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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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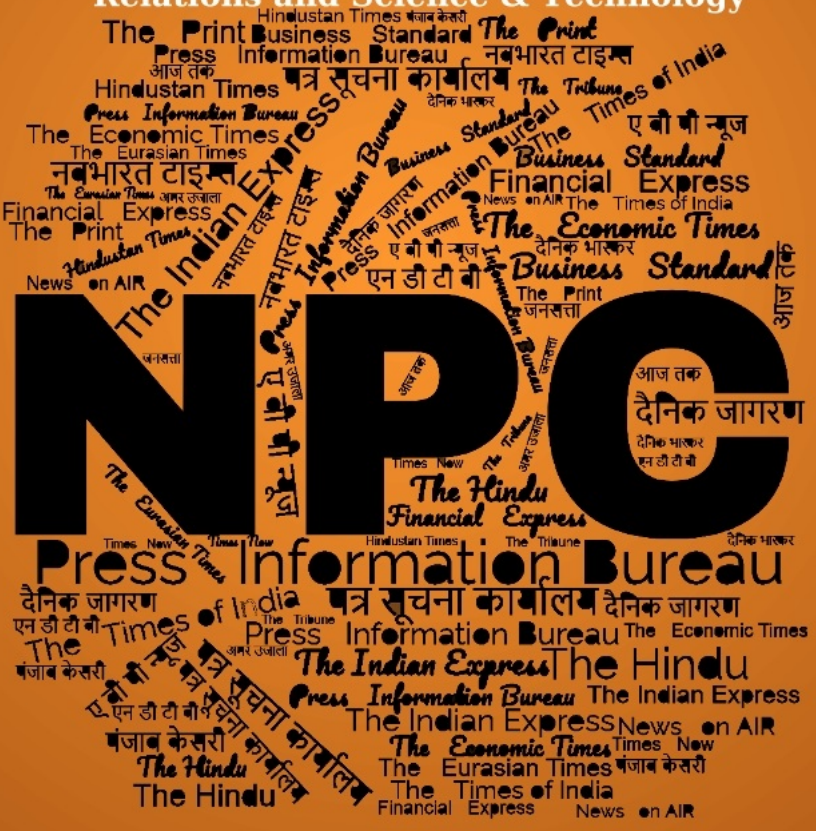

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DRDO News

Business Standard

Sat, 31 Aug 2024

Centum Electronics bags Rs 108-cr order from DRDO

Centum Electronics informed that it has received an order from Defence Research and Development Organisation (DRDO) worth Rs 109.58 crore.

The order includes intersatellite link & other payload subsystems to be executed within a period of 16 months. The value of the contract is Rs 108.58 crore.

Centum Electronics is in electronic system design and manufacturing, manufactures high end electronics modules, subsystems and systems used in the aerospace, defence, and industrial electronic sectors.

The companys consolidated net profit slumped 364% to Rs 3.84 crore in Q1 FY25 as against Rs 1.45 crore posted in Q1 FY24. Net sales marginally rose to Rs 238.81 crore in Q1 FY25.

The scrip had jumped 5.55% to end at Rs 1,704.30 on the BSE on Friday.

https://www.business-standard.com/markets/capital-market-news/centum-electronics-bags-rs-108-cr-order-from-drdo-124083100254_1.html

DECCAN Chronicle

Sun, 01 Sep 2024

Vedic Sciences Advancing Material Science: Former DRDO Chief Telangana

Research into scientific techniques mentioned in the Vedas had resulted in efficient material manufacturing processes and the effort was yielding highly optimistic results, said Dr G. Satheesh Reddy, former head of the Defence Research Development Organisation (DRDO) and former adviser to the defence minister.

Addressing the inaugural session of the two-day seminar, 'International Conference on Uniting Vedic Knowledge with Modern Technologies,' at T-Hub on Saturday, Sateesh Reddy complimented

the Srimaharshi Research Institute of Vedic Technology (SRVIT), based in Guntur, Andhra Pradesh, for being at the forefront of research into Vedic sciences and bringing results from the research into modern materials production systems.

“There are many well-proven technologies in Vedic sciences, in the areas of material science, cryptology and cryptography. The SRIVT’s research over 25 years in collaboration with various organisations that need materials, be it DRDO, CSIR, ISRO and the department of atomic energy, has produced highly optimistic results. In several instances, the processes used by the SRIVT were found to be much more efficient than those followed in modern science,” Satheesh Reddy explained.

He said India was developing numerous critical materials indigenously. “India is producing specialised steels for maritime applications, including those for submarines designed to withstand extreme pressures. The fact that nearly 80 per cent of the materials used in the construction of the aircraft carrier INS Vikrant carrier are sourced locally, our progress is undeniable,” Sateesh Reddy said.

“Hyderabad, in particular, stands out as a hub of research and development, with several institutions dedicated to advancing these specialised materials. The last decade has seen a spurt with several organisations and labs trying to produce many such critical materials in the country,” the former DRDO chief said.

Prof V. Ramgopal Rao, Vice Chancellor of BITS-Pilani Hyderabad, said, “We look forward to joining this research process and want to design the courses we can offer so that more and more people can use this knowledge. The exploration of ancient science should become a national movement. Politicians talk big, but when it comes to funding such projects, not many are seen doing much, which is a big concern.”

Dr A.B.S. Sastry, SRVIT founder, said, “What our Maharishis enunciated is very scientific and connected to nature. They authored several technological treatises based on the Vedas, which are universal scientific manuals. Such grandhas are the applied Vedic sciences authored by Rishis for the welfare of mankind.”

https://www.deccanchronicle.com/southern-states/telangana/vedic-sciences-advancing-material-science-former-drdo-chief-1820552

Defence News

Defence Strategic: National/International

Press Information Bureau
Government of India

Ministry of Defence

Fri, 30 Aug 2024

Two-Day Maiden Joint Commanders Conference to begin on September 4 in Lucknow

The first Joint Commanders' Conference (JCC) is set to take place at the Headquarters Central Command, Lucknow from 04-05 September 2024. Themed 'Sashakt aur Surakshit Bharat: Transforming the Armed Forces', the conference will be attended by Raksha Mantri Shri Rajnath Singh, and will serve as the pivotal platform for undertaking internal 'process reforms' within the armed forces.

Chief of Defence Staff General Anil Chauhan will inaugurate the convocation on September 04, which brings together the apex level hierarchy from the Ministry of Defence and the Armed Forces.

The two-day deliberations will focus on analyzing the impact of regional and global geo-political disruptions and the commensurate demands that are likely to be placed upon the reforms being undertaken by the armed forces.

Preparing for Future Wars, Jointness & Integration among the constituent services and technology absorption, riding on the Government's 'Atmanirbharta' initiative to achieve self-reliance in Defence, will be areas receiving prime emphasis.

The JCC is planned to be developed as a crucial forum for exchange of ideas, strategies and best practices among India's top military leadership, reinforcing the country's commitment to a strong and safer future and achieving strategic autonomy in defence.

https://pib.gov.in/PressReleasePage.aspx?PRID=2050203

Press Information Bureau
Government of India

Ministry of Defence

Fri, 30 Aug 2024

Indian Naval Ship Tabar Conducts Maritime Partnership Exercise With Spanish Navy Ship Atalaya

Indian Navy's frontline frigate, INS Tabar had arrived on a two day visit at Malaga, Spain on 25 Aug 24 and post departure on 27 Aug 24 conducted Maritime Partnership Exercise (MPX) with Spanish Navy Ship Atalaya in the Mediterranean Sea. India and Spain have been engaging in multiple fields towards enhancing the existing bilateral relations, including maritime domain.

The conduct of MPX between Indian Navy and Spanish Navy in the Mediterranean Sea signifies Indian Navy's outreach and sustenance, which also marks a significant milestone in the maritime cooperation between India and Spain. The MPX involved a series of advanced exercises such as Station Keeping, Replenishment at Sea Approaches (RASAPs), Flying Exercise (FYEX), Steam Past and PHOTOEX serials. Units from both navies demonstrated high levels of professionalism and commitment to enhance collaborative efforts.

The Indian Navy remains committed towards fostering partnership with navies across the world. The MPX with the Spanish Navy reinforces the strong bilateral naval ties, further strengthening our resolve and commitment towards ensuring enhanced cooperation in the maritime domain.

https://pib.gov.in/PressReleasePage.aspx?PRID=2050102

Press Information Bureau
Government of India

Ministry of Defence

Sat, 31 Aug 2024

Naval Commanders At Kochi For Operational Level Discussions

Admiral Dinesh K Tripathi, Chief of the Naval Staff, presided over Indian Navy's operational level discussions conducted at Kochi from 27 - 30 Aug 24. The Commanders-in-Chief, senior leadership from the Indian Navy, sister Services, HQIDS and Coast Guard participated in the discussions.

During the four day intense deliberations, IN operational concepts and responses to various operational scenarios with tri-services synergy and coordination with Coast Guard and other maritime agencies were critically analysed.

The discussions also focused on the developments in warfare, identifying areas for greater synergy in joint efforts, key technological support requirements, operational logistics and optimising manpower resources to tackle emerging maritime challenges.

https://pib.gov.in/PressReleasePage.aspx?PRID=2050377

Press Information Bureau
Government of India

Ministry of Defence

Fri, 30 Aug 2024

Self-reliance is first condition for a strong economy; Giant strides being made to realise PM Modi's vision of 'Aatmanirbhar Bharat': Raksha Mantri

"Target set for Rs three lakh crore defence production & Rs 50,000 crore defence exports by 2029"

India has become the biggest voice of the Global South, says Shri Rajnath Singh

"Our government will always be recognised as biggest 'Change Makers'; India ushering into an age of unprecedented development, prosperity, social harmony & growth"

Self-reliance in every sector is the first condition for a strong economy and the nation is making giant strides towards realising Prime Minister Shri Narendra Modi's vision of 'Aatmanirbhar Bharat'. This was stated by Raksha Mantri Shri Rajnath Singh at an event in Thiruvananthapuram, Kerala on August 30, 2024. He asserted that a raft of measures have been taken by the Government to create a robust production base and an ecosystem for defence R&D and innovation.

Some of the steps taken by the Ministry of Defence, that the Raksha Mantri enumerated, include setting up of Defence Industrial Corridors in Uttar Pradesh & Tamil Nadu and issuance of five Positive Indigenisation Lists of more than 5,500 items. He added that GE-414 engines will now be made in India, which marks a remarkable progress in the country's engine-making capability. He referred to his recent US visit, stating that he had fruitful discussions with the US defence companies and they are excited to join the 'Make In India' programme.

Shri Rajnath Singh stressed that there was a time when the country relied on other countries to meet the defence needs, and about 65-70% of defence equipment was being imported. But this has

changed today, he said, highlighting that 65% is being manufactured on the Indian soil and only 35% is being imported.

The Raksha Mantri added that the annual defence production has crossed Rs 1.27 lakh crore and the target is to reach Rs 1.75 lakh crore in this fiscal year. He exuded confidence that the Ministry of Defence will achieve a target of Rs three lakh crore worth of defence production by 2029.

