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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

Press Note : Security

Operation SINDOOR: The Rise of Aatmanirbhar Innovation in National Security

India's growing technological self-reliance

Source: Press Information Bureau, Dt. 15 May 2025, URL: <u>https://www.pib.gov.in/PressReleasePage.aspx?PRID=2128746</u>

Introduction

Operation SINDOOR emerged as a calibrated military response to an evolving pattern of asymmetric warfare, one that increasingly targets unarmed civilians along with military personnel. The terrorist attack on tourists in Pahalgam in April 2025 served as grim reminder of this shift. India's response was deliberate, precise, and strategic. Without crossing the Line of Control or international boundary, Indian forces struck terrorist infrastructure and eliminated multiple threats. However, beyond tactical brilliance, what stood out was the seamless integration of indigenous hitech systems into national defence. Whether in drone warfare, layered air defence, or electronic warfare, Operation SINDOOR marks a milestone in India's journey towards technological self-reliance in military operations.

Air Defence Capabilities: Tech as the First Line of Protection

On the night of 07-08 May 2025, Pakistan attempted to engage a number of military targets in Northern and Western India including Awantipura, Srinagar, Jammu, Pathankot, Amritsar, Kapurthala, Jalandhar, Ludhiana, Adampur, Bhatinda, Chandigarh, Nal, Phalodi, Uttarlai, and Bhuj, using drones and missiles. These were neutralised by the Integrated Counter UAS (Unmanned Aerial Systems) Grid and Air Defence systems.

Air Defence systems detect, track, and neutralise threats using a network of radars, control centres, artillery, and both aircraft- and ground-based missiles.

On the morning of May 8, the Indian Armed Forces targeted Air Defence Radars and systems at a number of locations in Pakistan. An Air Defence system at Lahore was neutralised.

PERFORMANCE OF SYSTEMS

As part of Operation SINDOOR, the following were used:

- Battle-proven AD (Air Defence) systems like the Pechora, OSA-AK and LLAD guns (Low-level air defence guns).
- Indigenous systems such as the Akash, which demonstrated stellar performance

AKASH is a Short Range Surface to Air Missile system to protect vulnerable areas and

vulnerable points from air attacks. The AKASH Weapon System can simultaneously engage



India's Air Defence Systems, combining assets from the Army, Navy, and primarily the Air Force, performed with exceptional synergy. These systems created an impenetrable wall, foiling multiple attempts by Pakistan to retaliate.

The Integrated Air Command and Control System (IACCS) of the Indian Air Force brought all these elements together, providing the net-centric operational capability vital for modern warfare.

Offensive Actions with Pinpoint Accuracy

India's offensive strikes targeted key Pakistani airbases- Noor Khan and Rahimyar Khan with surgical precision. Loitering munitions were used to devastating effect, each finding and destroying high-value targets, including enemy radar and missile systems.

Loitering munitions also known as "suicide drones" or "kamikaze drones", are weapons
systems that can hover or circle a target area, searching for a suitable target before
attacking.

All strikes were executed without loss of Indian assets, underscoring the effectiveness of our surveillance, planning, and delivery systems. The use of modern indigenous technology, from long-range drones to guided munitions, made these strikes highly effective and politically calibrated.

Indian Air Force **bypassed and jammed Pakistan's Chinese-supplied air defence systems**, completing the mission in just 23 minutes, demonstrating **India's technological edge**.

Evidence of Neutralized Threats

Operation SINDOOR also produced concrete evidence of hostile technologies neutralized by Indian systems:

- Pieces of **PL-15 missiles** (of Chinese origin)
- Turkish-origin UAVs, named "Yiha" or "YEEHAW"
- Long-range rockets, quadcopters and commercial drones

These were recovered and identified, showing that despite Pakistan's attempts to exploit advanced foreign-supplied weaponry, India's indigenous air defence and electronic warfare networks remained superior.

Performance of Systems: Air Defence Measures of the Indian Army

On May 12, *Lt Gen Rajiv Ghai, Director General Military Operations*, in the Operation SINDOOR press briefing highlighted the excellent performance of a mix of legacy and modern systems:

Preparedness and Coordination:

Since precise strikes on terrorists were conducted without crossing the Line of Control or International Boundary, it was anticipated Pakistan's response would come from across the border.

- A unique blend of Counter Unmanned Aerial Systems, Electronic Warfare assets, and Air Defence Weapons from both Army and Air Force
- Multiple defensive layers from the International Boundary inward:
- a. Counter Unmanned Aerial Systems
- b. Shoulder-Fired Weapons
- c. Legacy Air Defence Weapons
- d. Modern Air Defence Weapon Systems

This multi-tier defence prevented Pakistan Air Force attacks on our airfields and logistic installations during the night of May 9-10. These systems, built over the last decade with continuous government investment, proved to be force multipliers during the operation. They played a crucial role in ensuring that both civilian and military infrastructure across India remained largely unaffected during enemy retaliation attempts.

ISRO's contribution: At an event on May 11, ISRO Chairman V Narayanan mentioned that At least 10 satellites are continuously working round-the-clock for the strategic purpose to ensure the safety and security of the citizens of the country. To ensure the safety of the country, the nation has to serve through its satellites. It has to monitor its 7,000 km seashore areas. It has to monitor the entire Northern part continuously. Without satellite and drone technology, the country can't achieve that.

The Business of Drone Power: A Rising Indigenous Industry

The Drone Federation India (DFI), is a premier industry body representing over 550 drone companies and 5500 drone pilots. DFI's vision is to make India a global drone hub by 2030, and it promotes the design, development, manufacturing, adoption and export of Indian drone and counter-drone technology worldwide. DFI enables ease of doing business, promotes the adoption

of drone technology, and hosts several programs like Bharat Drone Mahotsav.Some companies involved in the drone space are:

•Alpha	Design	Technologies	(Bengaluru):	Partnered	with	Israel's	Elbit	Systems	to
build SkyStriker.									

•Tata Advanced Systems offers a full range of integrated solutions across Defence & Security and has served as a trusted partner to India's armed forces for over six decades.

•Paras Defence & Space Technologies operates within the Defence and Space segments, distinguished by Indigenously Designed Developed and Manufactured (IDDM) capabilities.

•IG Drones is a Drone Technology Company for manufacturing and R & D of Drones specialized in defence and other industry applications along with provider of drone related services like drone surveying, mapping & inspection by industry experts. The company has partnered with Indian Army, Government of India , multiple State Governments, among others..

The Indian drone market is projected to reach \$11 billion by 2030, accounting for 12.2% of the global drone market.



Drones at the Centre of Modern Warfare

The integration of drone warfare into India's military doctrine owes its success to years of domestic R&D and policy reform. Since 2021, the ban on imported drones and the launch of the PLI (Production Linked Incentive) scheme have catalyzed rapid innovation. The scheme of Production Linked Incentive for drones and drone components of Ministry of Civil Aviation was notified on 30th September, 2021 with a total incentive of Rs 120 crores spread over three Financial Years (FYs), FY 2021-22 to FY 2023-24. The future lies in autonomous drones with AI-driven decision-making, and India is already laying the groundwork.

Defence exports crossed the record figure of about **Rs 24,000 crore** in Financial Year 2024-25. The aim is to increase the figure to Rs 50,000 crore by 2029, and make India a developed nation and the world's largest defence exporter by 2047.

Make in India continues to power the growth of the defence sector.

India has emerged as a major defence manufacturing hub, driven by the "Make in India" initiative and a strong push for self-reliance. In FY 2023–24, indigenous defence production reached a record ₹1.27 lakh crore, while exports soared to ₹23,622 crore in FY 2024–25, a 34-fold increase from 2013–14. Strategic reforms, private sector involvement, and robust R&D have led to the development of advanced military platforms like 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.

The government has backed this growth with record procurement contracts, innovations under iDEX, drives like SRIJAN, and two Defence Industrial Corridors in Uttar Pradesh and Tamil Nadu. Key acquisitions such as LCH (Light Combat Helicopters) Prachand helicopters and the ATAGS (Approval for Advanced Towed Artillery Gun System) highlight the shift towards indigenous capability. With targets of ₹3 lakh crore in production and ₹50,000 crore in exports by 2029, India is firmly positioning itself as a self-reliant and globally competitive defence manufacturing power.

Conclusion:

Operation SINDOOR is not just a story of tactical success. It is a validation of India's defence indigenization policies. From air defence systems to drones, from counter-UAS capabilities to net-centric warfare platforms, indigenous technology has delivered when it mattered most. The fusion of private-sector innovation, public-sector execution, and military vision has enabled India to not only defend its people and territory but also assert its role as a hi-tech military power in the 21st century. In future conflicts, the battlefield will increasingly be shaped by technology. And India, as shown in Operation SINDOOR, is ready, armed with its own innovations, backed by a determined state, and powered by the ingenuity of its people.

