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# समाचार पत्रों से चयित अंश Newspapers Clippings

A Daily service to keep DRDO Fraternity abreast with DRDO Technologies, Defence Technologies, Defence Policies, International Relations and Science & Technology

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Fri, 17 Dec 2021

# City poised for defence, aerospace sector growth: DRDO Chief

*Satheesh Reddy underscores the need for qualitative research and development to achieve success*

Hyderabad: DRDO chairman and secretary of the department of defence R&D Satheesh Reddy called for the academia, research labs and micro, small and medium enterprises, to come together to form a complete ecosystem for strong growth in the defence and aerospace sector.

### **Strong base**

The sector is expected to flourish in the near future and Hyderabad already having a strong base in defence and aerospace will be in the forefront, he said, and underscored the need for qualitative research and development to achieve success, for India to emerge as a leading exporter in defence products.

Dr. Reddy was addressing the 5th edition of the annual flagship event, Defence Conclave - Strategies for bridging technology, start-ups and exports in India's defence sector, organised by the Confederation of Indian Industry (CII) Telangana virtually on Thursday.

The government has earmarked 64% of defence procurement budget for the local industry and a lot of effort is going into strengthening local capabilities. Domestic supply chains need to thrive and network with original equipment manufacturers, said additional secretary, department of defence production, Sanjay Jaju.

TS Industries secretary Jayesh Ranjan said that the State happens to be the hub of both start-ups, defence production and defence research. A perfect ecosystem that can bridge the gaps in technology, start-ups and exports and enhance the country's defence capabilities, he said, and suggested policy level interventions in creation of level playing field for new generation entrepreneurs to enter into the sector.

Chairman and MD of Ananth Technologies and CII TS convenor P. Subba Rao said that the defence industrial policy has to be supplemented by the strategy for exports without which the economic base of the industry would be difficult to sustain in the present economic competitive environment.

CII CMD Sameer Goel sought online export authorisation procedures to be streamlined through portals. Kalyani Rafael CEO and MD Rudra Jadeja said that policy interventions are required in technology transfer, foreign direct investment and conducive environment for sustainability of business operations, said a press release.

<https://www.thehindu.com/news/national/telangana/city-poised-for-defence-aerospace-sector-growth-drdo-chief/article37971440.ece>

## HAL signs Rs 2,400 cr contract with BEL for supply of avionics for LCA

*This is the biggest ever order received by BEL for avionic systems*

Bengaluru: Hindustan Aeronautics Limited on Thursday awarded a Rs 2,400 crore contract to Bharat Electronics Limited for the manufacture and supply of 20 types of airborne electronic systems for the LCA Tejas Mk1A fighter aircraft programme.

The order spanning five years from 2023 to 2028 involves supply of critical avionic Line Replaceable Units (LRUs) related to Digital Flight Control Computers, Air Data Computers, Weapon Computers, LRUs related to Radar Warning Receiver (RWR) and Head Up Display, a BEL statement said.

The LRUs have been indigenously designed and developed by Aeronautical Development Agency (ADA), DRDO Labs, Aeronautical Development Establishment (ADE), Combat Aircraft Systems Development and Integration Centre (CASDIC) and Central Scientific Instruments Organisation (CSIO).

According to HAL, "this is the biggest ever order that HAL has placed on any Indian company boosting 'Atmanirbhar Bharat' campaign."

This is the biggest ever order received by BEL for Avionic Systems and will go a long way in ensuring the Indian Air Force's air superiority and giving a boost to the Prime Minister's vision of an 'Atmanirbhar Bharat', the BEL statement said.

The order for supply of Avionic Systems for 83 Tejas MK1A fighter aircraft will be executed by two Strategic Business Units (SBUs) of BEL: Electronic Warfare & Avionics, Bengaluru, and BEL-Panchkula, Haryana.

All the systems will be delivered by BEL to HAL in a ready-to-board condition.

"LCA Tejas programme is an excellent example of synergies between Indian Defence establishments such as HAL, DRDO & BEL. The current order for development and supply of 20 types of critical avionics LRUs for Tejas Mk1A is a shot-in-the-arm for Make in India activity," said HAL CMD R Madhavan.

"We are pleased to receive this order from HAL for the prestigious LCA Tejas programme and look forward to continuing strong partnership and joint success with HAL," said BEL CMD Anandi Ramalingam.

Deliveries under 83 Tejas Mk1A order to IAF will commence from 2023-24, an HAL statement said.

The contract documents were handed over by General Manager LCA Tejas Division, HAL, E P Jayadeva to General Manager (EW&A) BEL, Manoj Jain.

[https://www.business-standard.com/article/companies/hal-signs-rs-2-400-cr-contract-with-bel-for-supply-of-avionics-for-lca-121121600511\\_1.html](https://www.business-standard.com/article/companies/hal-signs-rs-2-400-cr-contract-with-bel-for-supply-of-avionics-for-lca-121121600511_1.html)



LCA Tejas fighter

## **HAL signs Rs 2,400-crore contract with BEL for LCA programme**

*Deliveries under 83 Tejas Mk1A order to Indian Air Force will commence from 2023-24 onwards.*

Bengaluru: In a major boost to indigenisation, HAL signed a contract with Bharat Electronics Limited (BEL) for development and supply of 20 types systems for the LCA Tejas Mk1A programme here on Thursday.

The five-year contract, spanning from 2023 to 2028, is valued at Rs 2,400 crore and involves supplying critical avionics Line Replaceable Units (LRUs), flight control computers and night flying LRUs. This is the biggest ever order that HAL has placed on any Indian company boosting 'Atmanirbhar Bharat' campaign.

