

# Indian Navy to get first tranche of indigenously-built anti-submarine torpedo Varunastra soon

*The heavyweight torpedo Varunastra is a ship-launched, electrically-propelled underwater weapon equipped with one of the most advanced automatic and remote-controlled guidance systems*

*By Ritesh K Srivastava*

New Delhi: The Indian Navy will soon receive the first tranche of indigenously-built heavyweight anti-submarine torpedo Varunastra, which is likely to add more firepower to India's marine defence capabilities.

According to reports, the first tranche of torpedo Varunastra, which has been developed by the Naval Science and Technological Laboratory (NSTL), a premier laboratory of the DRDO, will be handed over to the Indian navy within four months.

Its formal induction into the Indian Navy will catapult India into the elite club of eight countries possessing the capability to design and build such a naval defence system. The heavyweight torpedo Varunastra is a ship-launched, electrically-propelled underwater weapon equipped with one of the most advanced automatic and remote-controlled guidance systems.



The weapon system uses its own intelligence in tracking the target.

Capable of hitting stealth submarines underwater, the 1,500-kg Varunastra can carry a warhead weighing 250 kg and has an operational range of 40 km. The anti-submarine electric torpedo is seven to eight metres long with a diameter of 533 mm.

According to the DRDO, the submarine, which can travel at a speed of 40 knots (74 km/h), can be launched both from ships and submarines. It has GPS-based locating aid, a unique feature in contemporary torpedoes in the world, according to the DRDO.

Varunastra has been extensively tested at sea in association with Indian Navy for evaluating the weapon capabilities as per Naval Staff qualitative requirements. The weapon has completed all environmental qualification tests like shock, vibration, temperature cycling, marine environmental tests etc.

Varunastra can be fired from the Rajput class destroyers, Delhi class and all future Anti-Submarine Warfare (ASW) ships capable of firing heavyweight torpedoes.

<https://zeenews.india.com/india/indian-navy-to-get-first-tranche-of-indigenously-built-anti-submarine-torpedo-varunastra-soon-2256409.html>

# DRDO develops 'mirchi bomb' inspired from the spicy bhut jolokia

*'Mirchi bomb' can be used in different situations of low intensity conflict*

*By Rekha Dixit*

Red, hot and spicy. The famous raja chilli or bhut jolokia of the northeast has inspired a weapon, the chilli grenade or mirchi bomb.

Defence Research Development Organisation (DRDO), which had first identified bhut jolokia as the hottest chilli in the world, had been working for some years to tap the fire of the chilli.

DRDO's Defence Research Laboratory (DRL) in Tezpur has now come up with a range of devices that can be used in different situations of low intensity conflict. From chilli spray, which can be kept in a woman's purse for self defence to grenades that can be lobbed to control crowds or manage hostage situations, there are now a range of products—a mirchi bomb for every situation.

Speaking to THE WEEK, S. Datta of the DRL said the active ingredient in bhut jolokia, capsaicin, was initially extracted from chilli. However, it was not easy to scale up production. Bhut jolokia is a sensitive plant which only grows in exacting conditions of soil, temperature and rainfall, to yield the kind of fire that once put it at the top of the Scoville scale, which is used to measure the fire in chilli. Because of the difficulty in getting a steady and large supply of capsaicin from the plant, the laboratory now bases its products on the chemical alone, which is not extracted from the plant, but has the same chemical formula. "Locals burn dried pods of these chillies to keep wild elephants away. That is how we got the idea," said Datta.

The product was first conceptualised in 2010 and now the lab has it in a range of packaging. The larger grenades can be lobbed into crowds to control mobs. They also come with a thin hose which can be pushed under a door into a room with hostages and abductors. Several state police forces have tested the products, so has the National Security Guard (NSG), said Datta. The aim was to make a weapon that would only target the ocular system and not the respiratory system. The product, which comes as a non explosive, eco-friendly and non-toxic stream, has minimal side effects, which go away within a few hours.

Datta said though bhut jolokia has slipped several ranks on on the hottest chillies of the world list, most of the newer entries are commercially grown hybrid varieties, unlike the bhut jolokia, whose fire was naturally occurring and not enhanced by cultivars.

Whether the hottest in the world or not, it certainly has inspired some hot bombs.