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DRDO develops high-pressure polymeric membrane for sea water desalination

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Source: Press Information Bureau, Dt. 15 May 2025, URL: <u>https://www.pib.gov.in/PressReleseDetailm.aspx?PRID=2128795</u>

Defence Research & Development Organisation (DRDO) has successfully developed indigenous nanoporous multilayered polymeric membrane for high-pressure sea water desalination. Defence Materials Stores and Research & Development Establishment (DMSRDE), the Kanpur-based laboratory of DRDO, has developed the technology for desalination plant in Indian Coast Guard (ICG) ships, based on their operational requirement to address the serious challenge of stability when exposed to chloride ions in saline water. The development has been completed in a record time of eight months.

DMSRDE, along with ICG, successfully carried out initial technical trials in the existing desalination plant of Offshore Patrolling Vessel (OPV) of ICG. The initial safety and performance trials of the polymeric membranes were found to be fully satisfactory. The final operational clearance will be given by ICG after 500 hrs of operational testing.

Presently, the unit is under testing and trials on OPV. This membrane will be a boon for desalination of sea water in coastal areas after certain modifications. It is another step by DMSRDE in the journey of *Aatmanirbhar Bharat*.

Indian Navy Achieves Big Success In Seabed Mining Tech As DRDO Tests Multi-Influence Ground Mine — MIGM

Source: Eurasian Times, Dt. 15 May 2025, URL: <u>https://www.eurasiantimes.com/indian-navy-achieves-big-success-in-seabed-mining/</u> The Defense Research and Development Organization (DRDO) and the Indian Navy recently tested an indigenously designed and developed seabed mine named MIGM (multi-influence ground mine).

The test under combat conditions was carried out using a reduced explosive warhead.

Seabed Mines

Seabed mines are explosive devices placed on or anchored to the ocean floor, designed to detect and destroy enemy ships or submarines. Also referred to as "ground mines," they are triggered by various signatures of passing vessels, such as acoustic, magnetic, pressure, or seismic influences.

Seabed mines differ from buoyant or moored mines, which float at various depths. Resting on the ocean floor, seabed mines are harder to detect compared to buoyant or moored mines, which float at various depths and are more visible to sonar or other detection systems.

Their position on the seabed reduces the likelihood of visual or acoustic detection, especially in deeper or complex underwater environments.

Also, ground mines are not easily displaced or damaged by ocean currents, tides, or rough weather. They remain stationary, ensuring consistent coverage of strategic areas like harbors, choke points, or sea lanes.

Seabed mines feature multi-influence sensors. These sensors are optimized for the seabed environment, where they can pick up subtle disturbances caused by passing vessels, making them highly effective against low-signature targets.

Seabed mine sensors are more sensitive because they are oriented upwards and focused on the water column above where target vessels operate. Buoyant or moored mine sensors have to look down into the seabed clutter, resulting in lower discrimination and sensitivity.

Seabed clutter—such as natural sediment, marine life, rocks, or debris—can generate noise or false signals that interfere with sensor accuracy.

By looking upward, the sensors minimize interference from this clutter, as the water column is generally less noisy and more uniform compared to the complex seabed environment. This improves the signal-to-noise ratio, making it easier to detect a vessel's acoustic, magnetic, pressure, or electric potential signatures.

MIGM

As its name suggests, the MIGM also features multi-influence sensors—acoustic, magnetic, pressure, and seismic sensors—that can detect the sophisticated signatures of modern stealth ships and submarines.

The MIGM has been developed by the Naval Science and Technological Laboratory (NSTL), Visakhapatnam — a DRDO lab specializing in naval systems — in collaboration with two other DRDO establishments: High Energy Materials Research Laboratory (HEMRL), Pune, and Terminal Ballistics Research Laboratory (TBRL), Chandigarh.

According to the DRDO, the MIGM test demonstrated the system's operational readiness and effectiveness under realistic conditions.

"The successful firing confirms the system's multi-sensor integration and intelligent triggering capabilities, tailored to address evolving maritime threats."

"Production of the MIGM will be undertaken by Bharat Dynamics Limited (BDL), Visakhapatnam, and Apollo Microsystems Limited, Hyderabad, ensuring that the system is manufactured domestically at scale, in line with the government's 'Aatmanirbhar Bharat' initiative."

Other nations that have developed seabed mines like the DRDO's MIGM include the US, Russia, China, and Italy.

US Submarine-Launched Mobile Mine (SLMM)

The US has deployed an advanced seabed mine laying system called Mk 67 Submarine-Launched Mobile Mine (SLMM) for use on its Los Angeles-class SSNs.

The system is designed for covert minelaying in hostile waters, such as harbors, straits, or shipping lanes, where direct delivery by aircraft or surface ships would be too risky.

The system comprises a repurposed Mk 37 torpedo that can be launched like an ordinary torpedo to stealthily deploy a multi-influence seabed mine at a set distance and direction from the launch point.

The SLMM provides a way to deny access or trap enemy vessels in key maritime choke points such as the Strait of Malacca.

Russian PMK-3

The Russian PMK-3 multi-influence seabed is similar in concept to the SLMM but adopts a different approach to remote mine laying.

Like the SLMM, it can be deployed from a submarine's torpedo tube. However, instead of using a repurposed torpedo to travel the distance from the launch point to the intended deployment point, the PMK-3 uses a solid-fuel rocket motor that propels it to a much greater distance while remaining underwater.

It can travel a longer distance before settling on the seabed and carries a heavier explosive package that can inflict greater damage on larger warships and submarines. The PMK-3 can be programmed with delayed activation and self-destruct/self-neutralization timers.

Italy's MANTA

Italy's MANTA, a modern smart seabed mine developed by the Italian defense company Leonardo, is also considered to be comparable to the DRDO's MIGM.

It is part of Italy's next-generation naval mine warfare capabilities and is designed for strategic sea denial, harbor protection, and area denial missions.

Here are the key features based on Leonardo's official information.

It can be deployed via ship, submarine, or UUV (Unmanned Underwater Vehicle). Equipped with multi-influence sensors (magnetic, acoustic, pressure), it can distinguish between targets using target detection algorithms, reducing the chances of false detonations. It can be customized for different mission profiles—e.g., harbor denial, area denial, choke point control. It can be remotely programmed to activate or self-destruct.

All the above seabed mines have low acoustic and magnetic signatures to resist detection by mine countermeasures.

Conclusion

The Italian MANTA seabed mine is the most modern of the seabed mines that are currently deployed operationally. Its outstanding features include configuration customization and remote programming. It's not known if the DRDO's MIGM will have these capabilities.

Seabed mines that can be remotely and stealthily deployed are referred to as mobile mines. Notably, the MANTA is not a mobile mine.Going by the name, MIGM is also not a mobile mine. It's highly likely that the MIGM will initially be deployed using ships and possibly sea drones.

It remains to be seen if the Indian Navy will pursue a stealthy remote-laying capability using a torpedo or rocket motor. If it does, the system could be available in 5 to 10 years.

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DST & DRDO institutes join hands to strengthen groundbased Space Situational Awareness

Source: Press Information Bureau, Dt. 14 May 2025, URL: <u>https://www.pib.gov.in/PressReleasePage.aspx?PRID=2128692</u>

An institute of the Department of Science and Technology (DST) has signed a Memorandum of Understanding (MoU) to partner with a Defence Research and Development Organisation (DRDO) institute to utilize observational facilities at the Aryabhatta Research Institute of Observational Sciences (ARIES), and its scientific expertise in exploration of space to strengthen India's capabilities in ground-based Space Situational Awareness (SSA).

The MoU was signed between ARIES, Nainital, an autonomous institute of DST and Instruments Research & Development Establishment (IRDE), Dehradun, a laboratory of DRDO by Dr. Manish Kumar Naja, Director, ARIES, and Dr. Ajay Kumar Director, IRDE on 13th May 2025 at IRDE, Dehradun.

ARIES is a premier research institute in the field of astronomy, astrophysics and atmospheric sciences and hosts state-of-the-art national observing facilities including the 3.6 m Devasthal Optical Telescope and ST Radar system.

IRDE is a leading institution engaged in the design and development of Electro-Optical surveillance systems for the Armed Forces across ground, naval, airborne, and space platforms.

The scope of MoU include use of observing facilities at ARIES for monitoring and data acquisition on space objects, jointly developing Electro-Optics based systems for astronomy and SSA applications, development of image processing and data analysis techniques by integrating artificial intelligence and machine learning (AI/ML) and knowledge exchange, training activities, and capacity building through scientific & technical research and development.

This MoU signed in the presence of Dr. Brijesh Kumar, and Dr T. S. Kumar from ARIES; and Ms. Ruma Dhaka, Dr. Sudhir Khare, Dr. Manavendra Singh, Mr. Abhijit Chakraborty and Mr. Bharat Ram Meena from IRDE represents a strategic partnership between two key scientific institutions of Uttarakhand, with the goal of advancing objectives in space surveillance systems and ground-based astronomy.

The close geographical proximity of ARIES and IRDE is expected to facilitate regular interaction, access to facilities, technical exchanges and coordination of joint activities.

