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# Defence minister Rajnath Singh congratulates DRDO for successful night trial of Agni-II

*Rajnath Singh took to Twitter to congratulate the DRDO for successfully conducting the first-night trial of the surface to surface medium-range missile*

*By Yash Sanghvi*

Mumbai: Defence Minister and senior BJP leader Rajnath Singh on Sunday took to the social media platform of Twitter to congratulate the Defence Research and Development Organisation (DRDO). The congratulatory tweet was in lieu of the first successful night trial of the surface to surface medium-range missile conducted by the DRDO. "The nation is proud of DRDO scientists," he said.

## **Rajnath Singh's tweet congratulating the DRDO**

Congratulations to Team @DRDO\_India for the first successful night trial of surface-to-surface medium-range missile #Agni2.

The nation is proud of DRDO scientists who have helped India in strengthening its defence capabilities.

— Rajnath Singh (@rajnathsingh) November 17, 2019

## **DRDO successfully conducts the first-night trial**

On the night of November 16, the DRDO had successfully conducted the first night trial of Agni-II. The Agni-II is a versatile surface-to-surface medium-range nuclear-capable missile. The missile was launched from Dr. Abdul Kalam Island off Odisha, according to the defence sources. The missile has a strike range of 2000 km, the defence source stated. A defence official said this was the first time that the sophisticated missile was test-fired at night.

The 2000 plus km range surface to surface missile has already been inducted and is part of countries arsenal for strategic deterrence. It was launched as a regular exercise undertaken by the armed forces, he said. The test on November 16 was carried out by the specially formed Strategic Forces Command (SFC) of the Army with logistic support from the Defence Research and Development Organisation. Agni-II was developed by Advanced Systems Laboratory along with other DRDO laboratories and integrated by the Bharat Dynamics Limited, Hyderabad, the sources said.

## **Agni-II is part of the Agni series of missiles**

Agni-II is part of the Agni series of missiles which includes 700-km range Agni-I, 3,000-km range Agni-III, Agni-IV and Agni-V. The first test-firing of the prototype of the Agni-II missile was carried out on April 11, 1999. On May 17, 2010, the trial of nuclear-capable Agni-II ballistic missile was conducted by the Special Strategic Command Force from the ITR before it was made operational by the Army. The last trial was conducted on February 20, 2018, from the same base.

<https://www.republicworld.com/india-news/general-news/rajnath-singh-congratulates-drdo-for-successful-night-trial-of-agni-ii.html>

## **DRDO Chief says India will become self reliant in defence production in next 5 years**

*Defence Research and Development Organisation (DRDO) Chief Satheesh Reddy affirmed recently that India will become completely self-reliant in defence manufacturing in the next five years and will not need critical technologies from outside*

India is already self-reliant in a number of areas such as radars, electronic warfare system, torpedoes and communications systems, the DRDO Chief stated.

DRDO is a technology development organisation and all our technologies have been realised into products by various PSUs and industry. DRDO has set a target to achieve self-reliance in missiles, radars, sonars, torpedoes, armaments and EW (early warning) systems. The DRDO Director-General was delivering a lecture at an event organised by the Aeronautical Society of India. He stated

“We will offer our technologies to industries for early realisation of products and to support R&D facilities. Our focus will also be to support start-ups through the Technology Development Fund (TDF). Time and cost management of projects involving industry is another priority area. We have come up with a policy for identification of a Development Cum Production Partner (DcPP) in which the industry will be involved in all stages of system development. ”

When questioned about the progress of the Light Combat Aircraft and AMCA projects, he said “An advanced version, the LCA MK II, is the next aero platform. LCA MK II configuration is frozen and qualitative requirements are finalised.

It is our endeavour to develop the fifth-generation advanced multi-role combat aircraft (AMCA) as per the project schedule to meet the Air Force’s requirements. We should be in a position to roll out the first AMCA within five years of project approval.

Reddy in the lecture, briefed about his plans on outsourcing further to private industry. He said “The private sector has been playing a great role in the production of DRDO equipments. When Dr Kalam started work, there were barely 30 partner companies, but now we have more than 1,800.

A number of industries started as fabricators for us and have now become established aerospace manufacturers with our technology, handholding and quality practices. Actually, the aerospace industry developed by us is our strength.

The Akash air defence system, for example, is built 87% by the industry. We have thrown open our test facilities to the industry. We will help with technology for the development of products. We are identifying companies in the private sector that can take on the role of lead system integrator for major systems.” When inquired about the updates on systems like the BMD, Astra, the DRDO chief stated “We have developed a number of variants of anti-tank missiles. User trials of NAG ATGM have been successfully conducted and development trials of Helina, the airborne anti-tank missile, are under progress. We are currently working on MPATGM (man-portable anti-tank guided missile) programme. Five demonstration trials have already been completed and we would be able to offer it for user trials soon. India is one of the few countries that has an active and successful BMD (Ballistic Missile Defence) programme. We have demonstrated our BMD capability through both simulation as well as live target engagements in both endo and exo regions. All essential technologies have been proven through tests. ”

<https://eurasianimes.com/drdo-chief-says-india-will-become-self-reliant-in-defence-production-in-next-5-years/>

# The rapid-fire nuclear missile tests: What of India?

*The missile was analyzed for night flight for first time in person trials*

A slew of Indian missile checks has triggered hypothesis regarding the geostrategic message that the nation is sending its own neighbors. India's Strategic Forces Command (SFC) efficiently completed the night flight have a look at of nuclear-tipped Intermediate Vary Ballistic Missile (IRBM) Agni-II with 2,000km change on Saturday. It was touted to be individual trials in cooperation with the Defence Analysis and Development Organisation (DRDO). Media studies imply the missile used improved navigation system which may reduce concentrating on errors.

