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DRDO News

हिमालय में सबसे बड़े दुश्मन “मौसम” से सेना जीतेगी जंग, तैयार हो गया है हिमकवच

Source: News18 Hindi, Dt. 17 Feb 2025,

URL: <https://hindi.news18.com/news/nation/indian-army-to-get-new-drdo-himkavach-in-siachen-9038530.html>

दुनियां के सबसे ऊंचे रणक्षेत्र सियाचिन में 40 साल से भारतीय सेना दो दुश्मनों से लड़ रही है, पहला है मौसम तो दूसरी है पाकिस्तान की साजिश. सर्दियों में तापमान माइनस 40 से 50 डिग्री तक पहुंच जाता है. गर्मियों में 10 डिग्री से ज्यादा नहीं चढ़ता. वहां चलने वाली हवा उसे माइनस 5 से माइनस 10 डिग्री तक और गिरा देता है.

यहां पर तैनात सेना के जवान सुपर सोल्जर से कम नहीं. इसी तरह की तैनाती 1999 के बाद से कारगिल की चोटियों पर तो 2020 के बाद से पूर्वी लद्दाख के हाई एल्टीट्यूड एरिया में है. यहां पर तैनात सैनिकों के लिए अब ऐसा स्वदेशी मल्टी लेयर क्लोदिंग डीआरडीओ ने तैयार किया है जो 20 डिग्री से -60 डिग्री तक के तापमान में कारगर साबित होगा.

हिमकवच करेगी सेना की रक्षा

हिमालय की ऊंचाई तैनात सैनिकों के लिए खुशखबरी है. रक्षा अनुसंधान और विकास संगठन (DRDO) ने एक नया था. इसका नाम दिया गया “हिमकवच”. यह मल्टी-लेयर कपड़ों का एक ऐसा सिस्टम है, जिसे खास तौर पर ठंडी में सेना के इस्तेमाल के लिए डिजाइन किया गया है.

इसका का मकसद था सैनिकों को ऐसे कपड़े मुहैया कराया जाए जो हर मौसम में इस्तेमाल में लाए जा सके. न केवल बेहद ठंडे मौसम में शरीर को गर्म रख सके बल्कि अलग अलग भौगोलिक परिस्थितियों में उनकी सुरक्षा और सुविधा सुनिश्चित कर सके. इस कपड़े को ऐसी तकनीक के साथ बनाया गया जो तापमान, ह्यूमिडिटी, बारिश और तेज हवाओं वाले इलाके में सैनिकों की ड्यूटी को और आसान बनाएगी.

ट्रायल हुआ सफल

डीआरडीओ ने इस हिम कवच को तैयार कर के भारतीय सेना को ट्रायल के लिए दिया. जिन करणों को ध्यान में रखकर इसका अविष्कार किया गया वह उसमें पूरी तरह से खरा उतरा. इस कपड़े का सबसे बेहतरीन पहलू है इसका कैमुफ्लेज, जो उन्हें ग्लेशियर और घाटी की स्थितियों में दुश्मन की नजर से छिपाने में मदद करेगा.

स्पेशल क्लोदिंग के बिना टिक पाना मुश्किल

माइनस डिग्री तापमान में सैनिकों के लिए खास तौर पर स्पेशल कपड़े इशू किए जाते हैं. 9000 फिट की ऊंचाई वाले इलाकों को हाई एल्टीट्यूड एरिया कहा जाता है. यहां तैनात होने वाले सभी सैनिकों को एक्सट्रीम क्लाइमेट क्लोदिंग (ECC) जारी होती है. इसमें जैकेट, गर्म लोअर, स्नो बूट, यूवी रे चश्मे सहित कुल 17 आइटम होते हैं. यह हर सैनिक के पास होते हैं.

जबकि 13 ग्रुप आईटम होते हैं जिसमें टेंट, कैरोसिन हीटर सहित वो चीजें शामिल हो जो कि कई लोग एक साथ इस्तेमाल करते हैं. उसी तरह से 15000 फिट से ऊंचाई वाले इलाकों को सुपर हाई एल्टीट्यूड में गिना जाता है. जिसमें सियाचिन सहित नॉर्थ सिक्किम, कारगिल, बटालिक की पहाड़ियां आती हैं. इस इलाके में तैनात होने वाले सैनिकों को स्पेशल क्लोदिंग एंड माउंटेनियरिंग इक्विपमेंट दिए जाते हैं. हर सैनिक को 18 आईटम दिए जाते हैं और 12 ग्रुप आईटम होते हैं.

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India's DRDO Pushes Boundaries with New 120 km Pinaka Rocket to Upgrade Army's Precision Strike Systems

Source: Republic World, Dt. 17 Feb 2025,

URL: <https://www.republicworld.com/defence/defence-technology/indias-drdo-pushes-boundaries-with-new-120-km-pinaka-rocket-to-upgrade-armys-precision-strike-systems>

The Defence Research and Development Organisation (DRDO) is making significant strides in the development of a new, high-calibre Pinaka rocket variant with an impressive range of 120 km. According to an official statement at Aero India 2025, the development, which began in 2024, is already in advanced stages, with the first test of the new variant expected to take place in October 2025.

While the exact calibre of the new Pinaka rocket has not been disclosed, sources suggest it will be comparable to the Russian Smerch rockets, which have a calibre of 300 mm and have been in active service with the Indian Army since 2007. The new rockets are designed to be launched from the Pinaka Multi Barrel Rocket Launcher (MBRL), with a new pod being developed for this purpose.

The Pinaka system, known for its robust and versatile capabilities, has undergone numerous iterations over the years, with the existing variants featuring 214 mm fin-stabilized, solid-propellant, guided, and unguided rockets. These rockets are fired from the Pinaka MBRL, which has proven its efficacy in multiple combat scenarios. The upcoming 120 km range variant is poised to provide the Indian Army with even more firepower, with the added advantage of being compatible with existing launchers, thus making it a cost-effective upgrade for the Indian Army.

New Variants with Greater Range Under Development

DRDO is also expanding the Pinaka system's capabilities with two additional variants in the pipeline. One of these will feature an extended range of 120 km, while the other will push the boundaries even further with a range of over 200 km.

These new variants are part of a broader effort to upgrade the Indian Army's artillery capabilities and meet the ever-evolving demands of modern warfare. The Indian Army has given its approval for the development of these new variants, underscoring the importance of long-range precision strike capabilities in India's defence strategy.

While the 120 km version will maintain the same calibre (214 mm) as the earlier variants, the more powerful version, capable of hitting targets at over 200 km, will likely require a new calibre and launcher system. The Indian Army's commitment to enhancing its artillery strength is evident in the approval and funding of these advanced systems. Experts believe these upgrades will significantly enhance India's ability to deter threats along its borders, particularly with neighbouring countries where tensions often escalate.

Naval and Air Force Plans for Pinaka System Integration

Beyond the Army, DRDO is also working on specialized variants of the Pinaka system for the Indian Navy and Air Force. In particular, the naval version is designed for underwater operations and submarine countermeasures, with an impressive range of 75 km. The first trial of this naval variant is scheduled to take place later this year, marking a significant step towards enhancing India's naval defence capabilities. Additionally, the Indian Air Force (IAF) is exploring the possibility of integrating modified Pinaka systems into its arsenal as a more cost-effective alternative to the expensive Pralay missile.

The integration of the Pinaka system with the IAF would not only enhance the Air Force's strike capabilities but also offer versatility in operational theatres. Pinaka rockets could potentially be adapted for use with Su-30 fighter jets, providing air-to-surface strike capabilities. This adaptation is expected to make the IAF's operations more efficient and economical, especially when compared to the deployment of more costly missile systems like Pralay.

Pinaka: A Key Component of India's Defence Modernization

The ongoing development of the Pinaka system is part of India's broader defence modernization efforts, which include enhancing indigenous missile and rocket technologies. The Pinaka family of rockets, with their impressive range and precision, are expected to play a central role in the Indian Army's artillery operations. With the increasing focus on long-range and precision strike capabilities, the DRDO's advancements in the Pinaka system highlight India's commitment to becoming self-reliant in its defence needs.

Experts note that the development of high-range, cost-effective rocket systems like the Pinaka is crucial in the context of evolving security threats. By enhancing the range and accuracy of its artillery systems, India aims to deter potential adversaries and enhance its strategic deterrence capabilities. The continued modernization of India's artillery and missile systems is expected to bolster the nation's defence preparedness in the years to come.

Pinaka and Beyond for India's Rocket and Artillery Capabilities

As the DRDO continues to enhance the Pinaka system, experts anticipate even more innovations in the coming years. The development of the 120 km range variant and the 200 km variant will certainly bolster India's firepower, but it is likely that the DRDO will continue to push the envelope with new and advanced missile technologies. With an eye on international developments and evolving threats, the DRDO's ongoing work on both the Pinaka system and other missile programs will be key to strengthening India's national security.

India's growing missile capabilities, exemplified by the Pinaka family, reflect a broader trend in the Indian defence sector towards self-reliance. As tensions persist along India's borders, having the ability to launch precision strikes at extended ranges is a strategic advantage that cannot be understated. In the coming years, the Pinaka system will undoubtedly play a central role in safeguarding India's sovereignty and enhancing its position on the global stage.

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Defence News

Defence Strategic: National/International

Indian Army displays 'Kamikaze' drone at IIT Jammu Expo

Source: The Economic Times, Dt. 17 Feb 2025,

URL: <https://economictimes.indiatimes.com/news/defence/indian-army-displays-kamikaze-drone-at-iit-jammu-expo/articleshow/118333780.cms>

The Indian Army on Monday displayed its advanced kamikaze drone at the Science and Technology Expo held at IIT Jammu, highlighting its surveillance and attack capabilities.