Defence News

Defence Strategic: National/International

India pushes for UN ban on LeT proxy TRF after Pahalgam terror attack

Source: Business Line, Dt. 15 May 2025,

URL: <u>https://www.thehindubusinessline.com/news/india-pushes-for-un-ban-on-let-proxy-trf-after-pahalgam-terror-attack/article69577806.ece</u>

An Indian delegation met top officials of the UN Office of Counter-Terrorism (UNOCT) and Counter-Terrorism Committee Executive Directorate here even as New Delhi stepped up efforts to designate The Resistance Front, an LeT proxy, as a UN-listed terror outfit for its alleged involvement in the Pahalgam attack.

The Resistance Front (TRF), a front for Pakistan-based terrorist group Lashkar-e-Taiba (LeT), had claimed responsibility of the Pahalgam attack.

"An Indian technical team, which is in New York, is interacting today (Wednesday) with the Monitoring Team of the 1267 Sanctions Committee and other partner countries in the UN.

"They will also be meeting with the United Nations Office of Counter-Terrorism (UNOCT) and Counter-Terrorism Committee Executive Directorate (CTED)," sources told PTI.

The development comes in the wake of the horrific April 22 terror attack in Pahalgam in Jammu and Kashmir and the retaliatory Operation Sindoor launched by India targeting terror infrastructure in Pakistan and Pakistan-occupied Kashmir.

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Op Sindoor marks 'milestone' in India's journey towards technological self-reliance: Defence Ministry

Source: The Print, Dt. 14 May 2025,

URL: <u>https://theprint.in/india/op-sindoor-marks-milestone-in-indias-journey-</u> towards-technological-self-reliance-defence-ministry/2626084/

Operation Sindoor showcased the sharp rise of India's defence power and technological might as the military delivered precision strikes and neutralised Pakistani terror targets without crossing the borders, the Defence Ministry said on Wednesday.

he operation also produced concrete evidence of hostile technologies neutralised by Indian systems that included pieces of PL-15 missiles of Chinese origin and Turkish unmanned aerial vehicles (UAVs) named "Yiha" or "YEEHAW", it said.

It marked a "milestone" in India's journey towards technological self-reliance in military operations, the ministry said on Operation Sindoor.

In perhaps referring to the strikes on the terror targets on early May 7, the ministry said the Indian Air Force bypassed and jammed Pakistan's Chinese-supplied air defence systems, completing the mission in just 23 minutes and demonstrating India's technological edge.

"Long-range rockets, quadcopters and commercial drones – these were recovered and identified, showing that despite Pakistan's attempts to exploit advanced foreign-supplied weaponry, India's indigenous air defence and electronic warfare networks remained superior," it said.

India's air defence systems, combining assets from the Army, Navy, and primarily the Air Force, performed with exceptional synergy and these systems created an impenetrable wall, foiling multiple attempts by Pakistan to retaliate, the ministry said while highlighting various aspects of the operation.

India carried out precision strikes on terror infrastructure early on May 7, following which Pakistan attempted to attack Indian military bases on May 8, 9 and 10.

The Pakistani actions were strongly responded to by the Indian side. The Indian military targeted eight Pakistani airbases with missiles and other long-range weapons on May 10 in retaliation for Pakistan's attempts to strike 26 military facilities.

"Operation Sindoor emerged as a calibrated military response to an evolving pattern of asymmetric warfare, one that increasingly targets unarmed civilians along with military personnel," the ministry said.

"The terrorist attack on tourists in Pahalgam in April served as a grim reminder of this shift. India's response was deliberate, precise, and strategic." Beyond tactical brilliance, what stood out was the seamless integration of indigenous hi-tech systems into national defence, the ministry said.

Whether in drone warfare, layered air defence, or electronic warfare, Operation Sindoor marks a milestone in India's journey towards technological self-reliance in military operations, it added.

The ministry said India's offensive strikes targeted key Pakistani airbases — Noor Khan and Rahimyar Khan — with surgical precision.

Loitering munitions were used to devastating effect, each finding and destroying high-value targets, including enemy radar and missile systems, it said.

Loitering munitions, also known as "suicide drones" or "kamikaze drones", are weapons systems that can hover or circle a target area, searching for a suitable target before attacking.

A unique blend of counter-unmanned aerial systems, electronic warfare assets, and air defence weapons, as well as shoulder-fired weapons, were deployed to counter enemy threats.

The ministry said the multi-tier defence prevented Pakistan air force attacks on Indian airfields and logistic installations during the night of May 9-10.

"These systems, built over the last decade with continuous government investment, proved to be force multipliers during the operation," it said. "They played a crucial role in ensuring that both civilian and military infrastructure across India remained largely unaffected during enemy retaliation attempts," it added.

The ministry said all strikes were executed without loss of Indian assets, "underscoring the effectiveness of our surveillance, planning, and delivery systems." The use of modern indigenous technology, from long-range drones to guided munitions, made these strikes highly effective and politically calibrated, it said in a statement.

The Integrated Air Command and Control System (IACCS) of the Indian Air Force brought all these elements together, providing the net-centric operational capability vital for modern warfare, it added.

Indian defence exports saw 34-fold jump in past decade, says Rajnath Singh

Source: The Print, Dt. 14 May 2025,

URL: <u>https://theprint.in/defence/indian-defence-exports-saw-34-fold-jump-in-past-decade-says-rajnath-singh/2625763/</u>

Defence exports from India are at all-time highs, having risen a whopping 34-fold over the past decade."India exported defence goods worth Rs 23,622 crore in 2024-25 — a 34-fold rise as against just Rs 686 crore in 2013-14," Defence Minister Rajnath Singh's office said in a post on X.

The defence minister's office asserted that India's defence sector is growing stronger than ever, driven by the spirit of a self-reliant or Atmanirbhar Bharat. As part of its 'Atmanirbhar' and Make in India plans, the government launched various schemes, including the production-linked incentive (PLI), in various sectors to make Indian manufacturers globally competitive, attract investments, enhance exports, integrate India into the global supply chain, and reduce dependency on imports.

With the government's thrust on the Make in India initiative, defence production has surged to historic highs. This rise in defence manufacturing has also led to substantial returns for investors in major defence manufacturing PSUs over the past years. The government is investing heavily in defence and aerospace manufacturing, with several defence hubs being set up. Notably, many global companies have either shared or shown intent to share critical defence and aerospace knowledge with India.

A wide range of items, including ammunition, arms, subsystems/systems, and parts and components, were exported to around 80 countries in the just-concluded financial year, according to the Ministry of Defence data.

The government is now aiming for annual exports worth Rs 50,000 crore by 2029, thus strengthening its global footprint.Indian defence sector stocks, which had recently corrected from their highs, have again been soaring over the past weeks, much of it due to the recent flare-up of tensions with Pakistan. The successful display of India's indigenously developed systems against the adversary last week also lent support to the defence stocks basket.

The latest conflict with Pakistan also alluded to the fact that it is critical to achieve self-reliance in defence manufacturing.

The Nifty India Defence index has climbed over 30 per cent over the past three months, reflecting investor confidence in the strategic importance and commercial growth of India's domestic defence sector. The rise in indigenous defence manufacturing has also led to substantial returns for investors in major defence manufacturing PSUs over the past few years.

Akashteer Air Defence System: आकाशतीर बना दुश्मन के ड्रोन और मिसाइलों का काल, दुश्मन की हर हवाई चाल की बेअसर

Source: अमर उजाला, Dt. 14 May 2025,

URL: <u>https://www.amarujala.com/india-news/bel-s-akashteer-air-defence-system-proves-mettle-amid-conflict-creating-hell-for-pakistan-s-air-adventures-2025-05-14</u>

'आकाशतीर' ने पाकिस्तान के ड्रोन और मिसाइल हमलों को नाकाम कर भारत की हवाई सुरक्षा में नई मजबूती दी है। बीईएल द्वारा विकसित यह स्वदेशी, एआई-आधारित प्रणाली युद्ध में उम्मीद से बेहतर साबित हुई। यह प्रणाली अब भारत की रक्षा आत्मनिर्भरता और तकनीकी ताकत का प्रतीक बन गई है।

वायु रक्षा प्रणाली 'आकाशतीर' ने पाकिस्तान के ड्रोन हमलों के दौरान अपनी क्षमता साबित कर दी है। दुश्मन के ड्रोन ने जैसे ही भारत की हवाई सीमा में घुसने का प्रयास किया, इस वायु रक्षा प्रणाली ने उसको तुरंत नष्ट कर दिया। इसने पाकिस्तान के लिए भारत की हवाई सीमा में घुसना नामुमकिन बना दिया।

आकाशतीर क्या है और इसे किसने तैयार किया

'आकाशतीर' को भारत इलेक्ट्रॉनिक्स लिमिटेड (बीईएल) ने स्वदेशी रूप से डिजाइन और तैयार किया है। यह वायु रक्षा प्रणाली स्वचालित (ऑटोमैटिक) है और आर्टिफिशियल इंटेलिजेंस (एआई) आधारित है। पाकिस्तान के साथ तनाव के दौरान इस प्रणाली ने ड्रोन, मिसाइलों, छोटे मानव रहित विमान (यूएवी) और लॉइटरिंग म्यूनिशन (भटकते बम) को रोक दिया, जिससे यह एक वैश्विक स्तर की रक्षा प्रणाली बन गई है।