The order for supply of these systems for 83 Tejas Mk1A fighter fleet will be executed by two divisions of Bharat Electronics Limited at Bengaluru and Panchkula (Haryana). All the contracted items will be delivered by BEL to HAL in a ready-to-board condition.

Deliveries under 83 Tejas Mk1A order to Indian Air Force (IAF) will commence from 2023-24 onwards. The homegrown fighter is slated to be equipped with indigenous flight control computers, air data computers which would also be supplied by BEL under this contract.

These systems have been designed and developed by various labs of Defence Research & Development Organisation (DRDO) and Aeronautical Development Agency (ADA), Bengaluru.

The contract documents were handed over by EP Jayadeva, General Manager, LCA Tejas Division, HAL, to Manoj Jain, General Manager (EW&A) BEL.

"LCA Tejas programme is an excellent example of synergies between Indian Defence establishments such as HAL, DRDO & BEL. The current order for development and supply of 20 types of critical avionics LRUs for Tejas Mk1A is a shot in the arm for Make in India activity. HAL stands committed to indigenous products," said R Madhavan, Chairman & Managing Director, HAL.

"We are pleased to receive this order from HAL for the prestigious LCA Tejas programme and look forward to continuing our strong partnership and joint success with HAL," said Anandi Ramalingam, Chairman & Managing Director, BEL.

<https://www.newindianexpress.com/states/karnataka/2021/dec/17/hal-signs-rs-2400-crore-contract-with-bel-for-lca-programme-2396442.html>

## Tejas Fighter: एचएएल का बीईएल के साथ सबसे बड़ा सौदा, अत्याधुनिक प्रणालियों से लैस होगा लड़ाकू विमान तेजस

सार

83 तेजस एमके1ए के लिए इन प्रणालियों की आपूर्ति के ऑर्डर को बंगलुरु और पंचकुला स्थित बीईएल की दो डिवीजनों द्वारा पूरा किया जाएगा।

विस्तार

हिंदुस्तान एरोनाटिक्स लिमिटेड (एचएएल) ने भारत इलेक्ट्रॉनिक्स लिमिटेड (बीईएल) के साथ 2,400 करोड़ रुपये के एक सौदे पर हस्ताक्षर किए हैं। इसके तहत बंगलुरु में हल्के लड़ाकू विमान (एलसीए) तेजस एमके1ए कार्यक्रम के लिए 20 प्रकार की प्रणालियों का विकास और आपूर्ति की जाएगी। आत्मनिर्भर भारत को बढ़ावा देने के लिए एचएएल द्वारा किसी भारतीय कंपनी को दिया गया यह सबसे बड़ा ऑर्डर है।



तेजस लड़ाकू विमान - फोटो : भारतीय वायु सेना

आर. माधवन बोले, तालमेल का बेहतरीन उदाहरण

साल 2023 से 2028 तक के इस अनुबंध में क्रिटिकल एवियोनिक्स लाइन रिप्लेसमेंट यूनिट्स (एलआरयू), फ्लाइट कंट्रोल कंप्यूटर्स और नाइट फ्लाइंग एलआरयू की आपूर्ति शामिल है। एचएएल के चेयरमैन और मैनेजिंग डायरेक्टर आर. माधवन ने कहा कि एलसीए तेजस कार्यक्रम एचएएल जैसे भारतीय रक्षा प्रतिष्ठानों, रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) और बीईएल के बीच तालमेल का बेहतरीन उदाहरण है।

माधवन ने कहा कि एचएएल स्वदेशी उत्पादों के लिए प्रतिबद्ध है। वहीं, बीईएल के सीएमडी आनंदी रामलिंगम ने कहा कि हमें प्रतिष्ठित एलसीए तेजस कार्यक्रम के लिए एचएएल से ऑर्डर मिलने की बेहद खुशी है और हम एचएएल के साथ मजबूत भागेदारी और संयुक्त सफलता कायम रखने के प्रति आशान्वित हैं।

83 तेजस एमके1ए के आपूर्ति

83 तेजस एमके1ए के लिए इन प्रणालियों की आपूर्ति के ऑर्डर को बंगलुरु और पंचकुला स्थित बीईएल की दो डिवीजनों द्वारा पूरा किया जाएगा। अनुबंध में शामिल सभी सामग्री बीईएल द्वारा एचएएल को लगाने के लिए तैयार हालत में दी जाएंगी।

83 तेजस एमके1ए आर्डर के तहत वायुसेना को आपूर्ति वित्त वर्ष 2023-24 से शुरू होगी। ये विमान स्वदेशी फ्लाइट कंट्रोल कंप्यूटर्स और एयर डाटा कंप्यूटर्स से लैस होंगे जिनकी आपूर्ति भी इसी अनुबंध के तहत बीईएल द्वारा की जाएगी। इन प्रणालियों का डिजाइन और विकास डीआरडीओ की विभिन्न प्रयोगशालाओं और बंगलुरु स्थित एरोनॉटिकल डेवलपमेंट एजेंसी ने किया है।

<https://www.amarujala.com/india-news/hal-biggest-agreement-with-bel-tejas-fighter-aircraft-will-be-equipped-with-state-of-the-art-systems>

# LCA Tejas Fighters give big boost to Indian Air Force's strike capabilities & Govt's flagship initiative – 'Atmanirbhar Bharat'

By Sakshi Tiwari

The state-run Hindustan Aeronautics Limited (HAL) has given a giant leap to India's flagship initiative 'Atmanirbhar Bharat' or Self Reliant India which aims at bringing greater indigenization in defense manufacturing.

