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समाचार पत्रों से चयनित अंश

Newspapers Clippings

डीआरडीओ समुदाय को डीआरडीओ प्रौद्योगिकियों, रक्षा प्रौद्योगिकियों, रक्षा नीतियों, अंतर्राष्ट्रीय संबंधों और विज्ञान एवं प्रौद्योगिकी की नूतन जानकारी से अवगत कराने हेतु दैनिक सेवा

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DRDO News

जवानों के लिए अच्छी खबर! वैज्ञानिकों ने तैयार किए खास जूते, लैंडमाइन पर पड़ा पैर तो भी रहेंगे सुरक्षित

Source: Jagran, Dt. 24 Mar 2025,
URL: https://www.jagran.com/uttar-pradesh/kanpur-city-drdo-develops-anti-mine-and-anti-spike-boots-for-indian-army-soldiers-safety-23905356.html

देश की सीमा से सटे इलाकों में दुश्मन की घुसपैठ रोकने के लिए होने वाली पेट्रोलिंग या फिर दुश्मन के क्षेत्र में किसी ऑपरेशन के दौरान जवानों के लिए खतरा बनने वाली लैंडमाइंस भविष्य में जवानों का रास्ता नहीं रोक पाएंगी।

भारतीय रक्षा अनुसंधान एवं विकास संगठन (DRDO) की इकाई रक्षा सामग्री एवं भंडार अनुसंधान एवं विकास स्थापना (DMSRDE) द्वारा तैयार बूट पहने जवान का पैर माइन पर पड़ने पर विस्फोट तो होगा पर जवान को कोई खास नुकसान नहीं पहुंचा पाएगी।

यही नहीं नक्सल प्रभावित इलाकों के घने जंगलों में गस्त करने के दौरान अर्द्धसैनिक बलों के जवान एंटी स्पाइक बूट पहन कर मिट्टी में छिपी कीले या फिर जहरीले कीड़ों से बेफिक्र रहेंगे।

दुश्मन के इलाके में घुसने पर सेना की इंफेंट्री बटालियन के सामने सबसे बड़ी चुनौती जवानों को लैंडमाइंस से बचाने की रहती है। अक्सर दुश्मनों द्वारा बिछाई गई माइंस में ब्लास्ट होने पर जवानों की जान चली जाती या फिर वह अपने पैर गंवा बैठते।

डीएमएसआरडीई के तीन साल तक चले शोध के बाद तैयार एंटी माइन बूट पहनने पर 125 किग्रा तक के वजन के माइन के विस्फोट होने पर जवान की जान को खतरा नहीं होगा उनके पैर भी सुरक्षित होंगे।

दरअसल एंटी माइन में विस्फोट होने पर औसतन 42 हजार किग्रा प्रति सेमी स्क्वायर का उच्च दबाव पैदा होता है। ये बूट विस्फोटक का अत्यधिक दबाव 160 गुणा तक कम कर देता है, इस कारण से माइन तो फटेगा लेकिन जवानों को शारीरिक नुकसान नहीं पहुंचेगा। तीन किग्रा के ये बूट कई प्रकार के हल्के सिरेमिक पोरस और एरामिड के हाइब्रिड भाग को मिलाकर बनाए गए हैं। जवान इसे पहनने के बाद थकान भी महसूस नहीं कर सकेंगे। बूट का सीआरपीएफ के द्वारा परीक्षण किया जा चुका है।

शोध करने वाली टीम ने एंटी स्पाइक बूट भी तैयार किया है जो जंगल में मिट्टी में छिपीं नुकीली कीलों और जहरीले कीड़ों से जवानों को सुरक्षित रखता है। जूते का भार एक किलो है।

जूते के तल पर शीयर थिकनिंग जेल और अन्य फाइबर की परत लगाई गई है। जो सोल में कील के आरपार होने से बचाती हैं। इसका भी परीक्षण भी सफल रहा। जल्द ही बूट बनाने की तकनीक रक्षा क्षेत्र की कंपनियों को हस्तांतरित की जाएगी। तकनीक हासिल करने वाली कंपनी सेना से आर्डर के अनुसार उत्पादन कार्य शुरू कर सकेगी।

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Defence News

Defence Strategic: National/International

Make in India Powers Defence Growth

Source: Press Information Bureau, Dt. 24 Mar 2025,
URL: https://pib.gov.in/PressReleasePage.aspx?PRID=2114546

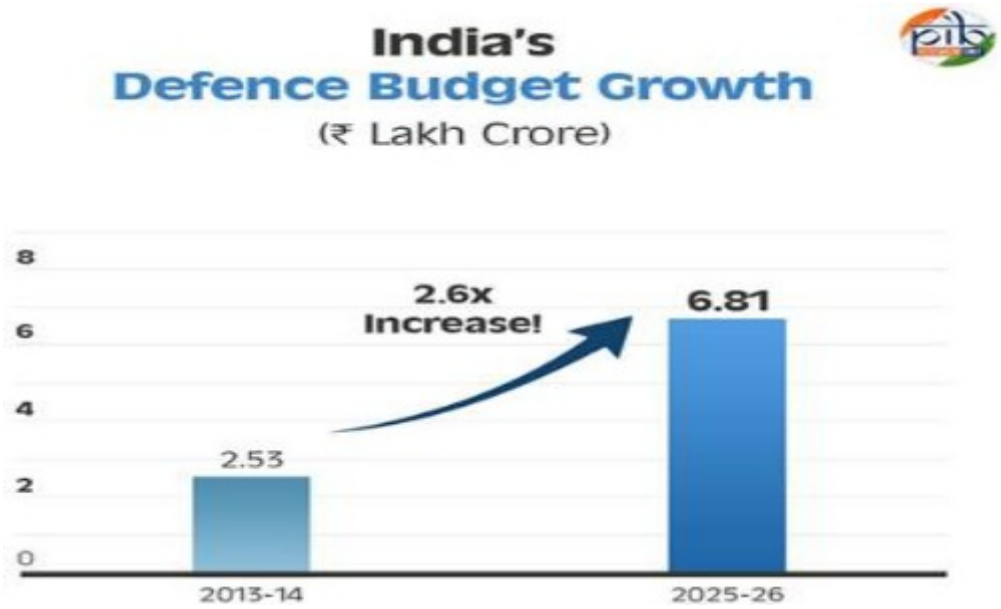
Introduction

India’s defence production has grown at an extraordinary pace since the launch of the "Make in India" initiative, reaching a record ₹1.27 lakh crore in FY 2023-24. Once dependent on foreign suppliers, the country now stands as a rising force in indigenous manufacturing, shaping its military strength through homegrown capabilities. This shift reflects a strong commitment to self-reliance, ensuring that India not only meets its security needs but also builds a robust defence industry that contributes to economic growth.

Strategic policies have fuelled this momentum, encouraging private participation, technological innovation, and the development of advanced military platforms. The surge in the defence budget, from ₹2.53 lakh crore in 2013-14 to ₹6.81 lakh crore in 2025-26, underlines the nation’s determination to strengthen its military infrastructure.

This commitment to self-reliance and modernisation is reflected in the recent approval by the Cabinet Committee on Security (CCS) for the procurement of the Advanced Towed Artillery Gun

System (ATAGS), a significant step in enhancing the Army's firepower. The deal includes 307 units of 155mm/52 caliber guns along with 327 High Mobility 6x6 Gun Towing Vehicles, equipping 15 Artillery Regiments under the Buy Indian–Indigenously Designed, Developed, and Manufactured (IDDM) category, at an estimated cost of ₹7,000 crore. Developed by DRDO with Bharat Forge and Tata Advanced Systems, ATAGS is a cutting-edge artillery system with a 40+ km range, advanced fire control, precision targeting, automated loading, and recoil management, thoroughly tested by the Indian Army in all terrains.