आकाशतीर ने किया उम्मीदर से बेहतर प्रदर्शन: बीईएल

बीईएल ने बुधवार को कहा कि असली जंग के हालात में यह प्रणाली उम्मीद से बेहतर प्रदर्शन कर रही है और हालिया तनाव के दौरान इसने भारत की वायु रक्षा प्रणाली को काफी मजबूत किया है। बीईएल ने सोशल मीडिया प्लेटफॉर्म एक्स पर एक पोस्ट में लिखा, बीईएल को गर्व है कि हमारी इन-हाउस डिजाइन और तैयार की गई आकाशतीर वायु प्रणाली ने युद्ध क्षेत्र में अपनी ताकत साबित की है। जमीन पर मौजूद रक्षा प्रणाली को इससे जोड़ा गया और इसने पाकिस्तान की हवाई चालों के लिए हालात बहुत मुश्किल बना दिए।

कैसे काम करती है आकाशतीर वायु रक्षा प्रणाली

इसने आगे कहा, इस प्रणाली ने उम्मीदों से भी बेहतर काम किया है। इसने हालिया संघर्ष के दौरान भारत को मजबूत हवाई सुरक्षा दी। आकाशतीर सेना के लिए एक स्पष्ट हवाई स्थिति की तस्वीर देता है, जिसे नीचे तक की ऑपरेशनल यूनिट भी देख सकती हैं। इससे हर कोई हालात को बेहतर समझ पाता है और सही फैसला ले पाता है। इस प्रणाली को मार्च 2023 में हस्ताक्षरित 1,982 करोड़ रुपये के अनुबंध के तहत विकसित किया गया।

आकाशतीर प्रणाली निगरानी करने वाले उपकरणों, रडार और कमान यूनिट को एक नेटवर्क में जोड़ता है और भारतीय सेना की वायु रक्षा इकाइयों को लगातार जानकारी देता है। यह प्रणाली युद्ध क्षेत्र में भारतीय सेना के ऊपर के हवाई क्षेत्र पर निगरानी रखता है और जमीन पर मौजूद वायु रक्षा उपकरणों को प्रभावी तरीके से नियंत्रित करता है।



आकाशतीर वायु रक्षा प्रणाली – फोटो : एएनआई/बीईएल

पाकिस्तान के ड्रोन-मिसाइल हमलों को किया नष्ट

7 मई को भारत की ओर से 'ऑपरेशन सिंदूर' शुरू किया गया, जिसमें पाकिस्तान और पाकिस्तान के कब्जे वाले कश्मीर (पीओके) में 9 आतंकी शिविरों को निशाना बनाया गया। इसके बाद पाकिस्तान ने कई ड्रोन और मिसाइलों से हमले की कोशिश की लेकिन 'आकाशतीर' ने उन्हें नाकाम किया। इससे किसी जान-माल का नुकसान नहीं हुआ। नुकसान हुआ भी तो बहुत कम हुआ।

बीईएल ने कहा कि आकाशतीर अग्रिम मोर्च पर तैनात यूनिट को संकेत देता है, ताकि वे तुत्काल कार्रवाई कर सकें और फ्रेंडली फायर जैसी घटनाओं को रोका जा सके। 'आकाशतीर' भारत की रक्षा तकनीक में आत्मनिर्भरता का प्रतीक है और 'आत्मनिर्भर भारत' मिशन के अनुरूप है। इसके साथ-साथ भारत में ही बना 'आकाश' सतह से हवा में मार करने वाली मिसाइल प्रणाली भी पाकिस्तान के ड्रोन हमलों को रोकने में अहम भूमिका निभा चुकी है।

India successfully tests counter swarm drone system, 'Bhargavastra'

Source: Buisness Today, Dt. 14 May 2025, URL: <u>https://www.businesstoday.in/india/story/india-successfully-tests-counter-</u> <u>swarm-drone-system-bhargavastra-476259-2025-05-14</u> India has successfully tested the new low-cost counter swarm drone system, 'Bhargavastra' that is developed by Solar Defence and Aerospace Limited (SDAL). The counter-drone system was successfully tested at the Seaward Firing Range in Gopalpur.

Bhargavastra operates in hard kill mode and can detect and eliminate small and incoming drones at distances of up to 2.5 km. Three trials were conducted by SDAL in the presence of senior officials from the Army Air Defence. Two trials involved firing one rocket each, while the third trial fired two rockets in salvo mode within two seconds. All four rockets performed as expected and met the required launch parameters.

Bhargavastra uses unguided micro-rockets as the first layer of defence to neutralise drone swarms within a lethal radius of 20 metres.



India successfully tests counter-drone system Bhargavastra

A guided micro-missile, tested earlier, serves as the second layer for precise neutralisation. The system is designed for deployment across diverse terrains, including high-altitude regions above 5,000 metres.

SDAL highlighted the system's indigenous design and cost-effectiveness. Bhargavastra is modular and can include an additional soft-kill layer for jamming and spoofing, providing an integrated shield for all branches of the armed forces. The sensors and shooter can be configured as per user requirements for layered air defence coverage.

The system integrates with existing network-centric warfare infrastructure. Its Command-and-Control Centre features advanced C4I technology. The radar can detect small aerial threats from 6 to 10 km away, while the Electro-Optical Infrared sensor suite ensures precise identification of low radar cross-section targets.

According to its developers, Bhargavastra represents a significant step in counter-drone technology. Its open-source architecture and multi-layered, cost-effective design with swarm neutralisation capabilities are unique globally.

India ramps up efforts for UN listing of LeT front TRF, meets top officials

Source: Buusiness Standard, Dt. 15 May 2025, URL: <u>https://www.business-standard.com/external-affairs-defence-security/news/</u> <u>india-ramps-up-efforts-for-un-listing-of-let-front-trf-meets-top-officials-</u> <u>125051500249_1.html</u>

An Indian delegation met top officials of the UN Office of Counter-Terrorism (UNOCT) and Counter-Terrorism Committee Executive Directorate here even as New Delhi stepped up efforts to designate The Resistance Front, an LeT proxy, as a UN-listed terror outfit.

The Resistance Front (TRF), a front for Pakistan-based terrorist group Lashkar-e-Taiba (LeT), had claimed responsibility for the attack that killed 26 people in Jammu and Kashmir's Pahalgam.

An Indian technical team, which is in New York, interacted today (Wednesday) with the Monitoring Team of the 1267 Sanctions Committee and other partner countries in the UN. They also met with the United Nations Office of Counter-Terrorism (UNOCT) and Counter-Terrorism Committee Executive Directorate (CTED), sources told PTI.

A readout from UNOCT and CTED of the meeting with the Indian team Wednesday, provided to PTI, said that United Nations Under-Secretary-General Vladimir Voronkov of the Office of Counter-Terrorism and Assistant Secretary-General Natalia Gherman of the Counter-Terrorism Committee Executive Directorate met with a delegation of the Government of the Republic of India.

The development comes in the wake of the horrific April 22 terror attack in Pahalgam and the retaliatory Operation Sindoor launched by India targeting terror infrastructure in Pakistan and Pakistan-occupied Kashmir.

India's push at the UN also comes after the UN Security Council issued a Press Statement in which the members had condemned the Pahalgam attack in the strongest terms but did not mention TRF as the group responsible for the attack.

Voronkov and Gherman expressed condolences for the April 22 attack.

The discussions with the Indian delegation focused on ongoing collaboration with CTED and UNOCT within their respective mandates, particularly in support of implementing key Security Council counter-terrorism resolutions and the UN Global Counter-Terrorism Strategy, the readout said.

It added that key areas of cooperation include UNOCT-led technical capacity-building initiatives supported by Indiasuch as cybersecurity, countering terrorist travel, supporting victims of terrorism, and countering the financing of terrorism.

The participants also discussed efforts to counter the use of new and emerging technologies for terrorist purposes, in line with the 2022 Delhi Declaration adopted by the Counter-Terrorism Committee under the Chairmanship of India.

Pakistan is currently a non-permanent member of the Security Council and will preside over the powerful 15-nation body in July.

Several Pakistan-based terror entities and individuals are listed under the 1267 Al Qaida Sanctions Committee of the UN Security Council and are subject to an assets freeze, arms embargo and travel ban.

In the past, veto-wielding permanent UNSC member China, a fair weather friend of Pakistan, has often put holds and blocks on proposals submitted by India and its partners like the US to blacklist Pakistan-based terrorists at the UN.

The 1267 ISIL (Da'esh) Al-Qaida Committee oversees the sanctions imposed by the Security Council.

The Committee comprises all 15 members of the Security Council and makes its decision by consensus. The Committee is mandated, among other things, to oversee the implementation of the sanctions measures and designate individuals and entities who meet the listing criteria set out in the relevant resolutions.

Following the Pahalgam attack, the UN Security Council had on April 25 issued a Press Statement on terrorist attack in Jammu and Kashmir' in which the members had condemned in the strongest terms the terrorist attack.

The members of the Security Council underlined the need to hold perpetrators, organisers, financiers and sponsors of this reprehensible act of terrorism accountable and bring them to justice, the press statement had said.