The drone can carry payloads of 150 to 300 grams. Its flight duration is 30 minutes without a mini drone and 15-20 minutes with a mini drone, which is used for carrying out kamikaze attacks.



Indian Army displays 'Kamikaze' drone at IIT Jammu Expo

Defence personnel at the expo shared the details and specifications of the drone. " We can carry RDX in this up to 150-300 g. Its duration time is 30 minutes, without mini drone and if mini drone is carried in this, then we can fly this up to 15-20 minutes. If the target is far away, we will fly the drone, once we find the target, we will make mini drone exit from this carrying the payload and crash it upon the target. This is known as 'suicide drone'," explained the defence personnel.

"The drone is equipped with a small camera; the drone could operate in both day and night conditions, with a zoom feature for better surveillance," added the defence personnel.

Earlier, Congress MP Rahul Gandhi's video criticising the government's drone policy where he was seen showcasing what appeared to be a China-made drone has come in for severe criticism.

President of the Drone Federation of India Smit Shah said that it is quite discomfoting for him and the community to see someone with significant responsibility to say that no one understands drone technology in India.

He further said that over 400 companies in our country and about 40 to 50 drone component companies are working very hard with all the challenges. Shah said that young people like him have to speak when someone with significant responsibility takes up a Chinese drone and belittles the entire industry.

"When someone with significant responsibility takes up a Chinese drone and belittles the entire industry, then young people like me have to speak up. There are over 400 companies in our country and about 40 to 50 drone component companies that are working very hard to deal with all these challenges," he said.

"And then someone whose personality is followed by at least some section of society comes and takes up a Chinese drone and says that we don't understand anything in India and none of these parts are made in India. So it is quite discouraging," he added.

Elaborating on the drone industry ecosystem, he said, "When we talk about drones, there are three aspects: regulation, technology, and adoption. Since 2021, the government has ensured that the policy and the regulation are the first aspects that are cleared."

"Handling a drone that belongs to DJI and is banned. I mean, it is a little uncomfortable for me and probably for the whole community," he added.

He further said, "In 2021, the government, with the support of the industry and academia, actively took a stance that we no longer believe that we are confused or we are looking at drones through the prism of confusion. We very clearly understand that drones are an opportunity."

"The technology has been used for quite some time now, but it has to be one of the most important technologies going forward, which is when there was a focus on making India a global drone hub," he added. He further said that so many companies are doing more than 60-70 per cent of components indigenously.

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F-35 fighter jet: What's a G2G deal, and why it's preferred

Source: The Economic Times, Dt. 17 Feb 2025,

URL: <https://economictimes.indiatimes.com/news/defence/f-35-fighter-jet-whats-a-g2g-deal-and-why-its-preferred/articleshow/118327746.cms>

During Prime Minister Narendra Modi's US visit a few days ago, President Donald Trump spoke at a joint press conference about the US willing to sell F-35 fighter jets to India. "Starting this year,

we'll be increasing military sales to India by many billions of dollars. We're also paving the way to ultimately provide India with the F-35 stealth fighters," he said. If the F-35 stealth fighter deal goes through, India will join an exclusive group of countries including NATO allies, Israel, and Japan — that operate this cutting-edge aircraft.

The procurement of the fifth-generation fighter jets from the US could follow key aspects of India's earlier acquisition of Rafale jets from France, such as it is likely to be a government-to-government (G2G) deal, ET has reported.

What is a G2G defence deal?

In contrast to procurement of defence equipment through an open competitive process, a government-to-government deal implies involvement of both the governments instead of the company selling weapons directly to India. Most of India's defence deals with Russia, the main weapons provider of India, have taken place under the G2G deals, also called Inter-Governmental Agreements (IGAs). The Rafale fighter jet deal with France was also done under the IGA.

The G2G defence deals, since they happen between two sovereign governments, can bypass the terms of the complex Defence Procurement Procedure (DPP) for more flexibility. The G2G deals begin with the Defence Acquisition Council of the Ministry of Defence drawing the broad contours of the deal. The deal is negotiated by a committee of the Ministry of Defence with a government agency of the foreign country. Both the government agencies finalise the price, delivery timeline and maintenance in addition to other aspects related to weapons procurement. The committee is not restricted to negotiate with only the foreign government agency but can also coordinate with the manufacturing company. The final deal brokered by the two government agencies is approved by a cabinet committee headed by the Prime minister.

Like the Rafale deal, the F35 acquisition may also follow the government-to-government mode, which guarantees deliveries and pricing at par with the US armed forces, ET has reported. Since the lengthy and cumbersome procedures under the Defence Procurement Procedure (DPP) can be bypassed under a G2G deal, it assures speedier delivery by ruling out the possibility of long delays which have marked many non-G2G weapons deals. Often, the armed forces have urgent need of weapons as it is the case with fighter jets. The open competition procurement happening through the DPP in many cases gets caught in lengthy delays and even gets cancelled after a considerable period of negotiation.

The decision to opt for a G2G deal for Rafale fighter jets was intended to address an emergency requirement. The government had reportedly informed the Supreme Court that Rafale deal, being a G2G arrangement, was better in terms of pricing, delivery and maintenance than the earlier contract the UPA government was negotiating, which floundered due to the French company and Hindustan Aeronautics Ltd. failing to agree on costs. The G2G route also offered better protection from uncertainties like sanctions or other disruptions in supplies, the government had said. It also meant a stronger engagement of the contracting nation in India's defence needs.

With the IAF having to make do with just 30 fighter squadrons when it is authorized 42.5, and Hindustan Aeronautics Ltd (HAL) struggling to produce even a 4th-Gen Tejas, Indian national security planners are obviously concerned. "With AMCA still at least 10-12 years away from

production, IAF will obviously be deeply interested in getting two to three squadrons (36 or 54 jets) of F-35s in the interim. If you need deterrence to prevent wars, you obviously need capabilities,” an official told TOI.

The Navy had said in 2022 that it would prefer a G2G deal to procure new carrier-borne fighter jets, though in the long-term it would prefer an indigenous twin engine combat aircraft to meet all requirements. India is now about to seal a G2G deal with the French government for 26 Rafale marine jets.

The G2G defence deals also provide a degree of comfort due to sovereign assurance. In case of the 2016 Rafale deal, any dispute in the execution of the Inter-Governmental Agreement was to be settled through the Bilateral High Level Group established by India and France. If any dispute between the two sides remained unresolved by the group, it was to be settled by arbitration in accordance with the United Nations Commission on International Trade Law.

The law ministry had initially red-flagged France’s refusal to provide direct sovereign guarantee for execution of the Rafale contract but the government went ahead to ink it in September 2016 after the French government provided a “letter of comfort” signed by its Prime Minister.

Another major advantage of a G2G deal is that the purchasing government receives the same benefits and protection that the manufacturer gives to its own government.

In 2019, the government had informed the Comptroller and Auditor General in case of the Rafale deal that the inter-governmental agreement, or the G2G deal, signed between two long-standing strategic partners made the responsibility of the French government and Dassault Aviation in the Rafale deal "joint and several", ensuring a high level of commitment.

Besides the possibility of better pricing and desired delivery timeline, a G2G defence procurement deal is preferred also to avoid allegations of malpractices or corruption which often mar deals happening through open competition.

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How Pakistan, China reacted to Donald Trump's offer to sell fifth-generation F-35 fighter jets to India

Source: The Week, Dt. 17 Feb 2025,

URL: <https://www.theweek.in/news/defence/2025/02/17/how-pakistan-china-reacted-to-donald-trumps-offer-to-sell-fifth-generation-f-35-fighter-jets-to-india.html>

Responding sharply to America's offer to sell advanced weapons to India, including the fifth-generation F-35 fighter jets, Pakistan expressed concerns over the potential sale causing "military imbalances" in the region.

"Starting this year, we will be increasing military sales to India by many billions of dollars," US President Donald Trump recently announced after talks with Prime Minister Narendra Modi, adding, "We are also paving the way to ultimately provide India with F-35 stealth fighters."

Known as the most lethal, survivable and connected fighter aircraft in the world, the Lockheed Martin F-35 had taken part in the recently concluded Aero India-2025 in Bengaluru.

According to a report in Dawn, Pakistan foreign office spokesperson Shafqat Ali Khan, reacting to Trump's offer, pointed out that such steps would accentuate military imbalances in the region and undermine strategic stability.

"They remain unhelpful in achieving the objective of a durable peace in South Asia," he was quoted as saying.

Further, he requested "international partners" to have "a holistic and objective view of the issues of peace and security in South Asia" and stop taking "one-sided positions divorced from ground realities."

When asked about the US decision to sell the fifth-generation fighter jets to India, Chinese foreign ministry spokesperson Guo Jiakun said the Asia-Pacific is an "arena for geopolitical games."

"No one should make China an issue in the relations and cooperation between countries, or seek to instigate bloc politics and confrontation. The Asia-Pacific is a stellar example of peace and development, not an arena for geopolitical games. Ganging up to form exclusive groupings and engaging in bloc politics and confrontation will not bring about security, and will by no means keep the Asia-Pacific and the whole world peaceful and stable," he was quoted as saying.

Foreign Secretary Vikram Misri had, on Friday, clarified that the F-35 jets deal with the US is only at the proposal stage. "This is currently something that's at the stage of a proposal. But I don't think the formal process in this regard has started as yet," he said.

