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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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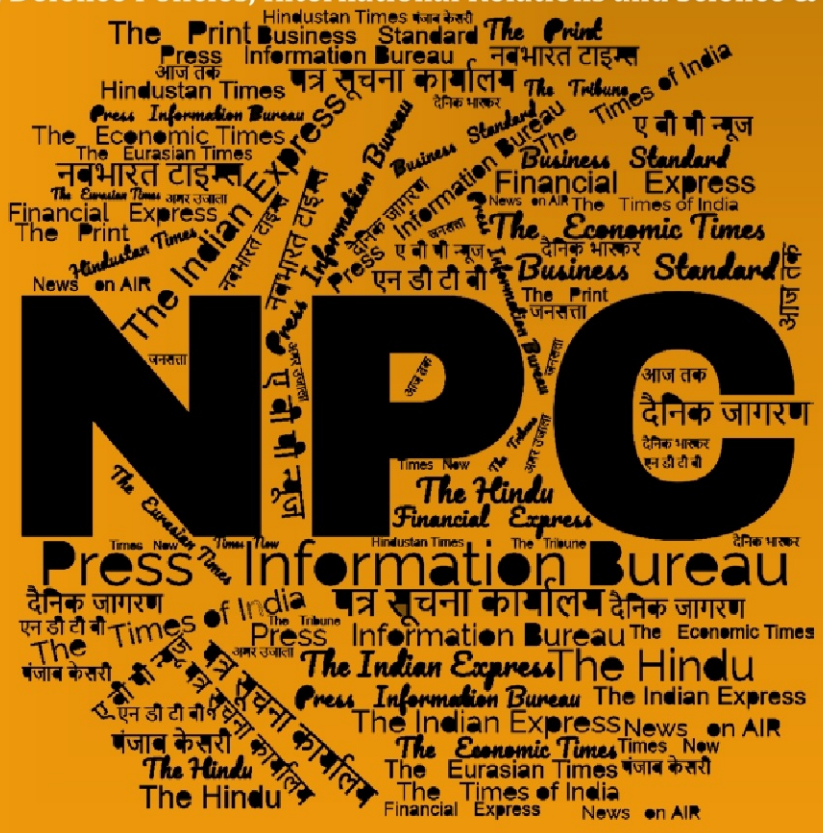

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Defence News

Defence Strategic: National/International

India-Maldives joint military exercise begins

Source: The Economic Times, Dt. 03 Feb 2025,
URL: https://economictimes.indiatimes.com/news/defence/india-maldives-joint-military-exercise-begins/articleshow/117892867.cms

The 13th edition of joint military exercise 'Ekuverin' between the Indian Army and the Maldives National Defence Force has commenced in the archipelago nation, officials here said.

Ekuverin meaning ‘Friends' in Dhivehi language is a bilateral annual exercise conducted alternatively in India and Maldives. In 2023, it was conducted at Chaubatia in Uttarakhand from June 11 to 24.

The military exercise commenced on Sunday.

"Opening Ceremony of 13th edition of two week long Joint Exercise ‘Ekuverin' was held @MNDF_Official Composite Training Centre, Maafilafushi," the High Commission of India in Maldives posted on X on Sunday.

Maldives National Defence Force Chief Major General Ibrahim Hilmy and Indian High Commissioner G Balasubramanian attended the ceremony, it said, sharing some photographs of the event.

The 14-day exercise is aimed at enhancing interoperability in counter insurgency and counter terrorism operations, and carry out joint humanitarian assistance and disaster relief operations.

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‘Third aircraft carrier to replace Vikramaditya’

Source: The New Indian Express Dt. 04 Feb 2025,
URL: https://www.newindianexpress.com/nation/2025/Feb/04/third-aircraft-carrier-to-replace-vikramaditya

The Indian Navy imagining itself as a three aircraft carrier force is in for reality check as the transition is unlikely in the near future. As per sources, the next aircraft carrier, whenever it is ready for sale, will emerge as the replacement of one of the existing aircraft carriers.

Sources privy to the situation said, “By the time the next aircraft carrier, Indigenous Aircraft Carrier-2, is ready for deployment, INS Vikramaditya would be on the verge of completing its operational life.”

As reported earlier by this newspaper, the Indian Navy's operational necessity required planning of two Indigenous Aircraft Carriers (IAC-2).

Navy's confirmation for IAC-2 on the lines of IAC-1, commissioned as INS Vikrant, was given with documentation works completed in December 2022.

However, on the sidelines of Aero India 2023, Chief of Naval Staff Admiral R Hari Kumar said, "Initially, we will go for the repeat order with improved capabilities. In the meantime, we will go for a study of larger carriers. By the time a third aircraft carrier is commissioned, the life-span of INS Vikramaditya may end."

The move for a repeat order of IAC-1 is based on multiple factors; construction time, cost and trajectory of indigenisation of aviation assets. According to the Navy, for a new carrier with modern tech, ship-building facility will have to be upgraded.

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Third Indian N-powered Ballistic Missile Submarine to be Inducted This Year

Source: Deccan Herald, Dt. 03 Feb 2025,
URL: https://www.deccanherald.com/india/third-indian-n-powered-ballistic-missile-submarine-to-be-inducted-this-year-3387338

Amidst growing Chinese footprint in the Indian Ocean region, the third Indian nuclear-powered ballistic missile submarine (SSBN) is set to be inducted this year, military sources said here, noting that the first two N-powered attack submarines (SSN) will be realised a decade later.

The boost to the Indian Navy's underwater arm also comes at a time when the Pakistan Navy is growing in strength with adequate support from China.

The Indian Navy currently operates two SSBNs – INS Arihant and INS Arighat – while the third one INS Aridhaman has been undergoing trials for close to three years. This platform, sources said, would be commissioned in 2025.

China's PLA Navy, the world's largest maritime force, has highly prioritised modernising its submarine force as it operates six SSBN, six SSN, and 48 diesel powered/air-independent powered attack submarines at the moment.

Despite the ongoing retirement of older hulls, the PLAN's submarine force is expected to grow to 65 units by 2025 and 80 units by 2035 due to an expansion of submarine construction capacity.