However, the press statement did not mention TRF as the group responsible for the attack after Pakistan managed to get the name removed.

Foreign Secretary Vikram Misri, during a briefing on Operation Sindoor last week, had said that The Resistance Front (TRF) had claimed responsibility for the Pahalgam attack. This group is a front for the UN-proscribed Pakistani terrorist group, Lashkar-e-Taiba.

It is notable that India had given inputs about the TRF in the half-yearly report to the Monitoring Team of the UN's 1267 Sanctions Committee in May and November 2024, bringing out its role as a cover for Pakistan-based terrorist groups.

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Earlier too, in December 2023, India had informed the monitoring team about LeT and Jaish-e-Mohammad operating through small terror groups such as the TRF, Misri had said.

Misri had underlined that Pakistan's pressure to remove references to TRF in the April 25 UN Security Council Press Statement is notable in this regard.

UNOCT was established in June 2017 and its main functions include enhancing coordination and coherence across the Global Counter-Terrorism Coordination Compact entities; strengthening the delivery of United Nations counter-terrorism capacity-building assistance to Member States and improving visibility, advocacy and resource mobilisation for United Nations counter-terrorism efforts.

The Security Council established the Counter-Terrorism Committee Executive Directorate (CTED) to assist the work of the Counter-Terrorism Committee (CTC), which was established by Security Council resolution 1372 (2001), adopted unanimously in September 2001 in the wake of the September 11 terrorist attacks in the United States.

PM Narendra Modi's doctrine on dealing with terror: Operation Sindoor

Source: Business Standard, Dt. 14 May 2025,

URL: <u>https://www.business-standard.com/india-news/pm-narendra-modi-s-doctrine-on-dealing-with-terror-operation-sindoor-125051400333_1.html</u>

The massacre in Pahalgam was not just an attack on innocent lives—it was an assault on India's conscience. In response, India decided to rewrite the rulebook on counter-terrorism. Operation Sindoor is the Modi government's clearest articulation of a zero-tolerance, no-compromise policy to safeguard national security, the Modi Doctrine.

PM Narendra Modi outlined the doctrine for dealing with terrorism during his televised address to the nation. The doctrine, shaped by recent events, establishes a decisive framework for India's response to terrorism and external threats.

PM Modi ensured every move—from suspending the Indus Waters Treaty to launching military strikes on terror camps, was carefully planned and timed. The government chose strategy over impulse. This helped prevent Pakistan and terror groups from anticipating India's response. It ensured that Operation Sindoor was executed with surprise, precision, and full impact.

Operation Sindoor, the new normal

"Operation Sindoor is now India's established policy in the fight against terrorism, marking a decisive shift in India's strategic approach", declared the Prime Minister, stating that the operation has set a new standard, a new normal in counter-terrorism measures.

As the Prime Minister stated in his address, "Operation Sindoor is not just a name, but a reflection of the feelings of millions of people of the country." It was India's message to the world that barbarity will be met with calibrated force. The complicity of neighbouring states in terrorism will no longer be shielded behind diplomatic façades or nuclear rhetoric.

Three pillars of the Modi Doctrine

The first key pillar of doctrine includes: Decisive Retaliation on India's Terms – any terrorist attack on India will be met with a fitting response, executed on India's own terms. The country will take strict action against the roots of terrorism, ensuring that perpetrators and their sponsors face the consequences.

The second pillar is Zero Tolerance for Nuclear Blackmail – India will not succumb to nuclear threats or coercion. The doctrine asserts that any attempt to use nuclear blackmail as a shield for terrorism will be met with precise and decisive action.

The third pillar of the doctrine refers to No Distinction Between Terrorists and Their Sponsors – India will hold both terrorists and their enablers accountable. The doctrine makes it clear that those who harbour terrorists, finance them, or support terror will face the same consequences as the perpetrators themselves.

PM Modi put the issue in a global context. Warning that nations supporting terrorism would ultimately face self-destruction, PM Modi urged them to dismantle their terror infrastructure before it is too late. PM Modi said that the new doctrine marks a significant shift in India's approach to national security, setting a precedent for a firm and resolute stance against terrorism. The government remains committed to safeguarding its citizens and ensuring that India's sovereignty remains uncompromised, he added.

No more business as usual with terror

This is not the first time India has acted with clarity and courage. From surgical strikes in 2016 to Balakot and now Operation Sindoor, India under PM Modi has built a clear doctrine: swift, decisive action against terror—on India's terms. Each step has raised the bar and shown India's resolve to act with precision when provoked.

This time the message from India is unambiguous—terror and trade cannot go together. The Attari-Wagah border has been shut. Bilateral trade has been suspended. Visas have been cancelled. The Indus Waters Treaty has been put on hold. In the Prime Minister's words, "water and blood cannot flow together." The economic and diplomatic costs of backing terror are now real and rising.

History will remember India's response to Pahalgam as measured and principled. It will remember our response to terror. Bharat stood tall, spoke with one voice, and struck with one force. Operation Sindoor is not the end—it is the beginning of a new era of clarity, courage, and our sankalp to tackle terror.

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From Pechora to S-400, Russian air defence systems India used to repel Pakistan's aerial incursions

Source: The Print,Dt. 14 May 2025,URL: https://theprint.in/defence/from-pechora-to-s-400-russian-air-defence-systems-india-used-to-repel-pakistans-aerial-incursions/2625963/

As Pakistan launched drones, loitering munitions, and long-range weapons last week, India's Russian-origin arsenal held firm. From legacy air defence guns to modern surface-to-air missile systems, the network of Soviet-era and contemporary Russian platforms formed the backbone of India's multi-layered shield, blunting the aerial threat between 7 and 10 May.

Among the threats were the swarms of drones—small, agile and designed to exploit radar blind spots that posed a unique challenge. But across the western front including Rajasthan, Punjab and Jammu, India's integrated air defence network knocked them out of the sky as well as intercepted more sophisticated threats like Pakistan's guided artillery rocket system, Fatah II.

Russia continues to be India's largest arms supplier, with New Delhi long relying on Moscow's defence technology to build the backbone of its military power including the air defence systems.

On Monday, Director General Air Operations, Air Marshal A.K. Bharti, described the country's air defence as a "wall impossible to breach."

The multi-tiered air defence (AD) network, a mix of legacy systems and newly acquired game changers, both indigenous and imported, thwarted multiple waves of Pakistani attacks on scores of locations from May 7 to 10, minimising damage to military infrastructure and civilian areas, Air Marshal Bharti said at the special briefing on Operation Sindhoor.

ThePrint looks at the Russian systems that played a critical role alongside other weapons during the mass airspace incursion carried out by Pakistan over the past few nights.

S-400, India's 'Sudarshan Chakra'

At the heart of India's defensive shield was the Russian S-400 Triumf system, the country's longrange air defence spearhead. Dubbed the 'Sudarshan Chakra', the S-400 is capable of engaging a wide array of aerial threats, from stealth aircraft and drones to cruise and ballistic missiles, at ranges up to 400 km.

With radar capable of tracking targets up to 600 km away, each S-400 battery can simultaneously engage up to 36 threats across multiple altitudes and velocities, deploying four types of missiles to form a layered interception envelope.

Multiple reports point out that the S-400 was key in successfully intercepting Pakistan's indigenously developed Fatah II guided artillery rocket near Sirsa, Haryana Saturday.

Anticipating the S-400's engagement envelope, Pakistan had reportedly relocated its F-16 squadrons to bases further inland, an implicit acknowledgement of the system's deterrent value.

India had signed a Rs 35,000 crore deal with Russia for five S-400 squadrons in 2018. Three squadrons have been delivered, while the remaining two are expected by 2026, a delay attributed to the ongoing Russia-Ukraine conflict.

Pakistan had falsely claimed to have destroyed an S-400 system at Adampur air base. On Tuesday, Prime Minister Narendra Modi visited the base during which photos and video footage showed the air defence system in the background, effectively debunking the claim.

ZU-23 air defence guns

As drones and low-flying munitions entered India's radar perimeter, the short-range air defence systems, many of them from Soviet-era but modernised by Indian defence firms, came into action.

Among them was the ZU-23-2, a twin-barrel 23 mm anti-aircraft gun introduced by India in the 1960s. Despite its age, the ZU-23 remains a mainstay of India's point defence, particularly for securing air bases, ammunition depots and forward posts.

Sources in the defence establishment say that across Udhampur, Samba and Pathankot, ZU-23s were responsible for shooting down dozens of enemy drones.

Mounted on towed platforms or 8×8 trucks in high-threat zones, these guns are capable of firing up to 2,000 rounds per minute and quickly form a dense flak barrier within a 2.5 km range ideal for engaging drones and low-altitude threats.

The upgraded versions of the ZU-23 fleet have replaced manual controls with an all-electric system and EOFCS (electro-optical fire control systems), enabling autonomous operation. Moreover, the new configuration includes day-and-night imaging cameras, laser rangefinders and digital fire control computers, allowing precise targeting even in extreme weather and terrain.