<https://www.theweek.in/news/sci-tech/2020/01/09/drdo-develops-mirchi-bomb-inspired-from-the-spicy-bhut-jolokia.html>



S. Datta of the DRL with 'mirchi bomb' products | Rekha Dixit

## Research will make cochlear implants 50% cheaper: Gadkari

*By Chaitanya Deshpande*

Nagpur: Union minister Nitin Gadkari, on Thursday, revealed that the Defence Research and Development Organisation (DRDO) has developed an indigenous multi-electrode cochlear prosthesis for the benefit of profoundly deaf people which will cut the cost of cochlear implants surgeries in India by 50%. The existing cost is more than Rs6.50 lakh.

“The DRDO team gave a presentation on the subject two days ago in New Delhi. This Made in India implants will bring a revolution in the field of cochlear implant surgeries and thousands of kids born deaf will be benefited,” he said.

Gadkari was addressing the inaugural function of the 72nd annual conference of the Association of Otolaryngologists of India (AOICON 2020) at Chitnavis Centre. Former chief minister of Madhya Pradesh Shivraj Singh Chouhan was the guest of honour.

About medical devices park project under MSME ministry, Gadkari said, “Medical devices parks will be opened to work on reducing costs of manufacturing goods. MRI machines costing Rs5 crore are being made available in such parks at only Rs98 lakh.”

The national convention of ENT surgeons AOICON will showcase vast expanse of otolaryngology field. Organizing chairman Dr Madan Kapre said that the conference will lay special emphasis on prevention of oral cancers along with advances in management. More than 1,800 delegates from all over India and abroad are attending the conference. Around 480 scientific research papers will be presented.

National president of AOICON Dr Satyaprakash Dubey appealed that Maharashtra Government should start a statewide mission to facilitate cochlear implant surgeries of poor patients on the lines of Madhya Pradesh. Replying to his appeal, Gadkari said that proposal has already been sent to the state government and chief minister will take final decision on it soon.

During the function, AOI felicitated veteran ENT surgeons Dr Krishnakant Bhargava, Dr KP Morwani and Dr Mohan Kameshwaran with lifetime achievement awards.

<https://timesofindia.indiatimes.com/city/nagpur/research-will-make-cochlear-implants-50-cheaper-gadkari/articleshow/73178996.cms>

# Here's why IAF is pushing for indigenous aero engine for its future aircrafts

*India's previous attempt to develop an indigenous aero-engine reached dead-end not once but twice*

*By Ashish Shukla*

The Indian Air force (IAF) is expected to push for a clause for development of a locally manufactured aero engine. The IAF is likely to introduce the proposal when it gives green signal to the multi-billion dollar programme with the next generation Advanced Multirole Combat Aircraft (AMCA) by the Defence Research and Development Organisation (DRDO). As per the current timelines, the AMCA fighter is expected to fly by 2026. The project is aimed at reducing the hefty import bills on importing combat aircraft in future. Moreover, the IAF is also putting its weight behind the project to attain true self-dependence.

As per a report published in the Economic Times, the first two squadrons of the Advanced Multirole Combat Aircraft will be using the American made variant of GE 414 engine. The project is expected to get a go-ahead in the nearby future on the condition that DRDO agrees to develop an aero-engine plant with foreign collaboration.



One of the senior officials said, "A clear path towards developing our own aero engine is essential and should be done along with the AMCA programme which is being supported. If needed, foreign collaboration from western nations that have advanced technologies can be sought."

## **Indigenous aero engine to make India self-reliant**

The Indian defence establishment has argued that engine technologies needed for future aircraft is accessible only to western countries like France, UK and the US while, it's all-weather partner Russia is lagging behind in the field. Besides, India does not want to commit the mistakes made by the Chinese who are facing major issues due to the lack of a reliable aero-engine programme. Notably, the DRDO has finalized the preliminary designs for the AMCA and the organisation is targeting the next five years to roll out the first test fighter. The next stage of the project is likely to demand around \$ 1 billion.

India's previous attempt to develop an indigenous engine reached dead-end not once but twice. Firstly, India planned to develop the indigenous Kaveri fighter jet engine as a part of the Rafale offsets deal but its decision to import all 36 aircraft in fly-away condition cancelled the prospects of such development. Secondly, the US-India Defense Technology and Trade Initiative (DTTI) has also agreed to develop a local engine but the project was suspended due to little progress.