Against a rapidly expanding Chinese submarine force, India's first SSN would join the force by 2036 followed by the second one in 2038, sources said.

The six Kalvari (Scorpene) class submarines have been inducted in the navy and talks between India and France are at an advanced stage to construct three more boats at Mazagaon dock. None of them have the AIP technology, which will be fitted later when the submarines go for a refit.

The long-awaited second submarine manufacturing project (P75I) has just crossed a milestone with the Defence Ministry clearing the proposal from Mazagon Dock Limited (MDL) and Thyssenkrupp Marine Systems (TKMS) to build six advanced submarines with AIP technology that will allow the boats to stay underwater for nearly three weeks.

Sources said the techno-commercial negotiations were unlikely to be completed this year and the first submarine from this programme can be expected in the next decade only.

Meanwhile, Pakistan plans to reinforce its naval force with 30 frontline ships with Chinese support. Islamabad is buying eight Type-39 Yuan class attack submarines with AIP technology, aiming to change the power dynamics in the Indian Ocean. The first one was launched in water in April 2024 for outfitting and trials.

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NCL collaborates with Indian Air Force for oxygen generation system in MiG-29

Source: The Times of India, Dt. 04 Feb 2025,
URL: https://timesofindia.indiatimes.com/city/pune/ncl-collaborates-with-indian-air-force-for-oxygen-generation-system-in-mig-29/articleshow/117895374.cms

The National Chemical Laboratory (NCL) and the Indian Air Force's 11 Base Repair Depot (BRD) have successfully resolved a critical issue affecting the on-board oxygen generation system of MiG-29 fighter aircraft in a major step in enhancing operational safety and performance during high-altitude missions.

The on-board oxygen generation system (OBOGS) is crucial for providing a steady oxygen supply to pilots during high-altitude operations. Over time, however, the zeolite material used in OBOGS loses efficiency because of moisture absorption, leading to suboptimal oxygen generation.

NCL, a laboratory of the Council of Scientific and Industrial Research, developed an optimised rejuvenation process that significantly enhanced oxygen output in the OBOGS units.

"Our team successfully rejuvenated the zeolite material used in the OBOGS units, which are crucial for providing a continuous supply of oxygen to pilots during high-altitude operations," Vijay Bokade, head of the catalysis and inorganic chemistry division at NCL, said.

The collaboration, initiated by NCL director Ashish Lele, was started in June 2023 at the request of the Indian Air Force's 11 Base Repair Depot (BRD). It was led by Bokade with Prashant Niphadkar, Nilesh Mali and Sachin Nandanwar as team members.

The team scaled up the rejuvenation process to handle large quantities of zeolite, enabling the successful deployment of multiple MiG-29 aircraft with refurbished OBOGS units.

NCL director Lele said, "In April 2024, NCL played a pivotal role in establishing a rejuvenation facility at 11 BRD to ensure sustainable and in-house maintenance of OBOGS units. Joint efforts between NCL and 11 BRD are now focused on completing ground trials of the indigenised zeolite with the concurrence of the Center for Military Airworthiness and Certification."

He said the qualification and certification of these indigenised zeolites for use in MiG-29 aircraft would mark a significant milestone in India's journey toward self-reliance in defence technology.

"This breakthrough reinforces the commitment of CSIR-NCL and the Indian Air Force to fostering innovation and technological advancements to meet national defence requirements," Lele added.

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Army partners with IIT Guwahati for lightweight bunker materials

Source: India Today, Dt. 04 Feb 2025,
URL: https://www.indiatoday.in/india/story/indian-army-partners-with-iit-guwahati-for-lightweight-bunker-materials-2674402-2025-02-04

The Indian Army's Gajraj Corps has signed an agreement with the Indian Institute of Technology (IIT) Guwahati to develop epoxy bamboo-based composites. These materials are intended to replace traditional bunker construction materials in high-altitude areas.

The project involves building defence structures in difficult terrain for testing. These structures will be assessed for their ability to withstand small-arms fire and extreme weather conditions.

The new panels aim to provide the same level of protection while being lighter, making transport easier and improving efficiency.

The agreement was signed in the presence of Major General Rohin Bawa, General Officer Commanding of the Red Horns Division, and Professor Devendra Jalihal, Director of IIT Guwahati. The initiative aligns with the Chief of the Army Staff's vision for a decade of transformation.

Major General Bawa said the Army is focused on adopting advanced technology and stressed the role of academia, industry, and start-ups in creating practical solutions. He expressed confidence that the collaboration would foster innovation and support the 'Atmanirbhar Bharat' initiative.

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Delivery of Apache attack helicopters from US for Army misses deadline again

Source: India Today, Dt. 03 Feb 2025,
URL: https://www.indiatoday.in/india/story/delivery-of-apache-attack-helicopters-from-us-for-indian-army-misses-deadline-again-2674078-2025-02-03

The Indian Army's Apache Squadron Is Still Waiting For The First Batch Of Apache Ah-64e Attack Helicopters From The Us Since The Past 11 Months Of Its Raising. The Delivery Of The Combat Helicopters Has Once Again Missed The Second Deadline.

As Part Of A Usd 600 Million Deal Signed In 2020 With The Us, The Army Had Expected Delivery Of Six Apache Helicopters By June 2024. However, The Timeline Was Shifted To

December 2024 Due To Supply Chain Disruption. The Wait Is Still Not Over For The Army's Aviation Corps, As The Apache Helicopters Have Still Not Been Delivered.

Originally, Six Helicopters Were Planned To Arrive In Batches Of Three. The First Batch Was Expected Between May And June 2024. However, The Helicopters Have Yet To Reach India, Leaving The Army's First Apache Squadron In Anticipation.

As Part Of A Usd 600 Million Deal Signed With The Us In 2020, The Indian Army Is Set To Receive Six Apache Helicopters. The First Batch, However, Has Already Faced A Delay Of Over Nine Months.

Sources In The Defence Ministry Indicate That This Delay Is Due To Technical Issues Faced By The Us. Additionally, There Is No Clarity On The Delivery Timeline For The First Batch Of Helicopters.

The Army's Aviation Corps Raised Its First Apache Squadron At Nagtalao In Jodhpur In March 2024. The Pilots And Ground Staff Were Trained And Ready To Undertake Flight Operations, But They Remain In Uncertainty As The Army Is Itself Not Aware About The Delivery Timelines Of The American Attack Helicopters.

