

## Ministry of Defence 'nominates' DRDO for building e-warfare systems

*The Mountain EW system "would be designed and developed by DRDO and manufactured by design-cum-production partner from the Indian (private) industry," announced the MoD*

*By Ajai Shukla*

New Delhi: The Defence Acquisition Council (DAC), chaired by Defence Minister Rajnath Singh, on Monday announced it had approved the purchase of Rs 3,300 crore of indigenously designed and developed military equipment.

The private sector is up in arms. Despite repeated Ministry of Defence (MoD) assurances that private firms would be allowed to compete for defence contracts on equal terms with the public sector — which includes the Defence Research and Development Organisation (DRDO), eight defence public sector units (DPSUs) and 41 ordnance factories — the DAC has ‘nominated’ the DRDO for designing and developing an indigenous lightweight electronic warfare system for mountains (hereafter, Mountain EW system).

The Mountain EW system “would be designed and developed by DRDO and manufactured by design-cum-production partner from the Indian (private) industry,” announced the MoD.

This denial of a design and development role to the private industry comes even as a private firm, Tata Power (Strategic Engineering Division, or SED), is building two far more complex integrated Mountain EW systems, a global tender it won in 2013 for Rs 926 crore. An amended order was placed in July, which is on track to be delivered in 24 months.

Meanwhile, a public sector partnership between DRDO and Bharat Electronics is floundering in developing two similar systems, for which they were ‘nominated’ by the MoD at twice the price bid by Tata Power (SED).

Federation of Indian Chambers of Commerce & Industry (Ficci) has strongly protested this sidelining of private firms. In a letter addressed directly to Rajnath Singh on October 10, [Ficci](#) wrote: “It is understood that serious considerations are being given to nominate (the Mountain EW system tenders) to DRDO/DPSUs, disregarding the private sector having equal, if not better, capability and skill sets in EW technologies,” wrote [Ficci](#).

“[Ficci](#) would request your personal intervention to advise that all the EW programme requests for proposals, or tenders, like all other capital acquisition programmes, as issued on competitive tendering basis,” the letter said.

Invoking Tata Power (SED)’s strong, two-decade-old track record in developing EW systems, Ficci wrote: “Private sector companies were involved in developing the critical command and control software and platform engineering for the integrated EW system Samyukta (in the 1990s). This was even acknowledged by Dr A P J Abdul Kalam, then DRDO chief”.

The MoD cites ‘security concerns’ to place orders for EW systems with the DRDO/DPSUs. This has been strongly protested by the private sector, which cites its own stringent security protocols.

“Any security concerns raised to justify DPSU/PSU nomination be discouraged as all ‘A category’ licensed private Indian vendors are covered under the same security guidelines issued by the MoD, as are DPSUs,” wrote Ficci.

Business Standard has reviewed Ficci’s letter to the defence minister.

EW systems are a crucial military force multiplier. They are built around a powerful receiver that picks up, records, and analyses enemy (or militant/terrorist) transmissions to obtain valuable intelligence. Its integrated direction finder establishes the precise location of the enemy transmitter. That location can then be attacked, using aircraft or ground forces. Alternatively, at a crucial stage of battle, the enemy's transmissions can be disrupted with high-power jammers, throwing his plan into disarray. Good EW systems allow an army to dominate the electromagnetic spectrum.

The Mountain EW system that the DAC cleared on Monday is a lightweight system that can be physically carried to remote locations, or heli-lifted onto high mountains. It is particularly useful in counter-militancy operations.

[https://www.business-standard.com/article/current-affairs/mod-nominates-drdo-for-e-warfare-systems-ficci-protests-to-rajnath-119102201626\\_1.html](https://www.business-standard.com/article/current-affairs/mod-nominates-drdo-for-e-warfare-systems-ficci-protests-to-rajnath-119102201626_1.html)



*Wed, 23 Oct 2019*

## **IAF test-fires BrahMos from Sukhoi**

New Delhi: The Indian Air Force (IAF) successfully fired the BrahMos air version missile from its frontline Su-30 MKI fighter aircraft today. The launch from the aircraft was smooth and the missile followed the desired trajectory before directly hitting the land target, the IAF said.