<https://www.ibtimes.co.in/heres-why-iaf-pushing-indigenous-aero-engine-its-future-aircrafts-811479>

## Food in space: From ISRO's Gaganyaan mission to NASA, what astronauts eat

*The Defence Food Research Laboratory, a Mysuru-based lab under DRDO, has prepared the packaged food items for the Gaganyaan mission.*

*Here's how astronauts eat in space, how space food is prepared and more*

New Delhi: The Indian Space Research Organisation (ISRO) announced its plan to send astronauts to space by December 2021, under its 'Gaganyaan' mission. The Indian astronauts are expected to spend at least seven days into space, but what will they eat? Apparently they will not miss Indian food as a menu of about 30 dishes, including idli sambar, upma, veg rolls, egg rolls, moong dal halwa and vegetable pulav, as per the news agency ANI.

The Defence Food Research Laboratory, a Mysuru-based lab under the Defence Research and Development Organisation, has prepared the packaged food items for the Gaganyaan mission. As per the news agency, astronauts will also be provided with food heaters.

As per the report, the Defence Food Research Laboratory has also prepared special containers to drink liquids like water and juices in space where there is no gravity. The astronauts will also be provided with cutlery and waste disposal pack on their mission.

"Apart from the food, we are also tasked with providing food-warmer technology, stainless steel cutlery and a waste disposal pack," Defence Food Research Laboratory director Anil Semwal told Times of India.

### **Eating food in space**

During NASA's first human spaceflight program Mercury, astronauts find eating in space fairly easy but the menu was limited. It consisted of bite-sized cubes, freeze-dried powders, and thick liquids stuffed in aluminium tubes. The food was unappetizing, freeze-dried foods were hard to rehydrate and crumbs had to be prevented from fouling instruments. However, the food started to improve on the following missions starting from the Gemini missions.

According to NASA, the Bite-sized cubes were coated with gelatin to reduce crumbling, and the freeze-dried foods were encased in a special plastic container to make reconstituting easier. With improved packaging came improved food quality and menus. Gemini astronauts had such food choices as shrimp cocktail, chicken and vegetables, butterscotch pudding, and apple sauce, and were able to select meal combinations themselves.

### **Food for NASA astronauts, Russian cosmonauts**

Currently, NASA astronauts, as well as the Russian cosmonauts, have real food that is dehydrated and packed in specially designed plastic bags for weightless conditions. The astronauts or cosmonauts just need to add hot or cold water and give it a good shake to prepare it— more or less instant cup noodles. Astronauts eat three meals a day— breakfast, lunch and dinner. Nutritionists ensure the food astronauts eat provides them with a balanced supply of vitamins and minerals whereas the calorie requirements differ for each person.

"An astronaut can choose from many types of foods such as fruits, nuts, peanut butter, chicken, beef, seafood, candy, brownies, etc. Available drinks include coffee, tea, orange juice, fruit punches and lemonade," NASA said.



For the NASA astronauts, the standard Shuttle menu repeats after seven days. It supplies each crew member with three balanced meals, plus snacks. Each astronaut's food is stored aboard the Shuttle and is identified by a coloured dot affixed to each package.

The food items of NASA astronauts include dehydrated beverages, fresh foods with a two-day shelf life, irradiated meat, items with intermediate moisture that won't go bad as quickly as fresh foods, items like nuts or cookies, rehydratable food that can be reconstituted with water, and thermostabilized items that can be prepared with heat to kill off possible spoiling agents.

### **How NASA prepares the space food**

The astronaut food is evaluated around eight to nine months prior to flight. The astronauts are given the opportunity to sample a variety of foods and beverages available for flight. A pack of information is given to each astronaut to use in planning their personal preference menus, which includes a standard menu, training menu, past flight menus the astronaut has chosen, and the baseline shuttle food and beverage list.

As per information provided by NASA, the food is selected approximately five months before flight and analyzed for nutritional content by the Shuttle Dietitian. Recommendations are made to correct any nutrient deficiencies based on the Recommended Dietary Allowances, after which the menus are finalized and provided to the Flight Equipment Processing Contractor (FEPC) in Houston three months before launch. The FEPC processes, packages, and stows the food in the Shuttle lockers before being transferred to KSC.

Apart from the selected menu, a supplementary food supply that provides approximately 2100 Kilocalories per person for two extra days is stowed aboard the Shuttle for each flight.