## **Message to China**

The DRDO is about to quickly have a look at its mysterious launch functionality of Okay-5 missile that's thought to have an assortment of three, 500 km. This means India could be purchasing the potential of atomic strikes from the ocean, air and the land, changing into solely the member of the nuclear membership. Others are the US, Russia, China and Israel.

## **India plans to Keep squadrons of Su-30MKIs fitted with BrahMos**

The triad's completion shall be a daring message mostly the northern rival that is effective, to China. Tensions with Pakistan on the west have been reigning excess since Prime Minister Narendra Modi abrogated Article 370 of the Structure eradicating Jammu and Kashmir's particular standing and the change of standing to two union territories together with Ladakh that obtained here into being on October 31. The completion of the triad is a message to China, which was needling India from Ladakh and business in Arunachal Pradesh.

India's mobile-launched ballistic missile deterrents that can attack any part of Pakistan s Agni collection rockets are all nuclear-capable and therefore are land-based and most of China. India has inducted Prithvi-1 and Agni-I to five with the SFC. Prithvi-1 can reach targets of as much as 600km away and Agni-I as much as 700km away with atomic warheads. Agni-II that has been analyzed because of its flight capabilities was tracked by its entire 2,000km flight, in accordance with research. Agni-III has and Agni-Four can take out targets Three, 500km away.

It & rsquo; s rumoured that it could possibly truly fly although is claimed to have 5,500 km change. The defence government are currently retaining details about the real change to keep away from global scrutiny. Agni-VI would be the actual gamechanger for the nation of hitting goals past eight,000 km, meaning it will probably be rated as a ICBM with the aptitude. What's more, the missile allegedly has MIRV (a number of independently targetable re-entry car) capabilities, which take India into a rare league of army powers. India is currently retaining its take a look at schedule secret.

## **Radars and telemetry stations**

The air-leg of the triad is that the supersonic BrahMos missiles, which are efficiently tested on Sukhoi-30MKI (Su-30MKI) air-superiority fighter airplanes. India plans to keep squadrons of Su-30MKIs fitted with BrahMos, in accordance with research. These are cruise missiles that can journey at Mach-Three (about thrice the pace of noise ) at reach goals 300km away. The three way partnership, brahMos Aerospace, is of growing a variant of the missile that may travel at greater than 28, inside the technique. The that has been analyzed on Saturday includes a launch weight of 17 tonnes and may take a 1,000 kg payload over 2,000km. A battery of telemetry commentary channels subtle radars devices and two naval boats positioned close to the belief level inside the area of Bay of Bengal tracked the missile by its flight, DRDO sources mentioned.

<https://nytelecast.com/2019/11/17/the-rapid-fire-nuclear-missile-tests-what-of-india/>

## **DRDO will continue to engage in cutting-edge technologies: G. Satheesh Reddy**

*In an exclusive interaction with BW Businessworld's Manish Kumar Jha, DRDO Chairman and Secretary Department of Defence R&D G. Satheesh Reddy talks about the critical issues of R&D in Defence, apart from other pertinent issues*

*By Manish Kumar Jha*

Despite insufficient budget and structural changes, Defence Research and Development Organisation (DRDO) has performed commendable on missile technology and fighter aircraft. In an exclusive interaction with BW Businessworld's Manish Kumar Jha, DRDO Chairman and Secretary Department of Defence R&D G. Satheesh Reddy talks about the critical issues of R&D in Defence, apart from other pertinent issues.

Excerpts:

**The plan to develop Kaveri fighter engine as a part of the Rafale deal has hit a roadblock after the Indian side found pricing prohibitive. Only a part of the offsets, over €250 million, could be utilised for the project and the remaining €500 million, the DRDO would have to shell out. Please share insight about the Kaveri engine and challenges to achieve the required thrust? Do you still see Kaveri as a potential fit?**

While developing Kaveri engine, we have learnt our lessons. It was a useful, technology development vehicle to traverse the path of fighter aircraft engine development cycle and understanding. The project gave enormous insight and experience in development of materials; various sub systems, assembly and testing an aircraft engine. It might have fallen short of expectations, but teams have gone through the process and now the requisite know how to develop a fighter aircraft engine and the intricacies involved. They are better equipped to handle and point of take off is definitely higher for next gen aircraft engine.

We have moved beyond Kaveri engine in terms of power, technology and utility. We intend to develop our own engines for fighter aircrafts; it could be with or without collaboration. Development of such critical technology is not about economics or offsets but about building technological capability in the country.

**Then, how about the AMCA and Tejas MK 2, as they require higher capacity engine?**

Higher capacity engine is a must for both aircrafts and there are no two opinions about that. Two parallel approaches are being planned, first is use of imported engine for development, and second is to develop indigenous engine, while progressing aircraft integration and flight testing to prove other aspects.

**Do we see the AMCA project being realised by 2023 as it addresses the huge capability gap in IAF for the depleting squadron? With the current scope of design, will the AMCA be at par with the F-22 Raptor and the F-35?**

It is our endeavor to develop the AMCA as per the project schedule to meet the Air force requirements. Preliminary designs of the aircraft have already been carried out. We should be in a position to roll out the first AMCA within 5 years of projection. We are not comparing AMCA with other aircrafts, but trying to meet our specifications.

### **Kindly tell about India's two-tier Ballistic Missile Defence (BMD) system?**

India is one of the few countries to pursue the BMD programme with vigor and enthusiasm. We have demonstrated our BMD capability through both simulation studies as well as live target engagements in both endo and exo regions. All essential technologies required for BMD include propulsion, sensors, precision control systems and terminal intercept with kill vehicle technologies, which have matured and proven through trials.