The Apache Ah-64e Attack Helicopters Are Intended To Support The Army's Crucial Operations On The Western Front. These Advanced Choppers Are Known For Their Agility, Firepower And Advanced Targeting Systems. Unsurprisingly, The Army Requires These Attack Helicopters As A Major Component Of Its Arsenal.

The Indian Air Force Has Already Inducted 22 Apache Helicopters As Part Of A Separate Order Signed In 2015, While The Army Is Awaiting These Advanced Attack Helicopters To Bolster Its Capabilities.

The Army's Aviation Corps Is A Critical Component Of Its Operational Capabilities, Providing Essential Aerial Support For A Variety Of Missions. The Assets Of The Army's Aviation Corps Include:

Helicopters:-

Advanced Light Helicopter (Alh) Dhruv: An Indigenous Multi-Role Helicopter Used For Various Purposes, Including Transport, Reconnaissance And Search And Rescue Missions. The Dhruv Fleet Remains Grounded After A Icg Alh Crashed Last Month.

Rudra: An Armed Version Of The Alh Dhruv, Equipped With Weapons For Close Air Support And Anti-Tank Missions. The Fleet Remains Grounded For Security Checks By The Hindustan Aeronautics Limited (Hal).

Cheetah And Chetak: Light Utility Helicopters Used For Reconnaissance, Casualty Evacuation And Logistics.

Light Combat Helicopter (Lch): A Newer Addition Designed For High-Altitude Operations, Capable Of Carrying Out Offensive Missions In Support Of Ground Troops.

Fixed-Wing Aircraft - Dornier 228: A Light Transport Aircraft Used For Reconnaissance, Logistics And Communication Duties.

Unmanned Aerial Vehicles (Uavs):

Heron: Medium-Altitude, Long-Endurance Uavs Used For Surveillance And Reconnaissance.

Searcher: Tactical Uavs For Shorter-Range Surveillance And Reconnaissance Missions.

Transport Helicopters:

Mi-17: Medium-Lift Helicopters Used For Troop Transport, Logistics And Evacuation Missions.

These Assets Allow The Army's Aviation Corps To Conduct A Wide Range Of Operations, From Battlefield Support And Reconnaissance To Logistics And Casualty Evacuation, Significantly Enhancing The Force's Overall Effectiveness In Various Terrains And Conditions.

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Rafale-M, Scorpene deals likely to be fast-tracked during PM Modi's France visit

Source: India Today, Dt. 03 Feb 2025,
URL: https://www.indiatoday.in/amp/india/story/pm-modi-upcoming-france-visit-rafale-m-scorpene-deals-fast-track-emmanuel-macron-2674272-2025-02-03

Prime Minister Narendra Modi's upcoming visit to France is expected to accelerate the procurement of 26 Rafale-M fighter jets and three Scorpene-class submarines, strengthening India's naval and aerial capabilities.

PM Modi is expected to visit Paris this month on a bilateral visit and attend the Artificial Intelligence Action Summit.

According to sources, PM Modi and French President Emmanuel Macron are expected to discuss key deals between India and France. These deals, along with several other key defence acquisitions, are likely to be finalised before March 31 this year.

A Cabinet Committee on Security (CCS) approval for these major deals is expected in the upcoming weeks, while the final discussions might take place around the visit of PM Modi to Paris, according to sources.

The Indian Navy is looking forward to the naval variants of 26 Rafale-M to bolster its aircraft carrier fleet. These fighters will operate from INS Vikrant and INS Vikramaditya. Besides the Rafale-M, three additional Scorpene-class submarines are to be built under Project-75, boosting India's underwater combat strength.

These submarines are to be constructed in collaboration with Mazagon Dock Shipbuilders Limited (MDL) and France's Naval Group. Other Navy procurements are also moving at an expected timeline.

A source aware of the issue said that the Indian Navy will start receiving the MQ-9B predator drones from the US by 2029.

The US has already delivered a replacement for one Predator drone after a crash last year. The Indian Navy has been operating two MQ-9As taken on lease from General Atomics in 2020.

In September last year, one of them carried out a controlled ditching at sea off Chennai after it encountered a technical failure while on a routine surveillance mission which could not be reset in flight.

Other Potential Deals Before Fiscal Year-End

Apart from these, the government is pushing to finalise other major defence procurements, including 307 Advanced Towed Artillery Guna Systems (ATAGs) within this financial year.

The focus remains on modernising India's armed forces through strategic partnerships and indigenous manufacturing under the 'Make in India' initiative.

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AI and Indian Army

Source: The Times of India, Dt. 03 Feb 2025,
URL: https://timesofindia.indiatimes.com/blogs/barracks-beyond/ai-and-indian-army/

The Indian Army is increasingly integrating AI to enhance its operational capabilities, though publicly available details remain scarce for security reasons. My analysis is primarily based on official reports, media sources, military speeches, and select DRDO publications.

The Indian Army is increasingly using Artificial Intelligence (AI) to improve security, surveillance, and decision-making. AI helps in detecting threats, analysing information, and automating various defence operations. This technology is already being used in multiple areas, making the Army more efficient and prepared for modern warfare.

One of the most important uses of AI is object detection. AI-powered drones, high-resolution cameras, and sensors help spot hidden threats like enemy bunkers, weapons, and explosives, even in difficult terrains. This is especially crucial along the Line of Control (LoC) and Line of Actual Control (LAC), where security forces need to constantly monitor movements. AI also helps combine data from different sensors to give soldiers a clearer picture of the battlefield.

AI also plays a big role in cybersecurity and tackling misinformation. Cyberattacks and fake news are major challenges for national security, and AI tools help detect and counter these threats. The Situational Awareness Module for the Army (SAMA) collects battlefield information from different sources to provide commanders with real-time insights, improving decision-making and strategic planning.

Another key application is natural language processing (NLP), which helps in real-time translation and communication. Along India’s borders, troops often interact with foreign languages like Mandarin (spoken in China) and regional dialects used by groups along the western borders. AI-powered translation tools make it easier to understand and respond to potential threats effectively.