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Is Chinese military just a paper dragon? RAND report raises questions about PLA's combat readiness

Source: The Week, Dt. 17 Feb 2025,

URL: <https://www.theweek.in/news/defence/2025/02/17/is-chinese-military-just-a-paper-dragon-rand-report-raises-questions-about-plas-combat-readiness.html>

Despite the modernisation efforts and an array of stealth aircraft, warships, submarines, and aircraft carriers that lags behind only that of the US military and a defence budget second only to the US, the People's Liberation Army (PLA) is not a war-ready force, a recent report by a US think tank claimed.

According to the report 'The Chinese Military's Doubtful Combat Readiness,' by Timothy R. Heath published by RAND Corporation, while PLA fields "a large and impressive suite of weapons and equipment", China's "ability to translate that materiel power into combat power remains far from proven."

While China's doctrine of joint warfare has been clearly articulated and it has shown its capabilities in nonwar missions, the PLA has "continued to shy away from any combat operations."

The report pointed out that China's own media is "replete with withering criticism of the military's inability to execute integrated joint operations and its lack of combat readiness."

Heath noted that almost all militaries train and hold exercises, but only a few militaries can fight like the US, as evinced by the Russian invasion of Ukraine. "For example, Russian troops routinely held large-scale exercises to practice combat operations prior to their poor performance on the battlefield in Ukraine."

Heath argued that the Chinese military is fundamentally focused on upholding Chinese Communist Party (CCP) rule rather than preparing for war, and observed that from its earliest years, the PLA's principal function has been defined by its mission to support the CCP's pursuit of political power. According to him, even the modernisation efforts are geared towards this end.

China's rapid modernisation gains are partly because of the country's desire to elevate the quality of the military from a very low base in the 1970s, he observed.

Besides, there is also the issue of corruption. The report points out that despite a widely publicised anticorruption campaign, graft appears well entrenched in the military.

"Chinese leaders have made no speeches that glorify war, advocate for war, or otherwise characterize war as inevitable or desirable. In addition, there is no evidence that the country is mobilizing for war or otherwise putting itself on a war footing. Chinese leaders have not even permitted popular media to dwell on the possibility of major war as a possible means of building awareness and support for such a war," the report notes.

According to him, the PLA's system of political controls limits how much the military can improve its combat effectiveness. "Anecdotal reports in Chinese media admit that operational competence remains a serious deficiency among political commissars."

"The prospect of a large-scale, high-intensity US-China war is improbable at this point. If US-China tensions escalate to hostilities, China will face strong incentives to favor indirect methods of fighting over large-scale conventional war," the report states.

In short, there is no question that the PLA has made impressive modernisation gains, according to the report. "The PLA values operational proficiency and has improved its combat effectiveness, albeit starting from a very low point. But the PLA's focus on upholding CCP rule constrains how much it can truly transform itself into a warfighting machine."

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Delivering LCA Mk-1A key, not countering criticism: HAL chief

Source: Hindustan Times, Dt. 18 Feb 2025,

URL: <https://www.hindustantimes.com/india-news/delivering-lca-mk-1a-key-not-countering-criticism-hal-chief-101739818403513.html>

Hindustan Aeronautics Limited (HAL) chief DK Sunil on Monday said that the state-run aircraft maker's focus is on delivering the new light combat aircraft (LCA Mk-1A) to the Indian Air Force

at the earliest rather than spending time on countering criticism of the indigenous programme, which is running behind schedule due to several reasons including delay in the supply of engines by US firm GE Aerospace.

His comments came a week after the Chief of the Air Staff, Air Chief Marshal AP Singh, questioned the firm's ability to meet the air force's critical requirements in the backdrop of a lingering delay in the supply of the new fighter jets, saying he had "no confidence" in the plane maker. Singh's remarks came during the air show, Aero India 2025, held in Bengaluru last week.

"Our focus is not on getting into a debate on this. I'd rather channelise the energy of my teams on delivering the aircraft. 'Tu tu main main se kuch nahin hoga' (squabbling will not serve any purpose)," Sunil said.

The IAF chief also tore into HAL for calling the aircraft the firm showcased at the five-day airshow "LCA Mk-1A" without upgrading its capabilities.

"Everything is [driven by] 'ho jayega (will happen) and 'karenge' (we will do it)... You (have started) calling it Mk-1A. It is not Mk-1A. Mk-1A is only after the capability comes in, not just by change of one software to other software. When the weapon comes in, when the capability comes in, then it is Mk-1A. 'Mazza nahin aa raha hain' (it's not working out)," Singh said on February 10 in an interaction with HAL officials that was recorded by someone.

Sunil said the IAF chief's concern likely stems from the declining number of fighter squadrons and the air force would like to get the Mk-1A as quickly as possible.

"We have built three Mk-1A fighters and flew them with 'Category B' (reserve) engines at the airshow. The aircraft are fully ready in hardware --- equipped with a more capable radar, the jammer is there, the electronic warfare suite is there, it has a new mission computer and a smart multi-function display. All the stuff that we had promised is there and fully integrated. Now we are in the final stages of firing the indigenous Astra beyond-visual-range air-to-air missile. We will do it in the next 15 days," the HAL chief said.

The rest of the hardware and software is the same as in the LCA Mk-1, which the IAF has already inducted, he said.

"When we carry out the Astra firing, then what the IAF chief is insisting... the kind of capability that the IAF chief is asking for will be achieved. The point is if you fire the missile, then the capability has come in. Once we finish firing the missile and it is okay, then the SOP (standard operating procedure) is final. After that, wherever the engines come, we are ready to deliver," Sunil said.

The IAF is deeply concerned about the current pace of the LCA Mk-1A programme because of the possible risks a delay in the induction of new fighters could pose to the air force's combat effectiveness. The air force ordered 83 Mk-1A fighters for ₹48,000 crore in February 2021 and plans to buy 97 more Mk-1As at a cost of around ₹67,000 crore.

The first aircraft was to be delivered to the IAF by March 31, 2024, but that didn't happen due to a combination of factors including GE Aerospace's inability to supply the F404 engines on time and

delays in some key certifications. HAL unveiled the LCA Mk-1A at the airshow, attempting to allay concerns about its readiness for induction into the IAF after delays.

“Supply chains constraints are holding us back. We have been after GE Aerospace for the engines for a long time. We placed the order for the engines before the main contract for 83 LCA Mk-1As was signed in February 2021. We got board approval and placed an order for the engines to get them faster,” the HAL chief said.

HAL is hopeful that engine deliveries will begin soon, and it will execute the contract for the 83 Mk-1As over the next three-and-a-half years. The follow-on contract for 97 more fighters is likely to be signed in three to six months, and HAL hopes to execute it by 2031-32.

“One more point I would like to add is that we were required to integrate the software defined radio on the Mk-1A much later under the contract, but we have already done that,” Sunil said.

HAL has set up a new production line in Nashik for Mk-1As to meet IAF’s growing needs. The firm says it can build 16 Mk-1As every year in Bengaluru, and the Nashik line will help it ramp up production to 24 jets.

The Mk-1A is an advanced variant of the Mk-1. The LCA is set to emerge as the cornerstone of IAF’s combat power as the world’s fourth largest air force is expected to operate around 350 LCAs (Mk-1, Mk-1A and Mk-2 variants) in the coming decade and beyond.

“I can only tell you our requirements and what our worries are. You have to alleviate those worries and make us more confident. At the moment, I am just not confident of HAL, which is a very wrong thing to happen,” the IAF chief said last week, putting the spotlight on the indigenous fighter programme. Singh said he would be the “happiest person” to be proved wrong.

The IAF chief was talking to a group of HAL officials while sitting in the cockpit of the locally produced Hindustan Jet Trainer (HJT-36), whose name has been changed from ‘Sitara’ to ‘Yashas’ following extensive modifications that fixed lingering problems.

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Malawian Defence delegation, led by General Paul Valentino Phiri, visits NDC in New Delhi

Source: The Tribune, Dt. 18 Feb 2025,

URL: <https://www.tribuneindia.com/news/world/malawian-defence-delegation-led-by-general-paul-valentino-phiri-visits-ndc-in-new-delhi/>

An eight-member delegation from Malawi, led by General Paul Valentino Phiri, the Commander of the Malawi Defence Force, on Monday, visited the National Defence College (NDC) in New Delhi.

The visit aimed at strengthening ties and enhancing interactions at the senior military leadership level. During their visit, the delegation also engaged with the faculty of NDC.

Sharing a post on X, Ministry of Defence said, "An eight-member Malawian delegation headed by General Paul Valentino Phiri, Commander, Malawi Defence Force visited #NDC, New Delhi today."

The post added, "The objective of the visit was to enhance interactions at senior military leadership level. The delegation interacted with the Faculty of NDC and had a familiarisation tour to various facilities."

Earlier, on the sidelines of Aero India 2025, Defence Minister Rajnath Singh held a bilateral meeting with his Malawian counterpart Monica Changanamuno on February 11.



During the meeting with the Minister of Defence, Malawi, both leaders had wide-ranging discussions on ways to further strengthen bilateral defence relations and enhance cooperation in areas of training, military courses and capacity building of the Armed Forces. Both sides also agreed to expedite signing of Memorandum of Understanding on Defence Cooperation to foster mutual understanding and enhance strategic interests.

Notably, India and Malawi share cordial and friendly bilateral relations. India established diplomatic relations with Malawi immediately after Malawi's Independence in 1964. Subsequently, a resident Mission in Malawi was established, however, due to some administrative reasons, the High Commission in Malawi was closed in 1993, though India continued to have diplomatic relations with Malawi. Malawi was concurrently accredited to our Mission in Zambia until

February 2012. The resident mission was re-opened in March, 2012. Malawi opened its Mission in Delhi in February, 2007.

India provides approximately 40 scholarships to Malawian students to pursue higher studies in India every year, according to the High Commission of India in Lilongwe.