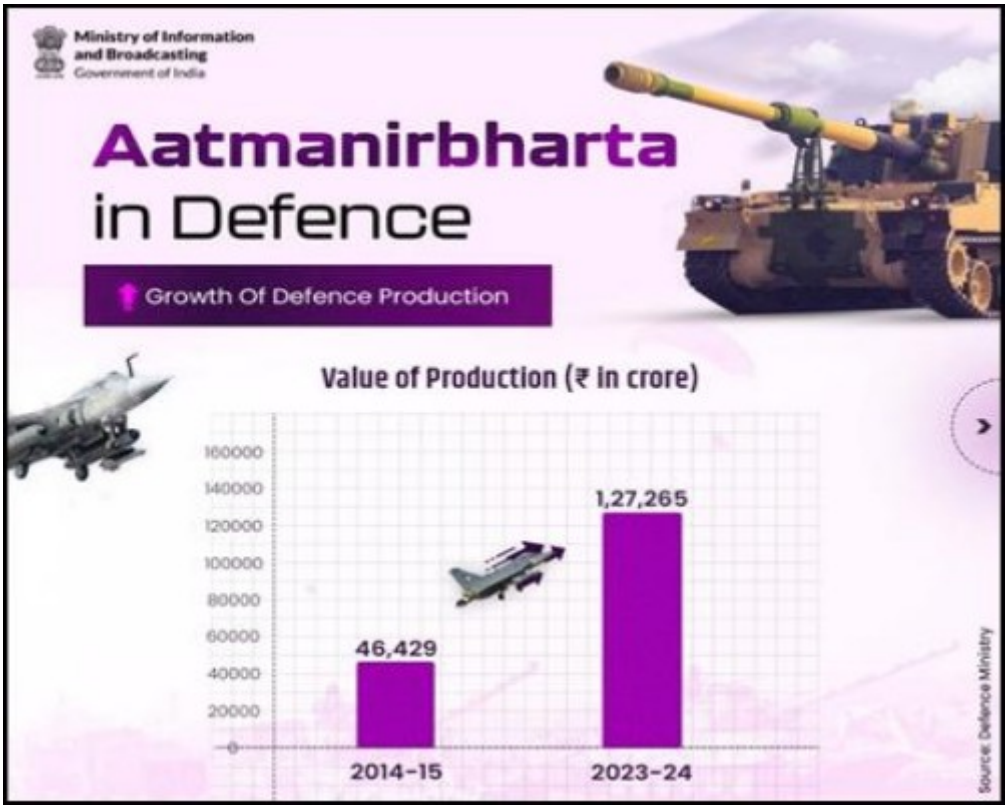


With modern warships, fighter jets, artillery systems, and cutting-edge weaponry being built within the country, India is now a key player in the global defence manufacturing landscape.

Surge in Indigenous Defence Production

India has achieved the highest-ever growth in indigenous defence production in value terms during Financial Year (FY) 2023-24, driven by the successful implementation of government policies and initiatives led by Prime Minister Shri Narendra Modi, focusing on attaining Atmanirbharta. The value of defence production has surged to a record high of ₹1,27,265 crore, marking an impressive 174% increase from ₹46,429 crore in 2014-15, according to data from all Defence Public Sector Undertakings (DPSUs), other public sector units manufacturing defence items, and private companies.

This growth has been bolstered by the Make in India initiative, which has enabled the development of advanced military platforms including the Dhanush Artillery Gun System, Advanced Towed Artillery Gun System (ATAGS), Main Battle Tank (MBT) Arjun, Light Specialist Vehicles, High Mobility Vehicles, Light Combat Aircraft (LCA) Tejas, Advanced Light Helicopter (ALH), Light Utility Helicopter (LUH), Akash Missile System, Weapon Locating Radar, 3D Tactical Control Radar, and Software Defined Radio (SDR), as well as naval assets like destroyers, indigenous aircraft carriers, submarines, frigates, corvettes, fast patrol vessels, fast attack craft, and offshore patrol vessels.



Key points:

- 65% of defence equipment is now manufactured domestically, a significant shift from the earlier 65-70% import dependency, showcasing India's self-reliance in defence.
- A robust defence industrial base includes 16 DPSUs, over 430 licensed companies, and approximately 16,000 MSMEs, strengthening indigenous production capabilities.
- The private sector plays a crucial role, contributing 21% to total defence production, fostering innovation and efficiency.
- India targets ₹3 lakh crore in defence production by 2029, reinforcing its position as a global defence manufacturing hub.

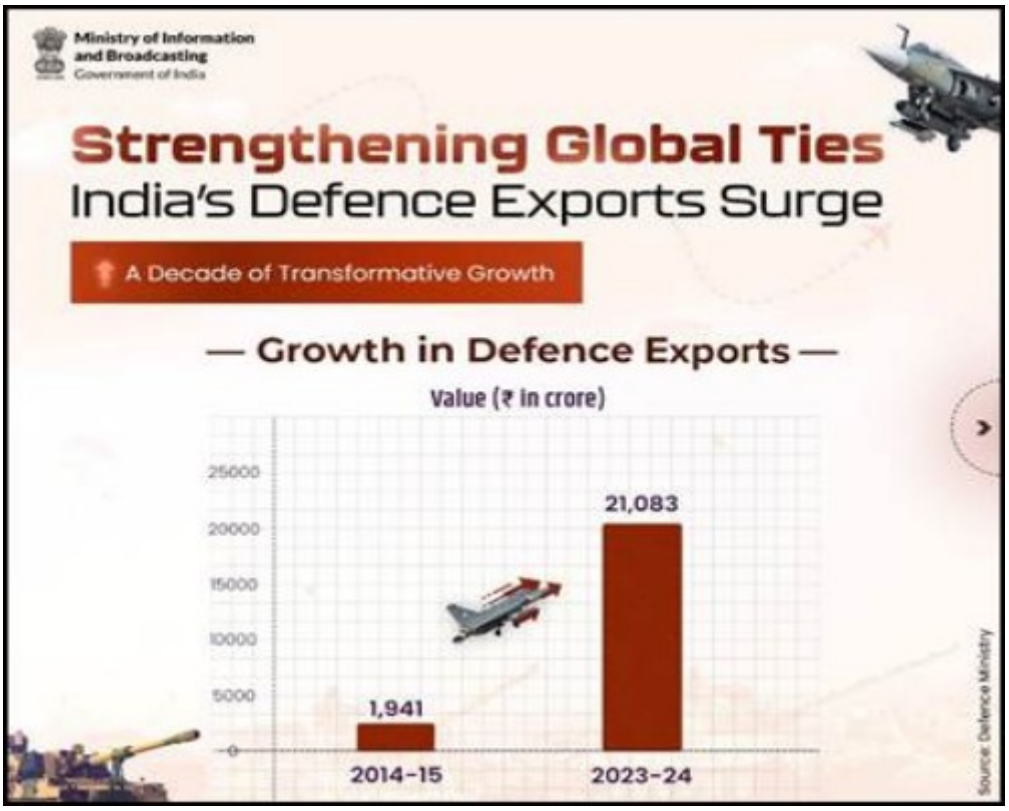
Unprecedented Growth in Defence Exports

India's expanding global footprint in defence manufacturing is a direct result of its commitment to self-reliance and strategic policy interventions. Defence exports have surged from ₹686 crore in FY 2013-14 to an all-time high of ₹21,083 crore in FY 2023-24, marking a 30-fold increase over the past decade.

Key points:

- Defence exports have grown 21 times, from ₹4,312 crore in the 2004-14 decade to ₹88,319 crore in the 2014-24 decade, highlighting India’s expanding role in the global defence sector.

- Defence exports surged by 32.5% year-on-year, rising from ₹15,920 crore in FY 2022-23 to ₹21,083 crore in FY 2023-24.
- India's diverse export portfolio includes bulletproof jackets, Dornier (Do-228) aircraft, Chetak helicopters, fast interceptor boats, and lightweight torpedoes.
- Notably, 'Made in Bihar' boots are now part of the Russian Army's gear, highlighting India's high manufacturing standards.
- India now exports defence equipment to over 100 countries, with the USA, France, and Armenia emerging as the top buyers in 2023-24.
- The government aims to achieve ₹50,000 crore in defence exports by 2029, reinforcing India's role as a global defence manufacturing hub while boosting economic growth.



Innovations for Defence Excellence (iDEX)

Launched in April 2018, Innovations for Defence Excellence (iDEX) has created a thriving ecosystem for innovation and technology development in defence and aerospace. By engaging MSMEs, startups, individual innovators, R&D institutes, and academia, iDEX has provided grants of up to ₹1.5 crore for developing innovative technologies. To further enhance self-reliance in defence technology, ₹449.62 crore has been allocated to iDEX, including its sub-scheme Acing Development of Innovative Technologies with iDEX (ADITI), for 2025-26. As of February 2025, 549 problem statements have been opened, involving 619 startups and MSMEs, with 430 iDEX contracts signed.

The scheme has three key objectives:

- Facilitate rapid development of new, indigenised, and innovative technologies for the Indian Defence and Aerospace sector, to meet their needs in a shorter time span.
- Create a culture of engagement with innovative startups, to encourage co-creation for Defence and Aerospace sectors.
- Empower a culture of technology co-creation and co-innovation within the Defence and Aerospace sectors.

The recently launched ADITI scheme aims to support critical and strategic technologies such as satellite communication, advanced cyber technology, autonomous weapons, semiconductors, artificial intelligence, quantum technology, nuclear technologies, and underwater surveillance. Under this scheme, grants of up to ₹25 crore are provided to innovators.

Reinforcing its commitment to supporting startups and MSMEs, the Ministry of Defence has also cleared procurement of 43 items worth over ₹2,400 crore from iDEX startups and MSMEs for the Armed Forces as of February 2025. Additionally, projects worth over ₹1,500 crore have been approved for development.