“Today, we are also exporting defence equipment made in India. In Financial Year 2023-24, India's defence exports crossed Rs 21,000 crore. Our target is to increase defence exports up to Rs 50,000 crore by 2029,” Shri Rajnath Singh said. On India’s growing stature on the international stage, the Raksha Mantri mentioned about Prime Minister Shri Narendra Modi’s recent visits to Russia & Ukraine, saying that he is the only global leader who was listened to by both the countries. “India has today become the biggest voice of the Global South. Every country considers and listens to India's opinion on significant issues. The Prime Minister was recently bestowed with Russia's highest civilian honour by President Vladimir Putin. With this, Russia has joined 16 countries that have given their highest civilian honour to our Prime Minister. These countries also include Muslim nations like UAE, Saudi Arabia, Afghanistan, Maldives and Bahrain,” he said.

Shri Rajnath Singh emphasised that the country has witnessed ‘Epochal Changes’ in the last ten years - from economic reforms to major social transformation, from cultural revival to significant political changes. He credited the people for playing the most important role in this change along with the government. “The last 10 years will go down in history as the decade of change and our Prime Minister & government will always be recognised as the biggest ‘Change Makers’. India is on a cusp of major change. It will usher India into an age of unprecedented development, prosperity, social harmony and growth,” he added.

The Raksha Mantri spoke on the growth in India's economy since 2014. “India’s economy was earlier among the ‘Fragile Five’. Today, it is being recognised all over the world as one of the ‘Fabulous Five’. During the last fiscal year, India’s economic growth rate was 8.2%. It was more than the growth rate of 7% the year before. For two consecutive years, India has been the fastest-growing economy out of all the world’s major economies. In the last ten years, from the 11th position, India has become the fifth largest economy. Investment firm Morgan Stanley estimates show that India will become the third largest economy by 2027,” he said.

Shri Rajnath Singh pointed out that despite the fast pace of growth, inflation is well under control in India. He cited the recent data released in July, which shows that retail inflation rate has been recorded at 3.54 per cent, the lowest in the last five years. “Before 2014, the number of start-ups used to be less than 1,000. Now, it has increased to more than one lakh. Today, India is the third largest start-up ecosystem in the world and every 10th unicorn is in India. India’s start-up ecosystem is expected to receive around $1 billion in new funding this year, 25% higher than last year,” he added.

Identifying good governance as Government’s priority, the Raksha Mantri stated every policy and programme is founded on the principles of stability, consistency, and continuity to ensure good governance. He added that productive expenditure in the form of highest capital expenditure; unprecedented investment in welfare schemes; end of wasteful expenditure and financial discipline have been the focus areas of the Government. Shri Rajnath

Singh emphasised that the efficacy and efficiency of the government was seen during the COVID-19 pandemic. “Our government ensured that life-saving resources and medicines were timely and promptly available. During the lockdown, we ensured food security by making free-of-cost ration available to the poor. Made in India vaccines were taken as a priority. We ensured the availability of these vaccines to each citizen promptly without any delay,” he said.

The Raksha Mantri described the success of ‘Swachh Bharat Abhiyan’ and ‘Open Defecation Free India’ as the best examples of ‘positive change’ brought by the Government led by Prime Minister Shri Narendra Modi. He also referred to the initiatives such as Pradhan Mantri Jan Dhan Yojana and Deen Dayal Upadhyaya Gram Jyoti Yojana which fulfil the needs and necessities of the people.

Shri Rajnath Singh also enumerated the efforts being made towards gender parity and women empowerment through schemes such as Beti Bachao, Beti Padhao & Nari Shakti Vandan Adhiniyam. He also mentioned about the abolition of the practice of Triple Talaq, reflecting the Government’s will and determination to end such a discriminatory practice. The Raksha Mantri termed the health, safety and welfare of women as the Government’s priority.

“Considering the atrocities and crimes against women in the country, despite all the changes, it seems that a lot remains to be done. Our government has adopted a strict attitude towards crimes against women, but many states are not making sincere efforts in this direction. The recent heart-wrenching incident in Kolkata is very tragic and disgraceful. We have amended the law to provide for the capital punishment for heinous crimes like rape. This law should be implemented with strictness,” he said.

Highlighting the growing role of women in the Armed Forces, Shri Rajnath Singh stated that many obstacles to the entry of women into the military have been removed. “We have ensured increased participation of women in all the three wings of the Armed Forces. Permanent Commission for women has been allowed. One of the most prestigious military training institutes, National Defence Academy, has also been opened for women. Our government is marching ahead with the vision of women empowerment and women-led development,” he said.

https://pib.gov.in/PressReleasePage.aspx?PRID=2050090

THE ECONOMIC TIMES

Fri, 30 Aug 2024

USISPF announces third edition of India-US Defence Acceleration Ecosystem to strengthen partnership in defence innovation

The US-India Strategic Partnership Forum (USISPF) on Friday announced that it will hold the third edition of its defence summit in the US to strengthen advanced technology partnerships in defence innovation between the two countries.

"Strengthening defence innovation! We're thrilled to announce the 3rd edition of the India-US Defence Acceleration Ecosystem (INDUS-X) Summit in collaboration with @Stanford's Gordian Knot Centre for National Security Innovation (@StanfordGKC) and the @HooverInst," the USISPF said in a post on X.

Announcing the date -- September 9 to 10 -- at the Stanford University Campus in California, the USISPF said: "The summit will bring together leading defence policymakers from Washington and New Delhi to strengthen advanced technology partnerships in defence innovation."

This year's theme -- "Harnessing Investment Opportunities to Enhance CrossBorder Defence Innovation Ecosystems" -- will focus on the critical role of private capital in advancing the defence innovation sector, the announcement said.

The summit, featuring keynote addresses, panel discussions, and roundtable sessions with leaders from both the private and the public sectors, will touch upon themes along the lines of strengthening defence advance technology partnerships, funding defence innovation, and resilient supply chains, the post said.

"A state-of-the-art, INDUS-X Tech Expo, will showcase cutting-edge technologies and innovations from defence and aerospace startups and companies, in an event, that will draw venture capital firms, academics, accelerators, and tech professionals from the Bay Area," it said.

https://economictimes.indiatimes.com/news/defence/usispf-announces-third-edition-of-india-us-defence-acceleration-ecosystem-to-strengthen-partnership-in-defence-innovation/articleshow/112924198.cms

Hindustan Times

Sat, 31 Aug 2024

DK Sunil appointed HAL chief as aircraft maker gears up for key projects

DK Sunil, who has spearheaded several key aerospace programmes and is known for his design expertise, will take over as the next chief of the Bengaluru-based Hindustan Aeronautics Limited (HAL) on Sunday as the aircraft maker gears up to execute some critical projects for the armed forces.

He replaces CB Ananthakrishnan who retired on Saturday.

Sunil, who joined HAL as a management trainee, has been with the firm for 37 years and contributed significantly to design, production, quality enhancement and customer support, HAL said in a statement on Saturday, announcing his appointment as chairman and managing director (additional charge). He will continue to head engineering, and research and development.

HT reported on August 29 that Sunil was the frontrunner for the top job at a time when HAL is at a critical juncture --- it is grappling with a delay in the Tejas light combat aircraft (LCA Mk-1A)

programme, working towards finalising a deal for joint production of jet engines in the country, and awaiting orders worth tens of thousands of crores for new fighter planes and helicopters.

Sunil's extensive design expertise ranges from equipment to system-level projects for both aircraft and helicopters, covering the entire spectrum of HAL's design activities, the statement said.

"During his tenure at the Mission Combat Systems R&D Centre in Bengaluru, he led teams focused on groundbreaking projects such as the advanced active electronically scanned array radar for fighters, automatic flight control system for the light combat helicopter and mission computers for helicopters and fighter platforms."

Several new technologies were developed under his leadership, including radar power supply, modern voice activated control systems and combined interrogator/transponder systems for identification of friendly and hostile aircraft.

Accelerating the LCA Mk-1A programme will be one of his top priorities as a question mark hangs over HAL's ability to meet the delivery timeline of the 83 LCA Mk-1As on order. IAF is unhappy with the current pace of the programme because of the possible risks the delay in the induction of new fighter planes could pose to the air force's combat effectiveness, and has flagged the hot-button issue to HAL, calling for timely execution of the ₹48,000-crore contract, as first reported by HT on July 12.

HAL had then said it will deliver 16 of these fighters to IAF in FY 2024-25 as per schedule. It also said it hoped to deliver all the 83 aircraft on order by 2028-29. Many in the air force are sceptical about the LCA Mk-1A deadlines being met, and one of the main reasons for that is the lingering delay in the supply of the F404 engines to HAL by US firm GE Aerospace.

Sunil also takes over at a time when HAL is negotiating a deal with GE Aerospace for the joint production of F414 engines in India. The two firms signed a memorandum of understanding in Washington in June 2023 to produce 99 F414 engines for India's future LCA Mk-2 programme. The joint production of the engines will help the country overcome a striking technology gap, lay the foundation for indigenous development of bigger jet engines and possibly open doors to exports.

Big orders are in the pipeline for HAL. The defence ministry could award it a contract by the year-end for 97 more LCA Mk-1As to strengthen the air force's capabilities. It is estimated to be worth ₹67,000 crore. The upcoming deal will be the second order for the LCA Mk-1A after the ministry awarded HAL the ₹48,000-crore contract for 83 such aircraft in February 2021.

Also, in June 2024, the defence ministry issued a tender to HAL for the proposed acquisition of 156 Prachand light combat helicopters (LCH) to sharpen the capabilities of the Indian Army and IAF. The new helicopters, 90 for the army and 66 for IAF, are estimated to cost ₹50,000 crore and will further boost India's self-reliance drive.

https://www.hindustantimes.com/india-news/dk-sunil-appointed-hal-chief-as-aircraft-maker-gears-up-for-key-projects-101725116958470.html

THE TIMES OF INDIA

Sun, 01 Sep 2024

High explosive pre-fragmented shell to be used to counter drones

The will soon induct high-explosive prefragmented shells to counter a swarm of drones and enhance its operational capabilities. The high-explosive pre-fragmented (HEPF) shells can engage multiple drones, having a payload capacity of 1kg, in a five-kilometre range.

These shells can be fired from ships equipped with AK-630 Naval guns. After firing, the shell produces about 600 metal shrapnels that can travel at a speed of 850 metres per second to engage the target in a five-kilometre range, said officials.India Navy's aircraft carriers, INS Vikrant and INS Vikramaditya, all destroyers, except Talwar class, Nilgiri class frigates, all corvettes, Deepak-class fleet tankers and Sandhayak-class survey vessels are using the AK-630 gun system.

"The significance of the anti-drone shell is high against the backdrop of recent drone attacks on Indian ships in the Gulf of Aden and the Indian Ocean Region (IOR). Apart from the existing anti-drone system on the ships, the Commanding Officer (CO) will have another option at their disposal to counter the drone threat," a senior Navy officer told TOI.