Schilka air defence system

In areas where mobility is key, the Schilka system or the ZSU-23-4, provided self-propelled, radarguided air defence. Mounted on a tracked chassis and equipped with four 23 mm autocannons and onboard radar, the Schilka can quickly track and destroy multiple targets in real time.

Originally designed for Soviet mobile formations, the Indian variant has been modernised by Bharat Electronics Limited. In 2011, the state-owned company received a contract to upgrade approximately 90 of the Army's ageing Schilka systems, first acquired in the early 1980s.

The upgraded variant includes a new 3D active phased-array radar, enhanced electro-optical sights, and improved electronic warfare capabilities, vastly extending its utility on the modern battlefield.

Pechora surface-to-air missile

Another legacy system reported to play a pivotal role was the Pechora, or S-125 Neva/Pechora, a staple of India's air defence network since the 1970s. A medium-range surface-to-air missile (MRSAM) system, the Pechora is known for its reliability.

The Pechora's presence, according to the defence sources, provided critical coverage at sites where newer systems were either engaged elsewhere or held in reserve.

The Pechora employs radar-guided V-600 missiles and uses the 4R90 Yatagan radar with five parabolic antennas to detect, track and engage low- to mid-altitude threats. With a detection range of 100 km and interception capability at altitudes up to 25 km, it can simultaneously target two threats at speeds of up to 900 m/s.

The seamless integration of long-range missile systems, radar-guided mobile units and pointdefence guns into a unified command network is what created the "wall" that Air Marshal Bharti referenced.

It's a doctrine of layered lethality, built over decades, that continues to hold. While India increasingly pivots towards indigenisation and Israeli technologies, the Russian-made platforms that formed the core of its air defence response are a reminder of a strategic partnership that still delivers under fire.

How upgraded L/70 guns, or 'original Bofors', became India's frontline defence against Pakistan UAVs

Source: The Print, Dt. 14 May 2025,

URL: <u>https://theprint.in/defence/how-upgraded-l-70-guns-or-original-bofors-became-indias-frontline-defence-against-pakistan-uavs/2625448/</u>

When Pakistan launched a coordinated drone offensive across 36 locations along India's western border last week, India's air defence grid snapped into action, with the upgraded L/70 guns playing a key role in thwarting the incoming danger. In what officials described as the largest drone incursion ever in the region, Pakistan deployed between '300-400 drones' on the night of 8–9 May to target Indian installations. Forensic analysis of the wreckage confirmed use of Turkish Songar drones, officials said.

Their aim, as pointed out by Colonel Sofiya Qureshi during a press briefing last week, was to test India's air defences and conduct reconnaissance following Indian armed forces' precision strikes on nine terror camps across Pakistan and Pakistan-Occupied Kashmir under Operation Sindoor.

Among the systems that responded to the drone threat were the upgraded 40-mm L/70 anti-aircraft guns, originally developed in the aftermath of World War II, that have since undergone a transformation through extensive upgrades. From Leh in the Union Territory of Ladakh to Sir Creek in Gujarat, these guns, along with other elements of the Indian air defence grid, played a crucial role in tracking and taking down incoming enemy drones.

Legacy system with post-modern lineage

The L/70 guns were originally developed in the late 1940s by Sweden's AB Bofors as a successor to the widely used L/60. These two versions of the anti-aircraft guns earned the moniker "original Bofors". Inducted by the North Atlantic Treaty Organization (NATO) first in 1952, it quickly became the NATO's standard for a medium-calibre air defence platform, known for its high-velocity 40-mm rounds, a longer barrel and a faster cyclic rate.

Each 40-mm air defence gun fires around 300 rounds per minute with a muzzle velocity of 1,000 metres per second and has an effective range of three to four kilometres.

India inducted the L/70 guns in the early 1960s, first through imports and later via licensed production at the Gun Carriage Factory in Jabalpur. Over time, it became the backbone of India's short-range air defence grid, with over a thousand guns deployed across forward air bases, cantonments and high-value infrastructure sites. But its original configuration with manual aiming and optical sights made it ill-suited to face modern threats like supersonic jets, rotary-wing drones and later, small unmanned aerial vehicles (UAVs).

The L/70 upgrade journey

The L/70s' real test didn't come from fighter jets or helicopters, but from a new class of threat small, low-cost drones with minimal radar signatures. The sudden proliferation of quadcopters, commercial UAVs and compact fixed-wing drones, often deployed by both State and non-State actors, posed a unique challenge to traditional radar and missile-based air defence systems.

Instead of retiring a platform with a vast existing inventory, the Army chose to extend the operational life of the L/70 anti-aircraft guns through an extensive upgrade programme.

Subsequently, the defence ministry initiated a series of upgrade projects for the L/70 in the early 2010s, led by two major players—state-run Bharat Electronics Limited (BEL) and private-sector giant Tata Advanced Systems.

BEL secured the flagship contract in 2017 to upgrade 200 L/70 guns.

The first set of these upgraded systems was inducted in 2021 and deployed to forward positions in Arunachal Pradesh's Tawang sector, bolstering air defence along the Line of Actual Control (LAC) with China.

Upgrades included replacing old hydraulic drives with electric actuators, significantly enhancing accuracy, response speed and maintenance reliability of these machines.

Additionally, a new Integrated Fire Control System (IFCS) was installed, incorporating a digital ballistic computer that calculates shell trajectory in real time.

This system autonomously adjusts for factors such as barrel tilt, round velocity, and atmospheric conditions, easing the load on gun crews.

BEL has also equipped L/70s with an advanced electro-optical suite to ensure effective targeting in all weather conditions and at any time of day.



The suite features a Daylight Television (DLTV) camera, an eye-safe Laser Range Finder (LRF), and a third-generation Thermal Imager (TI), enabling precise tracking and engagement even in low-visibility environments.

In 2024, BEL further enhanced L/70s by integrating a radar- and Radio Frequency (RF)-based Drone Guard System (DGS), designed to detect, track and neutralise rogue drones. The system enables a layered response, including jamming the communications, spoofing GPS signals, and carrying out kinetic strikes when needed.

The upgraded version is also capable of firing air burst ammunition, which detonates near the target rather than on direct impact. This feature significantly improves its effectiveness against small, agile drones by allowing it to engage multiple threats simultaneously.

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India Enters AI Warfare: Aerpace Unveils Defence Drones Under aerShield

Source: ANI, Dt. 15 May 2025,

URL: <u>https://www.aninews.in/news/business/india-enters-ai-warfare-aerpace-unveils-</u> <u>defence-drones-under-aershield20250515124143/</u>

In an era of fast-evolving conflicts and unmanned combat, drones have emerged as the decisive force in modern warfare. From targeted loitering strikes to autonomous surveillance missions across the globe, drones have redefined how nations assert dominance and secure their borders. The current war landscape demands speed, precision, and decision-making without latency-something traditional warfare systems cannot deliver.

As defence strategies worldwide shift towards autonomous and intelligent aerial systems, the need of the hour is clear: AI-powered, modular drone ecosystems that can operate with minimal human intervention while adapting dynamically to battlefield scenarios. Rising to this challenge, Aerpace Industries Limited, in collaboration with Aerpace Robotics Pvt Ltd, UAV Tech Pvt Ltd, and Leospear Defence Pvt Ltd, has successfully developed and tested India's nextgeneration smart UAV ecosystem under the aerShield initiative. Each partner brings a core capability--AI and flight software from Aerpace Robotics, airframe and propulsion engineering from UAV Tech, and advanced munitions integration from Leospear Defence.

At the heart of this ecosystem lies aerOS--an AI-based autonomous drone control platform that enables real-time flight navigation, mission execution, obstacle avoidance, and targeting with surgical precision. The system powers high-performance drones such as:-aerRecon ARM-5 (VTOL) and ARM-10 (STOL) for border surveillance-aerReaper AMMO-R7 - a kamikaze drone equipped to carry RPG-class payloads for tactical strike missions"We're not simply building drones--we're shaping a new frontier for India's defence autonomy," said Ravi Soni, Executive Director of Aerpace Industries. "aerShield is a testament to what homegrown innovation can achieve when guided by purpose and urgency. Our teams are committed to ensuring India leads, not follows, in the evolution of AI-driven defence.

"With testing completed and field integrations underway, Aerpace is set to begin live demonstrations for Indian and allied defense forces. This milestone marks a decisive move toward making India a global hub for smart, indigenous drone warfare systems--redefining the rules of engagement for decades to come.

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Science & Technology News

Dr. Jitendra Singh describes India as the emerging global biotech destination

The science minister addresses the "International Centre for Genetic Engineering and Biotechnology" (ICGEB) Board Meeting of Governors, attended by more than 60 countries of the world.