Government of India also provides 130 slots every year to Malawi under ITEC Programme. So far, more than 800 Malawian nationals from both government and private sectors have been trained in India in various fields since 2008. In addition, 32 Malawi Defence officials have been trained under ITEC Programme and UN Peacekeeping Training programme since 2017.

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Defence budget will go up by 9.5 percent to Rs 6.81 lakh crores in 2025-26: Defence Secretary Rajesh Kumar Singh

Source: ANI News, Dt. 18 Feb 2025,

URL: <https://www.aninews.in/news/national/general-news/defence-budget-will-go-up-by-95-percent-to-rs-681-lakh-crores-in-2025-26-defence-secretary-rajesh-kumar-singh20250218091910/>

Defence Secretary Rajesh Kumar Singh has said that the defence budget would go up by 9.5 percent from the current Rs 6.21 lakh crores to Rs 6.81 lakh crores in 2025-26.

Rajesh Kumar Singh said, "The current year's defence budget was Rs 6.21 lakh crores, which will go up by 9.5 percent to Rs 6.81 lakh crores in 2025-26. We should be spending 30 billion dollars per annum over the next decade as part of modernisation. Out of this capex budget, 75 percent is earmarked for procurement from domestic sources and 25 percent of this is earmarked for domestic private industry."

He further said that relaxation in Foreign Direct Investment (FDI) policy and industrial licensing procedure are other elements that will propel the growth in the defence industry. He further said that the total value of domestic production in India has reached 1.27 lakh crores in 2023-24 and exports have increased to 21,000 crores which is 30X jump in last 10 years.

"It's very obvious that the defence industry in India is at the cusp of a massive expansion. The current industrial ecosystem of India, which comprises 16 defence PSUs, 430 licensed companies and around 16,000 MSMEs, is the pillar of this expanding industrial base. Our focus has to be on reducing the entry barriers, as I had mentioned earlier, for new players and for new technologies so that our defence industrial ecosystem becomes adaptive, agile and capable of responding quickly to the changing nature of future warfare, as we have seen in recent geopolitical conflicts," he further said.

Earlier Rajesh Kumar Singh on Monday said India would be looking with an "open mind" to US President Donald Trump's offer to sell F-35 fighter jets to India. Speaking to ANI, Singh clarified that the offer has not been formally made and that the US would be exploring a roadmap to make the F-35 available.

"It is not an offer yet. What he (Trump) said is that they will look at a roadmap to make that (F-35) available. We will look into the offer after it becomes a firm offer. In any case, our procurements are done through a process... Creating an option is important for us and we will look into it with an open mind," Singh said.

He further emphasised that India's procurement process will guide any future decisions, highlighting that the Defence Ministry has a procurement plan in place. He mentioned that India has a large acquisition budget of Rs 1,80,000 crore for the next financial year and Rs 1,60,000 crore for the current year, which will be used for various procurements.

"The Defence Ministry has a procurement plan for the kinds of things you have mentioned (fighter planes, submarine and missiles). But obviously those will be announced only after the procurement process is complete... Yes, there are plans... Obviously, India has a very large acquisition budget of Rs 1,80,000 crore for the next financial year and about Rs 1,60,000 crore for this financial year and we will intend to utilise them through these procurements," the Defence Secretary said.

During Prime Minister Narendra Modi's visit to the US, while addressing the joint press conference, US President Donald Trump had stated that the United States would be increasing the defence sales with India with billions of dollars. He added that his administration is paving the way to provide India with F-35 aircraft.

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India, Italy hold discussion to strengthen collaboration in agriculture, defence and space

Source: ANI News, **Dt.** 18 Feb 2025,

URL: <https://www.aninews.in/news/business/india-italy-hold-discussion-to-strengthen-collaboration-in-agriculture-defence-and-space20250218081727/>

India and Italy held discussions in the national capital to enhance collaboration in key sectors such as agriculture, defence, space, infrastructure, and transport.

Union Commerce Minister Piyush Goyal met with Maria Tripodi, Undersecretary of State for Foreign Affairs and International Cooperation, Italy, and Antonio Bartoli, the Italian Ambassador to India, to explore ways to boost bilateral trade and strengthen cooperation in these crucial areas.

Taking to social media on Monday, Goyal described the meeting as "productive" and highlighted the commitment of both countries to deepening economic ties.

"Held a productive meeting with H.E. Maria Tripodi, Undersecretary of State for Foreign Affairs and International Cooperation, Italy, and H.E. Antonio Bartoli, Ambassador of Italy to India. Discussed enhancing bilateral trade ties and strengthening collaboration in key areas like agriculture, defence, space, infrastructure & transport," Goyal stated.

In addition to his meeting with the Italian delegation, Goyal also held a virtual discussion with Maros Sefcovic, the European Union's Commissioner for Trade and Economic Security.

The two leaders explored ways to enhance future engagement and discussed new opportunities to strengthen the India-EU partnership. The minister expressed his eagerness to welcome Sefcovic to India during his upcoming visit.

The discussions between Goyal and Sefcovic are likely to contribute to strengthening economic and strategic cooperation between the two regions. On Monday, Goyal also met with Soren Toft, CEO of Mediterranean Shipping Company (MSC), and Deepak Tewari, Managing Director of MSC Agency India.

The discussions focused on the immense growth potential of India's shipping and logistics sector, with an emphasis on investments in inland container terminals, shipbuilding, maintenance, and container manufacturing.

The meeting also covered deep-sea vessel partnerships and policy reforms aimed at enhancing India's global maritime competitiveness. Goyal emphasized the government's commitment to fostering innovation, growth, and self-reliance in the sector.

MSC, one of the world's largest shipping companies, plays a crucial role in India's trade logistics, and further investments from the company could significantly boost the country's maritime infrastructure. These meetings reflect India's active engagement in strengthening international trade partnerships and attracting investments to key sectors, aligning with the country's broader economic growth strategy.

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Former Air Force Chief Marshal Vivek Ram Chaudhari highlights nuances of building resilient air defence system

Source: ANI News, **Dt.** 18 Feb 2025,

URL: <https://www.aninews.in/news/world/asia/former-air-force-chief-marshal-vivek-ram-chaudhari-highlights-nuances-of-building-resilient-air-defence-system20250217133842/>

Former Indian Air Force Chief Marshal Vivek Ram Chaudhari on Sunday spoke about the India-US fighter plane deal and also highlighted the need to build a resilient multi-layered air defence system.

While speaking about the US- India deal for F-35 stealth aircraft, Former Indian Air Force Chief Vivek Ram Chaudhari said, "What the fifth generation fighters can bring to us, that is more important, which aircraft it will be, this is a secondary matter. Our own AMCA (Advanced Medium Combat Aircraft) program has just started and we want that whatever technologies come, it should encourage our self-reliance a little more and give a further boost to our AMCA program.

"During Prime Minister Narendra Modi's visit to the US, while addressing the joint press conference, US President Donald Trump had stated that the United States will be increasing the defence sales with India with billions of dollars. He added that his administration is paving the way to provide India with F35 air crafts.

"Starting this year, we will be increasing military sales to India by many billions of dollars. We are also paving the way to ultimately provide India with the F35, Stealth fighters", Donald Trump said.

The Lockheed Martin F-35 Lightning II is the most widely deployed fifth generation fighter aircraft. It took part in the Aero India 2025 show held between February 10 to 14 at the Yelahanka Air Force Station in Bengaluru. It was Asia's biggest aerospace and defence exhibition.

Touching upon the importance of drones in present times, Former Indian Air Force Chief Vivek Ram Chaudhari said, "The future of autonomous systems, particularly drones, when they're teamed along with manned aircraft, is the future of any air combat. Starting from multi-layered air defence systems, to hypersonic weapons, to space-based and persistent surveillance platforms, to fifth-generation fighters, stealth platforms, the list is endless."

The former Air Force Chief also said, "Having the resilient infrastructure is very important. We all understand this requirement. The drones are here to stay. They are going to be part of every other conflict and creating an air defence system that can counter drones from the lowest speed to the highest speed drones is something that we should accelerate developing and acquiring."

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IDEX Talks 2025 put sharp focus CBRNE threats

Source: ANI News, **Dt.** 18 Feb 2025,

URL: <https://www.aninews.in/news/world/middle-east/idx-talks-2025-put-sharp-focus-cbrne-threats20250218035140/>

IDEX Talks, an integral part of IDEX and NAVDEX 2025, have brought together global defence leaders, policymakers, and industry experts for high-level discussions on the evolving security landscape. Taking place at ADNEC Centre Abu Dhabi over five days, the forum serves as a strategic platform for sharing insights and solutions to emerging and future security threats.

This year's edition of IDEX, the largest in the event's history, facilitated CBRNE themed topics at IDEX Talks, focusing on chemical, biological, radiological, nuclear, and explosive (CBRNE) defence. The inclusion of these discussions underscores the growing need for advanced preparedness, rapid response strategies, and cutting-edge technologies to counter evolving security challenges.

With leading experts and defence specialists at the forefront, the sessions explored innovations in detection, protection, and decontamination, reinforcing IDEX's role as a global hub for comprehensive security solutions. IDEX and NAVDEX 2025 are being organized by ADNEC Group in collaboration with the UAE Ministry of Defence and Tawazun Council, featuring an esteemed lineup of speakers, including senior government officials, military commanders, and industry pioneers. Through expert insights into emerging threats, technological advancements, and collaborative defence strategies, the sessions provided attendees with a unique opportunity to engage in thought-provoking discussions and gain insights into the latest trends shaping the future of defence.