AI-driven drone swarms are another game-changing technology. These drones can work together in groups, performing tasks like surveillance, attacks, and communication relays without direct human control. Recent global conflicts have shown the effectiveness of AI-powered drones, and India is one of the first countries to operationalize them.

The Indian government is actively supporting AI development in defence. The Military College of Telecommunication and Engineering (MCTE) has been designated as the Army's AI Centre of Excellence, and DRDO's Centre for AI and Robotics (CAIR) is leading AI research. Programs like iDEX encourage Indian startups to develop cutting-edge AI-based defence solutions. In recent past the Indian Army showcased 75 AI-powered defence products at the AIDef Symposium, demonstrating rapid progress in this field.

As AI continues to evolve, challenges like data accuracy, security risks, and bias need to be addressed. With other countries advancing in AI-based warfare, India must remain focused on strengthening its AI capabilities to maintain an edge in modern military operations.

While AI offers immense benefits, challenges like data security, bias in AI algorithms and ethical concerns need to be addressed. AI systems must be reliable, unbiased, and secure to be effectively deployed in military operations.

AI is not just useful but essential for modern warfare, helping the Indian military stay ahead in defence technology. With global adversaries advancing in AI warfare, India must continue investing in AI to enhance national security and maintain military superiority.

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Two Chinese vessels in Arabian Sea, India keeps a close watch

Source: The Tribune, Dt. 04 Feb 2025,
URL: https://www.tribuneindia.com/news/india/two-chinese-vessels-in-arabian-sea-india-keeps-a-close-watch/

The presence of two Chinese survey vessels in international waters of the Arabian Sea has been reported with Indian security agencies closing monitoring their activities. The vessels — capable of mapping the sea-bed for resources and identifying optimal submarine routes — have been operating in the area since November last year, although these have remained outside India's Exclusive Economic Zone (EEZ), which extends 370 km from the shore.

Classified as "science vessels" and officially tasked with "fishing surveys", these ships are also known to perform strategic roles for the Chinese Navy, including recording underwater submarine sounds, monitoring warships of other nations and intercepting radio communications on open channels.

A similar Chinese survey vessel had conducted surveys around the Maldives in April 2024. It again returned to the region in November last year, sources said.

China has a huge "distant-water fishing fleet" in the Arabian sea. Many countries have raised concerns over the presence of illegal fishing fleets in the region. Indian security agencies too have flagged the presence of 175 Chinese vessels in international waters of the Arabian sea since

November last year. These vessels are now permanently operating in the Arabian Sea, except during the May-August fishing ban.

The activities of Chinese survey ships in the Arabian Sea have raised concerns among several countries, including India. These vessels are equipped with advanced technology to conduct oceanographic and hydrographic surveys, including studying marine environments, currents, climatic patterns and mapping the ocean floor. India has often questioned China's intentions since such data collection could have significant strategic implications, including the potential to undermine regional security.

The Arabian Sea is a critical maritime zone, serving as a vital transit route for global energy supplies and connecting major economies. China has been expanding its fleet of survey vessels, which it claims are for scientific purposes.

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India–Bhutan: CDS जनरल अनिल चौहान से मिले भूटान के शीर्ष सेना कमांडर, क्षेत्रीय सुरक्षा स्थिति पर हुई चर्चा

Source: Amar Ujala, Dt. 03 Feb 2025,
URL: https://www.amarujala.com/india-news/bhutan-s-top-army-commander-lieutenant-general-batoo-tshering-meets-cds-gen-anil-chauhan-news-in-hindi-2025-02-03

दिल्ली में रॉयल भूटान आर्मी के चीफ ऑपरेशन ऑफिसर लेफ्टिनेंट जनरल बाटू शेरिंग ने सोमवार को चीफ ऑफ डिफेंस स्टाफ जनरल अनिल चौहान के साथ मुलाकात और बातचीत की, जिसमें भारत–भूटान रणनीतिक साझेदारी को बढ़ावा देने पर ध्यान केंद्रित किया गया। वहीं इस मुलाकात के बारे में अधिकारियों ने बताया कि इस दौरान चर्चा में दोनों पड़ोसी देशों के बीच रणनीतिक साझेदारी और दोस्ती के मजबूत बंधन को बढ़ाने पर ध्यान केंद्रित किया गया। दोनों पक्षों ने क्षेत्रीय सुरक्षा स्थिति पर भी विचार–विमर्श किया।

लेफ्टिनेंट जनरल शेरिंग ने शनिवार को भारत की अपनी छह दिवसीय यात्रा शुरू की। इस यात्रा का उद्देश्य द्विपक्षीय सैन्य सहयोग को बढ़ावा देना और रक्षा सहयोग के लिए नए रास्ते तलाशना है।

डोकलाम पठार पर भारत ने भूटान के दावे का किया समर्थन

2017 में डोकलाम ट्राई–जंक्शन पर भारतीय और चीनी सेनाएं 73 दिनों तक आमने–सामने रहीं, जब चीन ने उस क्षेत्र में सड़क का विस्तार करने की कोशिश की, जिस पर भूटान ने अपना दावा किया था। डोकलाम पठार में भारत–चीन गतिरोध ने दोनों पड़ोसियों के बीच बड़े संघर्ष की आशंकाओं को भी जन्म दिया है। भूटान ने कहा था कि यह क्षेत्र उसका है और भारत ने भूटान के दावे का समर्थन किया है।

'मित्र देशों के बीच रणनीतिक संबंध और प्रगाढ़ होंगे'

पिछले कुछ वर्षों में, भूटान और चीन अपने बढ़ते सीमा विवाद के शीघ्र समाधान की ओर देख रहे थे। शनिवार को एक बयान में कहा गया, 'लेफ्टिनेंट जनरल बट्टू शेरिंग की यह यात्रा दोनों सेनाओं के बीच निरंतर सहयोग का मार्ग

प्रशस्त करती है। इस यात्रा से दोनों मित्र देशों के बीच रणनीतिक संबंध और प्रगाढ़ होंगे और आपसी हितों के मामलों में उनका सहयोग बढ़ेगा।'