The city-based Armament Research and Development Establishment (ARDE) laboratory of the Defence Research and Development Organisation (DRDO) has developed the shell. A Raju, the director of ARDE, told TOI, "We have handed over the production documents to Rear Admiral Rupak Barua, the Director-General of the Naval Armament Inspectorate, recently. The Navy will give supply orders to manufacturers based on their operational requirements."

Another ARDE offcial said, "We have achieved these operational requirements during multiple trials conducted under the guidance of the Navy's panel during development. After achieving the desired results, we have reached the final stage."

The Indian Navy provided technical inputs to ARDE to finalise drawings, design specifications, inspection tools, and proof and testing of the shell. It was a collaborative effort to find an indigenous solution, said the official.

https://timesofindia.indiatimes.com/city/pune/indian-navy-to-introduce-high-explosive-pre-fragmented-shells-to-counter-drones/articleshow/112959975.cms

The Indian EXPRESS

Sun, 01 Sep 2024

An Expert Explains: What the commissioning of INS Arighaat means to India

The commissioning of Arighaat should make all Indians immensely proud. India is now firmly in a very exclusive club that possesses the capability to build a nuclear-powered, ballistic missile capable submarine. It is a huge achievement for India's national defence-scientific community — Department of Atomic Energy (DAE) and Defence Research & Development Organisation (DRDO) — as well as their industrial partners, both public and private, that have contributed to the building and operationalisation of the submarine.

The Indian Navy must get a major share of the credit for being intimately involved with the SSBN project from the time its inception, a journey that has involved several very precise and critical processes that do not permit any room for compromise or error.

The significance of the achievement is enormous for self-reliance. Compared to Arihant, India's first nuclear-powered ballistic missile submarine that was commissioned in 2016, the indigenisation content has doubled in Arighaat (from 30 per cent to 60 per cent), while the build time has reduced substantially.

Some critical systems and sub-systems have been fully indigenised, which reduces India's reliance on foreign sources, and enhances reliability and better repair and maintenance support.

Types of nuclear submarines, what makes Arighaat special

Arighaat, like Arihant, is an SSBN. Nuclear-powered submarines are of three kinds. The one that carries conventional weapons is called an SSN in NATO terminology. The second type is capable of carrying guided missiles with conventional warheads — an SSGN. The third, and typically the largest and most complex, is the one that is capable of carrying ballistic missiles that may be nuclear armed — an SSBN.

Arighaat adds to India's sea-based nuclear deterrent, which is the most credible and survivable leg of the nuclear triad. It is understood that Arighaat will be able to carry enhanced-range missiles (3,500 km) — which will be a formidable capability.

How Arighaat fits into India's national security matrix

SSBNs are part of the country's nuclear deterrent, and constitute the sea leg of the triad, the other two being the air and land delivery systems.

India's nuclear doctrine, in addition to committing to "no first use", states that India must have a minimum credible deterrent that must be capable of massive retaliation in case of a nuclear attack by any adversary. This deterrent is aimed at preventing nuclear escalation of any conflict between two nuclear weapon states. Arighaat will strengthen this deterrence.

Challenges and opportunities in SSBNs like Arighaat, Arihant

The balance weighs heavily on the side of opportunity. If India can construct and operationalise SSBNs with such high indigenous content, it can build any kind of submarine from the nuclear stable. The gains of the enhanced indigenisation can also be utilised towards any future conventional submarine construction programme.

The experience gained by India's scientific community, the Navy, and industry is beyond measure. The spinoff in terms of creation of jobs and business is also immense. If India's nuclear submarine-building projects continue, they will prop up hundreds of industries, create several new ones, spur more innovation, and sustain the livelihoods of thousands of Indians.

Technical, operational, and training challenges will be aplenty, but these will work to the advantage of all stakeholders. They will foster even greater expertise, knowledge repositories, employment opportunities, and overall improvement in the defence-scientific-industrial complex.

https://indianexpress.com/article/explained/expert-explains-arighaat-nuclear-submarine-9542992/

Hindustan Times

Sun, 01 Sep 2024

Arighat commissioning revives debate over 'no first use' policy

India has just inducted its second indigenous nuclear ballistic missile submarine (SSBN), the INS Arighat. Unlike INS Arihant, India's first SSBN that served primarily as a technology demonstrator, the Arighat is a more advanced and operations-focused platform.

It has reportedly benefitted from the extensive testing and validation of the Arihant's systems, including its nuclear reactor, propulsion, and missile launch capabilities — all crucial aspects in developing SSBNs.

In core-capability terms, however, the INS Arihant and INS Arighat are quite similar. Both submarines weigh about 6,000 tonnes, are powered by an 83 MW pressurised water reactor, and are armed with K-15 nuclear ballistic missiles, which have a range of 750 km. Observers suggest that the anticipated expansion in deterrence capabilities will occur with the commissioning of the third SSBN, INS Aridhaman, expected next year.

This slightly larger, 7,000-tonne vessel will be equipped with K-4 submarine-launched ballistic missiles (SLBMs) with a striking range of 3,500 km. The Aridhaman will be followed by another advanced SSBN, the codenamed S-4, and another unnamed fifth SSBN to be armed with the 5,000-km range K-5 submarine-launched ballistic missile.

Expectedly, Arighat's commissioning has sparked speculation about a possible longrange patrol with nuclear ballistic missiles. It isn't clear yet if there are any plans to testfire the K-4 missile from the submarine, but this seems plausible, as the missile has only been tested from a submerged pontoon so far.

A missile test from Arighat would significantly bolster India's deterrence credibility. Even so, challenges remain. Targeting an SSBN in the deep ocean is difficult, as is maintaining effective communication with command authorities. Nuclear command and control on SSBNs is maintained through a system of controls involving de-mated missile systems and permissive action links — devices that prevent unauthorised arming and launching of nuclear weapons without the proper codes from the command authority.

The problem for India's strategic planners is that SSBNs communicate via very low-frequency systems, which limit the types of messages they can receive. It raises the possibility that the submarine could miss a code from the command authority to arm a missile and carry out a strike.

Even if it manages to overcome the communication challenge, it would take at least three SSBNs with long-range missiles to establish a credible sea-based deterrent. The 750-km range of the K-15 missile is insufficient to target key strategic areas in hostile countries.

Observers say a truly credible deterrence posture isn't achievable until the K4 missile is deployed on the Aridhaman and the larger, more capable platforms are commissioned. The delay in Arighat's commissioning should give Indian analysts pause. Launched in 2017, the submarine has taken over six years to be inducted into service. Even considering the lengthy timelines required for SSBN trials — including the time needed to test machinery, sensors, and command and control and communication systems — the delay is substantial.

Why, some wonder, is India investing in expanding its nuclear ballistic missile submarine capability when it should be focusing on conventional and nuclear attack submarines? The concern seems valid until one considers that India needs both warfighting submarines and SSBNs. While attack submarines (SSNs) are designed for warfighting, SSBNs are essential deterrence assets, providing India with a reliable second-strike capability in the event of a nuclear first-strike by an adversary.

The real impetus for India's expansion of its second-strike capability is, in fact, the significant growth of the Pakistani and Chinese navies in the Indian Ocean.

While Pakistan is set to acquire eight Chinese Type 039B Yuan-class submarines — with the first of the class launched in April this year — China's PLA Navy (PLAN) is focussing on two new classes of nuclear submarines: The Type 95 attack submarine and the Type 96 nuclear ballistic missile submarine. Worryingly, the power asymmetry between India and China remains stark — with the PLAN fast expanding its fleet to 60 submarines, including six SSBNs, six SSNs, and 48

diesel-electric submarines — while Pakistan continues to narrow the sea-power differential with India.

A related issue is India's nuclear doctrine. As competition in the Indian Ocean intensifies, there is an ongoing debate about whether India should reconsider its No First Use (NFU) policy. Critics argue that the boundaries between conventional and nuclear deterrence are increasingly blurred and that the three core tenets of India's nuclear doctrine — credible minimum deterrence, massive retaliation, and NFU — are no longer relevant.

They assert that India's commitment to NFU and "minimum deterrence" limits the size of its arsenal to a level insufficient for credible deterrence, especially as China and Pakistan continue to upgrade their arsenals.

India, however, is unlikely to alter its NFU and massive retaliation policy. Many within the country's security establishment believe that modifying the nuclear doctrine could have adverse implications.

Not only would abandoning NFU require substantial investments in financial and technological resources to make a 'first use' credible, but an aggressive nuclear stance could also trigger an arms race in the subcontinent and the wider Indo-Pacific region.

The commissioning of INS Arighat has brought this delicate issue back into focus.

https://www.hindustantimes.com/opinion/arighat-commissioning-revives-debate-over-no-first-use-policy-101725214320866.html

Hindustan Times

Sat, 31 Aug 2024

HAL inks key engine deal for multi-role helicopter

Bengaluru-based Hindustan Aeronautics Limited (HAL) on Friday signed a contract with SAFHAL Helicopter Engines for the joint design, development and production of a new engine called Aravalli for the future 13-tonne Indian multi-role helicopter (IMRH) and its deck-based version, the state-run aircraft maker announced.

SAFHAL is a joint venture between French firm Safran Helicopter Engines and HAL.

"The partnership with SAFHAL marks a pivotal moment in our journey towards achieving technological self-reliance in India's aerospace and defence sector," said HAL chief CB Ananthakrishnan, who retires on Saturday. The collaboration will not only ensure the operational capabilities of IMRH and 12.5-tonne DBMRH (deck-based MRH) platforms but also contribute to the broader goal of indigenous development of critical defence technologies, he said.

The helicopters could go into production with the new engine by 2031, HT has learnt.

They will be capable of carrying out a wide variety of missions, including transporting troops, conducting assault operations, air maintenance and anti-submarine warfare. “The engines will be designed to operate in diverse and challenging environments in which these helicopters will get deployed. Future extension to the civil market for offshore operations, utility, and VVIP transport is also planned followed by MRO (maintenance, repair and overhaul) activities,” HAL said.

IMRH is expected to compete with Russian Mi-17 choppers in both Indian and foreign markets. The platform could have a huge market as nearly 40 air forces across the world operate Mi-17 type helicopters.

“We are extremely proud to collaborate with HAL on this strategic project, capitalising on 25 years of successful partnership between Safran and HAL. With this project, we are enriching the collaboration with HAL as well as the strategic relationship between India and France,” said Safran Helicopter Engines CEO Cedric Goubet.

The combined expertise and resources of the two firms will ensure the success of the IMRH and DBMRH programmes, while contributing to the growth of India’s aerospace and defence sector, he added.

Under the contract, SAFHAL will work with its parent companies on cutting-edge engine technologies, ensuring superior performance, reliability, and operational efficiency. “This collaboration involves state-of-the-art design, advanced manufacturing processes and rigorous testing protocols to meet the highest global standards,” the HAL statement added.

https://epaper.hindustantimes.com/Home/ShareArticle?OrgId=318cf3f27aa&imageview=0

The Tribune

Mon, 02 Sep 2024

Army turns to 3-D tech for troops’ housing

To add facilities for troops in forward areas, the Indian Army is now using 3-D printing technology for making housing and liveable habitations at a faster speed. These are part of providing quality rations and habitat, infusion and absorption of technology, optimal utilisation of units, personnel, animals and equipment to ensure combat readiness.