**This alleged that the DRDO is just tinkering with the World War II equipment instead of working on cutting-edge technology...**

A-SAT, Ballistic Missiles, Ballistic Missiles defence Systems, Radars, Sonars, EW systems, Torpedoes are state-of-the-art systems and not World War II systems. Ignorance is not a bliss. DRDO has always and will continue to engage in cutting edge technologies. All the stakeholders have always appreciated the efforts of DRDO. Incidentally, in all of the above systems, we are one of the six or seven countries in the world to develop such capability.

Such points are raised to undermine the gains achieved from indigenous technology. We aimed to achieve self reliance in defence equipment and systems.

**Do we see the DRDO taking a giant leap in futuristic technologies such as Drones/Anti drones, AI applied applications, robotics in defence? Could you please give us the details of advance research in such areas, in the context of defence?**

Drones and Anti Drone technology area is on our prime agenda, as we are grappling with the current threat scenario. We are involving academia, startups and industry in a big way. We are working in the areas of cyber security, Artificial Intelligence, quantum computing, asymmetric technologies.

**Laser-based CIWS by the DRDO's Laser Science and Technology Centre takes on the future battlefield? Where are we now? Will the laser-Direct Energy as the weapon be the dominant weapon of the future?**

We have been working in the field of lasers and directed energy weapons for quite some time. We have developed a system, which is being field tested with medium power laser. Directed energy systems are primarily used for defence against drones and low altitude slow speed threats in the sky. We have acquired expertise in configuring; designing, integrating and testing ground based complex electro optical – laser systems for defence applications. We have to cover some ground in the area of high power lasers.

**DRDO's capital allocation is mere 6 per cent of the total defence budget and that also includes the cost of maintenance and other administrative expenditure, which is grossly inadequate. The Centre should treat DRDO as No. 1 priority. How do you look at the budgetary constraint? What would be grand allocation to sufficiently get the DRDO going high on multiple fronts?**

We have been adequately supported by the Centre in our research and development activities. As you have rightly said, cutting-edge technologies are not available at any cost. They are acquired hard way through the persistent efforts of the scientific community of the country. The Centre is well awarded. Whenever we approach for financial support, the response from the government is encouraging. We will put our best foot forward with the means provided.

**It has been often debated the role of private companies in the defence & aerospace, but lack in investment? What would the DRDO do to make a big difference in handholding and providing labs and infrastructure to private players for let say testing?**

Industry has played a great role in the production of the DRDO developed products. We have developed a number of erstwhile normal fabricators into established aerospace manufactures now, with our technology inputs, hand holding and quality practices. Actually, the aerospace industry developed by us, is our strength. I have been saying in different forums that the DRDO will not enter and work where industry can develop products for defence forces. We would like to concentrate on

futuristic and cutting-edge technologies, while meeting current demands of the tri services. We have thrown open our test facilities for the industry with reasonable charges. Let industry come out with reasonable proposals with investment, we will help with technology for the development of products.

<http://www.businessworld.in/article/DRDO-Will-Continue-To-Engage-In-Cutting-edge-Technologies-G-Satheesh-Reddy/14-11-2019-178712/>



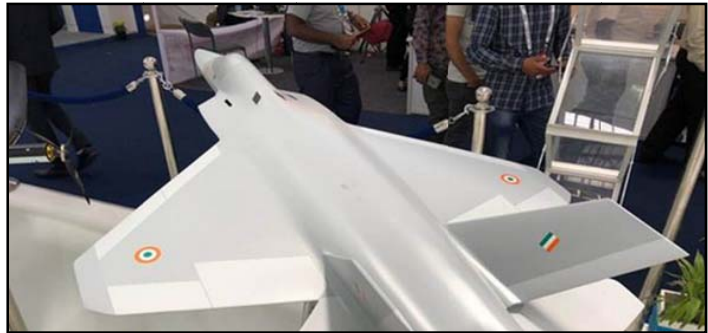
Tue, 19 Nov 2019

## Advanced Medium Combat Aircraft: India's own fifth-generation aircraft to boost defence industry

*Indian Air Force (IAF) is very keen that such indigenous development of aircraft should take place and the newly appointed IAF Chief Air Chief Marshal RKS Bhadauria has stated that 'the IAF gives full support to this idea and the programme is definitely taking off'*

*By Dr Ajey Lele*

It is expected that one of the most ambitious venture by India's defence establishment ever undertaken involving design and prototype development of Advanced Medium Combat Aircraft (AMCA) would get the approval by the Cabinet Committee on Security early next year. This project involves the development of a fifth-generation fighter aircraft and is expected to be undertaken jointly by various agencies of India's defence establishment and also private industry. The lead agencies of this project would be the Aeronautical Development Agency (ADA, an agency of DRDO) as the design firm and Hindustan Aeronautics Limited (HAL) as a manufacturing firm.



Indian Air Force (IAF) is very keen that such indigenous development of aircraft should take place and the newly appointed IAF Chief Air Chief Marshal RKS Bhadauria has stated that 'the IAF gives full support to

this idea and the programme is definitely taking off'. It is expected that this process of involving the end-user since the 'word go' would definitely help to develop this project in the desired direction.

This project is now, no longer only at a conceptual stage and some work has already begun. It is expected that the aircraft could undertake its first flight only by around 2032. Almost for four decades now DRDO has been working on the project involving the indigenous development of Light Combat Aircraft (LCA) called Tejas. This aircraft got inducted in the IAF on July 1, 2016. This is a lightweight, multi-role supersonic fighter aircraft and its trainer version is also available. This project did witness significant delays in execution, however, it has also helped both DRDO and HAL immensely to gather experience in the design and development of such aircraft. It has also assessed in developing an ecosystem within the country for such modern flying platforms.