SAMARTHYA: Showcasing India's Defence Indigenisation

The success story of indigenisation and innovation in the defence sector was highlighted at the Aero India 2025 event 'SAMARTHYA', which showcased India's progress in defence manufacturing. The event featured 33 major indigenised items, including 24 developed by Defence Public Sector Undertakings (DPSUs), the Defence Research and Development Organisation (DRDO), and the Indian Navy, along with nine successful innovation projects from iDEX.

Among the key indigenised items displayed were:

- Electro Block of the Anti-Aircraft Machine Gun
- Electric Mobile Part for Submarines
- Torsion Bar Suspension for HMV 6x6
- Extruded Aluminium Alloy for LCA MK-I/II and LCH Components
- Indian High-Temperature Alloy (IHTA)
- VPX-135 Single Board Computer
- Naval Anti-Ship Missile (Short Range)
- RudraM II Missile
- C4ISR System
- DIFM R118 Electronic Warfare Systems

The event further highlighted breakthroughs in AI-driven analytical platforms, next-generation surveillance systems, quantum-secure communication technologies, and counter-drone measures. Innovations like the 4G/LTE TAC-LAN, Quantum Key Distribution (QKD) system, Smart

Compressed Breathing Apparatus, and Advanced Autonomous Systems for the Armed Forces reflect India's evolving defence landscape.

Efforts are ongoing to bridge the gap between the Indian Army's operational challenges and the innovative solutions developed by academia, industry startups, and research institutions. Additionally, the focus remains on conducting multi-domain operations in a data-centric environment, especially in light of emerging transformative technologies.

SAMARTHYA stands as a testament to India's commitment to self-reliance in defence technology, reinforcing its ability to develop advanced, home-grown solutions for national security.

Advancing Self-Reliance

India's pursuit of self-reliance in defence manufacturing has significantly reduced its dependence on foreign suppliers. Through strategic policies and indigenous innovation, the country is developing cutting-edge military platforms, strengthening both national security and economic growth.

Self-Reliant Initiatives through Joint Action (SRIJAN)

- Launched by the Department of Defence Production (DDP) in August 2020 to promote indigenisation under Atmanirbhar Bharat.
- Serves as a common platform for Defence Public Sector Undertakings (DPSUs) and the Armed Forces (SHQs) to list imported items for domestic manufacturing.
- As of February 2025, over 38,000 items are available, with more than 14,000 successfully indigenised.

Positive Indigenisation Lists (PILs)

- The Department of Defence Production (DDP) and the Department of Military Affairs (DMA) have issued five Positive Indigenisation Lists (PILs) for LRUs, assemblies, sub-assemblies, sub-systems, spares, components, and high-end materials.
- These lists set fixed timelines beyond which procurement will be restricted to domestic manufacturers.
- Out of over 5,500 items listed, more than 3,000 have been indigenised as of February 2025.
- Key indigenised technologies include artillery guns, assault rifles, corvettes, sonar systems, transport aircraft, light combat helicopters (LCHs), radars, wheeled armoured platforms, rockets, bombs, armoured command post vehicles, and armoured dozers.

Defence Industrial Corridors

- Two Defence Industrial Corridors (DICs) have been set up in Uttar Pradesh and Tamil Nadu to boost defence manufacturing. These corridors provide incentives to companies investing in the sector.

- Investments worth more than Rs 8,658 crore have already been made in the 6 nodes of UP viz. Agra, Aligarh, Chitrakoot, Jhansi, Kanpur and Lucknow and 5 nodes of Tamil Nadu viz. Chennai, Coimbatore, Hosur, Salem and Tiruchirappalli.
- As of February 2025, 253 MoUs have been signed, with a potential investment of ₹53,439 crore.

Ease of Doing Business (EoDB)

- The government has introduced several measures to improve ease of doing business in the defence manufacturing sector.
- The validity of export authorisation for parts and components has been extended from two years to the completion of the order or component, whichever is later.
- In 2019, the Defence Product List was streamlined to reduce the number of items requiring a manufacturing licence.
- Parts and components of defence items were de-licensed in September 2019 to encourage investment.
- The validity of defence licences under the Industries (Development and Regulation) Act, 1951, has been extended from three years to 15 years, with a further extension option of up to 18 years.
- Over 700 industrial licences have been issued to 436 companies in the defence sector.
- The introduction of an end-to-end digital export authorisation system has improved efficiency, with more than 1,500 authorisations issued in the last financial year.

MAKE Projects: Driving Indigenous Defence Innovation

The MAKE procedure was first introduced in the Defence Procurement Procedure (DPP-2006) to promote indigenous design and development in the defence sector. Over the years, it has been simplified and streamlined through revisions in 2016, 2018, and 2020, ensuring faster development of defence equipment, systems, and components by both public and private industries.

MAKE projects have been divided into three categories:

MAKE-I (Government Funded)

- Up to 70% government funding for prototype development (capped at ₹250 crore per Development Agency).
- Minimum 50% Indigenous Content (IC) required.

MAKE-II (Industry Funded)

- Focuses on import substitution, encouraging domestic industries to develop critical defence systems.
- No government funding, with a minimum 50% Indigenous Content (IC) requirement.

MAKE-III (Manufactured in India through Transfer of Technology - ToT)

- Involves manufacturing in India under Technology Transfer (ToT) from Foreign OEMs.
- No design and development but require a minimum of 60% Indigenous Content (IC).

Key points:

- As of March 24, 2025, a total of 145 projects have been undertaken under the MAKE initiative, with the participation of 171 industries, driving indigenous defence production.
- The initiative includes 40 MAKE-I projects (Government Funded), 101 MAKE-II projects (Industry Funded), and 4 MAKE-III projects (Manufacturing through ToT), strengthening self-reliance in defence manufacturing.

Other Key Initiatives

In recent years, the Indian government has implemented a series of transformative initiatives aimed at bolstering the country's defence production capabilities and achieving self-reliance. These measures are designed to attract investment, enhance domestic manufacturing, and streamline procurement processes. From liberalizing foreign direct investment (FDI) limits to prioritizing indigenous production, these initiatives reflect a robust commitment to strengthening India's defence industrial base. The following points outline the key government initiatives that have been pivotal in driving growth and innovation in the defence sector.

- Liberalized FDI Policy: Foreign Direct Investment (FDI) in the defence sector was liberalised in September 2020 to attract foreign investment, allowing up to 74% FDI through the automatic route and above 74% through the government route. Since April 2000, the total FDI in defence industries stands at $21.74 million.
- TATA Aircraft Complex: Tata Aircraft Complex was inaugurated in Vadodara in October 2024 to manufacture C-295 aircraft, boosting Atmanirbharta in defence with 40 made-in-India aircraft out of 56 under the programme.
- Manthan: The annual defence innovation event, Manthan, held during Aero India 2025 in Bengaluru, brought together leading innovators, startups, MSMEs, academia, investors, and industry leaders from the defence and aerospace sectors, reaffirming confidence in the government's commitment to technological advancements and Aatmanirbhar Bharat.
- Defence Testing Infrastructure Scheme (DTIS): DTIS aims to boost indigenisation by providing financial assistance for setting up eight Greenfield testing and certification facilities in the aerospace and defence sector, with seven test facilities already approved in areas like unmanned aerial systems, electronic warfare, electro-optics, and communications.
- Priority for Domestic Procurement: Emphasis is placed on procuring capital items from domestic sources under the Defence Acquisition Procedure (DAP)-2020.
- Domestic Procurement Allocation: MoD has earmarked 75% of modernisation budget amounting to Rs 1,11,544 crore for procurement through domestic industries during the current Financial Year.

Conclusion

India's remarkable strides in defence production and exports underscore its transformation into a self-reliant and globally competitive military manufacturing hub. The combination of strategic policy interventions, increased domestic participation, and a focus on indigenous innovation has significantly strengthened the country's defence capabilities. The surge in production, the exponential rise in exports, and the success of initiatives like the Make in India reflect India's commitment to achieving Atmanirbharta in defence. With ambitious targets set for 2029, the nation is poised to further expand its global footprint, reinforcing its position as a dependable partner in the international defence market while enhancing national security and economic growth.

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Culmination Of Bilateral Naval Exercise - VARUNA 2025

Source: Press Information Bureau, Dt. 24 Mar 2025,
URL: https://pib.gov.in/PressReleasePage.aspx?PRID=2114535

The bilateral naval exercise VARUNA 2025, held from 19 to 22 Mar 25, brought together Indian Navy and the French Navy, underscoring their enduring partnership.