Army sources said gradually, modern technology is being adopted to cut down on long construction time. The Indian Army also has plans to make all its 306 military stations free from garbage landfill sites. Also, 68 solar projects are being set up including one at Siachen base camp.

The Army has tied up with the Food Safety and Standards Authority of India (FSSAI) to explore its countrywide network to ensure delivery of quality rations to troops.

Sources said as part of technology upgrade, the last mile connectivity by using mules to send rations and small supplies would be done away with totally by 2025. All-terrain vehicles and

drones that can carry load up to 25 kg are being inducted. Sources said now, the soldier sitting atop a picket on Siachen Glacier could get supplies like fresh vegetables more often.

While doing away with animal transport, the Army will maintain dog squads for countering insurgency and in counter-terrorism operations. Besides German shepherds, Belgian Malinois and labradors, the Army's Remount and Veterinary Corps has inducted local breeds like Mudhol hound.

https://www.tribuneindia.com/news/india/army-turns-to-3-d-tech-for-troops-housing/

The Indian EXPRESS

Mon, 02 Sep 2024

Cargo drones to robotic mules: Last mile connectivity is focus before winter at LAC

From upgrading ways to enhance last mile connectivity, monitoring of provisioning of transport, supplies, fuel and lubricants and establishing additional joint logistics nodes, the Army has been working on strengthening its entire logistics network as Indian troops brace for the fifth consecutive winter along the Line of Actual Control (LAC) in eastern Ladakh where they have been in a standoff with Chinese troops since May 2020.

An Army source said that ahead of the onset of six months of harsh winter, steps are being taken: last mile connectivity in mountainous terrain is gradually transitioning from animal transport to trucks, all-terrain and rugged terrain vehicles, civil hired transport and heavy cargo drones for transporting ration, fuel, oil and supplies. "Logistics supplies have been stepped up to meet the troops' needs deployed. Additionally, the Army continues to monitor stock levels twice daily to ascertain their sufficiency and to see there are adequate reserves in instances of contingencies," the source said.

Towards strengthening connectivity to border areas and strengthening the combat potential of soldiers deployed there, the Army is also working on procuring and deploying exoskeleton suits — to enhance the load carrying and other combat capabilities of troops — as well as on robotic mules which are still at an experimental stage even as its designing and simulation has been done.

However, the source said with the animal transport units still playing a key cog in transporting supplies to forward areas — particularly during rough weather conditions and in areas where there are infrastructural gaps — it is unlikely they will be replaced fully in the foreseeable future with modern technologies though there has been some rightsizing.

While there has been a set mechanism in place for adequate provisioning of troops deployed in high altitude areas during winters when several such areas are cut off due to harsh weather conditions, what has made it different in the last five years is the scale of supplies needed for the thousands of additional troops who have been deployed in eastern Ladakh since 2020.

"Last mile in any battlefield is very crucial. Due to our ability to construct roads and tracks to forward areas, animal transport can be replaced to some extent as we continue to build robust order infrastructure… However, in cases of cloudbursts and flash floods and other uncertain weather conditions, animal transport would continue playing an important role," a source said.

On providing fresh and quality rations to troops deployed in high altitude conditions, Army sources said that while efforts are on to provide fresh milk, meat and vegetables to troops deployed in forward areas, given the major logistical challenges, tinned and dehydrated ration would continue to be the mainstay there.

Sources said the Army has tied up with the Food Safety and Standards Authority of India to explore its countrywide network in ensuring quality assurance of rations delivered to troops. The sources said that Joint Logistics Nodes have been successful in providing integrated logistics to all services with optimal resource utilisation and new locations have already been identified to set up more such nodes to enhance jointness in logistics.

To support troops in their combat roles with military dogs, the Army has been breeding, training and deploying local breeds like Mudhol hound, Chippiparai, Rajapalayam and also trying out Rampur Hounds, alongside German Shepherds, Belgian Malinois and Labradors.

"These dogs are trained as Assault Dogs, Guard Dogs, Tracker Dogs, Infantry Patrol Dogs, Explosive Detection Dogs, Mine Detection Dogs, Narcotics Detection Dogs, Avalanche Rescue Operations Dogs and Search and Rescue Operation Dogs," a source said, adding that there is also significant technology absorption to augment military dogs' efficacy during operations and training.

While modernisation of the Army is underway, optimisation of certain branches and corps is under the process, such as the Pioneer Corps and the Army Postal Corps. For instance, three units of the Pioneer Corps have already been reduced and the manpower under Army Postal Corps has been brought down to 3,200 from 7,500 in the last eight years. "The infrastructure development work has to keep pace with the planned optimisation process," the source said. Source said the data and experience gained in increasingly adopting and operating green fuel by the Army would further help adopting latest fuel technologies in military trucks and combat vehicles across rugged terrain.

https://indianexpress.com/article/india/supplies-to-troops-in-ladakh-cargo-drones-to-robotic-mules-last-mile-connectivity-is-focus-before-winter-at-lac-9545328/

The Tribune

Sun, 01 Sep 2024

Hi-tech robots inducted into Army

Unmanned robots looking like steel-made 'dogs' have been inducted into the Army. They can carry high-resolution surveillance equipment, transport light loads, small arms, sensors and even have thermal imaging camera that provide images in the dark.

Ideally, the robots, which can even climb stairs, will be sent in ahead of troops if a terrorist hideout has to be raided. The robots are connected to the nearest base unit to provide real-time imagery. The Army has named these robots as MULES — Multi-Utility Legged Equipment.

The first lot of 25 arrived in June, following which the Army laid down the standard operating procedures for using these robots. These has been sent to front line units and are functional, sources said. The Army had placed an order for 100 such robots in September last year under an emergency procurement scheme. They can be equipped with small arms, allowing for actual encounter to be done while the troops could be at a safe distance. The robots can even carry small supplies to soldiers stationed in frontline positions.

China already has integrated similar robots into its military operations, unveiling gun-toting robots earlier this year. During an exercise with Cambodia, China demonstrated two versions of these robots: one weighing 50 kg and equipped with an assault rifle, and a lighter 15 kg model for reconnaissance missions.

The Indian Army is making a shift to include more and more technology in its operations. The year 2024 has been declared “year of technology absorption” to focus on adopting new technologies to stay ahead of adversaries.

https://www.tribuneindia.com/news/hi-tech-robots-inducted-into-army/

THE ECONOMIC TIMES

Fri, 30 Aug 2024

Indian Army on a fast track to modernisation: A year of change and the road ahead

The Indian Army is undergoing a significant transformation aimed at modernizing its systems, processes, and overall operational effectiveness. This comprehensive initiative, spanning the past year and continuing into the present, highlights the Army's commitment to staying ahead in a rapidly evolving technological landscape and addressing emerging strategic challenges.

Key Advancements in DigitalInitiatives

As part of the transformation, the Indian Army has made substantial progress in enhancing its digital capabilities. By transitioning from intuitive decisionmaking to a data-driven, objective approach, the Army has significantly improved its operational efficiency. This shift has been particularly impactful in upgrading the Army's surveillance architecture at both operational and strategic levels.

The improvements have streamlined the Observe, Orient, Decide, Act (OODA) loop, allowing for faster and more pragmatic decision-making. In his remarks, General Upendra Dwivedi, the Chief of Army Staff, emphasized the importance of these changes, stating, "The expedited Process of Emergency Procurement (EP) had further enabled the induction of crucial operational equipment,

particularly along the Northern front, in a timely manner." This focus on timely and efficient resource allocation is a testament to the Army's commitment to maintaining a high level of readiness.

Overhauling Military Training Programs

A significant component of the Army's modernization efforts is the revamping of its Professional Military Training programs. Recognizing the need to stay abreast of contemporary warfare, the Army has eliminated over 50 outdated courses, replacing them with training focused on modern technologies such as Drone Warfare, Electronic Warfare, and Multi-Domain Operations (MDO).

This strategic shift ensures that the Indian Army remains equipped with the skills and knowledge necessary to face future challenges.

Logistics Enhancements and Sustainability Initiatives

The logistics domain, a critical pillar of military operations, has also seen considerable advancements. The Army's involvement in the PM Gati Shakti National Master Plan has been instrumental in integrating 103 dual-use proposals, which not only enhance national infrastructure but also realign over 5,000 personnel to their primary tasks.

This realignment has significantly bolstered operational efficiency. In terms of sustainability, the Indian Army has introduced e-Office, an office automation tool designed to reduce paper usage and promote green practices. Inter-Directorate and Inter-Command e-Office competitions are being held to encourage eco-friendly environments and further digitization efforts across the force.

Financial Management and Capital Expenditure

The Army's focus on financial efficiency is reflected in its improved management of the Capital budget. In the previous fiscal year, the Army successfully finalized 78 Capital contracts worth ₹22,000 crore. This achievement underscores the Army's ability to effectively utilize resources forcritical operational needs. The expedited Process of Emergency Procurement (EP) has also played a crucial role in the timely induction of essential operational equipment, particularly along the Northern front.

General Upendra Dwivedi highlighted the importance of these financial management efforts, stating, "His clear directive to all stakeholders is to ensure that the Army's systems, processes, and functions become enabling tools for the Indian Army's Vision 2047."

Vision 2047: A Strategic Roadmap

The Indian Army's Vision 2047 is a forward-looking initiative aimed at transforming the force into a modern, agile, adaptive, technologically-enabled, and self-reliant entity. This vision focuses on ensuring the Army's capability to deter and win wars across the full spectrum of operations in a multi-domain environment, working in close coordination with other services. As the Army continues its transformation journey, these initiatives are expected to play a pivotal role in shaping its future.

The ongoing efforts to enhance operational efficiency, modernize training programs, and improve logistics underscore the Army's commitment to maintaining its status as a formidable force on the

global stage. The Indian Army's transformative measures are part of a broader strategy to address the evolving security environment. The emphasis on digitalization and operational efficiency aligns with global military trends, where datadriven decision-making and advanced surveillance systems are becoming increasingly critical.

The Army's focus on modern warfare technologies, such as Drone Warfare and Electronic Warfare, reflects the changing nature of conflicts, where technology plays a central role. Additionally, the Army's participation in national initiatives like the PM Gati Shakti National Master Plan highlights its role in not only defending the nation but also contributing to its infrastructure development.

This dual focus on defense and development is a key aspect of the Army's modernization efforts. The introduction of e-Office and other sustainability initiatives reflects the Army's commitment to environmental stewardship. As the Army moves towards greater digitization, it is also setting an example for other institutions to follow in reducing their environmental footprint.

https://economictimes.indiatimes.com/news/defence/indian-army-on-a-fast-track-to-modernisation-a-year-of-change-and-the-road-ahead/articleshow/112925843.cms

THE ECONOMIC TIMES

Sun, 01 Sep 2024

Explained: Balochistan's unrest & its consequences for India

As Pakistan faces a rise in terrorist attacks over the past few years, its troubled Balochistan province was hit this week by a series of assaults that have resulted in over 70 fatalities. The coordinated attacks, possibly the most extensive of their kind in recent history, were carried out by the separatist Baloch Liberation Army (BLA).