DRDO is expected to use a similar engine which is presently under design and development for the LCA project, called GE-414 engine. The aircraft belongs to the 'medium' group and is a 19-20 ton category fifth-generation fighter aircraft featuring stealth and including an internal weapon bay. This aircraft could be a better version of say upgraded Mirage 2000, the aircraft which currently the IAF flies. This aircraft is expected to complement the aircraft inventory which the IAF is expected to fly

say for a period of next 10 to 15 years. This would be a multirole combat aircraft and would be used in various conventional roles like strike, ground attack, interception and bombing. It is expected to have advanced avionics on-board to match the best in the world in this category of aircraft.

India's interest in the development of the fifth-generation fighter aircraft has been visible since 2007. There was much of talk towards the development of the fifth-generation fighter aircraft as a joint project by Indian and Russia. This project was alive for many years, however, India is known to have withdrawn from the project for unknown reasons around 2018. Subsequently, there was some talk that this project is still 'on track' for a very short duration to time, but now it appears that India would have a full focus on AMCA only.

There is much concern about the timelines of AMCA. This aircraft is expected to be flightworthy only by 2032 and this is a projected timeline. Globally and particularly with the Indian system, the experience which such major projects has always been that the timelines are very difficult to adhere too. There is also an opinion that 'around 2035, there would an increasing dependence on the UAVs, so would IAF require a flying platform like this then'? However, it is important to realise that almost for the last two decades there have been talks like UAVs (and long range missiles) would make fighter flying redundant, but all this has not happened. Obviously, there are many valid reasons for the survival of fighter aircraft as a major warfighting platform.

It is also important to note that the development of such platforms is time-consuming. The F-22, a prominent fifth-generation fighter jet is a cold war era design and was in making since the 1970s. It finally entered into the service during December 2005. Even then there was a talk that 'what use is the cold war era design aircraft, in the post-cold war period'. However, the aircraft has withstood the test of time.

AMCA is an important project both for IAF and DRDO/HAL. It would also be a major boost for India's defence industry. AMCA project should evolve as a major laboratory for India's aerospace industry.

*(The author is Senior Fellow, IDSA, New Delhi. Views expressed are personal.)*

<https://www.financialexpress.com/defence/advanced-medium-combat-aircraft-indias-own-fifth-generation-aircraft-to-boost-defence-industry/1765101/lite/>



## Varanasi: Youth develops 'Iron Man' suit to help soldiers in battle

Varanasi: Inspired by the Iron Man franchise, a part-time employee at a private university in Varanasi has developed an Iron-Man suit with the aim of helping the Indian Army soldiers in their encounters with enemies. Shyam Chaurasia, who works at the Ashoka Institute of Technology and Management, said that he made the suit prototype in an attempt keeping the soldiers of the Indian Army in mind.

"It is a metal suit designed to help the Indian Army soldiers during their encounters with terrorists and enemies. Currently, it is just a prototype, but it can help the soldiers immensely during the times of the battle," Chaurasia told ANI on Monday. "We have used gears and motors and it also has a mobile connection so that it can be used remotely. It has sensors which will help the jawans even when he is attacked from the back," he added.

The suit, made from 'jugaad' technology, is currently made of tin, but the determined youth is seeking for funds to make a working model out of it. Chaurasia added that the suit would act as a deterrent to the enemies of the nation, and at the same time embolden the soldiers even further by reducing the risk on their lives. "I would urge the government agencies like DRDO to take note of this suit and to build upon it to help the soldiers as other countries like Pakistan among others too are working on such models. The cost of a soldier's life is very high, what I have done is just an attempt to bring it in the radar of DRDO and other agencies," he said. (ANI)



<https://www.sify.com/news/varanasi-youth-develops-iron-man-suit-to-help-soldiers-in-battle-news-national-tlftGyeiifibh.html>

## India's first Chief of Defence Staff will direct three service Chiefs

*While the implementation committee is still to define the charter for the CDS, people familiar with the matter said the chief will be a single-point military adviser to the government, as suggested by the K Subrahmanyam-led Kargil Review Committee*

*By Shishir Gupta*

New Delhi: India's first Chief of Defence Staff (CDS) is expected to be announced next month — along with the appointment of a new army chief to replace Gen Bipin Rawat, who is retiring on December 31 — with powers to direct the three service chiefs and to create new theatre commands for an optimal military response in case of hostilities.

While the implementation committee, appointed by Prime Minister Narendra Modi and headed by national security adviser Ajit Doval, is still to define the charter for the CDS, people familiar with the matter said the chief will be a single-point military adviser to the government, as suggested by the K Subrahmanyam-led Kargil Review Committee.

The people cited above also said that the CDS “will not be a paper tiger”, but someone whose advice will be binding on the three services chiefs.

They added that apart from being responsible for promoting jointmanship, the new CDS will be heading all tri-service structures, with the existing post of Integrated Defence Staff being converted into the Vice Chief of Defence Staff. The current IDS chief Lt Gen PS Rajeshwar is being posted to India's only tri-service command at Andaman and Nicobar islands. He will succeed Vice-Admiral Bimal Verma, who is retiring on November 30.

Jointmanship, a key military doctrine, refers to coordination and integration of strategy, capabilities and execution across the three services.

The people said that though the CDS will carry four stars (like chiefs of the three services do), he will be the “first among equals”, with the task of prioritising hardware for future Indian military needs, allocating tri-services assets to the new theatre commands, and designating tasks to these formations.

The new CDS will be at the heart of Indian military diplomacy, spelling out the new jointmanship terms to break silos between the three services, which, experts say, have been prone to protecting their own turfs while joining hands only on common issues such as pay and pension.