Dr. Jitendra Singh Dedicates India's first of its kind public funded DST-ICGEB 'Bio-Foundry' at 31st ICGEB Board of Governors Meet

Reaffirms India's Bioeconomy Boom Under PM Modi — From \$10 Billion in 2014 to \$165.7 Billion in 2024, Targeting \$300 Billion by 2030

"India is the Right Place at the Right Time to Lead the Next Biotech Revolution with an enabling political dispensation," says Dr. Jitendra Singh

Calls Bio-E3 policy a Game changer to build a resilient ecosystem for bio-based products and promote high-performance biomanufacturing

Source: Press Information Bureau, Dt. 14 May 2025, URL: <u>https://www.pib.gov.in/PressReleasePage.aspx?PRID=2128674</u>

Addressing the "International Centre for Genetic Engineering and Biotechnology" (ICGEB) Board Meeting of Governors here today, Dr. Jitendra Singh, Union Minister of State (Independent Charge) for Science & Technology, Minister of State (Independent Charge) for Earth Sciences, MoS PMO, Department of Atomic Energy and Department of Space, MoS Personnel, Public Grievances and Pensions described India as the emerging global biotech destination and said, this is the most appropriate venue for such deliberations at a time when India has much to contribute to the world community.

The Meeting was being attended by representatives from more than 60 countries of the world.

On the occasion, the Minister dedicated India's first of its kind public funded DST-ICGEB 'Biofoundry' at the 31st Board Meeting of Governors of the International Centre for Genetic Engineering and Biotechnology (ICGEB) in New Delhi.

Founded in 1983, the International Centre for Genetic Engineering and Biotechnology (ICGEB) is a premier intergovernmental organization dedicated to advancing research in the life sciences. India is one of the founding members of ICGEB. The organization operates through three main centres: New Delhi (India), which focuses on research and biotechnology applications; Trieste (Italy), which serves as the headquarters and coordinates global operations; and Cape Town (South Africa), which functions as a key hub for research, development, and international collaboration.

ICGEB has 69 member countries and plays a key role in biotechnology-led sustainable global development through research, training, and technology transfer.

Addressing the Board of Governors Dr. Jitendra Singh said "This milestone aligns with the Government of India's BioE3 Policy (Biotechnology for Economy, Environment & Employment), approved under the visionary leadership of Prime Minister Narendra Modi."

Dr. Jitendra Singh reaffirmed that under the Modi Government, India's bioeconomy has seen an exponential rise — from \$10 billion in 2014 to \$165.7 billion in 2024, with a target to achieve \$300 billion by 2030. He emphasized that India is at the right time, in the right place, with a highly enabling political ecosystem to lead the next global biotechnology revolution.

Dr. Jitendra Singh highlighted India's remarkable progress in the biotechnology sector. He noted that India now ranks 12th globally in biotechnology and holds the 3rd position in the Asia-Pacific region. The country has emerged as the largest vaccine producer in the world and is home to the 3rd largest startup ecosystem globally. A testament to this growth is the exponential rise in biotech startups, which have surged from just 50 in 2014 to over 10,000 in 2024.

Recalling the success of Mission COVID Suraksha, Dr. Jitendra Singh noted the development of the world's first DNA-based vaccine. He proudly stated that India gifted these vaccines to the world under the Vaccine Maitri initiative, showcasing its commitment to global health equity.

Dr. Jitendra Singh mentioned the development of India's 1st of its kind Indigenous generation antibiotic for monotherapy in bacterial pneumonia Nafithromycin, backed in part by DBT-BIRAC. He also cited the creation of diagnostic kits for Dengue and HIV.

Emphasizing the national importance of biomanufacturing he lauded the BioE3 Policy, approved by the Union Cabinet in August 2024, as a game-changing step to build a resilient ecosystem for bio-based products and promote high-performance biomanufacturing. He stated that India is now poised to lead the next wave of industrial revolution with sustainable biotech-driven manufacturing practices.

Dr. Jitendra Singh expressed pride in ICGEB New Delhi's pioneering role in implementing the BioE3 Policy, especially through the newly dedicated Bio-foundry. The facility will serve as a platform for scaling up bio-based innovations in collaboration with startups and researchers.

He shared that 105 international students from 29 countries have earned PhDs, along with 112 postdoctoral researchers, reflecting its global academic excellence. He also highlighted the signing of an MoU between DBT and IN-SPACe for advancing space biotechnology and space medicine.

Dr. Singh underscored the importance of maintaining a strong focus on five key sectors to drive the next phase of India's biotechnology growth. These include bioenergy, bio-industrial, bio-plantation, biomedical, and biomanufacturing. He emphasized that strategic development in these areas will not only strengthen India's bioeconomy but also contribute significantly to sustainable development and global competitiveness.

The Minister reiterated, "India has the most enabling milieu today for biotechnology. The time is right, the ecosystem is ripe, and we have visionary leadership steering us toward becoming a global bioeconomy leader."

The ICGEB Board was represented by Dr. Jelena Begovic, President of the ICGEB Board of Governors, who underscored the critical importance of biotechnology in addressing the needs of today's rapidly changing world.

Dr. Lawrence Banks, Director General of ICGEB (Italy), lauded India's exceptional commitment and impressive strides in the biotech sector.

Marianna Maculan, Secretary of the ICGEB Board of Governors, was also present during the proceedings.

Dr. Rajesh Gokhale, Secretary of the Department of Biotechnology (DBT), highlighted India's growing leadership in the biomedical and bio-industrial sectors, emphasizing recent initiatives that are shaping the future of these domains. Dr. Alka Sharma, Senior Adviser at DBT and Dr Ramesh Sonti, Director, ICGEB were also present at the 31st Board Meeting.

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Iron-Doped catalyst developed for sustainable oxygen electrocatalysis

Source: Press Information Bureau, Dt. 14 May 2025, URL: <u>https://www.pib.gov.in/PressReleasePage.aspx?PRID=2128622</u>

Researchers from Centre for Nano and Soft Matter Sciences, (CeNS) a Bengaluru based autonomous institute under the Department of Science and Technology (DST), have created a groundbreaking new catalyst designed to make crucial oxygen-related catalytic reactions faster, more affordable, and efficient.

Electrocatalysis involving oxygen underpins numerous clean energy technologies, such as splitting water to produce hydrogen, creating clean fuels, and manufacturing chemicals like hydrogen peroxide. However, these technologies typically face challenges like slow reaction speeds, high energy demands, and high costs due to the limited availability and expense of the precious metals involved. Traditionally, catalysts used in these processes rely on expensive precious metals like platinum or ruthenium making the processes costly.

Targeting to reduce the costs, CeNS has developed a new catalyst that uses nickel selenide enhanced by precisely adding a small amount of iron (Fe). This has the potential of not only reducing costs significantly, but also improves performance.

The team of scientists from CeNS began with a special material known as a metal-organic framework (MOF). MOFs are porous, crystalline structures useful for chemical reactions but have limited electrical conductivity. The electronic structure of the MOF has been modulated by Fe doping to improve catalytic active sites. To improve conductivity, researchers converted MOFs into carbon-rich materials through a heating process known as pyrolysis, enhancing their ability to conduct electricity effectively.

After pyrolysis, researchers introduced selenium, creating two highly effective catalysts known as $Ni_xFe_1-xSe_2-NC$ and $Ni_3-xFe_xSe_4-NC$. The iron doping significantly improved the catalyst's electronic interactions, creating more active sites for reactions and optimizing how reaction intermediates bind to the catalyst surface. These enhancements made the catalyst exceptionally efficient for two key processes: the Oxygen Evolution Reaction (OER), which produces oxygen, and the Oxygen Reduction Reaction (ORR), which converts oxygen into valuable chemicals.

Extensive testing by the researchers showed that the catalyst, $Ni_xFe_1-xSe_2-NC@400$, achieved impressive performance. For the OER process, it required significantly less energy (lower overpotential) and demonstrated superior stability over 70 hours, outperforming traditional

ruthenium-based catalysts. In ORR tests for hydrogen peroxide production, this catalyst also exceeded the performance of industry-standard platinum-based catalysts, providing better reaction speeds and higher efficiency.



Fig: Schematic of Fe-doped Nickel selenides for bifunctional oxygen electrocatalysis

Additionally, the catalyst exhibited excellent electrical conductivity, a crucial feature for rapid and efficient chemical reactions. Detailed analysis revealed that iron doping changed the catalyst's electronic structure in a beneficial way, increasing active sites and facilitating better electron transport. These changes directly enhanced the catalyst's ability to perform oxygen-related reactions, making it highly effective and durable.

This breakthrough could significantly impact industries by providing a cost-effective, sustainable, and highly efficient alternative to current catalysts. Businesses could soon benefit from catalysts that not only cut operational costs but also could reduce environmental impact.

The research published in the journal Nanoscale opens exciting new avenues for designing advanced catalysts by tuning their electronic and structural properties. This approach could lead to the widespread adoption of more affordable and sustainable catalysts in next-generation clean energy technologies.

Publication link: https://doi.org/10.1039/D4NR04047C

For further information, contact Dr. Kavita Pandey at kavitapandey[at]cens.res.in

How CERN's collider achieved modern alchemy—turning lead to gold in a trillionth of a gram

Source: The Print, Dt. 14 May 2025, URL: <u>https://theprint.in/science/how-cerns-collider-achieved-modern-alchemy-</u> <u>turning-lead-to-gold-in-a-trillionth-of-a-gram/2625965/</u> CERN's announcement on May 8 that its Large Hadron Collider (LHC) can turn lead to gold was the Holy Grail for alchemists from the middle ages. This is the biggest discovery since the 'god particle' (Higgs Boson) and the 'beauty particle' (bottom quark).