These events have once again highlighted the Baloch insurgency, driven by longstanding neglect and the exploitation of Balochistan's natural resources, revealing the province as a vulnerable point for Pakistan.

The attacks, which saw BLA targeting police stations and taking control of major highways, coincided with the death anniversary of Baloch leader Nawab Akbar Khan Bugti, who was killed 18 years ago in one of then president Pervez Musharraf's counter-insurgency operations. Bugti's death only highlighted the shortcomings of military action, as it failed to address the true needs and aspirations of the tribal population.

This lack of genuine engagement led to the rise of additional armed separatist groups, which now not only target Pakistani security forces and Chinese interests but also attack Punjabi and Sindhi migrant workers.

New dimensions?

There's no doubt that the attacks were on a newer scale and demonstrated the insurgents' growing audacity, their robust support network, and their increasing capability to operate with greater freedom.

According to former Indian high commissioner to Pakistan, Ajay Bisaria, targeting of Punjabi workers introduces a new ethnic dimension, signalling that the Baloch radicals are looking to provoke and challenge the primarily Punjabi army. Nearly half of those killed by the BLA in the latest escalation were Punjabi workers.

The Baloch people resent the influx of Punjabis who are seen as having benefited from economic opportunities arising in Balochistan at the expense of the Baloch people. This has fed into the insurgency against the Pakistan state and the anti-Punjabi sentiment that sustains it. The sentiment has its genesis in the traditional domination of the Punjabi elite in the civil bureaucracy and the composition of the Punjabi-dominated army, which lords over the province in the absence of any genuine political leadership or effort to address the local grievances.

For the average Baloch, who feels entitled to the province's natural resources and views himself as a victim of the federal government's biased policies, Punjabi workers represent state oppression, perpetrated by the predominantly Punjabi establishment. Extrajudicial killings, enforced disappearances, human rights abuses, and the establishment's unwillingness to engage with civil rights groups have further fueled this mistrust.

According to Bisaria, the latest episode also represents a security meltdown and possibly a coalescing of the Afghan/ Pashtun and Baloch insurgencies. TTP (Pakistan Taliban) and BLA are coordinating, if not colluding. Unsurprisingly, India is being accused of being involved in the latest and previous attacks," he says.

Islamabad has repeatedly blamed India for providing financial support to the secessionists and Iran of allowing them safe hideouts. India has officially maintained these allegations don't merit any serious consideration and that Pakistan must introspect its own support to terrorism.

Pakistan remains under attack from the TTP in the Khyber Pakhtunkhwa province and the army has been worried for the past few years about a developing nexus between Baloch separatists and the TTP in Balochistan, which is home to a sizeable Pashtun population as well. TTP has cheered attacks by Baloch militants, accused Pakistan army of carrying out massacres in Balochistan and said groups like BLA and TTP have a common enemy. BLA has been designated as a terrorist group by both the US and UK.

The China factor

Not surprisingly, China was quick to condemn the attacks, saying it's prepared to enhance counterterrorism and security cooperation with Pakistan to jointly uphold regional peace and security.

Pakistan's hopes of turning the resourcerich Balochistan, its largest and most backward province, into an economic and energy hub have hinged on the BRI's flagship $60 billion China Pakistan Economic Corridor (CPEC).

The CPEC projects, however, have been marred by violent insurgency. CPEC facilities, along with Chinese engineers and workers, have been targeted by the BLA and other insurgent groups that accuse China of arming Pakistan against Baloch separatists and of working with Islamabad to exploit the natural resources of the province, while aiding the marginalisation of the local people.

Pakistan PM Shehbaz Sharif accused the separatists of working to scuttle the CPEC in his remarks on the latest attacks. With the BLA displaying greater operational capacity in the form of multiple attacks across the province, the CPEC, including the centrepiece Gwadar port, will remain vulnerable to the threat of violence.

Pakistan’s options

Balochistan, which accounts for more than 40% of Pakistan's land mass but only 6% of the population, has a long history of political unrest, as insurgency seeking a separate Baloch state dates to the time of independence.

Economic oppression, anti-Punjabi sentiment, enforced disappearances, extrajudicial killings and the plain inacceptance of the idea of Baloch nationalism have all contributed to the insurgency that is now jostling with traditionally more high-profile issues like Pakistan's role in Afghanistan for international limelight.

In the interest of regional, particularly its own, stability, Pakistan must find a way to politically address the Baloch discontent, instead of subjugating the local population with its militarist approach. To begin with, it must look into their grievances, particularly exploitation of resources which remains a sensitive issue. Insurgency has been boosted by the perception among the local people that they are being denied benefits of the exploration of Balochistan's considerable mineral resources.

While the army for now remains formidable enough to prevent any potential Balkanisation of Pakistan, it must encourage the federal government to enter a meaningful dialogue with the Baloch nationalists to mitigate violence and look at ways to finding a long-term solution, despite the seemingly intractable nature of the conflict.

The Baloch people, with their distinct identity, have traditionally been seen as secular and it's in Pakistan's interest to ensure they don't work with groups like the TTP which are driven by extremist religious ideology. Pakistan also has to find a way to engage civil rights groups like the Baloch Yakjehti Committee that want to peacefully raise issues like enforced disappearances and extrajudicial killings.

Implication for India

Pakistan will continue to accuse India of funding the BLA. In the past, it has justified crackdown on the separatists by talking up their alleged links with the enemy".

India will closely monitor the Pakistan army's response to the escalating situation in Balochistan, especially as it seeks to prevent any disruption to the assembly elections in Jammu and Kashmir. Recent terrorist attacks in Jammu have prompted Prime Minister Narendra Modi to caution Pakistan against using terrorism or proxy warfare against India.

India contends that Pakistan needs to reflect on why there has been a rise in attacks in both Khyber Pakhtunkhwa and Balochistan since the Afghan Taliban's return to Kabul, a development Pakistan had anticipated would restore its strategic influence in Afghanistan.

https://economictimes.indiatimes.com/news/india/whats-behind-the-escalating-tensions-in-balochistan-what-it-means-for-india-pakistan-china-jammu-and-kashmir/articleshow/112963365.cms

FINANCIAL EXPRESS
Read to Lead

Mon, 02 Sep 2024

India's Army bolsters Border Defence with cutting-edge firing range amidst tension with China

In a strategic move to enhance its defensive capabilities along the contentious border with China, the Indian Army is in the final stages of acquiring a new field firing range in one of the northeastern states. This development comes on the heels of the decommissioning of a crucial firing range in Uttar Pradesh due to the establishment of an airport in Ayodhya, a situation that has necessitated an urgent shift in training locations.

Field firing ranges are indispensable for the Indian Army, serving as the backbone of its training programs. These ranges are critical for honing the skills of new recruits and ensuring that seasoned personnel remain battle-ready. The absence of a secure and functional firing range poses significant challenges to maintaining the operational readiness of the armed forces.

A senior Army official emphasized the need for the new range, citing safety concerns arising from the airport's presence in Ayodhya. "With the new airport operational, it is no longer safe to conduct maneuvers or artillery firing in that area. We are, therefore, at an advanced stage of acquiring a new field firing range in the northeastern region, close to the border with China. This will allow us to continue essential training exercises without compromising safety," the official stated.

The new range, once operational, will support the Army's training needs for deploying heavy weaponry, including tanks and infantry combat vehicles (ICVs). These maneuvers are crucial for preparing the Army to defend India's borders, particularly in the rugged and challenging terrains of the northeast. The acquisition is also seen as a strategic move to reinforce India's military presence along the border with China, where tensions have flared in recent years.

The necessity of relocating the firing range from Ayodhya highlights the delicate balance the Indian Army must strike between national development and military preparedness. The airport's construction, while a significant infrastructure project, inadvertently compromised the viability of the existing range, prompting the search for an alternative location.

The Army's forward-thinking approach is not limited to acquiring new ranges. In line with global trends and environmental considerations, the Indian Army is also pioneering the adoption of green

technologies within its operations. Electric buses are being introduced, with plans to induct electric cars, motorcycles, and buses into the fleet. Collaborations with Indian Oil Corporation Limited (IOCL) and the National Thermal Power Corporation (NTPC) are underway to establish green hydrogen plants and buses, particularly in high-altitude regions like Leh and Chushul.

Furthermore, the Army's focus on last-mile connectivity in mountainous terrain is evolving, with a gradual transition from traditional animal transport to more modern vehicles like all-terrain and rugged-terrain vehicles. The Remount and Veterinary Corps (RVC) continues to expand its use of military dogs, incorporating indigenous breeds such as Mudhol hounds and Rajapalayams, which are trained for a variety of roles, including explosive detection and search and rescue operations.

The Indian Army's efforts to enhance its training capabilities through the acquisition of a new field firing range and the adoption of cutting-edge technologies underscore its commitment to maintaining a robust defense posture in the face of evolving threats. As the Army continues to innovate, it ensures that its personnel are equipped with the skills and tools necessary to protect the nation's sovereignty and security.

https://www.financialexpress.com/business/defence-indias-army-bolsters-border-defence-with-cutting-edge-firing-range-amidst-tension-with-china-3598693/

The EurAsian Times

Sun, 01 Sep 2024

IAF Jaguars – Stealthier Than Raptors, Deadlier Than Most Other Fighters, Why Retiring Nuke-Capable Jets Is Not A Great Move

The Indian Air Force (IAF) reportedly plans to begin phasing out its Jaguar strike aircraft starting in 2027-2028, with the complete phase-out scheduled by 2035-2040. Considering the relentless depletion of the IAF's fighter inventory—due to delays in planned acquisitions and repeated timeline slippages in the Tejas Mk-1A program—the Jaguar phaseout could adversely affect the IAF's operational capability.

The Jaguar is a capable aircraft that packs a punch. It's unique in its ability to fly at low heights over a long range. At 200 ft outside AWACS coverage, a Jaguar is more stealthy than an F-22 raptor at higher altitudes.

Continuing Relevance

Jaguar has continued in service despite the IAF's doctrinal shift to high-altitude warfare, which relies on long-range precision-guided munition. One reason why the Jaguar has remained relevant is that the IAF has adopted the fighter for medium-altitude stand-off strikes. We will look at the Jaguar's medium altitude strike capability later in this narrative.

The ongoing conflict in Ukraine has emphasized the continued relevance of a fighter such as the Jaguar. The conflict has illustrated that low-level penetration of contested airspace by attack aircraft is far safer than medium-altitude penetration because of the widespread use of and increased capabilities of AD (Air Defence) systems.

Ukrainian MiG-29s, Su-24, Su-25, and Su-27 fighters invariably fly to their standoff weapon launch points at very low altitudes, below the adversary's radar horizon, to escape detection. Nearing the launch point, they zoom up, launch their weapons, and once again "hit the deck."

Russian Su-34 and Su-25 follow similar attack profiles. The Jaguar is optimized for such attack profiles.