On December 16, 2021, HAL signed a deal with Bharat Electronics Limited for the development and supply of 20 types of systems for the Tejas Mk1A light combat aircraft (LCA) program.

The Bengaluru-based HAL said in a statement that a five-year deal, which runs from 2023 to 2028, entails supplying crucial avionics Line Replaceable Units (LRUs), Flight Control Computers, and Night Flying LRUs in what is called the biggest ever order that the state-run company has placed on any Indian company boosting 'Atmanirbhar Bharat' campaign.



HAL contract signing ceremony with BEL

"The LCA Tejas program is a great example of collaboration between Indian defense institutes like HAL, DRDO, and BEL. The latest order for the development and supply of 20 essential avionics LRUs for the Tejas Mk1A is a boost for Make in India", said R. Madhavan, the chairman of HAL.

The order for these systems meant for the 83 Tejas Mk1A fighter fleet will be fulfilled by two divisions of BEL at Bengaluru and Panchkula (Haryana). According to the statement, BEL will deliver all of the contracted equipment to HAL in a ready-to-board condition.

In February this year, HAL was awarded the contract to manufacture 83 LCA for the Indian Air Force (IAF) at an estimated cost of Rs 48,000 crore at the 13th edition of Aero India in Bengaluru.

Deliveries to the IAF will begin in 2023 and end in 2024. The indigenous fighter will be outfitted with a locally-developed flight control computer and an air data computer, both of which will be provided by BEL under this deal. DRDO and Bengaluru's Aeronautical Development Agency have collaborated to develop both of these systems.

India has been making concerted attempts to boost the capability of its armed forces as the country faces what is seen as two-front war threats from China and Pakistan. In fact, the existing Tejas in the IAF fleet had earlier been deployed along the Western border in August last year amid tensions with China. So while the more superior fighters in the IAF fleet were flying around, over and near the Eastern Ladakh sectors, the light combat planes had assumed the role of a watchdog against Pakistan along the Western region.

## Tejas to Get More Teeth

India has been attempting to develop a variety of indigenous technology and weapon systems in order to increase defense sector self-reliance, especially for its LCA Tejas.

HAL had signed a \$716 million deal with American company GE Aviation earlier this year for 99 F404 aircraft engines and related services to power the indigenous Tejas LCA Mk-1A. On top

of that, it is now building its own indigenous engine that is expected to power its Tejas variants as well as its AMCA aircraft.

The development of a homegrown AESA radar, which will be installed in the Tejas, is a big step forward and is aimed at creating a balance of power with China, which too has the AESA radars, as previously reported by the EurAsian Times.

These AESA radars will be installed in all 83 Mk1A Tejas Aircraft which will boost its capability significantly. These radars, like the current avionics systems, are also largely indigenous with about 95% local component. Additionally, India is also procuring HAMMER missiles from France to integrate them with the LCA Tejas aircraft after its success with the Rafales.

They are being procured under the emergency route granted to the military in the backdrop of continuing Chinese aggression. These missiles are expected to enhance the firepower of these LCAs and allow them to strike bunker targets deep inside the enemy territory.

### **LCA Tejas MK-1**

The 83 Mk-1A planes brought the total number of LCA versions ordered to 123. The 40 LCAs that the IAF has already ordered are in the initial operational clearance (IOC) and advanced operational clearance (FOC) variants. The LCA Mk-1A will have a number of enhancements over the FOC aircraft, making it the most advanced LCA variant to date.

The Mk-1A variant includes digital radar warning receivers, external self-protection jammer pods, AESA radar, enhanced beyond-visual-range (BVR) missiles, and greatly better maintainability. The indigenous component of the fighter is estimated to be around 60%, compared to 50% in earlier models. After completing the requisite design efforts, HAL has set a March 2022 timeline for the first flight of the LCA (light combat aircraft) Mk-1A fighter, according to HAL chairman R Madhavan.

Madhavan had said earlier that the countries in Southeast Asia and West Asia were showing interest in the Light Combat Aircraft (LCA) Tejas, and that each LCA MK1A jet would cost a total of Rs 306 crore.

The LCA Tejas and its two variants in the pipeline have become the flag-bearers of India's indigenous defense manufacturing. The new HAL contract is expected to not only give the requisite push to self-reliance but also boost the capability of the Tejas which is now being pitched to friendly countries.

<https://eurasianimes.com/indias-lca-tejas-fighters-give-big-boost-to-indian-air-force-mk1a/>



**United News of India**  
India's Multi Lingual News Agency

*Fri, 17 Dec 2021*

## **DRDO-affiliated Laboratory to hold exhibition in Pune**

Pune, Dec 16 (UNI) As part of 'Azadi Ka Amrit Mahotsav', High Energy Materials Research Laboratory-a DRDO offshoot-has organised a defence exhibition and a webinar here.

Starting from Friday, the two-day exhibition will showcase the contribution of HEMRL in defence related products and systems, read an official statement.

Meanwhile, the webinar will bring out the efforts made by DRDO for the development of various propulsion technologies to achieve Atma Nirbharata or Self Reliance, it apprised.

The HEMRL has invited the general public, defence enthusiasts and students to attend the events and have a glimpse of the technological might achieved by India.

<http://www.uniindia.com/drdo-affiliated-laboratory-to-hold-exhibition-in-pune/west/news/2594992.html>



# India demonstrates long-range, supersonic, precision strike missile capabilities amid border dispute with China

By Ashish Dangwal

India recently performed a series of weapon tests including the Helicopter-launched Stand-off Anti-Tank (SANT) missile, long-range Supersonic Missile Assisted Torpedo (SMART), and the Pinaka Mk2 extended-range rocket, highlighting the country's progress in the indigenous defense programs.