The target was a remote island in the Bay of Bengal, sources said. The BrahMos can hit targets on the ground from sea, air and ground.

The air-launched BrahMos is a 2.5 tonne supersonic air-to-surface cruise missile with range of around 300 km.

In November 2017, the IAF became the first air force in the world to have successfully fired an air-launched 2.8 Mach speed surface-attack missile of this category on a sea target.

Today was the second such live launch of the weapon. The integration of the weapon on the aircraft was a very complex process, involving mechanical, electrical and software modifications.

The software development was undertaken by IAF engineers while HAL carried out mechanical and electrical modifications on the aircraft. Dedicated efforts of the IAF, DRDO and Hindustan Aeronautics Limited have proven the capability of the nation to undertake such complex integrations, the IAF said.

The BrahMos provides IAF a much desired capability to strike from large stand-off ranges on any target at sea or on land with pinpoint accuracy by day or night and in all weather conditions. The capability of the missile, coupled with the superlative performance of the Su-30MKI aircraft, gives the IAF the desired strategic reach, according to the IAF.

### **First woman qualifies for operations**

New Delhi: Flight Lieutenant Bhawana Kanth has become the first woman fighter pilot to qualify for operations. Though inducted with two other women, she has, after completion of flying training, become the first women fighter pilot to be qualified to undertake missions by day on a fighter aircraft. Bhawana joined the fighter squadron in November 2017 and flew the first solo on MiG-21 Bison in March 2018. She is at present based at a forward location in Rajasthan. TNS

<https://www.tribuneindia.com/news/nation/iaf-test-fires-brahmos-from-sukhoi/776879.html>

## **BrahMos successfully test-fired on 2 consecutive days by IAF! Missile system achieves “bull’s eye accuracy”**

*The aim of the two tests was to assess the mission readiness and swift deployment capability of the surface-to-surface BrahMos cruise missile over the long-distance range of 300 kilometres*

*By Smriti Jain*

BrahMos test-fired successfully! In a huge boost for India’s defence preparedness, the Indian Air Force (IAF) has conducted two consecutive successful tests of the formidable BrahMos missile. The back-to-back tests on October 21 and October 22 prove the pinpoint accuracy of the BrahMos missile system, defence sources told Financial Express Online. Today’s launch was carried out in combat mode in the morning at 9:30 AM at Trek Islands in Car Nicobar Islands. According to IAF the twin successful launches were carried out by Indian Air Force’s user unit in operational configuration. The aim of the two tests was to assess the mission readiness and swift deployment capability of the surface-to-surface BrahMos cruise missile over the long-distance range of 300 kilometres.

The first test was done on October 21 at around 2:00 PM. According to IAF, the land-attack BrahMos missile in a practice configuration “flawlessly” followed the expected flight trajectory. The missile flew for almost its full range of 300 kms and hit the pre-set target with “bull’s eye accuracy”. Sources told Financial Express Online that this is the second time that two missiles have been launched on two separate days in the consecutive pattern have hit the targets with pinpoint accuracy. In 2017, the Indian Army fired missiles on May 2 and May 3 achieving accuracy. The second missile actually went through the crater created by the first missile.



The IAF has operationalised its land-based, mobile BrahMos missile system since 2014. It is now inching closer to deploying the lethal weapons system on its frontline fighter jet, the Sukhoi 30 MKI. The missile has already been integrated on the Su-30 MKI and is currently undergoing trials. In 2017 and 2019, the BrahMos missile was successfully test-fired from the Sukhoi-30 MKI hitting sea and land targets. According to BrahMos Aerospace MD Sudhir Mishra, the weapons system is the heaviest missile in the world to be integrated on a frontline fighter jet of a country.

BrahMos is the world’s fastest anti-ship cruise missile and has been jointly developed by Russia and India. An extended 450 kilometres range BrahMos missile has also been test fired successfully and an 800-km version is currently under development.