साउथ ब्लॉक में दिया गया गार्ड ऑफ ऑनर

इससे पहले रॉयल भूटान आर्मी के चीफ ऑपरेशन ऑफिसर (सीओओ) लेफ्टिनेंट जनरल बट्टू शेरिंग को सोमवार को साउथ ब्लॉक में गार्ड ऑफ ऑनर दिया गया। भारतीय सेना प्रमुख जनरल उपेंद्र द्विवेदी ने उनका स्वागत किया। इस दौरान दोनों अधिकारियों ने हाथ मिलाए। इससे पहले लेफ्टिनेंट जनरल बट्टू शेरिंग ने दिल्ली में राष्ट्रीय युद्ध स्मारक पर पुष्पांजलि अर्पित की और शहीद नायकों को श्रद्धांजलि दी। लेफ्टिनेंट जनरल बट्टू शेरिंग छह फरवरी तक भारत की आधिकारिक यात्रा पर हैं।

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Rare transmission system failure led to ALH crash, shows inquiry

Source: Hindustan Times, Dt. 04 Feb 2025,
URL: https://www.hindustantimes.com/india-news/rare-transmission-system-failure-led-to-alh-crash-shows-inquiry-101738609206920.html

Investigators have found that a rare failure of a critical part in the transmission system caused the crash of a coast guard Dhruv advanced light helicopter (ALH) at Porbandar in Gujarat on January 5, and a high-powered panel has been constituted to determine the reason for the breakdown of the component before steps can be initiated to fix the problem and declare the fleet airworthy again, two officials familiar with the matter said on Monday.

The ALH is unlikely to return to service soon.

The military's fleet of around 330 locally produced ALHs, which was grounded a month ago for a thorough safety inspection following the latest accident, is unlikely to be cleared for flying for several more weeks, the officials said.

The multi-mission helicopter has been designed and developed by Bengaluru-based Hindustan Aeronautics Limited (HAL).

A detailed analysis by the Council of Scientific and Industrial Research-National Aerospace Laboratories (CSIR-NAL), Bengaluru, found that the device that malfunctioned compromised the ability of the pilots to control the helicopter's motion, said the first official. It is most likely the swashplate assembly in the ALH's transmission system, HT has learnt. Two pilots and an aircrew diver were killed in the coast guard crash.

A top committee has been set up to find out what caused the material failure and how to address it to achieve safe flight operations.

The defect investigation committee (DIC) will consist of officials from the Bengaluru-based Centre for Military Airworthiness and Certification (CEMILAC), the Directorate General of Aeronautical Quality Assurance and HAL, and is expected to submit its report in four weeks after which remedial action will be taken, said the second official.

The ALH has been flying for more than 20 years, and a failure of this nature has never occurred before, he said. “The DIC will determine whether the issue is related to quality, inspection or maintenance. If it’s a straightforward issue and can be fixed easily, the helicopters will be cleared to fly in batches after mandatory safety checks involving the transmission system. If not, the ALH will stay grounded longer,” the second official added.

Both officials asked not to be named.

The ALH underwent a complete design review followed by a replacement of a defective control system only in 2023-24.

The ALH’s armed version Rudra was also grounded after the January 5 crash. The army and the Indian Air Force account for more than 90 Rudra helicopters.

The ALH has been a workhorse for the three services and the coast guard. For instance, the army flew its ALHs for more than 40,000 hours last year, with the helicopters mostly operating at altitudes of more than 15,000 feet. The army operates around 90 ALHs.

The wreckage of the coast guard helicopter was flown to Bengaluru on January 15. CSIR-NAL analysed the ALH’s integrated drive system, including the transmission system, gearbox and rotor hub, before pinpointing the failure.

Flight safety hinges on a helicopter’s transmission and control systems, said Air Marshal Anil Chopra (retd), a former director general of the Centre for Air Power Studies.

“Any failure can result in a catastrophic accident. Normally, the reliability of the transmission and control systems is extremely high. Any failure requires detailed analysis of the problem so that appropriate measures can be taken to rectify it. The ALH should resume flying only after the safety issue is resolved,” Chopra added.

The ALH has been involved in around 15 accidents during the last five years, putting the spotlight on its troubling safety record.

The coast guard suspended ALH operations following an accident last September when a helicopter crashed into the Arabian Sea near Porbandar. Then too, two pilots and an aircrew diver were killed. The grounding was for a one-time check. The three services did not ground their fleets then.

The Coast Guard cleared the helicopters for flying a few weeks later, after a safety inspection involving HAL, CEMILAC and all coast guard units.

Last September’s accident, too, came after the design review that culminated in a critical safety upgrade on the military’s ALH fleet, initiated by HAL. The upgrade involved installing upgraded control systems on the helicopters to improve their airworthiness. The safety inspection after last September’s crash focused on flying controls and the transmission system. Accidents can happen due to several reasons, including technical defect, human error (aircrew), and human error (servicing).

When the coast guard grounded its fleet last September, the focus of the inspection was on the safety, security, integrity and crack detection checks of several parts, including the main drive

flexible shaft and its attachments, main and tail rotor assemblies, upper and lower control systems, and roll, pitch, collective and tail rotor actuators. The inspection found nothing amiss.

The comprehensive design review came after the ALH fleet was grounded several times in 2023 too after a raft of accidents called into question its flight safety record.

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More for pensions, less for firepower: Is India's Defence Budget strategically weak?

Source: The Economic Times, Dt. 03 Feb 2025,
URL: https://economictimes.indiatimes.com/news/defence/more-for-pensions-less-for-firepower-is-indias-defence-budget-strategically-weak/articleshow/117880711.cms

India's defence budget for 2025 has seen a 9.52% increase, reaching Rs 6.81 lakh crore. However, much of this growth is attributed to rising pension costs and revenue expenditure. Despite this increase, the defence budget remains at 1.9% of the projected Gross Domestic Product (GDP) for 2024-25, a figure that experts argue is insufficient given India's strategic challenges. When compared to the revised estimates from the previous year's Rs 6.41 lakh crore, the actual increase is just 6%. The most significant rise in allocation is in the pension category, which accounts for 23.60% of the total budget and stands at Rs 1,60,795 crore, reflecting a 13.8% increase from last year's Rs 1,41,205 crore.