DARIN Upgrades

Since its initial induction into the IAF in the early 1980s, the IAF, in partnership with HAL and DRDO, has continuously upgraded the Jaguar to improve its stand-off attack, strike range, and target acquisition capabilities. The upgrades, referred to as DARIN (Display Attack Ranging Inertial Navigation) upgrades, were done in three phases – DARIN-1, DARIN-2 and DARIN-3.

The upgrades involved integrating new mission computers and software, cockpit displays (SMDs, Engine, and Flight Instrumentation Systems), a Fire Control Radar, a Hybrid navigation system, and an Autopilot with advanced modes.

DARIN 3 Jaguars feature a fully functional glass cockpit and an AESA radar as the primary sensor. Their ability to detect air, surface, and sea targets has been enhanced manifolds.

The DARIN I upgrade introduced advanced navigation and attack systems, including a new inertial navigation system, HUD/WAC (Head-Up Display/Weapon Aiming Computer), and other avionics improvements.

The DARIN II upgrade gave the Jaguar an Indigenous Electronic Warfare Suite, which comprises advanced radar warning receivers like the Tarang Mk II, along with other countermeasures. DARIN II also involved improvements in the navigation and attack systems, making the Jaguars capable of operating in more challenging electronic warfare environments.

The DARIN III integrated the Israeli EL/M-2052 AESA (Active Electronically Scanned Array) radar, enhancing the aircraft's air-to-air and air-to-ground capabilities with features like multi-target tracking and frequency agility. The upgrade also featured a glass cockpit, an advanced mission computer, and a new Helmet-Mounted Display System (HMDS) for better situational awareness and target acquisition.

The DARIN III upgrade has been pivotal in preserving the Jaguar's relevance in modern aerial warfare. In addition to enhancing the aircraft's combat capabilities, the upgrade facilitates better integration into the IAF's network-centric warfare framework, resulting in more effective coordination with AWACS and ground-based air defense systems.

DARIN-3 Engine Upgrade

The DARIN-3 upgrade program was to include replacing the Jaguar Adour 811 engine (25 kN dry thrust, 37.5 kN with afterburners) with Honeywell F-125IN engines (27.7 kN dry thrust, 43.8 kN

with afterburners). However, the price tag for acquiring the US engines and having HAL swap them onto the Jaguars was assessed as prohibitive.

Limited DARIN-3 Inventory

Based on a news report that Israel's ELTA has been contracted to upgrade 58 Jaguars with AESA radars, it's clear that the DARIN-3 upgrade would be limited to 58 Jaguars. Most likely, these are airframes with operational life that extends to 2035 and beyond.

Improved Range

When the Jaguar was initially acquired, it had the plumbing for air-to-air refueling, but the capability was inhibited, most likely because the IAF didn't see the need for it and, in any case, had no aerial tankers in its inventory.

Inflight refueling on the Jaguar has since been restored as part of the upgrade process. The fighter variant features a retractable refueling probe, while the trainer has a non-retractable probe.

New Weapons

DARIN-3 avionics support the integration of advanced air-to-air missiles like ASRAAM and smart air-to-surface munitions such as the RAMPAGE, Maverick, and Harpoon missiles; Paveway precision-guided munition; Joint Standoff Weapon; and the DRDO-developed SAAW (Smart Anti-Airfield Weapon). The punch acquired by the Jaguar is now formidable.

The Elbit Systems-developed Rampage is a stand-off weapon with all-weather capabilities designed for deep penetration strikes. Powered by a solid propellant rocket motor, it has a range of 150–250 km, a flight altitude of 3,000–40,000 ft, and a top speed of Mach 1.6. The claimed CEP is 10 m.

SAAW is an analog of the Israeli Spice glide bomb. When released from 12.8 km height and flying at 0.9 M, it has a range of over 90 km. Its CEP is 7m when using a combination of inertial navigation and GPS + GAGAN. With an IIR seeker for terminal homing, the CEP reduces to 3m!

Other new weapons integrated include Textron CBU-105 "sensor fuzed" Smart Anti-tank Cluster Bomb and DRDO's 500-kg General Purpose Bomb.

Can The Jaguar Continue In Service Longer?

Clearly, the Jaguar is now a potent platform despite being somewhat underpowered. It could be retained in service longer than currently projected to prevent the unacceptable depletion of IAF fighter aircraft inventory. Indeed, that may well be the case!

However, longer service retention could only be achieved by reducing the aircraft's monthly flying hours. HAL locally manufactured 145 Jaguar fighters for the IAF. Based on a fatigue analysis, the IAF estimates that the initial lot of Jaguars could remain operational till 2030. Subsequently, manufactured fighters could remain operational from 2035 to 2040.

Service Life Extension

Extending the Jaguar's technical life is an option. The F-16 has undergone multiple Service Life Extension Programs (SLEP). The F-16 airframe's original design life was about 8,000 flight hours.

After fatigue testing and structural reinforcements, some variants (like the F-16C/D) have been cleared to fly up to 12,000 hours or more. This includes upgrades to the wing structure, fuselage, and bulkheads.

However, extending a fighter's airframe life is not a trivial task. It would pose a formidable challenge for an airframer like the HAL. HAL likely lacks the technical equipment for rigorous testing of airframe fatigue or the ability to manufacture airframe components that may need to be replaced/upgraded consequent to the testing. (HAL's local manufacture of Jaguar fighters was largely an assembly job.)

Engine Life Extension Upgrade

An equally important challenge in extending the Jaguar's airframe life would be the fact that the Adour Mk.811 engines that power the Jaguar are no longer in production. Also, the performance of existing engines has degraded due to loss of thrust.

However, HAL probably has more options with the Jaguar engine than the airframe. It's reported that the Honeywell F-125IN engine option is now off the table. However, HAL still has the option to replace the Adour 811 with an alternative engine from the Adour 811 family.

Rolls-Royce earlier offered its Adour Mk-821, which has a 90% commonality with the Adour Mk-951 turbofan fitted on BAE Systems/HAL Hawk Mk132, as an alternative with a 20% increase in thrust.

Later, for some reason, the BAE withdrew the offer. It's unlikely that BAE cannot be persuaded to change its stance. It may even be possible for HAL to power the Jaguar with a reheat variant of its underdevelopment HTFE-25 25-kN Thrust Class Engine.

Indigenous Technology Showcase

In many ways, the DARIN-3 Jaguar is an Indigenous capability showcase. DRDO and HAL have used the Jaguar platform to develop, test, and operationalize avionic capabilities critical to modern fighters.

The DARIN-3 upgrade also illustrates how the focus in modern aerial warfare has shifted from airframe capabilities to avionics and weapon systems capabilities. Airframe capabilities have maxed out, and avionics and weapon systems capabilities will likely never max out.

Continuously modernized, the Jaguar could remain relevant well beyond 2035. Extending airframe life and fitting a replacement engine could come within the capabilities of HAL with overseas vendor support. The economics of extending the service life of the aircraft would, of course, have to be weighed against the operational advantages.

https://www.eurasiantimes.com/iaf-jaguars-stealthier-than-raptors-deadlier/

The EurAsian Times

Sat, 30 Aug 2024

China Bets On 'Attack Helos' To Checkmate Indian Military; Report Says PLA Has Constructed 10 Helipads Near LAC

In the latest example of China intensifying its military infrastructure near the Indian border, Indian media reports, citing satellite images, claim that Beijing has constructed nearly a dozen of helipads close to the Line of Actual Control (LAC).

India Today reported the development, which indicates that these helipads are part of the Chinese military's strategic effort to enhance rapid troop deployment capabilities. The report claims that the Chinese military has established ten helipads in total, stretching across critical locations near the LAC.

These helipads, each measuring over 150 meters in length, are situated strategically opposite key Indian locations, including the Daulat Beg Oldie region. Capable of accommodating medium-lift helicopters like the Mi-17s, these helipads are poised to significantly boost China's operational capacity in the high-altitude regions.

The strategic positioning of these helipads—particularly in the vicinity of Depsang and Gogra—makes it clear that the focus is on improving rapid deployment and logistical support. The report noted that the People's Liberation Army (PLA) is directing its attention toward areas such as the Chip Chap sector of Patrol Point 13 and the Hot Springs and Gogra regions.

This infrastructure buildup signals a concerted effort to maintain a robust military presence and ensure swift response capabilities in these critical areas. The construction of helipads is part of a broader pattern of intensified Chinese military preparations. Alongside these new facilities, there are reports of expanded airbases and underground bunkers in the Aksai Chin region.

Additionally, the report further pointed out that the ongoing construction includes three more helipads in strategically significant locations: south of Aktagh (north of the Karakoram Pass); Kyrmgo Traggar, opposite Gogra Hot Springs and Kongka La; and Ge'gyai county, towards the headwaters of the Indus River. The enhancement of the infrastructure comes against the backdrop of increasingly strained relations between China and India.

The border standoff, which escalated following the violent clash in Galwan Valley in June 2020—resulting in the deaths of 20 Indian soldiers and many on the Chinese side—has led to a marked deterioration in bilateral relations. The current situation represents the lowest point in India-China relations over the past six decades.

China's Transport Helicopter Fleet

In light of the recent expansion of Chinese military infrastructure near the Line of Actual Control (LAC), including the establishment of new helipads, it is important to analyze the specific helicopters that could be deployed by the PLA.

The newly constructed helipads are directly linked to enhancing the operational capabilities of China's helicopter fleet, which is central to the PLA's military strategy. These helipads are designed to accommodate medium-lift helicopters, underscoring China's focus on boosting its transport and logistical capabilities. The PLA's helicopter fleet primarily consists of three models: the Z-8, the Mi-17, and the recently introduced Z-20.

The Mi-17, a Russian-designed helicopter adopted by China in the 1990s, serves as the backbone of the PLA's transport fleet. China turned to the Mi-17 after being denied further sales of the Sikorsky S-70C-2 following the Tiananmen Square protests.

With over 200 Mi-17s in service, this helicopter can carry more than 30 troops, lift approximately 3 tons, and be equipped with wings featuring hardpoints for missiles and rocket pods.

The Z-8, a licensed variant of the French Aérospatiale SA 321 Super Frelon, has been in service since the mid-1970s. This helicopter can carry up to 27 fully armed troops and features two side doors and a rear ramp for rapid deployment.

The newer Z-8L variant is slightly larger and can handle even heavier loads. Currently, around 100 Z-8s are operational within the PLA. The newest addition to China's transport helicopter fleet is the Z-20, which entered service in 2019. Based on the UH-60 Blackhawk design but with a reduced number of rotor blades, the Z-20 incorporates modern fly-by-wire technology and can transport 12 to 15 troops.

China has also developed an armed variant of the Z-20 helicopter. Although still limited in numbers, the Z-20s are expected to become more prevalent as production increases. These helicopters play a crucial role in supporting China's military operations and logistics, especially in high-altitude and rugged terrains like those near the LAC.

Attack Helicopter Fleet

In addition to the expansion of its transport helicopter capabilities, China's investment in attack helicopters significantly enhances its military prowess. China's latest models, such as the Z-10 and Z-19, are designed to deliver precision strikes and operate effectively in mountainous terrains similar to those found along the LAC.