The recent tests indicate India's efforts to increase self-reliance and strengthen its strike power in the light of mounting concerns about China's aggression. The newly developed SANT missile and Pinaka rockets were both tested at the Pokhran testing range in northwest India on December 11, according to the Ministry of Defense.



Pinaka multi-barrel rocket launcher – Wikipedia

The long-range SMART system, developed by Defence Research and Development Organisation (DRDO) was successfully tested on December 13 at Balasore in Odisha.

The successful demonstration of these weapon systems is intended to increase indigenous defense capabilities.

## Stand-off Anti-Tank Missile

The Indian Air Force (IAF) and the DRDO successfully flight-tested the indigenously developed Helicopter launched SANT missile from the Pokhran ranges on December 11.

The release mechanism, advanced guidance and tracking algorithms, all avionics with integrated software, performed satisfactorily and tracking systems monitored all mission events. According to a statement released by the Ministry of Defense (MoD), this 'made in India' missile is capable of neutralizing targets up to a range of 10 kilometers.

The missile is equipped with an advanced millimeter-wave (MMW) seeker, which aids in the delivery of high-precision strikes from a safe distance.

The Hyderabad-based Research Center Imarat, a DRDO lab, designed and developed this missile. This was done in collaboration with other DRDO with some inputs from the defense industry. This missile is predicted to boost the IAF's armament.

It is the third in a series of indigenous stand-off weaponry that has recently been tested, the other two being a long-range bomb and smart anti-airfield weapon.

The SANT missile was successfully tested by DRDO off the coast of Odisha last year as well. It boasts both lock-on after launch and Lock-on before launch features. The SANT weighs 50 kg and is equipped with an MMW seeker instead of Helina's imaging infrared guidance and an 8 kilogram tandem high-explosive warhead.

The missile can be mounted on a variety of helicopters, including the Mi-35 attack helicopter, India's Light Combat Helicopter, and the 'Dhruv' Advanced Light Helicopter. It will particularly aid in the demolition of enemy assets, according to experts. The Mi-35 currently has a Russian-made Shturm missile that can target tanks from a distance of 5 kilometers.

## **Pinaka Multi-Barrel Rocket Launcher**

The Pinaka Extended Range (Pinaka-ER) Multiple Launch Rocket System (MLRS), one of the army's most powerful fire support systems, was successfully tested with rockets built by private sectors, according to DRDO.

Two DRDO laboratories in Pune, the Armament Research & Development Establishment (ARDE) and the High Energy Materials Research Laboratory (HEMRL), have successfully developed the Pinaka MLRS in collaboration with two private sector companies, L&T and Tata Power Company Ltd. (TPCL).

The DRDO provided technology to a Nagpur-based "industry partner" called Economic Explosives after evaluating the performance of the Pinaka MLRS.

The DRDO and the Indian Army have conducted a series of successful performance trials of Economic Explosives' rockets over the past three days. Enhanced range Pinaka rockets were test-fired at various ranges with various different capabilities, DRDO said, adding that "all of the testing objectives were met satisfactorily".

The Pinaka rocket system, which was first used in the 1999 Kargil War, is known for its pinpoint accuracy and deadly attacks, eliminating adversaries on mountain peaks.

A Pinaka regiment is made up of 18 multi-barreled launchers with 12 launcher tubes apiece. In just 44 seconds, these 216 tubes can drop seven tons of high explosives on the target, hitting opposing forces in the open without allowing them time to seek cover.

The army had previously used the Pinaka Mark I, which had a range of 37.5 kilometers and a limited accuracy of 500 meters. In 2016, the service requested DRDO to deliver a guidance kit for each individual missile.

The 'Enhanced Pinaka' project was taken up by Armament Research & Development Establishment (ARDE), which turned the Pinaka into a world-class rocket. The Enhanced Pinaka has a range of 75 kilometers and can hit within 10 meters of its target, enabling the army to eliminate a terrorist camp, enemy station, logistical dump, or headquarters without sending troops to hostile territory.

Between 2006 and 2010, two private industry partners – L&T and TPCL – produced the army's first two Pinaka regiments. The Ministry of Defense contracted for the army's third and fourth regiments in 2016. The third order for six regiments was placed in 2020, bringing the army's Pinaka inventory to 10 units. These will be outfitted with the Pinaka-ER rockets, which are now undergoing testing.

### **The SMART System**

On December 13, the DRDO performed a successful flight test of the Supersonic Missile Assisted Release of Torpedo (SMART). The last test was conducted in October 2020.

The entire trajectory was tracked by the electro-optic telemetry system, multiple range radars, including down-range equipment, and down-range ships positioned at various points in the Bay of Bengal, according to DRDO, who called the latest test a "text-book launch". The missile was outfitted with a torpedo, a parachute delivery system, and several systems necessary for torpedo discharge during the test.

"This canister-based missile system consists of advanced technologies — two-stage solid propulsion, electro-mechanical actuators and precision inertial navigation. The missile is launched from a ground mobile launcher," said DRDO.

A canister-based system allows the missile to be stored and operated from dedicated compartments. The inside environment of the canister is regulated, making transportation and storage easier; it also increases the weapon's shelf life.

Torpedoes are self-propelled weapons that can be shot from above or below the sea surface and travel underwater to hit their target. The DRDO embarked on an ambitious project in the mid-2010s to develop the capability to fire torpedoes aided by missiles. On October 5, 2020, the system underwent its first flight test.

