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K-4 बैलिस्टिक मिसाइल का एक सप्ताह में दूसरी बार सफल परीक्षण, चीन और पाक आएंगे मिसाइल की जद में

भारत ने दुश्मन को हराने के लिए अपनी सामरिक क्षमता में विस्तार करते हुए शुक्रवार को दूसरी बार शक्तिशाली के-4 बैलिस्टिक मिसाइल का सफल परीक्षण किया है।

विशाखापट्टनम: भारत ने दुश्मन को हराने के लिए अपनी सामरिक क्षमता में विस्तार करते हुए शुक्रवार को दूसरी बार शक्तिशाली के-4 बैलिस्टिक मिसाइल का सफल परीक्षण किया है। आंध्र प्रदेश के समुद्री तट से दागी गई इस मिसाइल की रेंज 3,500 किलोमीटर है और यह पनडुब्बी से दुश्मन के ठिकानों को निशाना बनाने में सक्षम है। इससे पहले इसका परीक्षण रविवार को किया गया था।

सरकारी सूत्रों ने बताया कि मिसाइल का परीक्षण दिन के समय समुद्र में पानी के भीतर बने प्लेटफॉर्म से किया गया। इसका विकास रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) ने किया है। इसे अरिहंत श्रेणी की परमाणु क्षमता से संपन्न पनडुब्बियों में तैनात किया जाना है। परमाणु क्षमता से संपन्न पनडुब्बियों पर तैनाती से पहले भारत इस मिसाइल के अभी और परीक्षण करेगा।

भारतीय नौसेना के पास फिलहाल अरिहंत ही एक ऐसा परमाणु क्षमता वाला पोत है, जो परिचालन में है। के-4 उन दो अंडरवाटर मिसाइलों में से एक है, जिन्हें भारत नौसेना के लिए तैयार कर रहा है। दूसरी मिसाइल का नाम बीओ-5 है और उसकी रेंज 700 किलोमीटर है। परमाणु हमला करने में सक्षम इस मिसाइल की जद में पाकिस्तान, चीन एवं दक्षिण एशिया के कई देश आ गए हैं।

जानिए, क्या होती है बैलिस्टिक मिसाइल

तकनीकी दृष्टिकोण से बैलिस्टिक मिसाइल उस प्रक्षेपास्त्र को कहते हैं जिसका प्रक्षेपण पथ सब ऑर्बिटल बैलिस्टिक पथ होता है। इसका उपयोग किसी हथियार (नाभिकीय अस्त्र) को किसी पूर्व निर्धारित लक्ष्य पर दागने के लिए किया जाता है। यह मिसाइल प्रक्षेपण के प्रारंभिक स्तर पर ही गाइड की जाती है। इसके बाद का पथ आर्बिटल मैकेनिक के सिद्धांतों पर एवं बैलिस्टिक सिद्धांतों से निर्धारित होता है। अभी तक इसे रासायनिक रॉकेट इंजन से छोड़ा जाता था।

<https://www.jagran.com/news/national-for-second-time-in-last-six-days-india-today-successfully-test-fired-the-3-500-km-strike-range-k-4-submarine-launched-ballistic-missile-off-coast-of-vishakhapatnam-19967714.html>

India successfully test-fires K-4 submarine launched nuclear capable missile

The missile, developed by the DRDO, has a range of 3,500 km and it will be able to bring almost all parts of Pakistan and several areas of China within its reach, officials said. The missile was test-fired successfully for the second consecutive time in the last five days off the coast of Visakhapatnam, the officials said

New Delhi: India on Friday successfully test-fired the K-4 nuclear capable submarine-launched ballistic missile off the coast of Visakhapatnam for the second time in the past five days, in a major milestone to augment its strategic arsenal and delivery systems.

The missile, developed by the DRDO, has a range of 3,500 km and it will be able to bring almost all parts of Pakistan and several areas of China within its reach, officials said.

The missile is being developed for integration with India's Arihant class nuclear submarines.

The missile was test-fired successfully for the second consecutive time in the last five days off the coast of Visakhapatnam, the officials said.

It was test-fired from an underwater platform, they added.

India has been steadily enhancing its strategic weapons which included successful test-firing of nuclear-capable inter-continental ballistic missile Agni 5 with a range of over 5,000 km.

In November, India conducted successful night trial of 'Agni-II' surface-to-surface medium range nuclear capable missile with a strike range of 2000 km.

<https://economictimes.indiatimes.com/news/defence/india-successfully-test-fires-k-4-submarine-launched-nuclear-capable-missile/articleshow/73591070.cms>

Arihant's N-capable missile 'ready to roll'

By Rajat Pandit

New Delhi: India tested its nuclear capable K-4 submarine-launched ballistic missile (SLBM), designed to have a strike range of 3,500 km, for the second time in six days on Friday. The missile test, as the one conducted on January 19, was undertaken from an undersea platform in the shape of a submersible pontoon off the coast of Andhra Pradesh.

The solid-fuelled K-4 missile is being developed by DRDO to arm the country's nuclear-powered submarines in the shape of INS Arihant and its under-development sister vessels. INS Arihant, which became fully operational in November 2018 to complete India's nuclear triad, is currently armed with the much shorter K-15 missiles with a 750 km range.