<https://www.financialexpress.com/defence/brahmos-successfully-test-fired-on-2-consecutive-days-by-iaf-missile-system-achieves-bulls-eye-accuracy/1743259/>

## ब्रह्मोस मिसाइल ने 300 किलोमीटर दूर भी लगाया सटीक निशाना

इंडियन एयरफोर्स ने पिछले दो दिनों में जमीन से जमीन पर मार करने वाले ब्रह्मोस मिसाइल के दो परीक्षण किए। इन दोनों ही परीक्षणों में मिसाइलों ने 300 किलोमीटर दूर स्थित टारगेट को सीधे सीधे हिट किया।

### हाइलाइट्स

- भारतीय वायुसेना ने पिछले दो दिनों के दौरान ब्रह्मोस मिसाइल के सफल परीक्षण किए
- इन दोनों मिसाइलों ने 300 किमी दूर स्थित लक्ष्य पर एकदम सटीक निशाना लगाया
- इन मिसाइलों से दूर स्थित लक्ष्य पर भी एकदम सटीक निशाना लगाया जा सकता है

अंडमान निकोबार: भारतीय वायुसेना ने पिछले दो दिनों में ब्रह्मोस मिसाइल के सफल परीक्षण किए। 21 और 22 अक्टूबर को दागी गई इन दोनों मिसाइलों ने 300 किलोमीटर दूर स्थित लक्ष्य पर एकदम सटीक निशाना लगाया और उसे ध्वस्त कर दिया। जमीन से जमीन पर हमला करने वाली इन मिसाइलों को अब छोटे प्लैटफॉर्म से लॉन्च करने के बावजूद दूर स्थित लक्ष्य पर भी एकदम सटीक निशाना लगाया जा सकता है।

जानकारी के मुताबिक, वायुसेना ने अंडमान निकोबार द्वीप समूह के ट्राक द्वीप से इन दो मिसाइलों को दो दिनों के भीतर फायर किया है। रूटीन ऑपरेशनल ट्रेनिंग के लिए फायर की गई इन मिसाइलों ने अपने लक्ष्य को एकदम सटीक ध्वस्त किया। बता दें कि ब्रह्मोस मीडियम रेंज की एक ऐसी सुपरसोनिक मिसाइल है, जिसे किसी एयरक्राफ्ट, शिप या छोटे प्लैटफॉर्म से भी दागा जा सकता है।

21 और 22 अक्टूबर दागी गई इन मिसाइलों का लक्ष्य लगभग 300 किलोमीटर दूर था। दोनों ही मिसाइलों ने अपने लक्ष्य को सीधे-सीधे हिट किया। इस परीक्षण के बाद भारतीय वायुसेना छोटे प्लैटफॉर्म से मिसाइल दागकर लक्ष्य पर सीधा हमला करने के मामले में और सशक्त हुई है और उसकी क्षमता बढ़ गई है।

<https://navbharattimes.indiatimes.com/state/other-states/other-cities/brahmos-surface-to-surface-missile-achieved-direct-hit-on-the-target-that-was-300-km-away/articleshow/71709245.cms>

THE HINDU

Wed, 23 Oct 2019

## DAC clears indigenous projects worth ₹3,300 crore

*Third generation ATGM and APUs included*

New Delhi: The Defence Acquisition Council (DAC) chaired by Defence Minister Rajnath Singh, which met on Monday, approved three projects worth ₹3,300 crore of “indigenously designed and developed equipment.” These include third generation Anti-Tank Guided Missiles (ATGM) and Auxiliary Power Units (APUs) for the T-72 and T-90 Tanks to be executed by the Indian industry.

“The third indigenous project pertains to discrete electronic warfare systems for the mountain and high altitude terrain, which would be designed and developed by the DRDO and manufactured by design cum production partner from the Indian industry,” the ministry said.

Both these projects will be progressed under the 'Make-II' Category, the statement said and added: "With this, for the first time the Ministry of Defence has offered complex military equipment to be designed, developed and manufactured by the Indian private industry."