This edition of the Exercise included exercises ranging across multi domain environments. The structured drills were designed to further fine-tune tactical and operational proficiency in complex scenarios. Advanced Air defence drills with the participation of Rafale-M of the French Navy and MIG-29K of the Indian Navy, simulating realistic combat scenarios, honed the ability of participating units to counter aerial threats jointly. Anti-Submarine Warfare exercises involving Indian submarine and Anti-Submarine frigates of the two forces focused on deepening the understanding and proficiency in underwater domain awareness and tactics. Surface warfare operations involved complex coordinated manoeuvres and simulated engagements, showcasing the

combined combat power of the participating fleets. Replenishment At Sea exercises by the two Fleet Tankers proved the logistical interoperability and enhanced mutual support and endurance for sustained operations. This edition of the exercise achieved a higher degree of operational coordination between the two navies than the previous editions.

The exercise achieved its aim of enhanced Jointmanship and reinforced the shared commitment to upholding the principles of a rules-based maritime order and promoting stability in the Indo-Pacific. The complex drills provided invaluable operational experience, strengthening the collective capacity to address contemporary maritime security challenges. The exercise facilitated the critical exchange of Best Practices, fostering a deeper understanding of each other's operational doctrines and enhancing the two navies' ability to operate seamlessly in complex maritime environments. Since its inception, the Varuna exercise has been a cornerstone of India-France defence relations, with both countries recognising the importance of maritime security and collaborative defence efforts. France and India share a strong commitment to safeguarding global Sea lanes and addressing shared maritime security challenges.

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Indian Navy's Maiden Initiatives of Indian Ocean Ship Sagar (IOS Sagar) and Africa India Key Maritime Engagement (AIKEYME)

Source: Press Information Bureau, Dt. 24 Mar 2025,
URL: https://pib.gov.in/PressReleasePage.aspx?PRID=2114491

Over the past ten years, Indian Navy has deepened its partnerships with maritime agencies of Indian Ocean Region (IOR), to enhance maritime security in consonance with the GoI's vision of Security and Growth for All in the Region (SAGAR). Indian Navy has been collaborating with navies of IOR countries on several initiatives such as joint naval exercises, coordinated patrols, information sharing, HADR efforts, capacity building and other diplomatic engagements. With SAGAR entering its second decade, and the announcement of Mutual and Holistic Advancement for Security Across the Regions (MAHASAGAR) by Hon'ble Prime Minister, during his visit to Mauritius in March 2025, Indian Navy is launching its maiden initiatives of IOS Sagar and AIKEYME, which are aimed at consolidating Indian Navy's stature as the 'Preferred Security Partner' and 'First Responder' in Indian Ocean Region.

IOS Sagar

Indian Ocean Ship (IOS) Sagar, is an initiative towards continued cooperation with IOR nations. One Indian Naval ship (INS Sunayna) is being deployed to the Southwest IOR with a combined crew of India and nine Friendly Foreign Countries (Comoros, Kenya, Madagascar, Maldives, Mauritius, Mozambique, Seychelles, Sri Lanka , South Africa). The ship is planned to be deployed for over a month in April 2025, and would be undertaking port calls at Dar-es-Salaam, Nacala, Port Louis, Port Victoria and Male and Joint surveillance of Exclusive Economic Zones (EEZs) of Tanzania, Mozambique, Mauritius and Seychelles.

The personnel from FFCs would undergo a training capsule of two weeks at various naval professional schools at Kochi, including training at Sea. The FFC personnel would be engaged in wholeship activities, watch keeping and other events related to their respective branches/ trade. The participants of IOS Sagar are also planned to witness harbour phase activities of Exercise AIKEYME at Dar-es-Salaam, Tanzania.

AIKEYME

India and Africa give immense importance to maritime security and have reiterated their commitment to increase cooperation in tackling maritime security threats such as piracy, illegal activities including trafficking, unregulated and unreported fishing through sharing of information and surveillance. A large scale multilateral maritime engagement exercise with African Countries, titled as 'Africa India Key Maritime Engagement' also known as 'AIKEYME', which means 'Unity' in Sanskrit is an initiative in this direction to enhance interoperability with the navies/ maritime agencies. The maiden edition of the exercise is being co-hosted by Indian Navy and Tanzania Peoples' Defence Force (TPDF) and would be conducted at/ off Dar-es-Salaam, Tanzania, and is planned to be inaugurated by Hon'ble RM Shri Rajnath Singh in mid-April 2025. The exercise is planned over six days and includes participation from Comoros, Djibouti, Eritrea, Kenya, Madagascar, Mauritius, Mozambique, Seychelles and South Africa in addition to the co-hosts. The Harbour Phase of the exercise would include TableTop and Command Post exercises on Piracy and Information sharing, along with training on Seamanship and Visit Board Search and Seizure (VBSS). The Sea Phase comprises Seamanship evolutions, Search and Rescue, VBSS, Small Arms firing and Helicopter Operations.

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Survival in today's battlespace is not about being fittest, but about those who adapt, transform, and position themselves & seize emerging opportunities: CDS Gen Anil Chauhan

Source: Press Information Bureau, Dt. 24 Mar 2025,
URL: https://pib.gov.in/PressReleasePage.aspx?PRID=2114581

"Survival in today's battlespace is not about being the fittest, but about those who adapt, transform, and position themselves and seize emerging opportunities.", said Chief of Defence Staff (CDS) General Anil Chauhan at the College of Defence Management (CDM), Secunderabad. He was addressing future strategic leaders undergoing Higher Defence Management Course HDMC-20 on the challenges of navigating the complex security landscape of the 21st century.

In his address, Gen Anil Chauhan highlighted the importance of adaptability, resilience and visionary leadership amidst rapidly shifting global power dynamics, non-traditional threats and technological advancements, characterised by fast paced AI disruptions, to address contemporary and emerging security challenges effectively. The CDS impressed upon the need for a whole of nation approach towards synergetic response and underscored the role of Indian Armed Forces in shaping the country's national security strategy.

The CDS, in his talk on National Security Architecture and Change Management in the Year of Defence Reforms, gave a deep insight into the functioning of the Department of Military affairs (DMA) and the transformative drive towards fostering jointness, integration and synergy in the armed forces. He provided a nuanced perspective of the roadmap for year of transformation marked by articulation of Vision 2047 for the armed forces, joint doctrines, defence & military policies along with efforts towards finalisation of Integrated Capability Development Plan, while elaborating upon the Atmanirbharta initiatives undertaken by the DMA.

During the visit, General Chauhan engaged with faculty members and course participants, including officers from friendly foreign countries, sharing his insights on the importance of fostering innovation, experimentation and collaboration within the defence establishment to stay ahead in an evolving strategic environment. The visit of CDS to CDM is a testament to the institution's commitment to excellence in defence management education and its role in shaping the future of India's National Security.

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Indian Army, Air Force to get 800 Km strike range BrahMos supersonic cruise missiles

Source: ANI News, Dt. 25 Mar 2025,
URL: https://www.aninews.in/news/national/general-news/indian-army-air-force-to-get-800-km-strike-range-brahmos-supersonic-cruise-missiles20250324212325/

In a significant boost for the defence forces, the Indian Army and the Air Force are going to get land-attack BrahMos supersonic cruise missiles, which would be able to hit targets at a range of beyond 800 Km.

The proposal for the acquisition of around 250 of these missiles has been cleared by the Defence Acquisition Council and will now be taken to the Cabinet Committee on Security for final approval, defence sources told ANI.

The missiles would be part of the units handling the missiles and would be deployed in both desert and high-altitude areas, they said.

The missiles earlier used to have a range of around 300 Kms but their capabilities have been enhanced significantly and can hit targets up to 800 Km.

The proposal from the two forces for the BrahMos cruise missiles is a repeat order of the missiles that the Indian Navy is getting, they said.

The BrahMos has been one of the most successful joint ventures in the Indian weapon manufacturing industry, even though a majority of it is produced by the Russian side.

The Indian side is working towards indigenisation of the major portions of the weapon system and has achieved success in some areas with support from the private sector industry.

The missile is being successfully exported to the Philippines with Russian support and more countries are showing interest in it.The BrahMos Aerospace, under its new leadership, is also

working towards BrahMos Next Generation missiles, which would be produced in Lucknow, Uttar Pradesh.

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Indian Military Academy to induct 1st batch of women officer cadets

Source: Hindustan Times, Dt. 25 Mar 2025,
URL: https://www.hindustantimes.com/india-news/ima-to-induct-1st-batch-of-women-officer-cadets-101742842270566.html

The 92-year-old Dehradun-based Indian Military Academy (IMA) will induct its first batch of women officer cadets in July 2025 after they graduate from the National Defence Academy (NDA) in Khadakwasla that opened its doors to them for the first time three years ago following a Supreme Court ruling, officials aware of the matter said on Monday.

Eight of the 18 women cadets, who are currently in the sixth and final term of training at NDA, have opted to serve in the army and will join IMA for another year of training before they are commissioned as officers next year, the officials said, asking not to be named. The first batch of women cadets will pass from NDA in May after completing three years of training. They had joined the tri-services academy in August 2022.

NDA currently accounts for 126 women cadets who are in different stages of training.