Jointmanship, as military experts including former service chiefs have pointed out, is more important in the event of a two-front war on India's northwestern and northeastern borders. China has already divided the People's Liberation Army into military regions and theatre commands for pinpointed military application. The Pakistani armed forces, meanwhile, operate on a joint staff headquarters concept, with the army playing the lead role under its Corps Commanders.

Former Northern Army commander Lieutenant General BS Jaswal (retd) said jointmanship is extremely important to optimise all the resources that are available in the armed forces. “It is especially important in the light of the philosophy of theatre commands,” he added.

<https://www.hindustantimes.com/india-news/new-chief-of-defence-staff-will-direct-three-service-chiefs/story-r9sHOKiMmIoYemSIXODWPK.html>

## राजनाथ सिंह का रक्षा कंपनियों को भारत में निवेश का न्यौता, Make In India पर जोर

रक्षा मंत्री राजनाथ सिंह ने रक्षा कंपनियों को सोमवार (18 नवंबर) को भारत में निवेश का न्यौता देते हुए कहा कि भारत ने 2025 तक देश से पांच अरब डॉलर के रक्षा उत्पादों के निर्यात का लक्ष्य रखा है। इसलिए कंपनियों को भारत में निवेश कर यहां की वृद्धि का हिस्सेदारी बनना चाहिए। वह यहां 'इंडिया राइजिंग' पर एक संगोष्ठी को संबोधित कर रहे थे। उन्होंने कहा कि प्रधानमंत्री नरेंद्र मोदी के नेतृत्व वाली सरकार देश को रक्षा विनिर्माण केंद्र बनाने के लिए प्रतिबद्ध है और अगले छह साल में इसे 26 अरब डॉलर का उद्योग बनाना चाहती है। उन्होंने कहा कि भारत में वैमानिकी, रक्षा साजोसामान और सेवा क्षेत्र में 2025 तक 10 अरब डॉलर का निवेश होने की उम्मीद है। यह क्षेत्र 20 से 30 लाख लोगों को रोजगार दे सकता है।

सिंह यहां मुख्य तौर पर आसियान देशों के रक्षा मंत्रियों एवं अन्य संवाद सहयोगी देशों की बैठक (एडीएमएम-प्लस) में भाग लेने पहुंचे हैं। यह आसियान देश और उसके आठ संवाद साझेदार देशों का एक मंच है। भारत इसका हिस्सा है। रक्षा मंत्री ने कहा कि प्रौद्योगिकी के हस्तांतरण के लिए एक नयी नीति लायी गयी है, ताकि रक्षा अनुसंधान और विकास संगठन (डीआरडीओ) द्वारा विकसित प्रौद्योगिकी उद्योग को आसानी से उपलब्ध करायी जा सके।

सिंह ने कहा, "सरकार की रक्षा उत्पादन नीति-2018 के मसौदे में उसने 2025 तक देश से पांच अरब डॉलर के रक्षा उत्पाद के निर्यात करने का लक्ष्य रखा है।" उन्होंने कहा कि एक तरफ तो यह लक्ष्य बहुत महत्वाकांक्षी दिखता है, लेकिन उसी समय यह बात प्रोत्साहित करती है कि देश का रक्षा निर्यात पिछले दो साल में छह गुना से अधिक बढ़ा है। सिंह ने कहा कि रक्षा क्षेत्र को 'मेक इन इंडिया' पहल के तहत त्वजो दी गयी है और इसका मकसद देश की रक्षा आयात पर निर्भरता घटाकर उसे विशुद्ध तौर पर रक्षा उत्पाद एवं मंच का निर्यातक बनाना है। उन्होंने निर्यात बढ़ाने के लिए रक्षा मंत्रालय द्वारा शुरू की गयी विभिन्न पहलों का भी जिक्र किया। इन पहलों में निर्यात के लिए प्रक्रियाओं का सरलीकरण, उद्योग लाइसेंस प्रक्रिया का सरलीकरण, प्रत्यक्ष विदेशी निवेश की सीमा में बढ़ोत्तरी, रक्षा ऑफसेट नीति को आसान बनाना और सरकार की परीक्षण सुविधाओं को निजी क्षेत्र के लिए उपलब्ध कराना इत्यादि शामिल हैं।

सिंह ने कहा कि 2016 में रक्षा खरीद प्रक्रिया को संशोधित किया गया और घरेलू रक्षा उद्योग को बढ़ावा देने के लिए एक नयी श्रेणी 'खरीदें भारतीय उत्पाद : आईडीडीएम (स्वदेश में डिजाइन, विकसित और विनिर्मित) श्रेणी बनायी गयी। सिंह ने कहा कि सरकार की तमिलनाडु और उत्तर प्रदेश में दो रक्षा गलियारे विकसित करने की इच्छा जगजाहिर है। एक रक्षा नवोन्मेष केंद्र पहले से कोयंबटूर में कार्यरत है। इसके अलावा एक रक्षा योजना समिति भी गठित की गयी है। उन्होंने कहा कि उत्तर प्रदेश सरकार ने एक रक्षा विनिर्माण गलियारा विकसित

करने की योजना बनायी है जो प्रस्तावित बुंदेलखंड एक्सप्रेसवे के साथ-साथ होगा। यह गलियारा भारत को रक्षा उत्पादन में आत्मनिर्भर बनाने में मदद करेगा।