The inaugural IDEX Talks placed a strong emphasis on CBRNE threats. Christophe Phan Kim, Sales Manager at Proengin, delivered the first presentation on "Evolving Chemical and Biological Threats: Challenges in Protecting Critical Sites and Shelters."

He outlined the diverse threats to infrastructure across military, industrial, and pharmaceutical sectors, highlighting the limitations of conventional detection systems, which primarily focus on gas-based threats while biological attacks often manifest as aerosols. He emphasised the need for advanced detection solutions capable of identifying solids and liquids in addition to gaseous substances. Addressing the evolving chemical threat landscape, Phan Kim discussed the risks posed by industrial toxic substances, terrorist attacks involving agents such as Novichok, and emerging dangers from Pharmaceutical-Based Agents (PBAs), Toxic Industrial Chemicals (TICs), and Toxic Industrial Materials (TIMs). He underlined growing concerns in the United States over pharmaceutical-based threats and the urgent need for comprehensive detection solutions.

Showcasing Proengin's expertise, he introduced the company's advanced detection tools, renowned for their sensitivity, reliability in extreme conditions, and real-time identification of both known and unknown threats. His insights reinforced the importance of tailored solutions to safeguard national security and critical infrastructure.

The final presentation of the day was delivered by Naktel Ben Fraj, Senior Sales Manager at Karcher Futuretech GmbH, Germany, on "CBRNE Decontamination Technologies." Karcher Futuretech has been a pioneer in this field since 1959, operating with the principle that different types of contaminants require specialised and advanced decontamination solutions. The company collaborates with NATO countries and remains committed to providing the most effective decontamination technologies.

"Our approach includes enhanced chemical formulations, innovative functional components, and improved decontamination scenarios. We offer a range of technologies, including wet chemical decontamination, hot gas technology, and vacuum-based solutions, ensuring comprehensive protection against CBRN threats," said Ben Fraj. The talks will continue for the next four days of the defence conference. With the introduction of CBRNE themed talks, IDEX and NAVDEX 2025 continue to push the boundaries of defence dialogue, driving collaboration and knowledge exchange to enhance global security resilience.

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Indian Army Heads to Japan for Counter-Terror Drills Under 6th Edition of Exercise Dharma Guardian

Source: Republic World, Dt. 17 Feb 2025,

URL: <https://www.republicworld.com/defence/indian-armed-forces/indian-army-heads-to-japan-for-counter-terror-drills-under-6th-edition-of-exercise-dharma-guardian>

The Indian Army and Japan Ground Self-Defense Force (JGSDF) are set to conduct the sixth edition of their annual joint military exercise Dharma Guardian at Mount Fuji, Japan, from February 25 to March 9, 2025. The exercise is aimed at strengthening interoperability between the

two forces while undertaking joint urban warfare and counter-terrorism operations under a UN mandate, according to an official statement by the Indian Army on X (formerly Twitter).

The announcement follows the visit of Chief of Army Staff General Upendra Dwivedi to Japan in October 2024, which focused on expanding bilateral defence ties and military cooperation between India and Japan. The upcoming iteration of Dharma Guardian is expected to build on the momentum of this visit and further bolster defence cooperation between the two nations.

"The 6th edition of Joint Military Exercise #DharmaGuardian, between #India and #Japan, is scheduled to be conducted at Mount Fuji, Japan from 25 February to 09 March 2025. The aim of the exercise is to enhance interoperability between the two forces while undertaking joint urban warfare and counter-terrorism operations under a UN mandate. Building on the momentum of the #COAS successful visit to Japan from 14 to 17 October 2024, Exercise #DharmaGuardian 2025 will further strengthen the bilateral defence cooperation between India and Japan," – Indian Army on X.

India-Japan Military Ties Strengthen Through Dharma Guardian

The annual Dharma Guardian exercise has become a crucial component of India-Japan defence cooperation, enabling both armies to exchange best practices, improve coordination in joint operations, and enhance combat readiness in asymmetric warfare scenarios. The 2024 edition of the exercise was held in Rajasthan, India, where troops from both sides participated in extensive training focused on counter-terrorism operations, urban warfare tactics, and disaster response strategies.

This year's exercise will take place at Mount Fuji, providing an opportunity for both forces to operate in a diverse and challenging terrain while simulating real-time combat situations. Experts believe that Dharma Guardian 2025 will not only help in refining the operational synergy between the Indian Army and the JGSDF but also act as a confidence-building measure between the two nations.

Expanding Defence Partnerships: A Growing Strategic Alliance

Beyond Dharma Guardian, India and Japan have been actively deepening their defence cooperation through multiple joint military and naval exercises, including:

- Malabar Exercise – A quadrilateral naval exercise involving India, Japan, the United States, and Australia, aimed at enhancing maritime security in the Indo-Pacific region.
- Exercise Shinnyu Maitri – The first counter-terrorism exercise between the Indian Army and the Japan Ground Self-Defense Force (JGSDF), focusing on joint special forces training.
- Naval Exercises between the Indian Navy and the JMSDF – These exercises focus on anti-submarine warfare, maritime security, and disaster relief operations.
- Air Force Cooperation – Strengthening ties between the Japan Air Self-Defense Force (JASDF) and the Indian Air Force (IAF) through joint training programs.

The India-Japan defence partnership aligns with their shared vision of maintaining regional stability, ensuring a free and open Indo-Pacific, and countering emerging security challenges, including terrorism and maritime threats.

Strategic Importance of Indo-Pacific Defence Collaboration

The increasing frequency and scale of India-Japan military exercises underscore the growing strategic alignment between the two nations. With both countries sharing concerns over regional security threats, including territorial disputes and the increasing militarization of the Indo-Pacific, collaborative military initiatives such as Dharma Guardian provide a strong deterrent against hostile actors in the region.

By enhancing interoperability, military coordination, and tactical expertise, India and Japan are not only fortifying their bilateral ties but also reinforcing their commitment to peace, security, and stability in the Indo-Pacific region. As the sixth edition of Dharma Guardian unfolds at Mount Fuji, experts anticipate that this exercise will set the stage for deeper military engagements and more robust strategic collaborations between the two Asian powers in the years to come.

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‘Critically Dependent’ On U.S. Tech, How IAF Missed Out On Made In India Fighter Jet Much Before LCA Tejas

Source: The EurAsian Times, Dt. 17 Feb 2025,

URL: <https://www.eurasiantimes.com/edited-the-geopolitics-of-jet-engines-the-last/>

Notwithstanding the return of national combat aircraft programs in many countries, there is no easy alternative available to American jet engines. Consider, for example, the curious case of Turkey. In 2019, the country was kicked out of the F-35 Joint Strike Fighter program for purchasing the Russian S-400 Triumf air defense system. However, Ankara decided to challenge US dictates and developed its own fifth-generation fighter jet, TF KAAN.

In February 2024, KAAN conducted its maiden flight. Impressive by any standards. However, there is just one lacuna. Turkey’s so-called indigenous fighter jet prototype is flying on a US-made General Electric F110 turbofan engine. Similarly, South Korea received accolades for its KF-21 Boramae program, a 4.5-generation multirole fighter that restarted the trend toward developing national combat aircraft. The KF-21 successfully completed its maiden flight in July 2022. However, the aircraft is also dependent on GE Aerospace for the supply of jet engines, as General Electric’s F414-GE-400K engine powers it.

There was much talk of using an indigenous engine on the KF-21. However, in 2024, South Korea announced it would continue using the GE engines for the KF-21 for at least one decade. Meanwhile, Hanwha Aerospace will try to develop an indigenous jet engine for the KF-21 with the exact dimensions of the F414-GE-400 engine. Only time will tell whether this endeavor will be successful.

Achilles Heel Of India’s Fighter Jet Programs

India's case is somewhat unique among the countries with a national combat aircraft program. India was the first Asian country to develop an indigenous fighter jet, the Hindustan Aeronautics Limited (HAL) designed HF-24 Marut. The Marut conducted its maiden flight on June 17, 1961, and the first production was officially delivered to the IAF on April 1, 1967. The HF-24 Marut was an absolute beauty with its sleek, pencil-slim contours, elegant swept-wing, and tail configuration attached to a perfect area-ruled fuselage.

Although a very capable fighter, Marut could not fulfill its role as an intercepting, supersonic jet due to the lack of an appropriate power plant. Initially designed to be a supersonic-capable (Mach 2) interceptor aircraft, it would never exceed Mach 1. The limitation was principally due to India's failure to source a good engine for the fighter jet. The Marut was powered by the UK-manufactured Bristol Siddeley Orpheus 703 turbojet engines. This underpowered engine meant that Marut was technically obsolete by the time the first production aircraft were completed.

India worked hard to find a sufficiently powerful engine to replace Marut's Orpheus 703 turbojet engines. The Soviet Klimov K-7 was tried but couldn't fit the existing airframe. The RD-9F axial flow engine met the same fate. India then tried to co-develop an engine with Egypt—the EL-300. However, the 1967 Arab-Israeli war meant that Egypt abandoned its plans for developing an indigenous fighter and decided to purchase Soviet fighter jets off the shelf.

Pushpindar Singh, author of "Spirits of the Wind: The HAL HF-24 Marut," says that "the Marut was unbeatable at low-level flying, but it was underpowered for maneuverability...Marut was ahead of its times and had the government persisted with that program, India would have been a generation ahead in the design and development of aircraft today."

Following India's first nuclear test in 1974, adverse international public opinion worsened India's chances of obtaining better engines for the Marut; even spares for its existing Orpheus engines became scarce. Ultimately, a host of geopolitical factors meant that India could not find an appropriate engine for Marut, and the program was shelved in the 1980s.