This SMART system includes a mechanism that allows the torpedo to be fired from an existing supersonic missile system, extending its range well beyond its own. A torpedo with a range of roughly 50 kilometers, for example, can be carried by a missile system to a distance of 1000 kilometers, from where it can be launched.

According to DRDO officials, the system not only provides the capability to fire the torpedo beyond its range but also provides versatility in terms of the launch platform that comes with the missile system.

The Defence Research and Development Laboratory (DRDL) and Research Centre Imarat (RCI) — both in Hyderabad; the Aerial Delivery Research and Development Establishment (ADRDE) in Agra, and the Naval Science and Technology Laboratory (NSTL) in Visakhapatnam are among the DRDO laboratories that have developed technologies for the SMART system.

Officials stressed that given China's proactive deployment of naval assets in general and submarines in particular in the Indian Ocean Region, India's capability building in the field of anti-submarine warfare is critical. When the SMART system becomes operational, India would be able to fire torpedoes at enemy naval assets from far-off positions.

<https://eurasianimes.com/india-demonstrates-long-range-supersonic-precision-strike-missile-capabilities-china/>



Fri, 17 Dec 2021

## India tests SFDR technology critical for development of long range air-to-air missiles

### Snapshot

- **India is currently developing a 160-km range version of the Astra air-to-air missile.**

The Defence Research and Development Organisation (DRDO) tested its Solid Fueled Ducted Ramjet (SFDR) technology for the fourth time with a demonstration flight earlier today, *Livefist* has reported.

The development of SFDR technology will enable India to make its own long-range air-to-air missile, which could mirror the capabilities of the best missiles in this class, like MBDA's Meteor, which the Indian Air Force uses on its Rafales.

The last test of the technology was conducted in March 2021. The test, DRDO said back then, helped prove many technologies and sub-systems, including the ground booster motor and nozzle less motor.



Flight test of Solid Fuel Ducted Ramjet technology.

"Successful demonstration of Solid Fuel based Ducted Ramjet technology has provided DRDO with a technological advantage which will enable it to develop long range air-to-air missiles. At present, such technology is available only with a handful of countries in the world. During the test, air launch scenario was simulated using a booster motor. Subsequently, the nozzle-less booster accelerated it to the required Mach number for Ramjet operation," the Ministry of Defence had said in a statement released after the test.

India has been working on the Mark-II version of home grown Astra air-to-air missile, which will have a range of around 160 kilometer. The SFDR propulsion system, which was also tested in 2019, is critical for the missile's performance in the terminal phase of its flight towards the target.

The Meteor missile also depends on its ramjet propulsion for "more energy to maneuver during the endgame of the engagement".

“The ramjet motor [propulsion system] provides the [Meteor] missile with thrust all the way to target intercept, providing the largest No-Escape Zone of any air-to-air missile,” the literature on the missile on MBAD website reads.

While the DRDO’s plan for Astra Mark-II is to mirror the performance of MBDA’s Meteor missile, it may take a few more years to reach there, experts say.

The development of the Astra missile began in 2001.

The Mark-I version of the missile was tested for the first time in May 2003. Since then, Astra Mark-I has been test-fired multiple times, and has been integrated with Su-30 MKI. In September 2019, the missile, test-fired from an Su-30MKI of the IAF, hit a target 90 kilometer away. The air-to-air missile has already been ordered in large numbers for the Indian Air Force and the Indian Navy.

<https://swarajyamag.com/news-brief/india-tests-sfdr-technology-critical-for-development-of-long-range-air-to-air-missiles>

## THE TIMES OF INDIA

Fri, 17 Dec 2021

### 'Personnel sphere' for 1st desi deep ocean manned mission being developed; ISRO, DRDO provide expertise

By Surendra Singh

New Delhi: Along with the ongoing Gaganayaan programme to send a manned mission to space by 2023, the Centre is also simultaneously working on the country’s first manned scientific submersible for deep ocean missions. The project has been named ‘Samudrayaan’.

National Institute of Ocean Technology, an autonomous institute under the ministry of earth sciences, has developed and tested a ‘personnel sphere’ for a manned submersible system. The personnel sphere of 2.1m diameter, to be used as a crew module for up to a depth of 500m, has been developed using mild steel and tested by sending it down 600m in the Bay of Bengal



A model of the submersible for the deep ocean manned mission

using the research vessel Sagar Nidhi in October this year, minister of earth sciences and S&T Jitendra Singh informed Rajya Sabha in a written reply on Thursday.

A titanium alloy personnel sphere for the manned submersible system, for 6,000-metre water depth rating, is under development in association with Isro’s Vikram Sarabhai Space Centre at Thiruvananthapuram, Singh said.

Under the Rs 6,000-crore deep ocean mission, approved by the cabinet in June this year, the Centre will send a manned submersible with three persons to a depth of 6,000 metre in the ocean with a suite of scientific sensors and tools. The project will enable exploration of ocean resources for drinking water, clean energy and blue economy. It will also make deep space mining and exploration a reality.

Once the manned mission is successfully launched, it will put India in the elite club of select countries, including the US, Russia, Japan, France and China, with a capability to launch deep ocean manned missions.

Under the MATSYA 6000 plan, three persons — one pilot and two scientists — within the submersible will dive to a depth of 6,000m for a duration of 12 hours and will be able to stay underwater for 16 hours. Isro, IITM and DRDO have been roped in to support the programme.