Overall military spending increased to 4.9 trillion rupees ($57 billion) from over 4.6 trillion rupees a year ago. Much of the allocation is on account of salaries and pensions, said Laxman Kumar Behera, a professor at the Special Centre for National Security Studies at New Delhi's Jawaharlal Nehru University, told Bloomberg.

Capital Expenditure and Modernisation EffortsThe capital budget for modernisation—including the procurement of new fighter jets, drones, artillery guns, tanks, and helicopters—has seen a modest increase of Rs 8,000 crore, from Rs 1.72 lakh crore in the current fiscal to Rs 1.80 lakh crore in the new budget. However, the armed forces were unable to fully utilise last year's capital budget, returning Rs 13,000 crore. Notably, the budget documents do not provide specific allocations for the Army, Navy, and Air Force.

The capital outlay for modernisation—including procurement of new fighters, drones, artillery guns, tanks, and helicopters—has been increased only marginally by Rs 8,000 crore to Rs 1.80 lakh crore. The capital budget constitutes 26.43% of the total defence allocation, with Rs 1,48,722.80 crore specifically earmarked for capital acquisitions. Of this, Rs 1,11,544.83 crore—or 75% of the modernisation budget—has been designated for procurement from domestic sources, while Rs 27,886.21 crore is reserved for private industries.

However, the Indian armed forces, which had hoped for a substantial increase in capital expenditure, failed to fully utilise last year's budget, returning Rs 13,000 crore in unspent funds. This shortfall in spending has raised concerns about procurement delays and the efficiency of fund utilisation.

Notably, 75% of the modernisation budget (Rs 1,11,544.83 crore) is allocated for domestic procurement, reinforcing the government's push for self-reliance. Rs 27,886.21 crore from this share is set aside for purchases from private Indian industries.

Rising Revenue Expenditure

The allocation for revenue expenditure, which covers salaries, allowances, and operational preparedness, stands at Rs 3,11,732.30 crore—45.76% of the total budget. This marks a 24.25% increase from the previous year's budgetary estimates. The increase is attributed to additional troop deployment in border areas, extended sea deployments, and higher operational costs for aircraft.

Under the revenue head, Rs 1,97,317.30 crore has been allocated to cover salaries and allowances for the armed forces. The Ministry of Defence has assured that any additional requirements will be addressed during the mid-year review.

Border Security and Strategic Infrastructure

Recognising the ongoing border tensions with China and Pakistan, the budget has made provisions for strengthening border infrastructure. The Border Roads Organisation (BRO) has received an allocation of Rs 7,146.50 crore, marking a 9.74% increase. These funds will be used to construct critical tunnels, bridges, and roads, including projects in Arunachal Pradesh, Jammu & Kashmir, and Rajasthan. India's defence posture is also being shaped by evolving geopolitical challenges. The country is under pressure to play a more active regional security role, particularly amid Houthi-sponsored attacks on Gulf shipping and piracy threats from East Africa.

Defence Research and Development Boost

The Defence Research and Development Organisation (DRDO) has received an allocation of Rs 26,816.82 crore for FY 2025-26, marking a 12.41% increase from the previous year's Rs 23,855.61 crore. Of this, Rs 14,923.82 crore is dedicated to capital expenditure for R&D projects, underscoring the government's focus on technological advancements in defence.

Revenue expenditure, which includes pay and allowances for armed forces personnel and operational readiness, has been significantly increased to Rs 3,11,732.30 crore. This marks a 24.25% jump compared to the previous financial year. The Ministry of Defence stated that this allocation would support additional troop deployments in border areas, extended naval operations, and increased flying hours for aircraft. Under this head, Rs 1,97,317.30 crore has been set aside for salaries, with provisions for mid-year reviews if necessary.

Industry Reactions and Push for Self-Reliance

The Indian defence industry has broadly welcomed the budget's focus on self-reliance and modernisation. As told to ET Manufacturing, Rajinder Singh Bhatia, President of the Society of Indian Defence Manufacturers (SIDM), stated, "The continued increase in capital outlay for defence procurement from industries will drive self-reliance, innovation, and global competitiveness in the sector. The emphasis on indigenisation of critical defence technologies, along with policy support for industries, will further accelerate the development of a robust domestic defence supply chain."

Similarly, Vivek Merchant, Director of Swan Defence and Heavy Industries Limited, highlighted the impact on the shipbuilding sector, “The Rs 25,000 crore Maritime Development Fund is a game-changer, signaling the government’s serious intent to make India a global hub for shipbuilding. However, the industry still needs policy reforms that encourage private sector participation and reduce dependency on imports for critical components.”

Focus on Aerospace and Aviation

A substantial portion of the budget has been allocated to modernising the Indian Air Force, particularly in aircraft and aero-engines. Venkatesh Mudragalla, COO and Co-founder of Jeh Aerospace, remarked: “We welcome the Modified UDAAN Scheme, which will add 120 new destinations and 4 crore additional passengers, significantly enhancing regional connectivity and logistics. Strengthening air travel access is crucial for fostering economic growth and creating new opportunities in the aerospace and manufacturing sectors.”

Path to a Self-Reliant Future

The budget’s strong emphasis on research, skill development, and policy reforms aims to create a vibrant and resilient defence sector. Jaikaran Chandock, Director of Balu Forge Industries Ltd, noted, “Earmarking a sizable part of the modernisation outlay for domestic procurement is a move in the right direction. The focus on AI and deep-tech innovation will also lead to the development of a future-ready talent pipeline, positioning India as a global leader in defence manufacturing.”

Despite the increased budget, challenges remain. A 2023 parliamentary report highlighted that only 15% of the Army’s equipment is classified as ‘new’, while 45% is ‘older generation equipment’. As told to Bloomberg, Laxman Kumar Behera pointed out that India’s defence spending remains below 2% of GDP, despite facing a hostile neighbourhood. “Countries across the world, including small geographies like Poland, are spending around 5% as uncertainty grows,” he observed.

Nevertheless, the budget lays the foundation for India’s long-term vision of becoming a global defence powerhouse. With increased allocations for domestic procurement, R&D, and infrastructure development, the government is taking strides towards self-reliance, but sustained investment and policy reforms will be necessary to ensure comprehensive modernisation of the armed forces.