Talking about Marut, former IAF pilot Vijainder K Thakur, who himself flew the jet, told an aviation magazine that the greatest myth about Marut is that the aircraft didn't meet expectations. "The aircraft met expectations, but the project didn't! Because MoD (Ministry of Defence) never put into the aircraft the engines that the aircraft was built for," Thakur said.

Tejas – New Aspirations, Same Old Problems

India's indigenous fighter jet aspirations made a comeback in the 1980s with the LCA (Light Combat Aircraft) program. However, the LCA Tejas program was marred by the same problems Marut suffered—the lack of an indigenous jet engine. India's DRDO (Defence Research and Development Organisation) tasked the Gas Turbine Research Establishment (GTRE) with developing the GTX-37 engine for the LCA. Subsequently, the ambitious Kaveri engine project was sanctioned in late 1989.

Nine full prototype engines and four core engines have been developed, 3,217 hours of engine testing have been carried out, and Altitude Tests and Flying Test Bed (FTB) trials have been completed—but the engines were unsuitable for fighter aircraft. One significant shortfall – instead of the targeted 81 Kn, the engine could only produce 70.4 kN of wet thrust.

However, while attempting to develop the Kaveri engine, HAL simultaneously started designing the Tejas aircraft around the GE-F404 engine. When it became clear that the Kaveri engine could not replace GE engines, India decided to go ahead with the same old route—indigenous fighter aircraft with foreign-sourced engines. In August 2021, India signed a deal with GE Aerospace for 99 GE-F404 IN20 engines for US\$716 Million.

IAF's Never-Ending Wait For Tejas Jets

Sometimes, a picture is worth a million words, and a video is worth a billion words. The recent video of the Indian Air Force Chief Air Chief Marshal A P Singh publicly admonishing HAL at the ongoing Aero India 2025 for its poor track record in delivering aircraft in a timely manner is getting viral on social media.

“HAL is our company; we have all worked there. But I find that HAL is just not in mission mode,” said the IAF chief. “I was promised that when I come here in February, 11 Tejas Mk1As would be ready. And not a single one is ready.”

The IAF chief has been quite vocal about the delay in manufacturing the aircraft, which has reduced the force to 31 fighter squadrons against the sanctioned strength of 42. In its defense, HAL has cited the delay by GE in supplying the GE-F404 engine on schedule. General Electric is at least two years behind schedule in supplying the promised F404 engines. While the deal for the supply of 99 F404 engines was signed in August 2021, as per the schedule, HAL should have received the initial batch of engines by March 2023. However, this timeline was later pushed to March 2025, throwing the timeline for delivery of Tejas Mk1 and Mk1A in a tizzy.

In October last year, there was much talk in New Delhi about slapping penalties on GE for the repeated delays. While GE blamed “supply chain pressures” for the delays, many in India wondered if the delays were intentional to arm-twist New Delhi or sabotage India’s indigenous aircraft development plans. Dr. Abhinav Pandya, Founder & CEO of Usanas Foundation, suggested that the delay might serve US interests by destabilizing India’s defense plans. However, he acknowledged that such assertions require more substantial evidence to be credible.

Nonetheless, given that India hardly has any alternative to GE for aircraft engines, and not just Tejas Mk1 and Mk1A but also India’s plans for Tejas Mk2, AMCA (Advanced Medium Combat Aircraft)—India’s planned fifth-generation stealth fighter jet—and Twin Engine Deck Based Fighter (TEDBF), a carrier-based fighter, also depend on GE for engine supplies, India decided not to pursue the penalties route.

In 2023, HAL and GE signed a MoU for the co-production of 99 GE-F414 INS6 engines for the Tejas Mk2. These same engines will also power the initial batch of AMCA fighters. A final deal in this regard is expected by March 2025. However, in December 2024, it was reported that the talks had hit a roadblock as GE demanded US\$ 1.5 billion instead of the initially anticipated US\$1 billion for the deal. In short, India’s whole indigenous fighter jet development program is at the mercy of GE.

Modi-Biden Joint Statement And Jet Engines

It is indeed a rare sight when the heads of two of the world's largest democracies mention a jet engine deal in their joint statement. But this is exactly what happened in June 2023, when Indian Prime Minister Narendra Modi and then US President Joe Biden mentioned the HAL-GE deal to co-produce GE-F414 INS6 engines in India, calling it a "trailblazing initiative."

"Prime Minister Modi and President Biden hailed the landmark signing of an MoU between General Electric and Hindustan Aeronautics Limited for the manufacture of GE F-414 jet engines in India, for the Hindustan Aeronautics Limited Light Combat Aircraft Mk 2. This trailblazing initiative to manufacture F-414 engines in India will enable greater transfer of U.S. jet engine technology than ever before," the statement read.

The jet engine deal can again figure prominently in the joint statement during Modi's upcoming US visit on February 13. This shows the criticality of jet engines for India's Indigenous fighter jet program. On the other hand, this also shows the tremendous bargaining power the US has over India, notwithstanding Indian rhetoric about maintaining strategic autonomy. So, does India have no real alternative to US-made jet engines?

The Big Four Exclusive Jet-Engine Club

The US is not the only country that has mastered the complex art of making fighter jet engines. The international arena for manufacturing advanced fighter jet engines is dominated by the exclusive club of the Big Four—the US, Russia, France, and the UK. From the US, GE Aerospace and Pratt & Whitney are the big players. In the UK, Rolls Royce, and Safran in France. In Russia, United Engine Corporation (UEC) and Kuznetsov Design Bureau are the big players.

However, when it comes to reliability, maintenance costs, and shelf life, there is no competitor to US leadership. India has good strategic partnerships with France and Russia. France has even partnered with India in the development of Shakti helicopter engines. Yet, when it comes to engines for India's ambitious combat aircraft program, India invariably opts for US-made engines.

Not just India but countries like South Korea and Turkey are developing their combat aircraft around US-made engines, even though they are simultaneously working on their own indigenous jet engines.

Speaking on the issue of GE engines for Tejas, IAF veteran Group Captain Ajay Ahlawat told EurAsian Times: "When the idea of LCA came into being in the 1980s, the DRDO was given this task, and the project of Kaveri was started. The initial plan was that Kaveri, a home-grown engine, would power LCA. But after some years, it looked unlikely that the engine would be ready. In the 1990s, the choices of engines that could fit in LCA were very, very limited. There was GE, Pratt & Whitney, Rolls Royce, and Safran. However, based on the size and shape of LCA, there were essentially two choices – the M88 turbofan engine and the GE engine. The Aeronautical Development Agency (ADA), under the aegis of DRDO, decided to go with GE.

"At that stage, based on the promises made by GTRE and DRDO, it looked like only a short-term fix. It looked like that only the first prototypes would fly with GE engines, and then Kaveri would be available to take the program forward. Unfortunately, Kaveri did not succeed and we are struck with GE engines."

For the Tejas, Russian Klimov RD-33 and European Eurojet EJ-2000 engines were also considered. However, RD-33, which powers MiG-29, was considered too smokey and unreliable. EJ-2000 was rejected because the initial Tejas prototypes were designed around GE engines, and integrating EJ-2000 would have required redesigning the aircraft, which would have further delayed the project.

Conclusion

Many countries are investing in indigenous combat aircraft programs. By the 2030s, many Asian countries could be flying indigenously developed combat aircraft, boosting their self-reliance in defense production and reducing their dependence on Western technology.

However, while some countries have successfully designed and developed their own combat aircraft, they still rely on Western technology, particularly US technology, for combat jet engines. Russian and Chinese (Shenyang WS-10 “Taihang”) jet engines are available but are considered less reliable than US-made jet engines. In conclusion, it can be safely said that the US dominance in the critical area of combat jet engines will last for at least another decade.

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Aero India 2025: MKU delivers ballistic helmets to Indian Army

Source: Janes Dt. 17 Feb 2025,

URL: <https://www.janes.com/osint-insights/defence-news/security/aero-india-2025-mku-delivers-ballistic-helmets-to-indian-army>

Indian firm MKU Limited has delivered its Kavro Doma 360 ballistic helmet to the Indian Army, company officials confirmed to Janes at Aero India 2025.

MKU officials said the helmet has been officially inducted into service with the Indian Army and is currently undergoing trials abroad but did not elaborate.

According to the company, the helmet can protect against AK-47-fired 7.62×39 mm mild steel core (MSC) bullets as well as 7.62×51 mm and 5.56×45 mm NATO rounds. MKU said the helmet is lightweight, anti-allergic, all-weatherproof, chemical safe, and built to absorb shocks. The helmet maintains a back face signature (BFS) of less than 20 mm.

The company said the Kavro Doma 360 is also compatible with the modular accessory connector system (MACS), which enables a user to integrate the helmet with night-vision devices, communication devices, masks, mandibles, and torches.

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Science & Technology News

Journey of NQM's Quantum Sensing and Metrology Hub with lab grown technologies at IIT Bombay

Source: Press Information Bureau, Dt. 17 Feb 2025,

URL: <https://pib.gov.in/PressReleasePage.aspx?PRID=2104088>

The Photonics and Quantum Sensing Technology Lab at IIT Bombay is ready with some technologies that can give the newly initiated Quantum Sensing and Metrology Hub a kick start into the world of quantum technologies.

These include the quantum diamond microscope and the portable magnetometer at the P-Quest Lab headed by Professor Kasturi Saha.

Prof Saha is the Project Director of the newly initiated Quantum Sensing and Metrology Hub, Qmet Tech Foundation, established by IIT Bombay under the National Quantum Mission (NQM).