The minister had earlier said sea trials of the 500m-rated shallow water version of the manned submersible were expected to take place in the last quarter of 2022 and the deep water manned submersible would be ready for trials by the second quarter of 2024.

<https://timesofindia.indiatimes.com/india/personnel-sphere-for-1st-desi-deep-ocean-manned-mission-being-developed-isro-drdo-provide-expertise/articleshow/88329174.cms>

## DRDO on Twitter

A screenshot of a tweet from the account ANI (@ANI). The tweet text is: "In a major boost to indigenization, HAL signed a contract with Bharat Electronics Limited (BEL) for the development and supply of 20 types of systems for the LCA Tejas Mk1A program today in Bengaluru, Karnataka. (1/2)". The timestamp is 10:13 AM · Dec 16, 2021 · Twitter Web App.

A screenshot of a tweet from the account DRDO (@DRDO\_India). The tweet text is: "Over 90% of the order value are systems designed and developed with DRDO and ADA. #AtmanirbharBharat #Technology #indigenous".

A screenshot of a tweet from the account DRDO (@DRDO\_India). The tweet text is: "Flight control and avionics Line Replaceable Units (LRUs) ToTs from DRDO and ADA and joint development resulted in the largest order by HAL for indigenous systems on BEL for Tejas LCA Mk1. #AtmanirbharBharat #technologypartner".

A screenshot of a tweet from the account DRDO (@DRDO\_India). The tweet text is: "DRDO conducted a webinar on "Quality &amp; Reliability Techniques" today. Thrust was on industry trends &amp; application of modern techniques in design &amp; development of futuristic defence systems &amp; strengthening #RobustQualityCulture. #AmritMahotsav #IconicWeek".



**DRDO** ✓ @DRDO\_India · 16h

Normobaric Hypoxia Chamber developed by #DIPAS-DRDO was established at Base Hospital, Bengdubi. This facility would aid in rapid acclimatisation at high altitudes for quick deployments and is presently undergoing series of tests & evaluations. #SamarthEvamSaksham #AmritMahotsav





Fri, 17 Dec 2021

### 'Process to select next CDS has begun, name to be announced soon'

*The post of the senior-most uniformed officer of the country fell vacant due to the untimely demise of General Bipin Rawat in a helicopter crash on December 8 in Coonoor, Tamil Nadu.*

*By Mayank Singh*

New Delhi: Union Defence Minister Rajnath Singh on Thursday said that the government is proceeding with the exercise to find the successor of the deceased Chief of Defence Staff (CDS) General Bipin Rawat.

"The process to select the next CDS has begun and the name will be announced soon." Singh added. The Defence Minister said this while talking to the media on the sidelines of Awards ceremony for Excellence 2021 on the occasion of 96th Raising Day of Directorate General Defence Estates.

The post of the senior most uniformed officer of the country fell vacant due to the untimely demise of General Bipin Rawat in a IAF chopper crash on December 8 in Coonoor, Tamil Nadu. While, of the 10 passengers and four crew members 13 had died on the day of accident Group Captain Varun Singh succumbed to his injuries on December 15 in Command Hospital Bengaluru.

As first reported by The New Indian Express, General MM Naravane has been entrusted with the charge of Chairman, Chiefs of Staff Committee. With the creation of the CDS, the incumbent will become the permanent Chairman Chiefs of Staff Committee.

The post of CDS is important as it was created after a long wait in December 2019 and as the first CDS, General Rawat had initiated major reforms and reorganisation of higher defence management of the country.

Of the many duties and functions of the CDS, a few are -- to head the Department of Military Affairs (DMA) in the Ministry of Defence and function as its secretary, to act as the Principal Military Advisor to the Defence Minister on all Tri-Service matters.

Sources informed that Lt Gen Anil Puri, Additional Secretary in DMA is handling the officiating charge of the Secretary DMA and the current CISC, who is designated Deputy CDS under the CDS, Air Marshal BR Krishna is functioning as the Deputy CDS and will be reporting to General Naravane.

General Rawat had initiated restructuring of Military Commands for optimal utilisation of resources by bringing about jointness in operations, including through establishment of joint/theatre commands.

DMA is the fifth Department of the Ministry of Defence. The other four departments are the Department of Defence, Defence Production, Ex Servicemen Welfare, Defence Research and Development Organisation.

<https://www.newindianexpress.com/nation/2021/dec/16/process-to-select-next-cds-has-begun-name-to-be-announced-soon-2396304.html>

## **Visit of Vietnam National Assembly Chairman: Deepening of Comprehensive Strategic Partnership between India and Vietnam for peace, security and stability in the region**

*By SD Pradhan*

Currently Mr Vuong Dinh Hue, Chairman of the powerful National Assembly of Vietnam is visiting India (15-19 December) along with a high-level delegation on the invitation of Vice President Sri Naidu and Sri Om Birla, Speaker of the Lok Sabha. Significantly, this year marks the fifth anniversary of the signing of Comprehensive Strategic Partnership between the two countries. Next year India and Vietnam would be celebrating 50 years of their diplomatic relations. Mr Hue is a matured politician and an economist besides being an experienced parliamentarian. His visit has an ambitious agenda covering various aspects not only of bilateral relations but also of regional and international issues.

In an interview to the Indian press, he pointed out three dimensions of his visit. First, to further deepen the Comprehensive Strategic Partnership between the two countries in general and the relations between their legislative bodies in particular. Second, to create a new impetus for the bilateral relations, and offer a chance for the two sides to understand more about policies on socio-economic development and foreign affairs of each country. Third, to compare their notes of international and global issues of common concern, and seek solutions to global challenges for contributing to peace, security, stability and development in the region and the world.