उन्होंने कहा कि पिछले साढ़े पांच साल में सरकार ने दूरगामी सुधार किए हैं जिसका मकसद सार्वजनिक और निजी क्षेत्र के भी सामंजस्य बेहतर करना है। इन सुधारों ने रक्षा उत्पादन और खरीद में सकारात्मक योगदान दिया है। इसके अलावा लोक-निजी भागीदारी के तहत साझा परीक्षण और प्रमाणन योजना लाने पर काम किया जा रहा है। सरकार ने रक्षा आत्मनिर्भरता को आगे बढ़ाने के लिए पांच प्रमुख मानक तय किए हैं। ये मानक पहचान, इंक्वैबेशन, नवोन्मेष, एकीकरण और स्वदेशीकरण हैं। उन्होंने कहा कि रक्षा मंत्रालय ने 250 स्टार्टअप कंपनियों, 16 कार्मिक पहलों और पांच रक्षा नवोन्मेष केंद्रों को वित्त पोषण करने का लक्ष्य तय किया है। सिंह ने घरेलू और वैश्विक रक्षा कंपनियों को अगले साल लखनऊ में पांच से आठ फरवरी के बीच होने वाली 'रक्षा प्रदर्शनी' में शामिल होने का न्योता भी दिया।

<https://www.livehindustan.com/international/story-rajnath-invites-defence-majors-to-invest-in-india-in-bangkok-2856829.html>

## पाकिस्तान ने परमाणु हथियार ले जाने में सक्षम मिसाइल शाहीन-1 का किया परीक्षण

**पाकिस्तान ने सतह से सतह तक मार करने में सक्षम शाहीन-1 मिसाइल का सोमवार को सफल परीक्षण किया। यह मिसाइल परमाणु हथियार ले जाने में सक्षम है। इसकी मारक क्षमता 650 किलोमीटर है।**

**इस्लामाबाद:** पाकिस्तान ने सोमवार को सतह से सतह तक मार करने में सक्षम शाहीन-1 मिसाइल का सफल परीक्षण किया। परमाणु हथियार ले जाने में सक्षम इस मिसाइल की मारक क्षमता 650 किलोमीटर है। पाकिस्तानी सेना के प्रवक्ता मेजर जनरल आसिफ गफूर ने ट्वीट कर इसकी जानकारी दी। सेना प्रवक्ता ने बताया कि इस मिसाइल का परीक्षण पाकिस्तानी सेना के स्ट्रैटिजिक फोर्सज कमांड ने किया है। इस मिसाइल को हत्फ-4 के नाम से भी जाना जाता है।

गफूर ने मिसाइल का एक विडियो पोस्ट कर कहा कि इस मिसाइल के परीक्षण का उद्देश्य पाकिस्तानी सेना के रणनीतिक कमांड की ऑपरेशनल तैयारियों को परखना था। उन्होंने कहा कि इसके जरिए पाकिस्तान की विश्वसनीय न्यूनतम प्रतिरोध क्षमता को जांचा गया है। पाकिस्तान की इस मिसाइल के दायरे में भारत के लगभग सभी इलाके आएंगे। पाकिस्तान ने यह मिसाइल परीक्षण कहां किया है, यह अभी स्पष्ट नहीं है।

### **अगस्त में गजनवी मिसाइल का किया था परीक्षण**

इससे पहले पाकिस्तान ने अगस्त महीने में गजनवी मिसाइल का परीक्षण किया था। बता दें कि दो दिन पहले ही भारत ने 2,000 किलोमीटर तक की रेंज में दुश्मन को मार गिराने में सक्षम अग्नि-2 बलिस्टिक मिसाइल का सफल परीक्षण किया था। न्यूक्लियर हथियारों को ले जाने में सक्षम इस मिसाइल का परीक्षण रात के समय किया गया। इस मिसाइल का पिछले साल ही परीक्षण किया था, लेकिन पहली बार इसे रात में लॉन्च किया गया है।

न्यूक्लियर हथियारों को ले जाने में सक्षम इस मिसाइल की रेंज को जरूरत पर 3,000 किलोमीटर तक बढ़ाया जा सकता है। यह पहला मौका है, जब भारत ने रात के वक्त किसी मिसाइल का परीक्षण किया है। स्ट्रैटिजिक फोर्सज कमांड ने यह परीक्षण ओडिशा के एपीजे अब्दुल कलाम द्वीप पर किया। भारत के रक्षा बड़े में इस मिसाइल के शामिल होने से सुरक्षा को नए आयाम हासिल हुए हैं।

<https://navbharattimes.indiatimes.com/world/pakistan/pakistan-test-fired-missile-shaheen-1-capable-of-carrying-nuclear-weapons/articleshow/72107566.cms>

## **Pakistan successfully conducts test launch of surface-to-surface ballistic missile**

Islamabad: Pakistan on Monday successfully test-fired a nuclear capable surface-to-surface ballistic missile which can strike targets up to 650 kilometres, bringing a number of Indian cities under its range.

The test-firing of the Shaheen-I missile by the Pakistani military took place amidst Indo-Pak tensions over New Delhi revoking Jammu and Kashmir's special status.

According to Director General Inter Services Public Relations Major General Asif Ghafoor, the launch of Shaheen-I missile was held as part of a training exercise "aimed at testing the operational readiness of Army Strategic Forces Command".

The Shaheen-1 missile is capable of delivering all types of warheads up to range of 650 KMs, the ISPR chief tweeted.

"The launch was aimed at testing operational readiness of Army Strategic Forces Command (ASFC) ensuring Pakistan's credible minimum deterrence," he said. Pakistan successfully conducted training launch of SSBM Shaheen-1 capable of delivering all types of warheads upto... <https://t.co/2CjgmPCBi5> — DG ISPR (@OfficialDGISPR) 1574065329000

The Director General Strategic Plans Division, Commander Army Strategic Forces Command, senior officers from Strategic Plans Division, Army Strategic Forces Command, scientists and engineers witnessed the training launch, according to Pakistani media reports.

"Troops displayed a high standard of proficiency in handling and operating the potent weapon system, ensuring Pakistan's credible minimum deterrence, " the ISPR, the media wing of the Pakistani military, said.