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Strategic warfare meets ancient Indian wisdom: CDM seminar explores changing battle concepts, strategies

Source: The Week, Dt. 03 Feb 2025,
URL: https://www.theweek.in/news/defence/2025/02/03/strategic-warfare-meets-ancient-indian-wisdom-cdm-seminar-explores-changing-battle-concepts-strategies.html

The annual national seminar of the College of Defence Management (CDM), Secunderabad, with the theme ‘Developing Military Strategic Authentic Leaders (MISAL): Re-Imagining Concepts and Strategies’, discussed, among other things, leadership evolution, lessons from the ancient

Indian knowledge system, and competencies required for integrated, cross-service leadership in the wake of a constantly evolving modern warfare.

The seminar, which brought together senior military officials, strategic experts, and leading academicians to explore evolving military leadership frameworks, offered important insights into modern warfare challenges and leadership models essential for shaping future-ready armed forces and served as a platform to delve deeply into the construct, concepts and strategies that shape military leadership.

Chief of Defence Staff General Anil Chauhan, who delivered the keynote address, emphasised the need for adaptive leadership amid complex geopolitical shifts and disruptive technologies.

A major highlight of the seminar was a session on ‘Strategies for Developing Military Strategic and Authentic Leaders.’ During the seminar, Vice Adm Biswajit Dasgupta (Retd) and Lt Gen Ajay Chandpuria led discussions on the impact of disruptive technologies, changing geopolitical dynamics, and the evolving role of strategic military leadership.

The seminar featured discussions by various academicians on subjects including leadership evolution, lessons from the ancient Indian knowledge system, and competencies required for integrated, cross-service leadership.

The veterans offered critical insights into modern military challenges and leadership models that are crucial for shaping future-ready armed forces.

Commandant CDM Major General Harsh Chhibber underscored the necessity of re-evaluating military leadership strategies in light of increasing global conflicts, diminishing control mechanisms, and the socio-economic diversity of the armed forces.

The seminar reinforced the urgent need for military leadership to align with national security objectives, leveraging technological advancements and structural reforms within the armed forces.

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Science & Technology News

Scientists unlock new phenomenon in metal behaviour, opening doors for advanced tech

Source: The Times of India, Dt. 03 Feb 2025,
URL: https://timesofindia.indiatimes.com/science/scientists-unlock-new-phenomenon-in-metal-behaviour-opening-doors-for-advanced-tech/articleshow/117885569.cms

Indian scientists have discovered a new phenomenon in nanoscience that could change how we develop electronic devices, sensors, and catalysts. The research, led by Prof Bivas Saha from the Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bengaluru, reveals how electrons behave differently when confined in metals at the nanoscale.

The study, published in Science Advances, demonstrates for the first time how this confinement disrupts the normal plasmonic properties of metals — a finding that challenges traditional understanding of metal behavior at the molecular level. The work was conducted in collaboration with scientists from Purdue University and North Carolina State University in the USA, and the University of Sydney.

“Our findings highlight the transformative role of quantum confinement in redefining material properties. This is not just about understanding plasmonic breakdown—it’s about pushing the limits of how we can harness nanoscale phenomena for technological innovation,” explains Saha.

The research team used advanced techniques including electron energy loss spectroscopy and quantum mechanical calculations to observe and predict electron behaviour with unprecedented accuracy.

Lead author Prasanna Das describes the discovery as “a landmark achievement in materials science and nanotechnology.” The implications are far-reaching, promising advancements in optoelectronic materials, high-precision sensors, and more efficient nano-catalysts.

The team also argued that the breakthrough could position India at the forefront of nanoscience research, where classical and quantum physics intersect. The Department of Science and Technology (DST)-supported study marks a step forward in understanding how materials behave at the smallest scales, potentially leading to more efficient and powerful electronic devices in the future.

“The research opens new possibilities for developing advanced technologies across multiple industries, from electronics and photonics to energy conversion systems, reinforcing India's growing capabilities in cutting-edge scientific research,” DST said.

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The promises and problems of using bacteria to get rid of plastic Premium

Source: The Hindu, Dt. 04 Feb 2025,
URL: https://www.thehindu.com/sci-tech/science/the-promises-and-problems-of-using-bacteria-to-get-rid-of-plastic/article69175500.ece

During her time in a drug discovery lab, structural biologist Kavyashree Manjunath first started thinking about how much plastic her group used, even for a single experiment. From the smallest of tips used to draw solutions to pipettes, bottles, and more — the plastic waste from her lab alone was enough to shock the average environment-friendly scientist. If they stopped to think about it the way she had.

One slightly comforting thought is that the plastic is recycled. But Manjunath found that that's not always the case. "Over a period of 65 years, since the large-scale production of plastic started, almost 8.3 billion tonnes of plastic has been produced," she said, quoting a 2017 Science Advances study. "Out of this, less than 10% alone is recycled. Almost 4.9 billion tonnes are there in the environment, in some form or other."

The era of plastic-degrading bacteria has begunIn their own fields

The immense amounts of plastics lying around choking our planet has driven multiple biologists to look for sustainable solutions in their own fields. Some of them work on bacteria that can chew up plastics; others work directly with enzymes that can clean up the waste. Multiple scientists, including Manjunath, have turned into entrepreneurs, starting companies to use their solutions on a larger scale.

But the field is still very nascent, with most labs and companies still in the early discovery process. Biodegrading the tonnes of plastic we have generated — and will generate in the years to come — is the goal. But like most things in science, the path to success is long and arduous. How long the methods take to degrade plastic and the kinds of plastic they can act on remain some of the major bottlenecks to get across.

Delving into past work, Manjunath discovered there are natural enzymes that can break down the highly abundant polyethylene terephthalate (PET), a polyester found in many kinds of plastic items. Since Kohei Oda and his team at the Kyoto Institute of Technology first discovered the bacterium Ideonella sakaiensis, which breaks PET down using two enzymes, multiple groups have worked on isolating and improving those enzymes to try and degrade plastic efficiently.

But most of these natural enzymes take several months to years to work. "I thought, 'can these enzymes be engineered to break down PET much faster so that it can be used at a large scale in the industry?'" Manjunath said.