Scientists observed a real-life transmutation of lead into gold through a new mechanism involving near-miss interactions between atomic nuclei. But each of these gold particles is the size of a nucleus, and lasted barely a second before being destroyed in the collider. During the LHC's second run between 2015 and 2018, around 86 billion gold nuclei were created from smashing lead atoms at 99.999993 percent the speed of light.

"It is impressive to see that our detectors can handle head-on collisions producing thousands of particles, while also being sensitive to collisions where only a few particles are produced at a time, enabling the study of electromagnetic 'nuclear transmutation' processes," said Marco Van Leeuwen, ALICE (A Large Ion Collider Experiment) spokesperson, in a statement.ThePrint explains the science behind the magic.

How it was done

CERN caught the gold bug back as a side quest nearly two decades ago while working on the fundamental particles (smallest known building blocks of the universe) and forces (four forces of nature responsible for how matter behaves), when it started running the LHC. During the second run, the LHC produced 29 picograms of gold. A picogram is one trillionth of a gram.

In the third run, which has been operational since 2022, the amount produced was almost double that of the second run but trillions of times less than what would be required to make a piece of jewellery.

The third run, which will continue till 2026, has higher collision energy compared to its second run, improved detector performance, and collected more data.

The detector's zero degree calorimeters (ZDCs) counted photon–nucleus interactions that led to the emission of zero, one, two or three protons, along with at least one neutron.

ZDCs—which are specialised calorimeters used to detect and measure very small particles or radiation—are associated with the production of lead, thallium, mercury and gold.

"While less frequent than the creation of thallium or mercury, the results show that the LHC currently produces gold at a maximum rate of about 89,000 nuclei per second from lead–lead collisions at the ALICE collision point," the CERN statement read.

A flash of gold

The gold nuclei emerged from the collision with very high energy and hit the LHC beam pipe or collimators (devices that shape or direct beams of light or radiation to narrow them or limit their speed) at various points downstream, where they immediately fragment into single protons, neutrons and other particles.

In this form, the gold exists for just a tiny fraction of a second.

"Thanks to the unique capabilities of the ALICE ZDCs, the present analysis is the first to systematically detect and analyse the signature of gold production at the LHC experimentally," said Uliana Dmitrieva of the ALICE collaboration in a statement.

The biggest discovery that came from LHC was the Higgs Boson in 2012. The discovery provided evidence of how particles gain mass, proving the existence of the Higgs Field, which is key to the Standard Model of particle physics.

However, in recent years, scientists have questioned the lack of any big discovery from the LHC.

चांद पर बनेगा न्यूक्लियर पावर प्लांट, दो महाशक्तियों ने मिला लिया हाथ, फूले अमेरिका के हाथ-पैर

Source: Zee news hindi, Dt. 14 May 2025,

URL: <u>https://zeenews.india.com/hindi/science/china-russia-build-nuclear-power-plant-on-the-moon-ilsr/2758227</u>

चीन और रूस ने चांद पर न्यूक्लियर पावर प्लांट्स बनाने के लिए एक प्रोजेक्ट की शुरुआत की है, जो ग्लोबल लेवल पर स्पेस रेस को एक नई दिशा दे सकती है. यह प्लांट 2036 तक पूरा होने की उम्मीद है और इंटरनेशनल लूनर रिसर्च स्टेशन (ILRS) को ताकत देगा. यह प्रोजेक्ट दोनों देशों के बढ़ते अंतरिक्ष सहयोग और टेक्नोलॉजी डोमिनेंस की दिशा में एक अहम कदम मानी जा रही है, जो फ्यूचर की स्पेस खोजों के लिए बेस तैयार करेगी.

यह घोषणा ऐसे वक्त में की गई है जब अमेरिकी स्पेस एजेंसी नासा ने 2026 के बजट प्रस्ताव में चंद्रमा पर अपने Planned Orbital Station को रद्द करने की बात कही है, जबकि इसका आर्टेमिस प्रोग्राम, जिसका मकसद लगभग पांच दशकों के बाद अमेरिकी एस्ट्रोनॉट्स को चांद पर वापस भेजना है.

चीन-रूस चंद्र परमाणु ऊर्जा संयंत्र ILRS

रिपोर्टों के मुताबिक, चीन और रूस ने हाल ही में चंद्रमा के साउथ पोल पर इंसानों के लिए एक स्थायी बेस बनाने और एक परमाणु ऊर्जा संयंत्र बनाने के लिए एक समझौता ज्ञापन (एमओयू) पर साइन किए हैं, जो बेस और ILRS को ताकत देगा. यह एक क्रांतिकारी परियोजना है, जिसे वैज्ञानिकों ने लॉन्ग टर्म के लिए डिज़ाइन किया है, इसमें चंद्रमा पर फ्यूचर में इंसानों की मौजूदगी की संभावना भी शामिल है.

कब से शुरू होगा निर्माण का काम?

रूसी स्पेस एजेंसी रोस्कोस्मोस के डाइरेक्टर यूरी बोरिसोव ने कहा कि न्यूक्लियर प्लांट का निर्माण 'इंसान के मौजूदगी के बिना' किया जाएगा. उन्होंने संकेत दिया कि उन्नत रोबोट चंद्र सतह (lunar surface) पर निर्माण का काम करेंगे. हालांकि, बोरिसोव ने इस तरह की कोशिश के लिए जरूरी तकनीक के बारे में कोई जानकारी नहीं दी. लेकिन उन्होंने कहा कि सभी तैयारियां पहले से लगभग तैयार है. रिपोर्ट के मुताबिक, चंद्र परमाणु संयंत्र (Lunar Nuclear Plant) का निर्माण 2030 और 2035 के बीच शुरू होने वाला है और 2036 तक पूरा होने की उम्मीद है. ILRS की आधारशिला 2028 में चीन के चांग'ए-8 मिशन के साथ रखी जाएगी, जो चंद्रमा पर उसका पहला मानवयुक्त मिशन होगा.

ILRS मिशन क्या है और यह गेमचेंजर क्यों है?

इंटरनेशनल लूनर रिसर्च स्टेशन (ILRS) चीन और रूस द्वारा संयुक्त रूप से संचालित एक महत्वाकांक्षी परियोजना (Ambitious project) है, जिसका मकसद वैज्ञानिक रिसर्च करने के लिए चंद्रमा के दक्षिणी ध्रुव पर इंसानों के लिए एक आधार स्थापित करना है. जून 2021 में पहली बार मास्को और बीजिंग ने इसका ऐलान किया था, इसमें अब पाकिस्तान, मिस्र, वेनेजुएला, थाईलैंड और दक्षिण अफ्रीका समेत 17 अन्य देश शामिल हैं.

आईएलआरएस का निर्माण 2030 से 2035 तक पांच सुपर हेवी-लिफ्ट रॉकेट प्रोजेक्शन्स के जरिए से भेजी गई मैटेरियल्स का इस्तेमाल करके किया जाएगा और स्टेशन को 2050 तक एक्सटेंड करने की योजना है, जिसमें एक ऑर्बिटल स्पेस स्टेशन (orbital space station), चंद्रमा के भूमध्य रेखा (Moons equator) और उसके दूर के हिस्से पर दो नोड्स शामिल होंगे. खास बात यह है कि लूनर स्पेस स्टेशन को सौर, रेडियो आइसोटोप और परमाणु जनरेटर द्वारा संचालित किया जाएगा. और इसमें चंद्रमा-पृथ्वी और चंद्र सतह (lunar surface), चंद्र वाहन (lunar vehicle) और मानवयुक्त रोवर्स पर उच्च गति संचार नेटवर्क की सुविधा होगी.

आईएलआरएस का मकसद चंद्रमा पर रिसर्च और बगैर इंसानों के लॉन्ग टर्म के लिए मानव को प्रमुख तकनीकी आधार मुहैया करना है, तथा मंगल ग्रह पर मानवयुक्त मिशन के लिए आधार के रूप में काम करना भी है.

चीन का तेजी से बढ़ता स्पेस प्रोग्राम्स

खास तौर पर, चीन ने पिछले दशक में अपने स्पेस प्रोग्राम्स को तेजी से एडवांस्ड किया है. 2013 के चांग'ई-3 मिशन में अपना पहला चंद्र रोवर (Lunar Rover) उतारा था. तब से, बीजिंग ने चंद्रमा और मंगल पर कई रोवर भेजे हैं, चंद्रमा के पास और दूर के हिस्सों से नमूने इकट्ठे किए हैं. साथ ही, चंद्र सतह नक्शा भी तैयार किया है.

चीन के चांग 'ए-8 मिशन का टारगेट 2030 तक चीनी एस्ट्रोनॉट्स को चांद पर उतारना है, क्योंकि बीजिंग स्पेस रिसर्च और मिशन में अपने प्रतिद्वंद्वी अमेरिका की जगह ग्लोबल लीडर के रूप में अपनी जगह पक्की करना चाहता है.

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