“IMA will induct women cadets for the first time in almost 93 years, a watershed in its history. It is currently the only military academy in the country that does not train women,” said one of officials cited above.

In August 2021, the Supreme Court directed the government to allow women to take the NDA entrance exam and the first batch was inducted the next year. The order came almost three decades after they were allowed to serve in select branches of the three services as short-service commission (SSC) officers, and 18 months after the top court ruled that women officers who joined the Indian Army through SSC, were entitled to permanent commission and command roles.

Separate accommodation has been earmarked for the women officer cadets at IMA, although they will be assigned to different companies for training alongside their male counterparts, said a second official. “IMA officials have visited several training academies, including the Officers Training Academy (OTA), Chennai, the Air Force Academy, Dundigal, and the Indian Naval Academy, Ezhimala, to scope out different aspects of training women and gender-specific requirements,” he added.

“I don’t foresee any hurdles as the army has been training women at OTA for more than 30 years and similar training standards and practices will be adopted by IMA. Gender-specific requirements will be addressed too. There has been full acceptance of women in the military,” said Lieutenant Colonel Anu Singh Randhawa (retd), who served in the Army Ordnance Corps for 21 years.

Students become eligible to take the NDA and Naval Academy Examination, conducted by the Union Public Service Commission (UPSC), while they are in Class 12. Those who clear the

entrance exam must face the Services Selection Board (a rigorous personality and intelligence test spread over five days). The accepted candidates undergo a medical examination before UPSC releases the final merit list.

After training at NDA for three years, split into six terms, cadets head for further training at different academies depending on their choice of service before getting commissioned as officers. Also, there are different types of entries for both men and women to join service-specific academies after completing their graduation.

The women cadets are joining IMA at a time when the service is giving women officers more exposure to new roles for career development. Around 60% of the Indian Army's women commanding officers (COs) are currently heading units in operational areas, including forward locations in the Northern and Eastern Commands that are responsible for guarding India's borders.

More than 145 women officers have been approved for the rank of colonel since the army opened command roles to them two years ago. Of them, around 115 women are already heading their units.

But there have been issues. At a time when the armed forces have taken great strides towards correcting gender bias, a top general last year shot off a letter to the eastern army commander complaining about a litany of issues ostensibly plaguing army units commanded by women officers in the sensive eastern sector -- from officer management to a purportedly misplaced sense of entitlement, from a lack of empathy to an exaggerated tendency to complain, and from over-ambition to a lack of ambition.

The unprecedented five-page letter on "command by women officers" — written last October by then 17 Corps commander Lieutenant General Rajeev Puri to Eastern Army Commander Lieutenant General Ram Chander Tiwari — cited an "in-house review" by the Panagarh-based mountain strike corps.

To be sure, women are being assigned central roles on a par with their male counterparts in the armed forces — they are flying fighter planes, serving on board warships, being inducted in the personnel below officer rank (PBOR) cadre, and undergoing training at NDA. But tanks and combat positions in infantry are still no-go zones for women in the army.

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अपग्रेडेड रॉकेट गोला-बारूद के लिए **RFI** जारी**,** कहीं भी हो दुश्मन घूस कर करेगा वार

Source: Zee Bharat, Dt. 24 Mar 2025,
URL: https://zeenews.india.com/hindi/zee-hindustan/national/indian-army-issues-rfi-for-manufacture-rocket-ammunition-for-multi-barrel-rocket-launcher-defence/2692855

भारतीय सेना के हथियारों को मॉडर्न बनाने के लिए रक्षा मंत्रालय ने एक और बड़ा कदम उठाया है. इसके लिए अब ऐसे रॉकेट गोला-बारूद बनाए जाएंगे, जो देश भर में तैनात किए गए लॉन्चर्स से दागा जा सकता है. दरअसल, रक्षा मंत्रालय भारतीय सेना की सेवा में मौजूद 122mm ग्रैड BM-21 मल्टी बैरल रॉकेट लॉन्चर सिस्टम के लिए, रॉकेट गोला बारूद

खरीदने की योजना बना रहा है. इस उद्देश्य की पूर्ति के लिए अनुरोध सूचना (RFI) जारी की है. इस फैसले से, संभावित विक्रेताओं की पहचान करने और इस प्रोजेक्ट को पूरा करने में सक्षम, मूल उपकरण निर्माता (OEM) तथा अधिकृत विक्रेताओं से जानकारी प्राप्त करने में मदद मिलेगी.

रक्षा मंत्रालय ने **RFI** की जारी

रिपोर्ट की मानें तो, वर्तमान में तैनात अलग-अलग लॉन्चर के अनुरूप अलग गोला-बारूद उपलब्ध हैं. ऐसे में अपग्रेडेड गोला बारूद भारतीय सेना की क्षमता को बढ़ाने में मददगार साबित होंगे. इसके लिए रक्षा मंत्रालय ने RFI जारी किया है, RFI का मतलब है Request for Information यानी सूचना अनुरोध, यह एक तरह की औपचारिक प्रक्रिया होती है, जिससे संभावित आपूर्तिकर्ताओं से किसी उत्पाद या सेवा के बारे में जानकारी एकत्र की जाती है.

तोपखानों का संचालन होगा प्रभावी

RFI जारी होने के बाद यह स्पष्ट हो गया है कि पड़ोसी देशों से, किसी भी हालात में निपटने के लिए भारतीय सेना पूरी तरह तैयार है. अब भारतीय सेना की ग्रैड रॉकेट रेजिमेंट्स को ऐसे गोला-बारूद से लैस किया जाएगा, जिन्हें सभी प्रकार के इलाकों में तैनात किए गए लॉन्चर्स से दागा जा सके, जिनमें पर्वतीय क्षेत्रों सहित अन्य सभी भौगोलिक परिस्थितियां शामिल हैं.

वहीं इस रॉकेट गोला-बारूद के बनाने का मुख्य उद्देश्य भारतीय सेना के तोपखाने (Artillery) हमलों के संचालन को प्रभावी बनाना है. जिसले दुर्गम इलाकों में गोला-बारूदों की उपलब्धता और बढ़ जाएगी.

इस कदम का रणनीतिक महत्व

122mm ग्रैड BM-21 मल्टी बैरल रॉकेट लॉन्चर प्रणाली भारतीय सेना की आर्टिलरी क्षमता का एक महत्वपूर्ण हिस्सा है. इस गोला-बारूद की खरीद से भारतीय सेना की अटैकिंग क्षमता को बढ़ावा मिलेगा और स्वदेशी रक्षा निर्माण क्षेत्र को भी मजबूती मिलेगी. वहीं रक्षा मंत्रालय ने इच्छुक विक्रेताओं से अनुरोध किया है कि वे इस प्रोजेक्ट से संबंधित अपने उत्पादों की जानकारी साझा करें. इससे भारतीय सेना को अत्याधुनिक गोला-बारूद की आपूर्ति सुनिश्चित करने और रक्षा आत्मनिर्भरता को बढ़ावा देने में मदद मिलेगी.

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Army developing smart collars and bulletproof vests to protect military dogs

Source: The Tribune, Dt. 24 Mar 2025,
URL: https://www.tribuneindia.com/news/india/army-develops-smart-collars-and-bulletproof-vests-to-protect-military-dogs/

With military dogs being regularly employed in counter-terrorist operations as well as disaster relief missions, the Army is developing new protective devices like bulletproof vests and smart collars for its canine warriors that would help mitigate casualties.

Operational deployment exposes the dogs to extreme weather conditions, strenuous physical exertion and toxic environment, which can result in heat stress, fatigue, respiratory disorders and cardiac health issues.

A smart collar would monitor the dogs' physical parameters such as body temperature, pulse, respiration, heart rate variability and calorie expenditure, just like a smart watch or similar wearables used by humans, and alert the handler in case of any abnormality, an officer with the Remount Veterinary Corps (RVC) said.

At present, dog handlers rely on their judgment and experience to assess the health of the dog. At times, abnormal symptoms may not be visible, the handlers' response may be delayed due to ongoing operations or be inaccurate, he added.

A light, modular bulletproof vest for dogs is also on the drawing board, which would offer protection to the torso against bullets and splinters during anti-terrorist operations or patrolling in high threat perception areas like the Line of Control.

A limited number of imported bulletproof vests have been procured, but these are heavy and costly. The Army wants vests that weigh less than 2 kg so that the dogs' movements, agility and effectiveness are not hampered.

Over the past few years, several canine warriors have fallen to bullets while taking part in search operations, house clearing missions or neutralising terrorists, and in the process saved the lives of their fellow soldiers. Some of them have also been decorated for gallantry.

Dogs have been an integral part of the Armed Forces, Central Armed Police Forces (CAPFs), and other law enforcement agencies for decades. Undertaking guard duties, patrolling, assaulting and neutralising suspects, VIP security, sniffing out explosives and mine detecting contraband items, search and rescue, are among the roles they undertake. They have also served overseas with Indian troops.