Vietnam is India's closest partner in the South East Asia. India-Vietnam relations have acquired a new dimension with common strategic, political, security and economic interests. Both are victims of the Chinese aggressiveness and fought wars with that country. Both desire peace, stability and security in the region and believe in multilateralism. Both are maintaining good relations with the two rivals- US and Russia. Both are working together in the UNSC as the non-permanent members and supporting each other on various regional and international issues.

Despite restrictions caused by pandemic, interaction between the officials and leaders of the two countries continued. Last year, India and Vietnam agreed to boost their economic and defence engagement further in a virtual meeting of the India-Vietnam Joint Commission on Trade, Economic, Scientific and Technological Cooperation, which was co-chaired by Indian Minister of External Affairs Dr S. Jaishankar and his Vietnamese counterpart Mr Pham Binh Minh. Defence Minister Rajnath Singh and his Vietnamese counterpart General Ngo Xuan Lich, had also agreed to enhance the annual defence cooperation mechanisms. India had offered Vietnam a line of credit worth \$500 million to develop its defence industry.

Most important summit last year was in virtual mode between PM Modi and Vietnamese PM Nguyen Xuan Phuc on the 21st December. Significantly, they issued 'the India-Vietnam Joint Vision for Peace, Prosperity and People containing the guidelines for future development of India-Vietnam Comprehensive Strategic Partnership'. In addition, seven agreements inked included one on implementing arrangements on defence industry cooperation and another on nuclear cooperation between India's Atomic Energy Regulatory Board and Vietnam Agency for Radiation and Nuclear Safety. The summit provided an opportunity to hand over one high speed guard boat to Vietnam, launch of two other vessels manufactured in India, and keel-laying of seven vessels being manufactured in Vietnam under the \$100 million defence Line of Credit extended by India to that country.



The summit spelt out seven steps to further strengthen the Comprehensive Strategic Partnership between the two countries. These included stepped up regular high-level and institutionalized exchanges based upon the foundations of deep-rooted historical and cultural bonds, shared values and interests, mutual strategic trust and understanding and shared commitment to international law; enhanced defence and security partnership with the aim of maintaining stability in the Indo-Pacific region and stepping up of military-to-military exchanges, training and capacity building programmes across the three services and coast guards and intensification of defence industry collaboration; maintenance of peace, stability, security and freedom of navigation and overflight in the South China Sea (SCS) while pursuing the peaceful resolution of disputes in accordance with international law, particularly the 1982 United Nations Convention on the Law of the Sea (UNCLOS); promote partnership in the Indo-Pacific region, including the shared focus on ASEAN-centrality; strengthen multilateral and regional cooperation, including in the United Nations, ASEAN-led mechanisms and Mekong sub-regional cooperation; work towards reliable, efficient and resilient supply chains; the target of US\$15 billion of trade to be achieved at the earliest (in the last FY the trade has already reached \$ 11.12 billion); and encouraging people to people contact. The progress on the above may be reviewed.

Significantly, PM Modi had stressed that the Code of Conduct (CoC) negotiations should not prejudice the interests of other countries in the region. This is important as India has exploration interests, which is not liked by China. It is expected that during the Chairman's visit, the two sides may officially announce extension for Indian ONGC to explore oil and gas in the SCS.

Vietnam is the strongest opponent of the Chinese nine-dash-line claim in the SCS. During its Chairmanship of ASEAN in 2020, Vietnam not only ensured unity among the members on the issue of Chinese aggressive activities but also support of the International Community for maritime security issues.

The visit of Mr Vuong Dinh Hue is also likely to usher in a series of dialogues and discussion celebrating establishment of 50 years of diplomatic relationship between the two countries. Continued cooperation between the legislative bodies of Vietnam and India is one of the important pillars in the Vietnam-India Comprehensive Strategic Partnership. The two countries are also members of multilateral parliamentary forums.

This visit in person, taking place soon after Russian President Putin's visit, is significant. Both India and Vietnam have very close relations with Russia. Vietnam has been showing interest in the BrahMos missile. It is likely that on BrahMos missile there could be some progress. Besides the issue of acquisition of Akash missile, the two sides may also discuss the issue of more seats for training in the institutes of armed forces for Vietnamese officers. This time during President Putin's visit, there had been a discussion on exploring the possibilities for the joint cooperation in nuclear power plant in third countries like the one India and Russia had completed in Bangladesh recently. This opens up a possibility for a trilateral cooperation for nuclear power plants in Vietnam.

This visit is going to be an important step forward in strengthening the relationship between the two countries not only in defence sector but also in economic and maritime security. Vietnam's economic growth during the pandemic was a real miracle and it is emerging as an important hub for manufacturing. These make Vietnam invaluable for India's trade relations. According to Mr Hue, to further promote trade and investment relations between the two countries, their ministries of industry and trade should soon convene the 5th meeting of the joint sub-committee on trade to seek measures to promptly remove trade barriers and promote exports to each other's market. There is no doubt that investment relationship between the two countries is not commensurate with the potentials they have. The need to enhance trade promotion activities and create more favourable conditions for Vietnamese and Indian enterprises can hardly be underestimated.

Importantly, their growing strategic relationship has a great potential for ensuring peace, prosperity and stability in the Indo-Pacific and beyond. There is convergence in the Indo-Pacific Oceans Initiative pushed by India and ASEAN Outlook for Indo-Pacific. As both the countries are having close relations with Russia and the latter's involvement in the Indo-Pacific could prove

invaluable. The effort should be de-hyphenate the SCS issue from the US-China strategic rivalry. The dialogue during this visit could pave the way in this direction.