The young Professor who along with her group explores and pushes the boundaries of precision metrology, sensing and imaging, using unprecedented opportunities presented by novel interdisciplinary research in fields like nano-photonics, classical and quantum information processing and life sciences, is now playing a crucial role in bringing together top minds, groundbreaking research, and transformative ideas to accelerate the quantum revolution.

The structure of Qmet, one of the four thematic hubs created under NQM being implemented by the Department of Science and Technology (DST), Government of India comprises of 16 institutes and 40 researchers located across India who are working with a shared sense of purpose to achieve the common goal through collaboration, cooperation, and effective communication.

It aims to bridge fundamental research and practical applications in Quantum Sensing and Metrology—one of the four focus areas under NQM.

Diamonds are a major focus of Prof Saha's research. Her team works with defects called Nitrogen Vacancy (NV) centre in diamond which are very precise magnetic field and temperature sensors. She manipulates them to make systems that can probe your neurons or delve into your cells.

When the NV centres in the quantum diamond microscope being developed in Prof Saha's lab are excited with fluorescent green light, they emit red light. This NV centre defect exhibits a unique "spin" property. The spins couple with magnetic fields and they emit red light. So, they essentially act like ultra-sensitive magnetic field sensors.

The team aims to use the quantum diamond microscope to enable non-destructive testing of semiconductor chips by mapping magnetic field in 3D layers within an encapsulated chip.

They are also trying to extend this application into different other domains like biological sensing. They probe into neuronal cultures that exchange electrical pulses resulting in magnetic fields associated with them.

These magnetic fields, albeit extremely small, can be measured to trace the location of the neurons and this measurement can help identify and correlate how the neurons are actually interacting with the magnetic fields by producing single neuron resolution. This could be one of the potential ways in which one can really go to the fundamental limits of magnetic field sensitivity.

Diamonds mined in India, which Professor Saha specializes in, have a rich history dating back to ancient times and are renowned for their exceptional gemstone quality. The diamonds used for quantum applications, are however lab-grown CVD diamonds.

The team is working with a lot of diamond companies to enable indigenous, development of diamond within India for quantum applications. Enabling benchmarking of diamond samples is a crucial step in the process. In it they measure the different properties of the diamond NV spins or their lifetime technically called coherence time.

Apart from this they are working on the portable magnetometer that can be converted to chips which can be used in drones for surveillance.

In their dilettante with fundamental physics, the team is also looking at different kinds of magnetic materials to explore their viability as quantum materials. The set up they have developed will help them understand how different materials work, form magnetic maps extending even to the video of a magnetic map and understand the direction of the magnetic field being generated.

This opens up scope of commercialising it under the NQM. Improving the sensitivity of such a set up could help imaging of neurons. Their goal under NQM is to provide the highest kind of spatial resolution possible for a quantum microscope by pushing the sensitivity down absolutely to the fundamental limits and understanding the noise constraints that need to be corrected. In this manner, they plan to develop practical quantum devices via design and experimentation, thus connecting quantum theory to engineering applications.

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Satellite India's 1st private PSLV will launch TDS-1 to test 35 new technologies

Source: The Times of India, Dt. 17 Feb 2025,

URL: <https://timesofindia.indiatimes.com/science/satellite-indias-1st-private-pslv-will-launch-tds-1-to-test-35-new-technologies/articleshow/118338513.cms>

India's first privately manufactured Polar Satellite Launch Vehicle (PSLV), being built by a consortium of HAL and L&T, will carry a technology demonstration satellite (TDS-1) that will test up to 35 new indigenous technologies.

Isro chairman V Narayanan revealed this in an exclusive interview to TOI and said the launch, scheduled for the third quarter of this year, will mark a milestone as the first PSLV manufactured by the private sector under a contract for five rockets. The vehicle is in "advanced stages of realisation" with Isro providing technical guidance to the industrial partners.

"It is called a technology demonstration satellite (TDS-1)... There are 35 experimental things. Among other things, along with chemical propulsion, we are also going to use electric propulsion.

We are also going to demonstrate indigenous atomic clock, quantum payloads. So, a lot of things are in the store. And right now the payload is getting realised.”

The final number of experiments, targeted at 35, will be confirmed later. In TDS-1 Isro will test a 300 milli-Newton (300mN) electric propulsion thruster developed at Isro’s Liquid Propulsion Systems Centre (LPSC), which Narayanan headed before taking over as Isro chairman. The new thruster is currently undergoing life cycle testing.

He said Isro had earlier tried a 75mN thruster on the GSAT-9, but what will go on TDS-1 “will be the first time an entirely indigenous system will be deployed,” Narayanan said. The organisation had earlier developed associated components like the power processing unit, control systems and propellant tankage internally.

NGLV progressing In a wide-ranging interview, Narayanan also detailed Isro’s Next Generation Launch Vehicle (NGLV) programme. “...Our first launcher, the SLV-3, had the capability of putting around 35-40 kg to Low Earth Orbit (LEO). From that, our heaviest rocket (LVM-3) is capable of taking around 8,500 kg to LEO. Now, in NGLV the lift of mass will be around 1,000 tonnes and that height of the vehicle is 93m, more than 30-35 storey building height,” Narayanan said.

“The NGLV will feature three propulsive stages and two strap-on boosters. The core stage will be powered by nine LOX-methane engines, each generating 110 tonnes of thrust, with a propellant loading of 475 tonnes. The second stage will use two LOX-methane engines of the same class with 128 tonnes of propellant. The upper stage will use a LOX-hydrogen cryogenic engine (the C-32) with 32 tonnes of propellant capacity,” Narayanan said.

He said the configuration study was completed and Isro was in the process of development of subsystems, for example engines. “The design for the 11 LOX-methane engines (nine in core stage and two in second stage) has been finalised and we are in the process of giving clearances for fabrication,” he said.

Mission studies have been completed, while rocket structures and tankage designs are ongoing, he said, adding that Isro is currently in discussions with industry partners for manufacturing while simultaneously developing necessary test facilities.

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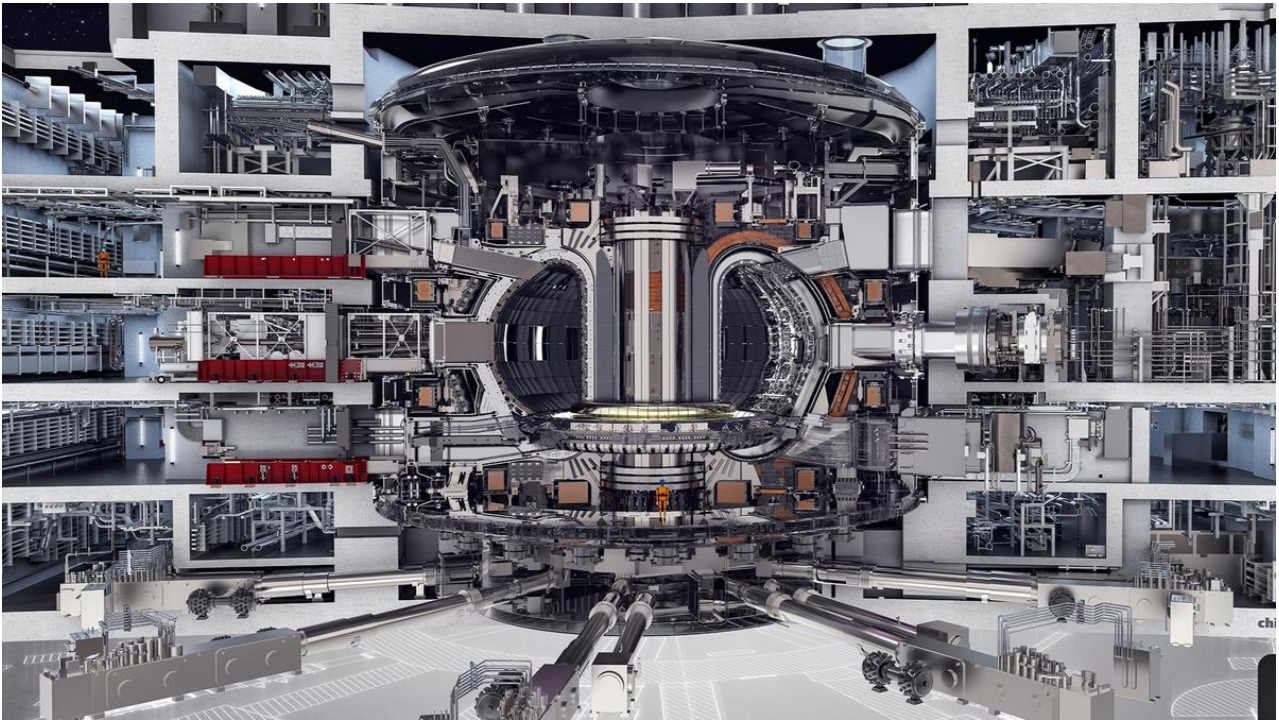
China’s EAST reactor keeps the fire of magnetic fusion burning

Source: The Hindu, Dt. 18 Feb 2025,

URL: <https://www.thehindu.com/sci-tech/science/china-east-tokamak-keeps-fire-magnetic-fusion-burning/article69226043.ece>

On January 20, Chinese scientists reported that they were able to maintain a plasma at a temperature of 100 million degrees C for about 1,066 seconds in a nuclear fusion reactor called the Experimental Advanced Superconducting Tokamak (EAST).

In 1938, physicists Otto Hahn and Fritz Strassmann found that energy is produced when the nucleus of an atom breaks apart, a process that Lise Meitner and Otto Frisch explained a year later as a process called 'fission'. Only four years later, physicists used this principle to build and operate the world's first reactor with a sustainable nuclear fission reaction.