Dogs, which have been critical to the success of many military operations, are considered as force multipliers. Besides their ability to detect hostile elements, they are able to get into places difficult to access by humans, and when equipped with cameras, also provide valuable tactical intelligence. Their relatively smaller size and faster speed make them a difficult target.

RVC officers say that the project to develop indigenous protective gear for dogs would also benefit other agencies in the country like the paramilitary forces, which are also using dogs in high stress operations like counter-terrorism, bomb detection, border guarding and VVIP protection.

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How the Indian Army supports private industry in defence manufacturing

-by Maj Gen RPS Bhadauria (Retd)

Source: WION, Dt. 25 Mar 2025,
URL: https://www.wionews.com/india-news/how-the-indian-army-supports-private-industry-in-defence-manufacturing-8886959

On a quest towards self-reliance, the Indian Army actively supports the private industry in defence manufacturing through several initiatives to foster collaboration, innovation, and capability development.

For operational familiarisation, the Army organises trips for industry representatives to forward areas to acquaint them with field conditions and operational requirements. This helps private companies design systems tailored to real-world military needs.

Among other initiatives, the Army also extends support for trials and R&D of systems developed by private companies and provides in-service equipment for research and development purposes.

In fact, going further for export facilitation, the Army assists private firms by issuing no-objection certificates for exporting indigenous products and promoting military diplomacy with friendly foreign countries.

Moreover, dedicated cells have been set up at institutions like Indian Institute of Technology (IIT) Delhi, Indian Institute of Technology (IIT) Kanpur, and Indian Institute of Science (IISc) Bengaluru, to link academia with industry, fostering innovative ideas for futuristic projects.

The Indian Army, in collaboration with the Centre for Land Warfare Studies (CLAWS), also organises seminars and discussions with industry representatives to help them understand the Army's long-term procurement plans and contribute effectively to modernisation efforts. Regular capsules are conducted at CLAWS to familiarise industry participants with the procedures and processes for defence procurement.

The Indian Army also supports Indian industry by hand-holding defence manufacturers through development cycles—providing firing ranges, technical assistance during trials to validate internal milestones, and even showcasing their equipment to prospective foreign customers.

One of the best examples of this collaborative model is the Advanced Towed Artillery Gun System (ATAGS), which has now received formal clearance from the Cabinet Committee on Security (CCS). In a major boost to self-reliance, the government has approved the acquisition of ATAGS worth nearly ₹7000 crore, marking a decisive step in indigenous artillery capability building.

The ATAGS, India's first indigenously designed, developed, and manufactured 155mm artillery gun, has been under development by DRDO in collaboration with private industry partners Bharat Forge and TASL since 2009. The system boasts a long 52-calibre barrel capable of delivering precision strikes beyond 45 km using guided munitions. With a largely indigenous supply chain—over 65% of components sourced locally including critical systems like the barrel, breech, muzzle brake, firing mechanism, and recoil system—ATAGS is a major demonstration of India's defence industrial capability under the Make in India programme.

At the time of development, the Indian Army's Artillery Directorate embedded a dedicated team at DRDO's Armament Research and Development Establishment (ARDE), Pune. This included a Colonel-rank Programme Coordinator, two Project Managers of Lieutenant Colonel rank, and support staff to coordinate project execution and monitor progress closely.

Now in the final stages of procurement, the order is expected to be split between the two Indian private companies, with Bharat Forge likely to receive 60% and TASL 40% of the initial production contract. The Ministry of Defence is expected to sign the contract before the end of March 2025.

The approval not only boosts domestic defence production but also paves the way for employment generation—an estimated 20 lakh man-days across industries—and future exports. Being entirely indigenous, the system ensures lifecycle support and operational availability without foreign bottlenecks, thereby enhancing strategic readiness along India's Northern and Western borders.

Beyond ATAGS, private Indian companies are playing a critical role in other artillery platforms as well. Bharat Forge, for instance, is a key contender in both the 155mm Mounted Gun System (MGS) and Towed Gun System (TGS) programmes. MGS field trials are scheduled for December 2025, with firms like Bharat Forge requesting delivery extensions until then. For the TGS, field evaluations are slated for July 2025, and vendors must submit systems accordingly.

The Indian Army's consistent focus on upgrading to 155mm calibre systems is evident. Legacy 130mm field guns are being converted to 155mm under the Sharang programme. The Army is also inducting 114 Dhanush guns, with full operational availability expected by 2026. In parallel, the force is enhancing mobility and firepower with platforms like the M777 Ultra-Light Howitzer and the K9 Vajra self-propelled howitzer, for which an additional 100 units were ordered in December 2024.

Meanwhile, the indigenous Pinaka rocket system continues to be upgraded for greater range and accuracy. The Army is also shifting focus toward smart ammunition and loitering munitions to increase precision and flexibility in future engagements. As articulated by Director General Artillery Lt Gen Adosh Kumar in September 2024, loitering munitions are a key area of future procurement.

This holistic approach—fostering public-private collaboration, enabling operational exposure, providing institutional and procedural support, and committing to long-term procurement—is helping transform the Indian Army into a force that not only strengthens national security but also catalyses India's emergence as a global defence manufacturing hub.

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China's hypersonic warfare capabilities set for a major upgrade as scientists develop means to double scamjet thrust

Source: The Week, Dt. 24 Mar 2025,
URL: https://www.theweek.in/news/defence/2025/03/24/chinas-hypersonic-warfare-edge-set-for-a-major-upgrade-as-scientists-develop-means-to-double-scamjet-thrust.html

China's next-generation weapons and aircraft are set to have greater speed, increased manoeuvrability and range, thanks to a recent propulsion breakthrough made by Beijing's scientists.

According to a SCMP report, research team at the Beihang University of Beijing developed a secondary combustion technique that is expected to double thrust of a scramjet engine that can operate at supersonic speeds.

The breakthrough comes even as US is set to field its first Long-Range Hypersonic Weapon System by this year. There were also reports that said hypersonic missile technology, including both hardware and software, were sould to Chinese Chinese military research groups working on hypersonic capabilities.

The SCMP report said this is done by "injecting magnesium powder into the exhaust gases from conventional jet fuel combustion."

In a peer-reviewed journal, Acta Aeronautica, the lead scientist of the team Yang Qingchun wrote that "magnesium particles react explosively with the waste gases already inside the engine, releasing energy that was once thrown away."

The SCMP report said the afterburner, which was tested under conditions simulating Mach 6 flight at an altitude of 30km, is set to enhance China's lead in hypersonic technology.

As magnesium thrives on "waste" gases, and according to the researchers, "liquid kerosene first cools engine walls via regenerative cooling, while magnesium, added downstream, combusts in a supersonic "firestorm" stabilised by twin cavities and optimised flow paths."

This would enable the "hypersonic aircraft to use every drop of jet fuel as a coolant to reduce the temperature on its surface, achieving efficiency unmatched by other designs," the SCMP report read.

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China Admits It Has Tech To Sabotage Undersea Cables; Unveils Powerful Deep-Sea Cable Cutter That Can Disrupt World Order

Source: The EurAsian Times, Dt. 24 Mar 2025,
URL: https://www.eurasiantimes.com/china-publicly-unveiled-an-undersea-cable-cutter/

China recently demonstrated a small, deep-sea cable-cutting gadget that can cut the most robust underwater power or communication lines in the world, posing a massive threat to global underwater security, Hong Kong-based South China Morning Post reported. This is the first time that a country has publicly unveiled such a device.

The device has been created by the China Ship Scientific Research Centre (CSSRC) and its affiliated State Key Laboratory of Deep-sea Manned Vehicles and reportedly targets armored cables. The team of scientists, led by engineer Hu Haolong, that developed the device maintains that it has been designed as a tool for seabed mining and civilian salvage.

However, the equipment's dual-use capabilities may raise concerns for other countries, especially in light of recent events involving a rising number of undersea cable-snapping incidents. The device can be used to cut armored cables that support 95% of the world's data transmission. These cables are coated with polymer, rubber, and steel sheaths to make them resilient.

As the news of this latest device went viral, several netizens pointed out China's hypocrisy in denying its role or intention regarding sub-sea cable snapping while unveiling a device that could make that task much easier. Some users on X also made memes, stating that Beijing is now making no bones of the fact that it is a threat to undersea cables.

According to the report, the device developed by the Chinese research team can cut cables up to 4,000 meters (13,123 feet) below the surface, which is twice the maximum operational range of current subsea communication infrastructure.

In peer-reviewed research published in the Chinese-language journal Mechanical Engineer on February 24, the team led by engineer Hu Haolong claimed that the cutting tool's design had overcome several difficult technological difficulties originating from the depth at which these devices are meant to operate.

For one, the water pressure surpasses 400 atmospheres at 4,000 meters. The team claims that even with prolonged operation at that depth, the device will not implode, thanks to its titanium alloy exterior and oil-compensated seals.