Pakistan successfully test-fired nuclear-capable surface-to-surface ballistic missile 'Ghaznavi' with a range of up to 290 kms on August 29, days after India revoked Jammu and Kashmir's special status on August 5.

The Indian Air Force carried out the successful firing of BrahMos surface-to-surface missiles from a mobile platform in October to check the IAF's capability to hit targets with "pin-point" accuracy at targets close to 300 KM.

The Pakistani missile test also came days after India conducted the first night trial of 'Agni-II' , its versatile surface-to-surface medium range nuclear-capable missile.

The 'Agni-II' missile has a strike range of 2,000 km and is an intermediate range ballistic missile. It has already been inducted into the armed forces.

India and Pakistan have been at odds after New Delhi abrogated the provisions of Article 370 of the Constitution to revoke Jammu and Kashmir's special status and bifurcated it into two union territories.

Pakistan reacted strongly to India's decision and downgraded bilateral ties and expelled the Indian envoy.

India has categorically told the international community that the scrapping of Article 370 was an internal matter. It has also advised Pakistan to accept the reality and stop all anti-India propaganda.

<https://timesofindia.indiatimes.com/world/pakistan/pakistan-successfully-conducts-test-launch-of-surface-to-surface-ballistic-missile/articleshow/72107826.cms>

## China's aircraft carrier sails near Taiwan, to train in disputed South China Sea

*The Chinese aircraft carrier fleet passed through the narrow Taiwan Strait days after an UN warship took the same route: The passage of the Chinese unnamed carrier is said to be a message to self-ruled Taiwan, which Beijing claims is a breakaway province*

*By Sutirtho Patranobis*

Beijing: China's first domestically built aircraft carrier is set to be deployed in weeks as it is set for a critical pre-launch training session in the dispute-ridden South China Sea after having sailed through the Taiwan Strait over the weekend, the People's Liberation Army (PLA) said on Monday.

The carrier, known as Type 002, is the largest warship built by China. Sunday's sail through the Taiwan Strait was its first appearance on a strategic waterway.

The Chinese aircraft carrier fleet passed through the narrow Taiwan Strait days after an UN warship took the same route: The passage of the Chinese unnamed carrier is said to be a message to self-ruled Taiwan, which Beijing claims is a breakaway province.

Organizing the domestically-built aircraft carrier for this kind of cross-regional sea testing and training is a normal arrangement in the construction of the carrier, said Cheng Dewei, spokesperson of the PLA Navy, in a video released by the PLA Navy in its Sina Weibo account on Monday.

A military expert told the tabloid Global Times on Monday that conducting a sea trial in the South China Sea will allow the aircraft carrier crew to become familiar with the sea area where it will often sail in future.

The deployment of the second carrier will boost China's rapidly expanding naval power as its warships sail further in international waters.

China's first aircraft carrier Liaoning, made in the Soviet Union before its dissolution, was launched in 2012.

The new one can carry at least 36 domestically developed J-15 fighter jets, some 50 percent more than the country's first, state media reported earlier this year. China's first aircraft carrier the Liaoning can carry 24 J-15 fighter jets.

Xu Guangyu, a senior consultant at the China Arms Control and Disarmament Association, told the Global Times that a sea trial involving an aircraft carrier fleet that includes multiple other vessels is needed before the carrier is commissioned.

"After the sea trial in the South China Sea, the aircraft carrier could sail to a naval port in Sanya, South China's Hainan Province for a commissioning ceremony that will see it finally join the PLA Navy," the GT report said.

If the domestically developed aircraft carrier is indeed hosted by the Sanya naval port over the long term, the South China Sea will be right at its doorstep, and not far from the island of Taiwan, analysts told the tabloid.

<https://www.hindustantimes.com/world-news/china-s-aircraft-carrier-sails-near-taiwan-to-train-in-disputed-south-china-sea/story-4rjhUAdpthaO35BP9H85gN.html>

## India to launch Cartosat-3, 13 nanosatellites from US on November 25: ISRO

*Cartosat-3 satellite is a third-generation agile advanced satellite having high-resolution imaging capability. The satellite will be placed in an orbit of 509 km at an inclination of 97.5 degrees*

### **HIGHLIGHTS**

- *Cartosat-3 satellite is a third-generation agile advanced satellite having high-resolution imaging capability*
- *ISRO's rocket PSLV-XL will put into orbit Cartosat-3 and 13 commercial nanosatellites from US*
- *The satellite will be placed in an orbit of 509 km at an inclination of 97.5 degrees*

Chennai: India will launch its cartography satellite Cartosat-3 and 13 commercial nanosatellites into sun-synchronous orbit on November 25, the Indian space agency said on Monday.

According to the Indian Space Research Organisation (ISRO), its rocket Polar Satellite Launch Vehicle-XL variant (PSLV-XL) will put into orbit Cartosat-3 and 13 commercial nanosatellites from the US on November 25.

The rocket is expected to lift off at 9.28 am.

Cartosat-3 satellite is a third-generation agile advanced satellite having high-resolution imaging capability. The satellite will be placed in an orbit of 509 km at an inclination of 97.5 degrees.

According to ISRO, the 13 nanosatellites from US is a part of the commercial arrangement with NewSpace India Ltd (NSIL), the new company that was set up recently under the Department of Space.