The People's Liberation Army Ground Force (PLAA) has seen a substantial increase in its attack helicopter fleet over the past decade, with estimates suggesting that the total number of attack helicopters, including those from other services, far exceeds 500.

The Z-9, adopted in 1994, is the cornerstone of China's attack helicopter fleet. This model is a licensed variant of the French Eurocopter AS365 and represents China's initial foray into military attack helicopters. Over 200 Z-9s are in service. The helicopter is equipped with two small pylons that can carry up to eight anti-tank or air-to-air missiles or two pods for rockets or machine guns. A naval variant is also capable of carrying a torpedo.

The Z-10, which entered service around 2012, represents a significant advancement in China's attack helicopter capabilities. As China's first domestically developed attack helicopter, it represents a considerable upgrade over previous models. It is equipped with two small wings, each with two hardpoints, allowing it to carry up to 16 anti-tank or air-to-air missiles or four rocket

pods. It is reported that a single Z-10 can destroy up to six enemy tanks in one sortie, and a formation of four Z-10s could potentially "wipe out" three tank companies.

The newest addition to China's attack helicopter fleet is the Z-19, which combines elements of the Z-9 and Z-10. The Z-19 serves as a reconnaissance and light attack helicopter. It features a tandem-seat configuration similar to the Z-10 but retains the enclosed tail rotor design of the Z-9, which minimizes noise and vibrations.

Although it does not have a nose-mounted cannon, some recent models are fitted with millimeter-wave fire-control radars mounted in domes above their rotors, similar to those of the American AH-64D Apache Longbow.

https://www.eurasiantimes.com/chinas-nearly-dozen-helipads-very-close/

Science & Technology News

Press Information Bureau
Government of India

Ministry of Science & Technology

Fri, 30 Aug 2024

Novel nano polymers pave way for low-cost, efficient sensors

Novel electrochemical and optical sensors developed with the help of a new group of nano polymer materials called Metal-organic frameworks (MOF) and 2-dimensional (2D) materials, can be used for rapid and convenient detection of several health, food quality, and environmental parameters. They can pave the way for low-cost point of care devices for quick detection and screening of diseases such as anaemia, cancer and so on.

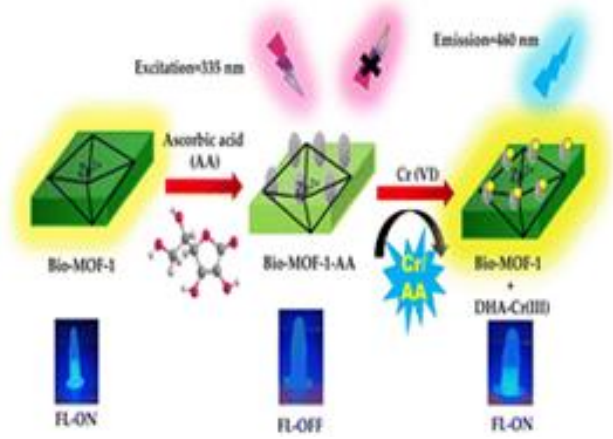
Recent decades have witnessed the advancements in several categories of nanomaterials for sensing applications. The MOFs and 2D materials possess several unique features that should project them as better alternatives as sensors, than other nanomaterials. Both MOFs and 2D class of materials are known for their large surface area, functionality, and optoelectronic properties. They also have a wide range of synthesis methods and can be developed into disposable electrodes, optical kits, fiber optic sensors, colorimetric strips, etc.

These excellent material features have been exploited to develop electrochemical and optical sensors for different analytes, such as bacteria, Aflatoxins, and heavy metals. Researchers of Institute of Nano Science and Technology (INST), Mohali, an autonomous institute of Department of Science and Technology, have developed a bunch of electrochemical and optical biosensors based on nano polymers multifunctional Metal-organic framework (MOF) and 2-dimensional (2D)

materials. MOFs are the multifunctional coordination polymers while MoS2 nanosheets, MXenes are some 2D materials that have emerged as materials of choice for sensors.

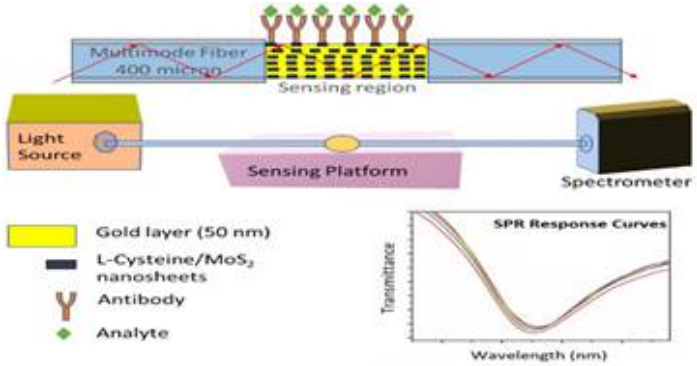
The researchers have utilized MOFs, 2D nanomaterials (e.g., MoS2, MXenes) and their composites. While these materials offer large surface areas, functionality, and desired transduction modes, their integration with biorecognition molecules was also robust and therefore resulted in reliable sensor performance. The results were published in the Elsevier Journals Food Control and Microchemical.

The application of MOFs, 2D materials and their composites allows greater sensitivity over many of the existing methods for the electrochemical and optical sensing of analytes. These materials offer multimode detection capabilities and hence some of the developed sensors have been demonstrated for simultaneous naked-eye based and fluorescence-based detections. The bioconjugation of biorecognition elements over the MOF and 2D materials-based interfaces was also characterised with a greater density to facilitate nano- to pico- molar level sensitivities. Besides, detection of diseases, the devices are also useful for analyzing food toxins such as Aflatoxins and Zearaloene in water, milk and staple food samples. Some of these sensors can be deployed as gas and heavy metal detection tools to monitor the environmental quality.



A simple nanoprobe to detect Cr(VI) in water and food samples. The nanoprobe is prepared with a MOF conjugated with ascorbic acid, whose fluorescence is turned-on in the presence of Cr(VI).

Screen-Printed electrode based electrochemical sensor for Aflatoxin B1. The electrode was modified by a composite of MOF and MXene, which were synthesized in lab. The sensor provides ppb level detection of Aflatoxin B1.



Sensing setup for the optical fiber based detection of Ferritin and IgG. The optical fiber was modified with a thin layer of gold followed by another nanolayer of L-cysteine modified MoS2. The SPR signal based sensor offers sensitive detection of Ferritin and IgG.

https://pib.gov.in/PressReleasePage.aspx?PRID=2050175

THE HINDU

Sun, 01 Sep 2024

IACS scientists discover a new target for cancer treatment

Using human breast cancer cells, a team of scientists at the Kolkata-based Indian Association for the Cultivation of Science (IACS) has discovered a new target for killing cancer cells, which can potentially lead to new therapies. This target is used by cancer cells to regulate DNA repair during cell division. Results of the study were published recently in The EMBO Journal.

The work sheds light on how cancer cells respond to topoisomerase 1-targeted chemotherapy, including how cancer cells sometimes develop resistance to treatment by using their intrinsic DNA repair toolbox. These insights could pave the way for precision medicine approaches for cancer patients.

Developing novel anti-cancer therapeutics may become possible through a combinatorial targeting of two key molecules — the CDK1 protein and the TDP1 enzyme. Present anti-cancer drugs — camptothecin, topotecan, and irinotecan — target a molecule (the enzyme topoisomerase 1 or Top1) involved in DNA metabolic processes like replication and transcription. The role of DNA topoisomerase 1 is critical for mitosis as it relaxes the DNA supercoil generated in the condensed chromosomes due to transcription.

“For the past decade at IACS, we have been investigating DNA repair pathways that provide resistance to camptothecin and its clinical derivatives,” says Dr. Benu Brata Das,

Professor at the School of Biological Sciences at IACS and the corresponding author of the paper. “Our goal is to uncover new methods to target and eliminate these pathways through targeted or personalised chemotherapy, especially in breast and ovarian cancer. We are currently using mouse models to test the combination drug therapies using in vivo tumours.”

Treatment strategies

Top1, an enzyme found in all higher organisms, plays a crucial role in maintaining the DNA structure during replication and transcription. Drugs that target Top1 disrupt its activity, leading to the death of many cells, including cancer cells.

However, cancer cells can activate repair mechanisms using a protein called TDP1, which counteracts the effect of the drug. Understanding the over-expression of various DNA repair proteins like Top1, TDP1 or CDK1 in cancers can provide critical insights into tumour biology.

These insights can help in diagnosing and predicting cancer outcomes and guide the development of targeted and personalised treatment strategies. Knowing these biomarkers is essential for advancing cancer therapy, understanding resistance mechanisms, and improving patient outcomes, says Dr. Das.

The researchers at IACS have identified a key DNA repair protein — TDP1 — which plays a role in repairing the DNA damage in cancer cells. Their study shows that cells switch their repair tools depending on the stage of the cell cycle and the presence of a drug called camptothecin that is used in chemotherapy.

They discovered that a specific change (phosphorylation) in TDP1 helps remove the TDP1 from the chromosomes during cell division. This finding is important because it helps explain how cells accurately divide and how problems in this process can lead to cancer.

The study suggests that targeting another protein (CDK1) can disrupt the Top1- mediated DNA damage-associated repair process, potentially killing cancer cells by causing chromosomal instability and stopping the cell division.

“We discover a new mechanism where we show CDK1 directly regulates TDP1 through chemical fine tuning to repair DNA breaks generated by camptothecin, during mitosis thus offering resistance to chemotherapy,” says Srijita Paul Chowdhuri, the first author of the paper.

Shows promise

CDK1 inhibitors — avotaciclib, alvocidib, roniciclib, riviciclib, and dinaciclib — are currently in various stages of clinical trials. These inhibitors can be used alone or in combination with other DNA-damaging agents.

Combining CDK1 inhibitors with Top1 inhibitors may have a powerful effect on cancer cells, the study finds. While Top1 inhibitors cause DNA damage, the CDK1 inhibitors prevent the repair of this damaged DNA or stop the cell cycle.

This combination makes it very hard for cancer cells to survive, and can enhance the overall effectiveness of the treatment by targeting different aspects of the cell cycle and DNA replication.

“Cancer cells often develop resistance to single-agent therapies through various mechanisms, such as improved DNA repair pathways or changes in the cell cycle regulation. By using both Top1 and CDK1 inhibitors together, this resistance can be overcome, making it less likely for cancer cells to evade treatment,” says Dr. Das.

“Since the rate of proliferation is higher in the case of cancer cells, there are higher chances of the combination drug being taken up by cancer cells,” says Dr. Das.

“The personalised approach of combinatorial chemotherapy will effectively kill cancer cells bypassing induced chemoresistance. More studies are needed to confirm the lab results,” he says.