### **India's manned space mission: Gaganyaan**

India plans to send three people to space as part of Mission Gaganyaan, which is scheduled to take off before 2022. Last week, ISRO chief K Sivan said that four astronauts have been identified for training that will begin in the third week of January in Russia.

ISRO's manned space mission is significant because, at the moment, only three countries — Russia, US, and China — have launched a manned space flight. If India manages to achieve this feat, it will be the country the fourth nation to have accomplished a manned space flight.

The project was first announced by Prime Minister Narendra Modi during his 2018 Independence Day speech. The spacecraft is likely to consist of an Orbital Module which will have a service and a crew module. The mission is estimated to cost around Rs 10,000 crore.

<https://indianexpress.com/article/technology/science/food-in-space-from-isros-gaganyaan-mission-to-nasa-what-astronauts-get-6208429/>

## India's Su-30 Jets are now armed with nuclear BrahMos cruise missiles

The BrahMos-armed Su-30s is only one of the ways that India is strengthening its strategic deterrent.

India's nuclear command has begun receiving fighter jets armed with the country's most advanced, supersonic cruise missile.

According to media reports, India's Strategic Forces Command (SFC) has begun receiving 42 Su-30MKI air dominance fighters modified to carry air-launched BrahMos supersonic cruise missile. This will significantly enhance the striking power of the air leg of India's nuclear triad.



“Individually, the Su-30 and BrahMos are powerful weapons,” Russia and India Report noted. “But when the world's most capable fourth generation fighter is armed with a uniquely destructive cruise missile, together they are a dramatic force multiplier.”

The Sukhoi Su-30 MKI is a twin-seater, highly maneuverable, fourth-generation multirole combat fighter aircraft built by Russia's Sukhoi Design Bureau and licensed to India's Hindustan Aeronautics Limited. The plane will serve as the backbone of India's Air Force through 2020 and beyond. Delhi has already acquired around 200 jets, and eventually plans to acquire 282 of them.

The BrahMos is jointly developed by India's Defense Research and Development Organization (DRDO) and Russia's NPO Mashinostroyeniya. Capable of traveling at speeds of Mach 3.0, the BrahMos is the fastest cruise missile in the world. As Russia and India Report explained, “The BrahMos' 3000 km per second speed – literally faster than a bullet – means it hits the target with a huge amount of kinetic energy. In tests, the BrahMos has often cut warships in half and reduced ground targets to smithereens.”

The same report notes that the Su-30 will add to the BrahMos' already deadly effect. “The Sukhoi's blistering speed will add extra launch momentum to the missile, plus the aircraft's ability to penetrate hardened air defences means there is a greater chance for the pilot to deliver the missile on to its designated targets.”

Pairing the Su-30 with the BrahMos missile will also drastically expand the striking power of the air leg of India's nuclear triad. The Su-30 itself has a range of up to 1,800 kilometers while the BrahMos missile can strike targets nearly 300 kilometers away. Thus, the newly modified Su-30s will allow India's nuclear aircraft to strike deep in the heart of China or Pakistan, Delhi's two main adversaries.

The plan to modify the Su-30 to carry the BrahMos missiles was first hatched back in 2010 when the SFC submitted a proposal for two squadrons of Su-30s to be put under its command. Later, in 2012, India's cabinet approved the project to modify 42 Su-30s to carry 216 BrahMos missiles. According to the Times of India, the integration project was mostly carried out by BrahMos Aerospace, with HAL also contributing crucial modifications.

The first of the new planes was handed over to the SFC in February and is believed to have undergone tests last month. Production on the second of the modified Su-30s has already begun. It is unclear when the SFC expects to receive the rest of the planes.

The BrahMos-armed Su-30s is only one of the ways that India is strengthening its strategic deterrent. It has also been busy testing the Agni-V, which is three-stage solid-fueled intermediate-range ballistic missile (IRBM) with a range of about 5,000 km. When the Agni-V is inducted into service, India will have the ability to strike any part of China with nuclear weapons for the first time. Furthermore, India is currently testing ballistic missile submarines (SSBN), which will complete the nuclear triad.

<https://www.defencenews.in/article/Indias-Su-30-Jets-Are-Now-Armed-With-Nuclear-BrahMos-Cruise-Missiles-808787>