To develop these enzymes, she founded Apratima Biosolutions, a start-up incubated at the Centre for Cellular and Molecular Platforms (CCAMP), Bengaluru. One enzyme they developed can break down 90% of PET waste in 17 hours, into products like terephthalic acid and ethylene glycol, which can be purified and used again.

She and her team are now working on making the enzymes even faster and cheaper. Once the technology is ready, her plan is to partner with the PET recycling industry to help scale it up. “The main thing is the speed, because if it takes some 10 days or something, it’s not feasible, right?”

‘Really fascinated’

Degrading PET waste as quickly as possible is one part of the problem; there are many other kinds of problematic plastics out there. Some scientists are using microbes to directly degrade the plastic. These methods are slower but, depending on the versatility of the microbes involved, can offer some advantages.

Sukanya Punthambaker and Vaskar Gnyawali, former researchers at the Wyss Institute at Harvard University and co-founders and CEO and Chief Scientific Officer of Breaking Inc., developed such an approach. They discovered a bacterium called X-32 that degrades PET as well as polyolefins, found in some packaging materials and polyamides like nylon.

Microplastics in sewage become 'hubs' for drug-resistant bacteria: study

“Polyolefins have one of the toughest carbon-carbon bonds to break, so we were really fascinated that this one microbe can do all three major plastic types,” Punthambaker said.

As of now, it takes the microbe 22 months to reduce these forms of plastic to carbon dioxide, water, and biomass. They are currently working on figuring out the enzymes involved so they can isolate them and edit their genes in a way to improve their speed and efficiency.

They also plan to test whether their microbe can be scaled up for use at an industrial level.

The biological approachApart from companies, academic researchers are also finding biological solutions to get rid of plastic. University of California San Diego nanoengineering professor Jon Pokorski is one of them. He is studying ways to make biodegradable plastic from scratch. He recently reported a method to make thermoplastic polyurethane (TPU), a commercial plastic found in memory foam, footwear, and foot mats, but infused with heat-resistant bacterial spores.

Pokorski and his team first evolved heat-resistant spores, made of Bacillus subtilis bacteria, in the lab. Then they incorporated the spores into the plastic; the spores can survive the high temperatures of plastic production and remain dormant in normal conditions. But as soon as the plastic is in a compost, the spores become active and start eating. Based on their findings, the bacteria took about five months to degrade 90% of the strips of TPU when they were in a moist, nutrient-rich compost environment ideal for their activation.

The longer time may be a trade-off but Pokorski believes using the live-bacteria approach to degrade plastic is more amenable to scaling up than using pure enzymes.

“Purifying an enzyme is quite a challenge, especially purifying enough of it to satisfy the problem of millions of tonnes of plastic every year,” Pokorski said. “I would argue that our solution is a much more viable solution for scaling. Because you’re not relying on a single enzyme to perform its function; you’re relying on something that’s going to replicate.”

Currently, at the academic lab scale they have tested, they needed very small amounts of spores for about a kilogram of plastic, and adding the spores improved the mechanical properties of the plastic as well.

“Like rebar reinforces concrete, the spores serve as a reinforcing additive to the polymer,” Pokorski explained. “Ideally the plastic will either last longer or you could use less plastic because it’s a better product.”

However, he thinks consumer acceptance could be a challenge. “I don’t know how regulatory agencies would feel about bacteria in plastics,” he said. “The bacteria that are used are pretty harmless, but you never know, right?”

The rate-limiting step

Another advantage of using bacteria to break down plastic, according to biomolecular engineer Nathan Crook, is one can then evolve them to become more efficient. At North Carolina State University, Crook discovered a way to attach the two previously discovered PET-degrading enzymes onto the surface of a very fast-growing bacteria called Vibrio natriegens and use it to eat up plastic as it would eat any other carbon source. They are now working on evolving it in the lab in a way that it can break plastics down faster.

Microplastics finally found in human brains, but that’s not the full picture

“The enzymes that break down the plastic are the rate-limiting step,” Crook said. “If you have an organism where the only way it can survive is to break down plastic, it’s going to find a way to mutate its enzyme so that they’re really good at breaking down plastic.”

But Manjunath, who works with enzymes, thinks scaling them up is not an issue. “There are a lot of fermentation industries which can produce the enzyme in large quantities,” she said. The challenges she anticipates instead are whether the enzyme can be reused and the amount of PET waste loading they will need to optimise.

“For example, if you have a 10-litre reactor, how much PET waste can you load into it?” she asked. “Because the less you load, the more expensive it becomes, so you have to make sure the technology is able to handle large quantities of PET waste at a given time.”

Another major challenge is to make sure the enzymes can degrade different kinds of PET waste — even the highly crystalline variety. Most enzymes in use now target PET used in packaging materials, but not the ones found in the pesky plastic bottles.

‘See the plastic gone’

Despite its challenges, some leading scientists and companies still prefer the enzyme approach. Greg Beckhamm, a senior researcher at the National Renewable Energy Laboratory in the US and his team worked on improving one of the PET-degrading enzymes, such that it could also degrade the crystalline PET in water bottles.

Carbios, a French company that’s one of the giants in the plastic-degrading business, have also engineered a highly efficient and heat-stable PET-degrading enzyme. Heating the plastic makes it

easier to degrade, so the company worked on making the enzymes heat-stable to increase its speed of action.

According to a 2020 Nature paper, their enzyme takes 10 hours to degrade 90% of PET waste. The broken-down components can also be used as raw materials for fresh bottles, leading to a circular PET economy. They are now planning on building a large PET recycling plant to degrade plastic at a much larger scale but have now postponed it due to a delay in funding.

No microplastics: new rules queer the pitch for 'biodegradable' plastics

"It takes time because this is a very new technology in this particular domain, right?" said Manjunath. "But I think these kinds of solutions are very essential."

According to Crook, it need not only be a company that does the job of clearing up the plastic polluting the environment. "Maybe there's a non-profit that takes on this thing and tries to clean things up, or a governmental organisation that does this at a loss, because it's so expensive to clean up all the plastic," he said.

"I want to see the plastic gone in some way. Maybe it's our [bacterial] strain or somebody else's. At the moment, we're open to a variety of things."

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