An exploded view of the ITER nuclear-fusion facility. A human figure in orange is shown just below the image's centre for scale. The tokamak is visible at the centre, with the D-shaped cross-section

By this time physicists also knew that energy is also produced when two atomic nuclei fuse together, a process called fusion. Nuclear fission produces harmful radioactive waste whereas nuclear fusion doesn't. This is why developing a nuclear fusion reactor has become an important technological goal for a world keenly interested in new sources of clean energy.

The tritium problem The problem is the amount of energy required to start and sustain a fusion reaction. A nuclear fission reaction can be kicked off by shooting neutrons of suitable energy at the atoms of unstable nuclei like uranium. For fusion to occur, however, the nuclei need to be exposed to a temperature of at least 100 million degrees C.

The lightest nucleus in nature is of hydrogen, consisting of a single proton. An isotope of hydrogen called deuterium has one proton and one neutron in its nucleus. The nucleus of another isotope called tritium has one proton and two neutrons. Deuterium-deuterium fusion requires a higher temperature to begin than deuterium-tritium fusion. This is because the extra neutron in the tritium nucleus helps overcome the repulsion of like-charges between the protons.

The fusion of a deuterium and a tritium nucleus creates a non-radioactive helium-4 nucleus, a neutron, and 17.6 MeV of energy, which is significant. The neutron can be directed to a blanket of materials surrounding the reactor that capture it and release more heat.

While deuterium is abundant in seawater, there are no natural deposits of tritium and it is very hard to produce. At present it is mostly created as a by-product in heavy-water fission reactors in Canada, India, and South Korea.

The temperature problem Yet another challenge for nuclear fusion is the temperature. For two nuclei to fuse, two things need to happen: the like-charges in the nuclei (due to the protons) need to be overcome, then the particles need to come within around 1 femtometre (fm) of each other so they can bond with each other using the strong nuclear force.

This force is the strongest fundamental force in nature and is responsible for keeping protons and neutrons together in the nuclei of atoms. But on the flip side, it only acts across very short distances: 1 fm is roughly one-fourth the width of a carbon nucleus. This is why the nuclei need to be heated to such high temperatures: to give them enough energy to overcome their repulsion and get so close to each other.

There are different reactor designs to achieve nuclear fusion by meeting these conditions. One set of designs involves the use of a tokamak — a donut-shaped vessel where the nuclei are confined, like in a cage, and made to fuse.

A magnetic cage Inside the vessel, a deuterium gas is exposed to about 20 million degrees C, when matter exists in the plasma state. The charged particles are stripped from their respective atoms and float around freely. Next, the particles are exposed to a very strong magnetic field that acts like an invisible net, trapping the particles along the field lines. This method is called magnetic confinement.

Engineers prefer to use electromagnets — special materials that generate a magnetic field when a current is passed through wires coiled around them — to create these fields because the field strength only depends on the amount of current in the wires. These wires are also superconducting: they can carry electric current with zero resistance if they are cooled to a very low temperature, which is achieved by blanketing them with liquid nitrogen or helium.

Inside EAST, both toroidal and poloidal magnetic fields are generated by superconducting electromagnets. It is currently the world's only tokamak with this feature. Toroidal magnetic fields flow around the donut-shaped reactor while poloidal fields flow through its centre. Together, they keep the particles within from drifting into the vessel's walls and collapsing the plasma. Instead they move in a spiral pattern through the vessel, with opportunities to collide with each other and fuse.

The poloidal field also induces an electric current in the plasma. When parts of the plasma resist the flow of this current, heat is produced, adding to the energy required to achieve fusion. A fast visible wavelength camera's images of plasma inside the EAST Tokamak at various times. A fast visible wavelength camera's images of plasma inside the EAST Tokamak at various times.

Through the years, EAST has been setting a series of records and validating the technologies used to achieve them. It was the first tokamak to sustain a plasma in high-confinement mode at around 50 million degrees C for more than 60 seconds in 2016 and for more than 100 seconds in 2017. In 2023, EAST achieved the world's first steady-state high-confinement plasma for 403 seconds — a world record that it broke on January 20, 2025, by sustaining a plasma for 1,066 seconds. For this

achievement, operators provided twice the thermal power to EAST as they did for the 2023 feat, allowing the plasma to remain stable for longer. At present, EAST isn't producing electricity. In fact, it is yet to reach a milestone called ignition: meaning it doesn't produce enough heat for more fusion reactions to occur, a.k.a. become self-sustaining. To produce usable electricity, a tokamak needs to maintain millions of degrees C for at least a few hours.

EAST is a testbed reactor for ITER, an international megaproject in which six countries around the world, including India, and the European Union are working together to build a tokamak that will sustain nuclear fusion that releases more energy than that required to sustain the plasma.

A need for alternatives

Crucially, EAST's successes are important for ITER's future because the latter has come under criticism for its delayed timelines and cost overruns. With a bill already upwards of EUR 18 billion, ITER has been called the most expensive science experiment in history — at a time in which the high cost of doing cutting-edge science has put off many governments from pursuing it.

Some research groups have also been trying to achieve nuclear fusion using methods that require fewer (but still considerable) resources. For example, one alternative to achieving magnetic confinement is a device called a stellarator. Whereas a tokamak has a simple donut shape, a stellarator has a more twisting design that is harder to build and operate. But its advantage is that it does away with the need for a poloidal magnetic field to achieve a twisting magnetic field inside the vessel. Instead it achieves the desired field configuration using a more complicated architecture of external magnets.

Other designs do away with magnetic confinement altogether. In one technique, for example, a pellet of deuterium and tritium is hit with laser beams of extreme power. Whereas a deuterium nucleus has one proton and one neutron, a tritium nucleus has one proton and two neutrons. When the beams strike the pellet, the energy causes the nuclei to compress and fuse, releasing more energy. The heat from the reactions could then be diverted to a pool of water, generating steam that moves a turbine and produces electricity.

Understanding the fusion energy breakthrough announced by the U.S. In the light of lasers In 2008, scientists at the Lawrence Livermore National Laboratory in the US began a project called 'Laser Inertial Fusion Energy' (LIFE) to test this idea. While they were able to develop lasers with the requisite power, the fusion output was found to be much lower than they had predicted. The project was cancelled in 2013 after it became clear it couldn't achieve ignition.

But another project at the same institute, called the National Ignition Facility (NIF), achieved the milestone in 2022. At the NIF, a system of 192 high-power lasers delivers 2.05 megajoules (MJ) of energy towards a small cylindrical capsule at the centre of the room. This capsule, called a hohlraum, is made of uranium-238 and plated with gold. It's about 2 mm wide. It contains a thin shell made of a polymer inside which deuterium and tritium atoms are placed in a frozen or gaseous state.

When electromagnetic radiation from the lasers enters the hohlraum, it strikes the inner wall and produces X-rays. Over a short span of time, the nuclei are bombarded by X-rays from all directions inside the hohlraum. Eventually they compress the fuel sample in a symmetric way and heat it up

rapidly to around 100 million degrees C. In 2022, the NIF said it had used this technique to produce 3.15 MJ of energy, crossing the breakeven point.

On the other hand, ITER was launched in 2007 and is expected to produce its first plasma only in 2033, and over time also devour the world's meagre tritium reserves. The desperate need for sources of clean energy means achieving nuclear fusion may just be a matter of time, especially if governments continue to trust the scientists working on the required technologies. But which technology gets it over the line — magnetic, inertial or something else — remains to be seen. Some private sector enterprises are also beginning to enter the mix.

While the NIF has demonstrated a proof-of-concept ignition, EAST is keeping tokamaks in the hunt with its large scale and steady progress. Shamim Haque Mondal is a researcher in the Physics Division, State Forensic Science Laboratory, Kolkata.

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ISRO's builds specialised rocket to test Gaganyaan parachutes

Source: News Nine, Dt. 17 Feb 2025,

URL: <https://www.news9live.com/science/isros-builds-specialised-rocket-to-test-gaganyaan-parachutes-2823546>

ISRO has provided a glimpse of a brand new vehicle in its annual report, designed specifically to test out parachutes of the Gaganyaan Crew Module. The Gaganyaan Programme is an ambitious endeavour to lift humans to Earth orbit using domestic hardware.

The Gaganyaan Crew Module, which is the spaceship, will fly to Earth orbit on top of a Human-Rated Launch Vehicle Mark 3 (HR-LVM3), which is a modified version of the LVM3, the mightiest rocket in ISRO's fleet. At the end of the orbital flight, Gaganyaan Crew Module will deploy a complex series of 10 parachutes to decrease its velocity before an ocean splashdown to safely return the Gaganyatris.

ISRO has built the rocket to test these parachute systems during the various phases of the descent of the Gaganyaan Crew Module through the atmosphere. The Sub-Orbital Launch Vehicle for Experiments (SOLVE) rocket is a modified version of the PSOM XL motor, which acts as a strap-on booster for ISRO's workhorse rocket, the Polar Satellite Launch Vehicle (PSLV).

ISRO has finalised the configuration of the vehicle using this motor, worked out how much load it can carry, studied its aerodynamics, and have configured the avionics architecture. The specialised vehicle will allow ISRO to thoroughly test and validate the brand new hardware to make it safe enough for humans.

Parachute Tests by Rail Track Rocket Sled

The parachutes to shed the velocity of the Crew Module after it sheds the Support Module and reenters the atmosphere. The parachutes have to deploy from a fast moving spaceship, and ISRO has also tested out their deployment at a dedicated facility in Chandigarh, made up of a rocket that

fires a sled across rail tracks. The Rail Track Rocket Sled (RTRS) facility is located at the Terminal Ballistics Research Laboratory (TBRL), and is operated by India's Defence Research and Development Organisation (DRDO).

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