<https://www.indiatoday.in/india/story/congress-notice-in-lok-sabha-over-withdrawal-of-spg-cover-of-gandhi-family-1620406-2019-11-19>



## **Explained: Understanding space Internet**

*SpaceX shot 60 satellites into orbit last week, and will keep doing so until it has a 12,000-strong constellation in place. In two years, it hopes to supply non-stop, low-cost Internet everywhere on Earth*

*By Sohini Ghosh, Amitabh Sinha*

Ahmedabad, Pune: The SpaceX, the world's leading private company in space technology, last week fired a spray of 60 satellites into orbit, the first operational batch of what is intended to eventually evolve into a constellation of nearly 12,000 satellites aimed at providing low-cost and reliable space-based Internet services to the world. The Starlink network, as the project is called, is one of several ongoing efforts to start beaming data signals from space, and also the most ambitious.

The first batch of Starlink satellites — also numbering 60, and similar in configuration to the ones launched on November 11 — went up on May 24, but they will not be part of the network. SpaceX announced the satellite Internet constellation in January 2015, and launched two test satellites in February 2018. Following last week's launch, the company has now deployed 122 satellites in orbit.

In October, SpaceX appeared ready to scale up its ambition, telling the International Telecommunication Union (ITU) in filings through the United States Federal Communications Commission (FCC) that it intends to deploy another 30,000 Starlink satellites in Low Earth Orbit (LEO) in coming years.

The ITU is the United Nations specialised agency for information and communication technologies, with a membership of 193 member states, some 900 companies, universities, and international and regional organisations. The FCC is the statutory communications regulator of the US.

### **Why is it necessary to launch satellites in order to provide Internet services?**

This is mainly to ensure that reliable and uninterrupted Internet services — now part of humanity's basic infrastructure and an important means of delivering a wide variety of public services to the world's peoples — are universally available in every part of the globe.

Currently, about 4 billion people, more than half the world's population, do not have access to reliable Internet networks. And that is because the traditional ways to deliver the Internet — fibre-optic cables or wireless networks — cannot take it everywhere on Earth. In many remote areas, or places with difficult terrain, it is not feasible or viable to set up cables or mobile towers.

Signals from satellites in space can overcome this obstacle easily.

### **How old is this idea of space Internet?**

Space-based Internet systems have, in fact, been in use for several years now — but only for a small number of users. Also, most of the existing systems use satellites in geostationary orbit. This orbit is located at a height of 35,786 km over the Earth's surface, directly above the Equator. Satellites in this orbit move at speeds of about 11,000 km per hour, and complete one revolution of the Earth in the same time that the earth rotates once on its axis. To the observer on the ground, therefore, a satellite in geostationary orbit appears stationary.

So how will placing satellites in lower orbits help?

One big advantage of beaming signals from geostationary orbit is that the satellite can cover a very large part of the Earth. Signals from one satellite can cover roughly a third of the planet — and three to four satellites would be enough to cover the entire Earth. Also, because they appear to be stationary, it is easier to link to them.

But satellites in geostationary orbit also have a major disadvantage. The Internet is all about transmission of data in (nearly) real time. However, there is a time lag — called latency — between a user seeking data, and the server sending that data. And because data transfers cannot happen faster than the speed of light (in reality, they take place at significantly lower speeds), the longer the distance that needs to be covered the greater is the time lag, or latency.

In space-based networks, data requests travel from the user to the satellite, and are then directed to data centres on the ground. The results then make the same journey in the reverse direction. A transmission like this from a satellite in geostationary orbit has a latency of about 600 milliseconds. A satellite in the lower orbit, 200-2,000 km from the Earth's surface, can bring the lag down to 20-30 milliseconds, roughly the time it takes for terrestrial systems to transfer data.

The LEO extends up to 2,000 km above the Earth's surface. The Starlink satellites — the 12,000 for which SpaceX has permission, as well as the other 30,000 that it wants to launch — will be deployed in the altitude band of 350 km to 1,200 km.

But lower orbits have their own problem.

Owing to their lower height, their signals cover a relatively small area. As a result, many more satellites are needed in order to reach signals to every part of the planet.

Additionally, satellites in these orbits travel at more than double the speed of satellites in geostationary orbit — about 27,000 km per hour — to balance the effects of gravity. Typically, they go around the Earth once every few hours. To compensate for the fact that they cannot be seen from a terrestrial location for more than a few minutes, many more satellites are needed in the networks, so that there are no breaks in the transmission of data. That is the reason why the Starlink network is talking about 42,000 satellites.

### **By when will Starlink be able to provide its space-based Internet service?**

Starlink aims to start service in the northern United States and Canada in 2020, and expand to cover the whole world by 2021. The current plan is to deploy satellites in two constellations of around 4,400 and 7,500. Launches — 60 satellites at a time — will take place at frequent intervals now onward. SpaceX says it can start services on a small scale once 400 satellites join the network.

Several other private companies too, have plans for space-based Internet services. These include Amazon, OneWeb and O3B (apparently named for the 'Other Three Billion'), each involving large constellations of satellites in lower and middle Earth orbits — but these projects are very small compared to Starlink.

Once operational, space-based Internet networks are expected to change the face of the Internet. Services such as autonomous car driving are expected to be revolutionised, and the Internet of Things (IoT) can be integrated into virtually every household, whether urban or rural.

### **Is there a downside to this projection?**

Three issues have been flagged — increased space debris, increased risk of collisions, and the concern of astronomers that these constellations of space Internet satellites will make it difficult to observe other space objects, and to detect their signals.

To put things in perspective, there are fewer than 2,000 operational satellites at present, and fewer than 9,000 satellites have been launched into space since the beginning of the Space Age in 1957. Most of the operational satellites are located in the lower orbits. On September 2 this year, the European Space Agency (ESA) had to perform, for the first time ever, a “collision avoidance manoeuvre” to protect one of its live satellites from colliding with a “mega constellation”.

Astronomers and scientists have also complained about increased “light-pollution”, a reference to light reflected from the man-made satellites that can interfere with — and be mistaken for — light coming from other heavenly bodies.

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