलेगा। अभी 42 संक्रमित मरीजों पर ही इसका परीक्षण हो सका है। 200 मरीजों पर शोध पूरा होने के बाद अंतिम रिपोर्ट भारत सरकार को भेजी जाएगी।

एसएन प्राचार्य और डीएम को भी भेजा पत्र

प्राचार्य ने बताया कि दवा के बेहतर परिणाम आने के बाद इसका उपयोग करने के लिए एसएन मेडिकल कॉलेज के प्राचार्य और जिलाधिकारी को भी पत्र लिखा गया है। इसमें होम्योपैथी दवा का कोविड मरीजों के इलाज में इस्तेमाल की पेशकश की गई है।

<https://www.amarujala.com/uttar-pradesh/agra/neminath-homeopathic-medical-college-claims-to-make-corona-virus-medicine?pageId=1>



Fri, 22 May 2020

## कोविड-19 / वायरस को सतह और हवा में खत्म करने वाली मशीन भारत आई, 800 वर्ग फीट तक के क्षेत्र को संक्रमण मुक्त कर देगी

- कोरोनावायरस को पैदा करने वाले वुहान में भी हो रहा है इस मशीन का इस्तेमाल, दो दिन पहले दिल्ली आई
- पिछले दस साल से दुनिया के बाजार में, टेस्टिंग करवाई तो पता चला कि कोविड-19 में भी कारगर

भोपाल: देश में ऐसी मशीन आ चुकी है जो कोविड-19 के वायरस को सरफेस और हवा में 99 प्रतिशत तक खत्म कर सकती है। इसे बनाने वाली कंपनी का दावा है कि इस एयर डिसइंफेक्शन मशीन का इस्तेमाल दुनिया के कई देशों में पिछले करीब 10 साल से बैक्टीरिया को मारने के लिए हो रहा था और कोरोनावायरस को खत्म करने में भी यह कारगर साबित हुई है।

इसके बाद स्पेन, वुहान, दक्षिण कोरिया जैसे देशों में हॉस्पिटल, ऑफिस जैसी जगहों को संक्रमण मुक्त करने के लिए इसका इस्तेमाल किया जा रहा है। मशीन 500 से 800 स्क्वायर फीट तक के एरिया को दो घंटे में संक्रमण मुक्त कर देती है।

जनवरी में यूनिवर्सिटी ऑफ बार्सिलोना में इसकी रेस्पिरेटरी सिंक्राइटियल वायरस (RSV) पर टेस्टिंग हुई। जांच में पता चला कि दो घंटे में इस मशीन के प्रतिशत तक वायरस खत्म हुए।

आरएसवी को कोविड-19 से भी ज्यादा खतरनाक वायरस माना जाता है। इसके हमले के बाद लंग्स बुरी तरह डैमेज हो जाते हैं और पीड़ित का बचना मुश्किल हो जाता है।

इसी आधार पर निर्माता दावा कर रहे हैं कि कोविड-19 में भी यह बेहद कारगर साबित हो रही है। मप्र-छत्तीसगढ़ में इस मशीन के डिस्ट्रीब्यूटर मनीष बियानी ने बताया कि दिल्ली में दो दिन पहले यह मशीन आई है और मप्र में शनिवार-रविवार तक आ जाएगी। पहले हॉस्पिटल्स में इसकी सप्लाई की जाएगी।



इस मशीन का निर्माण दक्षिण कोरिया की कंपनी वेलिस ने किया है। इसकी भारत में कीमत 65 से 75 हजार रुपए के बीच होगी।

जरिए वेट कंडीशन में 99 प्रतिशत और ड्राय में 92

## कैसे खत्म करती है वायरस

- निर्माता के मुताबिक, मशीन में लगे कार्ट्रिज में हाइड्रोजन परॉक्साइड भरा होता है। यह ओएच रेडिकल प्रोड्यूस करता है। यही ओएच रेडिकल वायरस की प्रोटीन लेयर में मौजूद हाइड्रोजन से केमिकल रिएक्शन करके वायरस को खत्म करने का काम करते हैं।
- यदि इसे चौबीस घंटे चलाया जाए तो कार्ट्रिज में मौजूद हाइड्रोजन परॉक्साइड तीन महीने में खत्म होगा। इसके बाद इसे दोबारा फिल करवाना होगा। जिसका खर्चा 3500 रुपए आएगा।
- दावा है कि मशीन 500 से 800 स्क्वायर फीट तक के एरिया को संक्रमण मुक्त कर देती है। जरूरत के हिसाब से उपयोग किया जा सकता है। कहीं लोगों का आना-जाना नहीं होता तो हफ्ते में एक बार इसे चलाकर जगह को संक्रमण मुक्त किया जा सकता है।

## दक्षिण कोरिया में हुआ निर्माण

- इस मशीन का निर्माण दक्षिण कोरिया की वेलिस नामक कंपनी ने किया है। कंपनी कई देशों में पिछले करीब दस सालों से इस मशीन को बेच भी रही है। यह बैक्टीरिया को मारती है।
- कोरोनावायरस आने के बाद निर्माता कंपनी ने इसे टेस्टिंग के लिए यूनिवर्सिटी ऑफ बार्सिलोना भेजा। जहां पता चला कि यह कोविड-19 वायरस को भी खत्म कर रही है।
- इसके बाद ही इसे दुनियाभर के मार्केट में उतारने का फैसला किया गया। मशीन की भारत में कीमत 65 से 75 हजार रुपए के बीच होगी।

<https://www.bhaskar.com/business/news/virus-surface-air-eradication-machine-came-to-india-claim-will-make-the-area-up-to-800-square-feet-infection-free-127327625.html>