Second, steel-reinforced cables cannot be cut with conventional blades. So, to address that shortcoming, Hu and his colleagues developed a 150mm (six-inch) diamond-coated grinding wheel that rotates at 1,600 revolutions per minute (rpm), producing sufficient force to break steel while causing the least amount of disruption to marine sediment.

Further, the report states, "Mounted on submersibles with constrained power budgets, the tool's one-kilowatt motor and 8:1 gear reducer balance torque (six Newton-metres) with efficiency, though prolonged cuts risk overheating."

The device has been designed to operate with advanced positioning technology to prevent misalignment and could be operated by robotic arms in near-complete darkness.

The revelation comes amid an expansion in China's undersea capabilities, including the development of manned and unmanned submersibles. This new device is specifically designed to integrate with China's Fendouzhe or Striver and the Haidou series of submersibles.

This has given rise to concerns that China could use the device to sever the undersea cables in the event of war with the United States in the Indo-Pacific region. Amid rising tensions in the region, analysts and military pundits have flagged a war between the two superpowers as a very real possibility. Moreover, Beijing could choose to cut undersea telecom communication cables in the Taiwan Strait in case it decides to invade the self-ruled island state.

Going a step ahead, the SCMP report contends that China could weaponize these cable cutters to snap undersea communication lines in sites like Guam, a very strategic US territory in the Pacific. Guam is home to a key US port and air force base and is believed to be used as a launchpad in the event of a US-China conflict.

Undersea cables play a vital role in global communications and energy transmission. They form the backbone of the internet and support the flow of electricity between countries and continents. When disrupted, they have the potential to disrupt economies and be a part of a larger hybrid warfare.

Carnegie Endowment, a US-based non-partisan think tank, writes in an article: "Even a modest disruption in internet connectivity that would be a minor nuisance to the general public could have drastic consequences for European and global financial markets, which rely on rapid information flows to optimally perform.

"Europeans have begun to recognize that damage to subsea data cables in their immediate vicinity could be part of a broader toolkit of hybrid aggression directed against them, in which single events do not amount to acts of war and attribution can be remarkably difficult."

Though the concerns surrounding China's potential role in such sabotage are based on mere predictions, they come in the wake of several instances of undersea sabotage allegedly committed by Russia against the backdrop of the Ukraine War and amid international sanctions imposed on it by the West.

China's Role In Undersea Sabotage

China has also been accused of several of these sabotage incidents in its neighborhood and overseas.

Taiwan has repeatedly accused Beijing's ships of deliberately cutting undersea cables. For instance, in early January 2025, Taiwan's coast guard said it suspected a Chinese-owned freighter of severing a critical undersea telecom cable off the island's northern coast, as previously reported in detail by the EurAsian Times.

A similar incident was reported again in February 2025. At the time, Taiwan's coast guard detained a cargo ship and its Chinese crew to investigate their alleged role in disconnecting a cable from Chunghwa Telecom that connected Taiwan to the Penghu Islands. The Coast Guard later said in a statement that eight Chinese crew members were on board the Togo-flagged ship that was accused of causing damage to the cable.

China has been under the scanner for attempting to sabotage undersea cables since 2023. It was first implicated in October 2023 when its ship, the New Polar Bear, broke the 77-kilometer Balticconnector pipeline, a vital energy supply for Finland. Following the incident, the New Polar Bear sailed to St. Petersburg and was later photographed in the Arkhangelsk region of Russia, eventually docking in Tianjin, China.

China first denied European claims that the New Polar Bear was to blame. However, in August 2024, it admitted that the damage was indeed caused by the ship flying the Hong Kong flag, attributing the incident to a strong storm.

Later, in November 2024, two fiber-optic cables between Finland and Germany and Sweden and Lithuania were severed, with suspicions of a possible Chinese role as the Chinese bulk carrier Yi Peng 3 sailed over those cables around that time.

The investigations into the sabotage focused on determining a potential Chinese role, which led to a month-long stand-off between the two sides. It ended only when China allowed representatives from Germany, Sweden, Finland, and Denmark to board the ship along with Chinese investigators in December 2024.

When the incident took place in November, Lithuanian Foreign Minister Gabrielius Landsbergis posted on X: "If I had a nickel for every time a Chinese ship was dragging its anchor on the bottom of the Baltic Sea in the vicinity of important cables, I would have two nickels, which isn't much, but it's weird that it happened twice."

In addition to Russia, European states have become more suspicious of the Chinese role in undersea cable sabotage attempts. Some analysts have even suggested that Beijing may be aiding Russia in carrying out these activities to assess the West's resilience against these attacks.

China, on its part, has denied all culpability. In fact, Hu and his team suggest that the device supports marine resource development and has been successfully used in terrestrial studies to cut cables that are 60 mm thick.

However, since China is notorious for employing dual-use technology, concerns are likely to persist.

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Science & Technology News

India Achieves Milestone in TB Research: Dr. Jitendra Singh Announces completion of 10,000 Genome Sequences of Mycobacterium Tuberculosis

Source: Press Information Bureau, Dt. 24 Mar 2025,
URL: https://pib.gov.in/PressReleasePage.aspx?PRID=2114548

In a significant breakthrough in the fight against tuberculosis, Union Minister Dr. Jitendra Singh announced the completion of genome sequencing of 10,000 isolates of "Mycobacterium tuberculosis" at a summit organised on the occasion of "World TB Day" at Vigyan Bhawan here.

The achievement marks a major stride in India's commitment to eradicating TB ahead of the World Health Organization's (WHO) 2030 targets.

Addressing a gathering of leading medical academicians, health scientists, researchers, and senior officials, Dr. Jitendra Singh highlighted the government's ambitious efforts to eliminate tuberculosis five years before the WHO's global goal. He underscored the importance of collaborative research and the need for a whole-of-science, whole-of-government, and whole-of-mission approach to achieve this target.

The genome sequencing initiative is part of the Dare2eraD TB program (Data Driven Research to Eradicate TB), launched on March 24, 2022, which focuses on data-driven research to eradicate TB. A key component of this initiative is the Indian Tuberculosis Genomic Surveillance (InTGS) Consortium, spearheaded by the Department of Biotechnology (DBT), the Council of Scientific and Industrial Research (CSIR), and the Indian Council of Medical Research (ICMR), in collaboration with major clinical institutions. The program aims to sequence over 32,000 TB isolates to identify drug resistance mutations and improve treatment outcomes.

Dr. Jitendra Singh emphasized that the deep genomic dataset being developed has the potential to revolutionize TB diagnostics and drug resistance prediction. He noted that genome sequencing can significantly improve diagnostic accuracy and enable faster resistance profiling, reducing the time needed to determine effective treatments from weeks to mere hours or days. This, he said, will help

in tailoring treatment regimens to individual patient needs and reduce the risk of treatment failure or relapse.

Drawing from his own medical background, Dr. Jitendra Singh reflected on the historical challenges of TB treatment in India, from the stigma surrounding the disease to the evolution of medical advancements. He called for greater community engagement, emphasizing that TB eradication is not just a scientific or medical challenge but a societal one. "Unless we involve common people, raise their consciousness, and evoke their participation, our fight against TB will remain incomplete," he said.

Appreciating the pioneering scientific advancements and their instrumental role in fight against tuberculosis, Hon'ble Minister said that while phenotypic drug-susceptibility tests and M. tuberculosis culture are generally regarded as the gold standard for diagnosis, genome sequencing technologies are increasingly being applied for strain identification and drug resistance prediction, providing valuable insights for clinical decision-making and surveillance activities.

He also added that the adoption of molecular methods for TB diagnosis and resistance testing remains uneven, significantly influenced by socioeconomic disparities across countries. To fight the incessant TB, it is important to propel these innovations to scale and embed them into real-world implementation.

Dr. Rajesh Gokhale, Secretary DBT, hailed the completion of 10,000 genome sequences as a milestone achievement, adding that the data will be instrumental in strengthening India's TB surveillance and diagnostic capabilities. He stressed the importance of translating this research into practical applications that can be scaled up for real-world impact.

The event also saw the participation of senior officials including Dr. N. Kalaiselvi, Director General CSIR; Dr. Rajiv Bahl, Director General ICMR; and Dr. M. Srinivas, Director AIIMS, among others. Dr. Jitendra Singh appreciated the proactive and visionary initiatives to support transformative innovations for a more robust pipeline of tools that can overcome the translational challenges and better prepare India to address TB than ever before.

With India accounting for a significant portion of the global TB burden, this breakthrough in genome sequencing is expected to bolster national and global efforts to combat the disease. The government's continued investment in cutting-edge research, coupled with policy interventions and community participation, could pave the way for a TB-free India well ahead of its 2025 target.