<https://www.thehindu.com/news/national/dac-clears-indigenous-projects-worth-3300-crore/article29761430.ece>

#SWARAJYA

Wed, 23 Oct 2019

## As Indian Army mulls induction of more Aakash missiles, here's how they will guard against China-Pakistan intrusion

The Ministry of Defence is considering a proposal by the Indian Army to acquire two regiments of the Akash Prime missiles which will enhance the security architecture in the region and help prevent any intrusion of aircraft through the mountainous borders with Pakistan and China, reports *Economic Times*.

The proposal was discussed at the meeting of the Defence Acquisition Council held on Monday (21 October).

The latest 'Akash Prime' missiles have a higher performance range than their predecessors and can be deployed in high altitude areas above 15,000 feet, which becomes extremely important for high altitude regions of Ladakh bordering Pakistan and China.



Aerial targets like fighter jets, cruise missiles and air-to-surface missiles as well as ballistic missiles can be destroyed by the Akash missile.

Reportedly, the acquisition of the said regiments would be around Rs 10,000 crore, hinted a few government sources.

It is indigenously developed by Defence Research Research Organisation (DRDO) and produced by Bharat Dynamics Limited (BDL) for Missile Systems and Bharat Electronics (BEL) for other radars, control centres in India.

Notably, the Army already has two regiments of the Akash missile system and is considering addition of another two for deployment at the Pakistan and China border, while Air Force is set to acquire seven squadrons of the missile system.

### About Akash Missile System

Akash is a medium range surface-to-air missile (Akash SAM) defence system which can target enemy missiles and aircraft from a distance of 18 to 30 km at an altitude up to 18 km.

Akash employs an integrated ramjet-rocket propulsion system. Ramjet is an air-breathing jet engine that uses the forward movement of the missile to compress air without a separate compressor. Since ramjets cannot produce thrust at zero airspeed, Akash has a rocket assist to accelerate it to a speed where it begins to produce thrust.

Akash flies at supersonic speed of around Mach 2.5, that is, 2.5 times the speed of sound and ramjets work most efficiently at supersonic speeds of close to Mach 3. The ramjet engine gives it



thrust to intercept the target at supersonic speed without any speed deceleration, unlike Patriot missile of US, and the solid fuel system makes it more economic and accurate.

It can be fired from both static or mobile platforms, such as battle tanks, providing flexible deployment. The Air Force versions use a combination of tracked and wheeled vehicle.

Akash is a multitarget handling surface-to-air missile system. It can destroy manoeuvring targets such as unmanned aerial vehicles (UAV), fighter aircraft, cruise missiles and missiles launched from helicopters.

Akash SAM can target and destroy different aerial targets simultaneously with a kill probability of 88 per cent for the first and 99 per cent for the second missile on a target.

The missile could play an important role in the light of the recent incidents of Pakistan dropping ammunition in Indian territory via Chinese drones.

Apart from an integral ramjet propulsion, the Akash SAM system consists of a switchable guidance antenna system, a command guidance unit, an onboard power supply, a system arming and detonation mechanism, digital autopilot, radars and C4I centres.

The high-power, multi-function Rajendra phased-array radar is the most important part of the the Akash SAM system battery. The battery has four launchers, with three missiles each, and four Rajendra radars, interlinked and controlled by the group control centre (GCC).

Each launcher is controlled by one radar that can track 16 targets. The Rajendra radar can, therefore, guide 12 missiles simultaneously while eyeing 64 targets.

The 3D passive electronically scanned array Rajendra radar (PESA) can electronically scan and guide the missile towards targets. The communication links, command and control nodes, sensors and self-propelled launchers of the entire Akash SAM system are IT-integrated.

The PESA antenna array is situated on a rotating platform with a swivel of 360 degrees. With this, the Rajendra radar can detect up till a radius of 80 km, engage a target up till 60 km at an altitude of 8 km. Overall, the Akash can intercept from a range of 30 km and provide air defence missile coverage of 2,000 km<sup>2</sup>.