Though the study was carried out in human breast cancer cells, the CDK1 inhibitors in combination with Top1 inhibitors can have additional benefits for patients suffering from other cancers, such as ovarian, colorectal, and small cell lung cancers (SCLC); small cell lung cancers are strongly associated with tobacco smoking.

https://www.thehindu.com/sci-tech/science/iacs-scientists-discover-a-new-target-for-cancer-treatment/article68559161.ece

THE ECONOMIC TIMES

Mon, 02 Sep 2024

Could Nasa’s DART mission create a man-made meteor shower? Here’s what you need to know

In the aftermath of Nasa's Double Asteroids Redirect Test (DART) mission, over two million pounds of space debris have been created, possibly resulting in a man-made meteor shower lasting up to a century.

This follows the mission's deliberate collision with the asteroid moonlet Dimorphos in September 2022 to test Earth's planetary defense system. The DART mission successfully deflected Dimorphos and significantly altered its shape.

"The entire shape of the asteroid has changed, from a relatively symmetrical object to a 'triaxial ellipsoid' — something more like an oblong watermelon," said Shantanu Naidu from Nasa's Jet Propulsion Laboratory.

A study by Cornell University suggests that fragments from the DART collision could potentially impact Earth and Mars within the next 10 to 30 years. Eloy Peña Asensio, a researcher at Italy's Polytechnic University of Milan, noted that these particles could intermittently reach Mars or Earth, producing visible meteors as they enter the Martian atmosphere.

Despite their visibility, these particles are expected to be small, ranging from grain-sized to smartphone-sized, posing no threat to Earth's surface.

The collision produced over two million pounds of rocky debris, some of which could travel at speeds of 1,118 miles per hour. Although it is unlikely that these fragments will reach Earth, if they do, "the resulting meteor shower would be easily identifiable… as it would not coincide with any known meteor showers," Asensio explained.

The meteors are predicted to move slowly, with peak activity expected in May and visibility primarily from the southern hemisphere near the Indus constellation. This potential meteor shower is unique due to its man-made origin, differing from traditional meteor showers.

The DART mission underscores the need for ongoing research into space debris and its long-term effects on Earth and other celestial bodies. Managing space debris is becoming increasingly important as space exploration advances.

The mission's success in testing planetary defense capabilities also paves the way for future research and exploration strategies to protect Earth from potential asteroid threats.

https://economictimes.indiatimes.com/news/science/could-nasas-dart-mission-create-a-man-made-meteor-shower-heres-what-you-need-to-know/articleshow/112980620.cms

The Indian EXPRESS

Fri, 30 Aug 2024

Chandrayaan-3 data shows sharp temperature difference just centimetres beneath moon's surface: Study

There is an extreme temperature difference of nearly 60 degree C between the surface of the moon and just 10 cm within it, according to a yet-to-be-published study based on data from the ChaSTE payload on Chandrayaan-3 lander. This extreme heat non-conductivity of the lunar surface can pave the way for temperature-controlled habitats under it, said a senior scientist from the Indian Space and Research Organisation (Isro).

Scientists are looking at whether the moon can serve as a base for deep space exploration and whether long-term habitation is possible on the Earth's satellite.

The Chandra's Surface Thermophysical Experiment (ChaSTE) experiment carried on the lander was like a thermometer that was wedged 10 cm into the lunar regolith — the lunar soil, rock chips, and mineral fragments that make up the top layer of the moon. The instrument had 10 sensors — each 1 cm apart — to measure the temperature at different levels within this layer.

"There are 10 sensors on it to measure the temperature at different depths for 10 days. We could see how the temperature was varying in different depths as the sun passed over the region," the Isro scientist said.

The lunar day is equivalent to 14 Earth days — the Chandrayaan-3 mission was scheduled such that all the experiments could conduct experiments for nearly the entire duration.

After 10 days, a live thermal conductivity test was carried out. "There was a heater placed on the eighth sensor at the depth of about 8 cm. We turned on the heater after ten days to see how the regolith conducts the heat. The heater was turned on for four hours, switched off, and then the decline in temperature was measured by the sensors. That gave us the first information about the actual thermal conductivity of the moon," the scientist said, adding that the paper is to be published soon.

The scientists said the experiment showed that the surface of the moon was completely non-conducting. "If it is non-conducting, I can use it as a thermal blanket for a human habitat. It's like

using a blanket during the winter nights — the temperature outside may be low, but if we make a habitat inside, any heat generated will remain trapped," the scientist said.

One of the challenges of lunar missions is the extreme temperature variance — ranging from 121 degree C during the day to -133 degree C during the night. In deep craters, temperatures as low as -246 degree C have also been recorded.

https://indianexpress.com/article/technology/science/chandrayaan-3-moon-data-temperature-9541093/

ThePrint

Sat, 31 Aug 2024

White hydrogen could solve the hydrogen industry's financial challenges

Faced with high costs, midstream transportation challenges, and the slow development of demand, the low-carbon hydrogen economy faces lowered expectations around its growth in the near term. Developers and consumers continue exploring alternative forms of low-carbon hydrogen, among them white hydrogen.

White hydrogen's superpower is that — unlike alternatives such as green or blue, which require inefficient conversion processes — it comes ready-made and at a much lower cost. With their exploration and development expertise, oil and gas companies are well-placed to become champions of this emerging low-carbon molecule.

The world needs low-carbon hydrogen to decarbonize. Some suggest that naturally occurring hydrogen could be a potential market disruptor — but, as a nascent industry only now beginning to gain ground, there are currently many questions surrounding white hydrogen and its potential.

Here are five of the most important questions about white hydrogen answered.

1. **What is white hydrogen?**

Like oil and gas, white hydrogen is naturally occurring. Generated by continuous geochemical reactions in hard rock, white hydrogen's characteristics differ from hydrocarbon molecules in that they are small and light and more likely to escape cap rocks.

More research is still required, with practical field experience and data collection needed to establish the key components of a hydrogen play.

2. **Why is white hydrogen generating interest right now?**

The world needs low-carbon hydrogen to decarbonize. Global low-carbon hydrogen demand is forecast to reach almost 200 Mtpa (million tonnes per annum) by 2050, up from 1 Mtpa today in WoodMac's base case, with green hydrogen supply meeting the bulk of this future demand.

Green hydrogen's production costs, though, remain stubbornly high, with a range as wide as US$6/kg to US$12/kg. This is driven by green hydrogen's need for high availability of renewable power for electrolysis. It will also depend for years on substantial subsidies to work towards a commercial threshold in the range of US$3/kg.

White hydrogen offers a much cheaper alternative resource. Without the need for inefficient energy conversion or manufacturing processes, white hydrogen produced at scale from reservoirs sited close to end-user markets could be delivered well below US$1/kg. The co-existence of helium may also offer a valuable commercial lever for white hydrogen exploitation.

3. **How significant an energy source could white hydrogen become?**

White hydrogen is not an energy transition panacea. Currently, WoodMac estimates that alternative forms of low-carbon hydrogen production — including methane pyrolysis, gasification and the extraction of naturally occurring white hydrogen — combined will form only a small portion of future supply.

This outlook may change in the coming decade if successful pilot projects prove technical and commercial feasibility and supportive policy frameworks are introduced. Based on prospective resource volumes, white hydrogen production could reach 17 Mtpa by 2050. Capturing similar levels of subsidy support to green hydrogen would also significantly boost infrastructure, displacing some higher-cost manufactured hydrogen production.

4. **Who is involved?**

The white hydrogen industry is truly nascent. A handful of innovators backed by private investment are leading the way in trying to understand the prospective resource. To date, the only operational white hydrogen project is the Bourakébougou field in Mali, which delivers electricity to a small village.

Globally, some countries are considering the opportunity to develop white hydrogen, enabling exploration-led activity through amendments to existing petroleum and mining codes. But regulating the unknown is never straightforward. In Europe, France has led the way in recognizing the potential of white hydrogen, modifying its mining code as a result, whereas the German government has announced it sees no extraction opportunity in naturally occurring hydrogen. Australia is a hotspot for exploration activity, an outcome of several regional governments adding it to the list of regulated substances and allocating budgets and grants.

5. **Can oil and gas companies lead the way?**

With significant work needed to gain a full technical understanding of how hydrogen molecules are generated and stored in the subsurface, petroleum industry techniques are critical to unlocking white hydrogen.

With their subsurface expertise, white hydrogen should hit the sweet spot for oil and gas companies. Given the right regulations and incentives, governments could enable exploration opportunities for these companies and kick-start the sector. Block licensing, exploration and appraisal drilling and fiscal terms could broadly mirror those for oil and gas.

Oil and gas companies also have the capital to drive white hydrogen forward, just as they are doing with carbon capture, utilization and storage. This could prove transformational, as even the most advanced white hydrogen projects being led by small privately backed startups still lack firm timeframes to Final Investment Decision and face significant obstacles.

Still unproven, white hydrogen has the potential to form part of the future portfolio of low-carbon molecules for some oil and gas companies, which will also include biomethane, e-methane, blue and green hydrogen and its derivatives. Indeed, white hydrogen would likely displace some blue and green developments. Technology, capital and regulation hold the key.

https://theprint.in/environment/white-hydrogen-could-solve-the-hydrogen-industrys-financial-challenges/2247228/

Mon, 02 Sep 2024

IITG, ISRO researchers detect weak polarisation in X-ray pulsar

Researchers from the Indian Institute of Technology, Guwahati (IITG) and the Indian Space Research Organisation (ISRO) have discovered that the polarisation of X-rays emitted by the first known galactic ultraluminous pulsar is significantly lower than expected.

The exotic stellar remnant is designated as Swift J0243.6+6124, with the research challenging conventional theories on the radiation emitted by such objects.

When a massive star runs out of fuel to sustain nuclear fusion, it collapses under the influence of its own gravity, with the material in the core compressed, transforming the protons and electrons into neutrons, and resulting in a neutron star.

If the mass of the core is between one and three times that of the Sun, then the outward pressure from the neutrons prevents the formation of a black hole, by allowing the core to collapse further.

These are incredibly dense, city-sized objects that contain as much mass as the Sun. Many neutron stars spin rapidly, with their polar jets acting as precise cosmic lighthouses, which are known as pulsars.

What are ultraluminous X-ray pulsars?

X-ray pulsars are a particular variety of neutron stars in binary systems, with a companion star orbiting a highly magnetised neutron star, emitting X-ray pulses.

Ultraluminous X-ray sources were believed to be elusive intermediate mass black holes from neighbouring galaxies, but are now believed to be pulsars. Swift J0243.6+6124 was discovered by NASA's Swift observatory, and was the first galactic ultraluminous X-ray pulsar identified.

The polarisation from the X-rays was only about three per cent the expected value.

A paper describing the findings has been published in The Astrophysical Journal Letters.

One of the study authors, Santabrata Das, said, “The discovery of lower polarization in the X-rays from Swift J0243.6+6124 is important because it makes us rethink how these stars work. Neutron stars in binary systems have very strong magnetic fields that direct matter from a nearby star to their poles. This process affects the X-rays we see because the magnetic field influences how the X-rays behave. The polarization of Xrays plays a big role in this. The unexpected low polarization means our current understanding of these magnetic fields and X-rays needs to be updated.”

https://www.news9live.com/science/iitg-isro-researchers-detect-weak-polarisation-in-x-ray-pulsar-2679128