<https://timesofindia.indiatimes.com/blogs/ChanakyaCode/visit-of-vietnam-national-assembly-chairman-deepening-of-comprehensive-strategic-partnership-between-india-and-vietnam-for-peace-security-and-stability-in-the-region/>

## Science & Technology News



Fri, 17 Dec 2021

### **ISRO to launch SSLV in the first quarter of 2022, lift-off satellites from four countries during 2021-2023**

*The SSLV will provide a payload capability of 500 kilograms to a 500-kilometre planar orbit.*

New Delhi: The Small Satellite Launch Vehicle (SSLV) being developed by the Indian Space and Research Organisation (Isro) is in the final stages of development and its maiden launch is set to be conducted in the first quarter of 2022. Minister for Science & Technology Dr Jitendra Singh on Thursday gave the information in a written reply in the Rajya Sabha.

The SSLV will provide a payload capability of 500 kilograms to a 500-kilometre planar orbit. By comparison, the PSLV — the workhorse of Isro — can take up to a 1,750-kilogram payload into SSO of 600 km altitude

The government has sanctioned Rs 169 crores for the development of the project. This will cover the development & qualification of the vehicle systems and the flight demonstration through three development flights (SSLV-D1, SSLV-D2 & SSLV-D3).

The hardware and structures for the SSLV development project including the solid motor cases, nozzle sub-systems, mandrels for the casting of solid motors, inter-stage structures, actuator motors add fixtures will be acquired through private industries.

"The development of SSLV has been primarily envisaged to build a cost-effective launch vehicle with high launch frequency and quick turnaround capability in order to cater to the growing opportunity in the global launch services market for small satellites," the Ministry of Science & Technology said in a statement.

SSLV is a three-stage all solid vehicle, which will have the option of multiple satellite mounting options for nano, micro and small satellites.

#### **ISRO to launch satellites from four countries in 2021-2023**

Isro has signed six agreements with four countries to launch satellites in 2021-2023, generating 132 million euros in revenue. The space agency, through its commercial arm, New Space India Limited (NSIL) will launch these satellites onboard Polar Satellite Launch Vehicle (PSLV), on a commercial basis.

"Through launching foreign satellites on-board an Indian launch vehicle, India has earned a foreign exchange revenue of nearly \$35 million and 10 million euros in the last three years," the minister said in his written reply.

He further added that the type of foreign satellites that have been launched by Isro includes satellites primarily for earth observation, scientific and technology demonstration purposes. Since 1999, Isro has launched a total of 342 foreign satellites belonging to 34 countries.

<https://www.indiatoday.in/science/story/isro-small-satellite-launch-vehicle-sslv-pslv-k-siwan-1888595-2021-12-16>

# Demonstrating Feshbach resonances between a single ion and ultracold atoms

A team led by Prof. Dr. Tobias Schätz, Professor of Atomic and Quantum Physics at the Institute of Physics at the University of Freiburg, Dr. Pascal Weckesser, Fabian Thielemann and colleagues, demonstrate magnetic Feshbach resonances between a single barium ion and lithium atoms at near absolute zero temperature. The researchers found that depending on the strength of the external magnetic field, the expansion of the ion and atoms can be controlled. "At these ultracold temperatures, the collisions between particles reveal their quantum mechanical nature," explains Schätz. "Our research has shown that we're learning a bit more about the possibilities for controlling the quantum mechanical properties of wave-particle duality." The group published their findings in the journal *Nature*.

## Quantum effects dominate at ultralow temperatures

In classical physics, the molecular formation of atoms and ions usually slows down with decreasing temperature until it finally gets so cold that the individual particles stand still and no collision or reaction can occur. However, the laws of quantum physics predict that at ultralow temperatures, quantum effects dominate rather than classical laws, and the collision of atoms and ions suddenly follows different rules. In the quantum realm, where the so-called wave-particle duality prevails, an ultracold temperature—just above absolute zero at  $-273.15$  degrees Celsius—leads to an increase in collision rates. The reason is that the particles can no longer be described as colliding spheres, but as wave packets that can superimpose, amplify or cancel each other out like water waves.

## Feshbach resonances despite stronger interaction

The superposition of the waves gives rise to resonances, which the Freiburg researchers studied. "Among other things, we found Feshbach resonances between barium ions and lithium atoms by controlling their interaction processes with the help of a magnetic field," says Schätz. Feshbach resonances have previously been demonstrated in collisions of slow atoms. However, the research group was now able to do so in a significantly different regime of strong interaction prevalent due to the ion's charge. In addition to magnetic fields, the scientists used ultrahigh vacuum and cages made of light in their laboratory to isolate the laser-cooled atoms and ions.

"Basic research on quantum mechanics is now increasingly leaving the lab and entering the real world. By studying the effects under idealized conditions in the lab, we can better understand them and use them in a controlled, wide-ranging way—curiosity driven and by the perspective of controlling and increasing the efficiency of chemical reactions, up to finding new ways for charge flow in solids," says Schätz.

**More information:** Pascal Weckesser et al, Observation of Feshbach resonances between a single ion and ultracold atoms, *Nature* (2021). DOI: [10.1038/s41586-021-04112-y](https://doi.org/10.1038/s41586-021-04112-y)

**Journal information:** *Nature*

<https://phys.org/news/2021-12-feshbach-resonances-ion-ultracold-atoms.html>



Artistic impression of an individual ion interacting with several atoms with a wave-like character. Credit: Ella Marushchenko