The guidance system of the missile is such that it enables it to work through electronic countermeasures. The Rajendra radar completely guides the Akash missile, which increases its efficacy against electronic jamming of aircraft.

The missile has a 60-kg payload capacity and it could use prefabricated tungsten alloy cubes warheads or even a nuclear warhead. The warhead of the Akash missile is coupled with a digital proximity fuse. A detonation mechanism is put in place to control the detonation sequence. The missile is also integrated with a self-destructive device.

The Akash missile system was tested along with all other air defence missiles, including Israeli ones, in the Indian Air Force (IAF) inventory during an exercise in Suryalanka (Andhra Pradesh) in 2018 and was adjudged as the best performer.

<https://swarajyamag.com/news-brief/as-indian-army-mulls-induction-of-more-akash-missiles-heres-how-they-will-guard-against-china-pakistan-intrusion>

## Deal with HAL for 83 Tejas Light Combat Aircraft soon: IAF

*In a previous order, the Indian Air Force had signed a deal  
with the Hindustan Aeronautics Ltd for 40 Tejas LCAs*

New Delhi: The Indian Air Force (IAF) is likely to sign a deal with Hindustan Aeronautics Ltd (HAL) for acquiring 83 Tejas Light Combat Aircraft (LCA) as negotiations over the price of the fighter jets are almost done, defence sources said here on Tuesday.

In December 2017, the IAF had issued a single-vendor tender to the HAL for procuring 83 LCA. However, the deal is yet to be signed owing to delay in negotiations over the price of the aircraft.

"The cost negotiating committee is almost finished with the price negotiations of the aircraft. Once it is done, IAF will enter into a deal with the HAL," a senior IAF official told IANS.

As per sources, the deal for 83 Tejas LCA, which are of the Mark 1A variant, is expected to cost the IAF in the range of Rs 45,000 crore. The aircraft will have improved serviceability, faster weapon-loading time, enhanced survivability, a better electronic warfare suite and Active Electronically Scanned Array (AESA) radar that will significantly enhance its capability.

The Centre for Military Airworthiness and Certification (CEMILAC) had provided the Final Operational Clearance to the Tejas LCA earlier this year, certifying it as a multi-role fighter with capabilities including beyond visual range air-to-air and air-to-ground attack capabilities as well as longer endurance through mid-air refuelling.

In a previous order, the IAF had signed a deal with the HAL for 40 Tejas LCAs. So far, around 18 LCAs have been delivered to the IAF from this order.

India, at present, has a shortfall of around 10-12 squadrons of fighter jets in its inventory even as the first four of the 36 Rafale multi-role aircraft are scheduled to arrive into the country by May next year. At the formal receiving ceremony of the first Rafale jet in France on Dussehra this year, Defence Minister Rajnath Singh had said that the full consignment of 36 aircraft will arrive in India by the year 2022.

"India will receive the first 18 Rafale jets by February 2021. By April-May 2022 we will receive all 36 jets," Rajnath Singh had said.

<http://www.newindianexpress.com/nation/2019/oct/22/deal-with-hal-for-83-tejas-light-combat-aircraft-soon-iaf-2051462.html>



## City scientists fuel space dream

*Two IIT Bombay alumni, who are developing an eco-friendly propulsion system for satellites, recently won a DRDO award.*

*By Suktara Ghosh*

Two IIT Bombay alumni are on the path of an innovation that can virtually transform how satellites work. Tushar Jadhav, 29, and Ashtesh Kumar, 26, under the aegis of their start-up Manastu Space Technologies and along with IIT B, are developing I Booster, a green propulsion system that uses high performance and eco-friendly fuel to boost the performance of satellites. It won them the third prize on October 15 at the Dare to Dream Innovation Contest 2019, organised by the Defence Research and Development Organisation (DRDO), which encourages innovations in defence and aerospace technologies. The duo is now all set to showcase I Booster next month at the S-Booster 2019 in Tokyo, Japan. Manastu is the only Indian space startup to be shortlisted to compete for a grand prize of 10 million yen (about Rs 65.22 lakh).