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New triboelectric nanogenerator with single crystals of organic compound could be useful for biological applications

Source: Press Information Bureau, Dt. 24 Mar 2025,

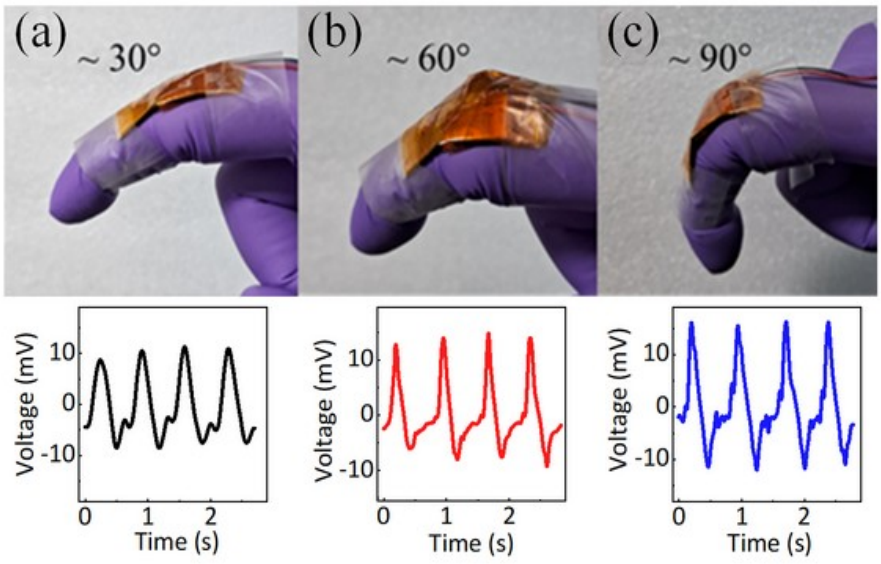
URL: https://pib.gov.in/PressReleasePage.aspx?PRID=2114473

Researchers have developed a triboelectric nanogenerator (TENG) wherein flexible single crystals of an organic compound was used as the main component for the fabrication of a self-powered tactile sensor which was used to monitor finger joint movements. This has significant importance particularly in biomedical and robotic system development and could pave the way for their utilization as biomedical wearable devices.

Organic materials are gaining importance for optoelectronic applications because of their lower cost and environmental footprint, easy fabrication, and practical feasibility. Among various organic materials, single crystals are better suited for device fabrication because of their well-ordered packing and precise spatial arrangements. They also possess intrinsic long range structural order and anisotropy and tuneable optical and electronic properties, thereby resulting in superior device performance. Additionally, the ease of synthesis, crystallization, and device fabrication position organic single crystals as promising candidates to meet the evolving demand for next generation technologies.

Scientists from Institute of Nano Science and Technology (INST), Mohali, an autonomous institute of the Department of Science and Technology (DST) demonstrated the first ever fabrication of TENG incorporating flexible single crystals of small organic molecules. The research involved has been published in the Journal of the American Chemical Society. Triboelectrification was attained in single crystals as a result of surface functionalization with positively and negatively charged moieties, viz. Zn2+ and F−, respectively, which resulted in different surface potentials thereby leading to reversible adhesion through electrostatic interaction and induction phenomena.

The TENG incorporating the single crystals was capable of charging commercial capacitors thereby ensuring its ability to be used as a self-powered touch sensor. Capitalizing on these features, a self-powered tactile sensor was fabricated to demonstrate limb movements. The protocol adopted to vary the surface charge on single crystals through surface functionalization techniques was simple and scalable. Moreover, the TENG developed works in the non-contact mode and promises outstanding endurance properties. The excellent mechano-electric sensitivity (∼102 mV/kPa until 6 kPa range) and response time (∼38 ms) establish the viability of flexible organic single crystals for mechanical energy harvesting and biosensing applications.



Biomechanical signal sensing using TENG. Photographs of TENG attached to a finger along with the measured output voltage response at (a) 30°, (b) 60°, and (c) 90° bending angles.

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Why is the Parker Solar Probe trying to 'touch' the sun?

Source: The Hindu, Dt. 24 Mar 2025,
URL: https://www.thehindu.com/sci-tech/science/why-is-nasa-parker-solar-probe-trying-to-touch-sun/article69371673.ece

Among the various places humans have aspired to visit in the solar system, the sun remains the most foreboding. On December 24, 2024, NASA's Parker Solar Probe arrived within 6.1 million km from the star's surface. This is a short distance to be from the sun: no spacecraft has ever made such a close approach. Even the Parker Solar Probe took seven years to get here.

The probe made another approach to the sun on March 22 and will do so again on June 19 this year.

Watching the sun

Sunlight is the main source of energy for earthlife. The sun's core produces this energy using nuclear fusion. The star also has strong, dynamic magnetic fields crisscrossing its surface, and sudden changes in the way they're arranged give rise to intense explosions called solar flares. Numerous electrons, protons, and heavy nuclei are spit out of the solar corona — the uppermost layer of the sun's atmosphere — at about 900 km/s.

These particles carry an enormous amount of energy and sometimes rush towards the earth at tremendous speed in an event called a coronal mass ejection. Their effects on the earth constitute a solar storm, including electric grid failures, loss of telecommunication channels, and damage to the ozone layer. They can also damage instruments onboard satellites.

To understand the dynamics of the corona over time and their effects on the solar system at large, scientists need to observe the sun closely. This is also why the Indian Space Research Organisation launched and is currently operating the Aditya-L1 probe, stationed at about 150 million km from the star.

An able heat shield

Around six decades ago, a scientist named Eugene Parker predicted the existence of the solar wind: a stream of charged particles flowing out from the sun in all directions. NASA named the Parker Solar Probe in his honour.

The probe was launched on board a Delta IV rocket from Cape Canaveral in Florida in August 2018. Once in space, the probe's maximum speed was an astounding 692,000 km/hr.

To protect against the sun's intense heat, the probe has an 8-foot-wide, 4.5-inch thick carbon-carbon composite material shield that can withstand up to 1,370º C while weighing only 73 kg. This shield was built by researchers at the Johns Hopkins Applied Physics Laboratory. It consists of a carbon composite foam sandwiched between two carbon plates. Its sun-facing side is coated with white ceramic paint to reflect as much sunlight as possible instead of absorbing it.

Scientists puzzled by super-bright light from the sunJust a few metres behind the shield, in its shadow, the ambient temperature drops to 29º C, allowing the probe's scientific instruments to

operate without special provisions to maintain the temperature. The probe also has two sets of solar power arrays: one in the shield's shadow that supplies power to the instruments and the other on the sun-facing side, which uses a special fluid pump to cool itself while powering the probe during its close approaches.

Touching the sun

Curiously, the first obstacle to the mission's success wasn't the sun's heat but its gravity. Since the probe flew through space at a very high speed, it had to decelerate significantly as it got close to the sun. If it didn't, the sun's gravity would have encouraged it to dive right into the star. This is why Parker's first mission profile had the probe fly towards Jupiter and swing around the gas giant to achieve an optimal speed to fly towards the sun. This idea fell out of favour because of the large travel distance.

The probe's final mission profile was more direct: to use the combined gravitational forces of the earth and Venus to slowly spiral closer to the sun's surface, in the process spending more than 2,000 hours flying through the corona and 24 times along the solar equator.

The probe has four scientific instruments: FIELDS, Integrated Science Investigation of the Sun (ISoIS), Wide-Field Imager (WISPR), and Solar Wind Electrons Alphas and Protons (SWEAP). FIELDS measures the electric and magnetic fields of the sun's atmosphere; ISoIS observes the energetic particles that cause solar storms while SWEAP records their properties; and WISPR takes pictures as it passes through the corona.

A 'sun-touching' event occurred in April 2021 when Parker moved closer to the sun than its Alfvén surface — the height beyond which the solar wind can't affect the star's surface — as ascertained by the FIELDS and SWEAP instruments.

A fifth instrument, called a Faraday cup, lies outside the shadow of the heat shield and measures the density of ions and electrons in the solar wind. It is made of a molybdenum alloy with a melting point of 2,349º C.

Blowin' in the (solar) wind

Parker data has already revealed many new details about the sun. The solar system is ceaselessly coated in dust particles created when space rocks weather and scientists believed the dust ought to be everywhere. Yet Parker revealed dust-free pockets near the sun. The probe also detected magnetic switchbacks: parts of the solar wind where the magnetic field (created by the collective of charged particles) abruptly bent back on itself.

An important open question in solar astrophysics is why the sun's surface is only 6,000º C or so whereas the solar corona is 200-times hotter. Based on Parker's data of magnetic switchbacks and other related phenomena, scientists believe the answer to the mystery lies in Alfvén waves: an oscillation of ions in the plasma released by the sun, set in motion by forces in the surrounding magnetic field. During its close-approach on March 22, the Parker Solar Probe once again attempted to get within around 6 million km of the sun's surface. What did it find this time?

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