The I Booster comprises a thruster – a small scale rocket engine weighing approximately 200gm – which, aided with a catalyst and green fuel, can boost the performance of a satellite while bringing down production costs as well as risk factors. “We have cleared six of the nine levels of NASA’s Technology Readiness Levels (TLR), which measures the maturity level of a particular technology. We hope to clear the remaining three by 2021,” says Jadhav, who has worked with the DRDO.

2021 is a strategic year as far as space technology goes as the US and the European Union have decided to tax heavily, if not ban, hydrazine as a space fuel. “Hydrazine is a lowperforming, extremely



toxic and carcinogenic fuel. It's twice more dangerous than methyl isocyanate, the gas that caused the Bhopal gas tragedy. People have died on field while handling it," explains Jadhav.

Manastu's as yet unnamed fuel, which is a combination of hydrogen peroxide with an additive, once commercialised, would be competing with ammonium dinitramide (AND), being developed by the European Space Agency, and hydroxylammonium nitrate (HAN) that's being developed by NASA. "Our fuel is expected to be more efficient, and the entire propulsion system would be around 60 per cent cheaper than those fuels once we reach the market. That would give us an added advantage. This has aroused the interest of both the DRDO and ISRO in our product," he says. The IIT B has already applied for a patent, while they are in the process of writing three more, Jadhav says.

Dr Arindrajit Chowdhury, associate professor, Mechanical Engineering, who along with Jayesh Bellare, professor, Chemical Engineering, IIT Bombay, has been mentoring Kumar and Jadhav for years, says, "A lot of complex things happen simultaneously when we use hydrogen peroxide as a fuel. Manastu has made major strides in perfecting the process, and if we can successfully develop this safer and cheaper technology, we shall have a lucrative solution not only for the Indian space industry, but anybody who's launching a satellite across the world."



The encouragement and recognition, apart from bringing in the much-needed funds, is also paving the way for Manastu to scale up. The technopreneurs, who floated the company in 2017, are looking to scale up the business by expanding their seven-member team next month. They are scouting for a wellappointed facility of their own. They are also putting into good use the people management lessons they learnt as part of the historic IIT Bombay Student Satellite Project that launched the ISRO PSLV C35 satellite in 2016. "The technology is just one e part of it. Explaining the vision to people, and then getting them to actually execute it, was a huge lesson which is coming into use for us again now," says Jadhav, who along with his team, puts in an average of 12 to 13 hours' work every day.

The high of the innovation has indeed touched all who are part of the project. "Not many of our students delve into developing technology after leaving the institution. Personally, I'm extremely proud of the work Kumar and Jadhav are doing, and the hard work they do often puts me to shame," says Chowdhury.

<https://mumbaimirror.indiatimes.com/mumbai/other/city-scientists-fuel-space-dream/articleshow/71713682.cms>

## **DRDO to be key for Gaganyaan**

*Under Gaganyaan, a three-member Indian crew will be launched into low earth orbit (LEO) for an orbital mission of up to a week.*

*By Pathri Rajasekhar*

Nellore: The Defence Research and Development Organisation (DRDO) will be playing an important role in Gaganyaan, India's first manned mission that is expected to be launched in 2022, the 75th anniversary of India's independence. Under Gaganyaan, a three-member Indian crew will be launched into low earth orbit (LEO) for an orbital mission of up to a week.

Prior to this, two unmanned missions are planned to validate various technologies. The Human Space Flight Centre (HSFC) and Vikram Sarabhai Space Centre (VSSC) of the Indian Space Research Organization (Isro) had inked a pact with various labs of DRDO last month for joint development of human-centric systems for Rs 10,000 crore.

Speaking to this newspaper, DRDO chairman Dr G. Sateesh Reddy said, "DRDO has developed various critical technologies for defence applications which will be customised to the requirement of human space flight."

<https://www.deccanchronicle.com/nation/current-affairs/231019/drdo-to-be-key-for-gaganyaan.html>