"The K-4 is now virtually ready for its serial production to kick-off. The two tests have demonstrated its capability to emerge straight from underwater and undertake its parabolic trajectory," said a source.

India has the land-based Agni missiles, with the over 5,000-km Agni-V inter-continental ballistic missile now in the process of being inducted, and fighter jets jury-rigged to deliver nuclear weapons. But INS Arihant gives the country's deterrence posture much more credibility because nuclear-

powered submarines armed with nuclear-tipped missiles are considered the most secure, survivable and potent platforms for retaliatory strikes.

Once the K-4 missiles are inducted, they will help India narrow the gap with countries like the US, Russia and China, which have over 5,000-km range SLBMs. The K-4 missiles are to be followed by the K-5 and K-6 missiles in the 5,000-6,000 km range class.

The 6,000-tonne INS Arihant, which is propelled by an 83 MW pressurised light-water reactor at its core, in turn, is to be followed by INS Arighat, which was launched in 2017. The next generation of nuclear submarines, currently called S-4 and S-4*, will be much larger in size.

<https://timesofindia.indiatimes.com/india/india-successfully-test-fires-k-4-submarine-launched-missile/articleshow/73589861.cms>

hindustantimes

Mon, 27 Jan 2020

India plans 5,000-km range submarine launched ballistic missile

The 5,000km-range submarine-launched ballistic missile will carry the same K-series label and will cover all of Asia, parts of Africa, Europe and Indo-Pacific including South China Sea

By Shishir Gupta

New Delhi: With the K-4 submarine-launched ballistic missile completing the development stage and ready for induction, the Defence Research and Development Organisation (DRDO) has gone back to the drawing board to develop a 5,000km-range submarine-launched platform that matches the surface-to-surface Agni-V missile, according to senior officials.

The 5,000km-range submarine-launched ballistic missile will carry the same K-series label and will cover all of Asia, parts of Africa, Europe and Indo-Pacific including South China Sea, the officials added.

While the details remain classified and the DRDO tight-lipped, the officials said that after testing the 3,500km-range K-4 missile twice in one week, the weapon is now fully developed with fixed parameters and is ready to be inducted on INS Arihant class of nuclear submarines. The solid fuelled K-4 is a three-metre tall missile with accuracy within 100 metres of its over one tonne nuclear warhead. Both the tests were conducted using underwater pontoon off the coast of Vizag on India's eastern seaboard. At present, INS Arihant carries B-05 nuclear missile with a range of 750km, with the K-15 nomenclature being made redundant.



However, the DRDO focus is now on a 5,000km-range ballistic missile to join the elite club of US, Russia and Chinese nuclear submarines. According to officials, this missile will match Agni-V in range with a potent destruction capacity. India currently has no plans to develop any other longer-range missile as the 5,000km range will act as a deterrent to all its adversaries in Asia and beyond. "While we have the capacity to build a longer range nuclear missile of intercontinental range, the final decision lies with the government. And no such sanction has been either sought or approved," said a senior official.

<https://www.hindustantimes.com/india-news/india-plans-5-000-km-range-ballistic-missile/story-bystz09QSaHJwYvAtlbNeI.html>

DRDO flaunts anti-satellite weapon system

A-Sat missile 'Shakti', Dhanush artillery, Chinook , Apache copters make debut at Rajpath parade

By Sunil Thapliyal

New Delhi: Anti-satellite weapon “Shakti”, lethal artillery gun “Dhanush”, and newly-inducted helicopters Apache and Chinook were among the key military assets showcased by India for the first time at the Republic Day parade on Sunday. With space becoming a vital dimension of any country’s economic and military superiority, DRDO’s Anti-Satellite Weapon System which play a critical role in providing the necessary strategic deterrence was also displayed at the parade.

In March last year, the DRDO had launched “Mission Shakti”, India’s first A-SAT mission and demonstrated its anti-satellite technology. A live orbiting satellite in the Low Earth Orbit (LEO) was destroyed in a “Hit to Kill” mode with 10 centimetre accuracy, with the satellite and the missile approaching each other at a high speed of nearly 11 km per second.



Scaled down models of IAF’s Rafale aircraft and Indian Navy’s Kolkata-class stealth destroyer and a Kalvari-class submarine were also displayed during the ceremonial event. In the mechanised columns, three indigenously-developed battle tank T-90 Bhishma, three Ballaway Machine Pikate, three K-9 Vajra gun system, two transportable satellite terminal (TST) and two Akash surface-to-air-missiles, were also showcased.

The Apache and Chinook were among the main attractions as they flew across the clear blue sky, leaving the spectators spellbound. The helicopters, transport aircraft C-130J Super Hercules and C-17 Globemasters, drew loud cheers from people as they showed their aerial manoeuvres.

US-made Chinook, twin-engine, tandem rotor is a multi-role, vertical-lift platform, which is used for transporting troops, artillery, equipment and fuel. Four Chinooks were inducted into the IAF in March last year. Eight US-made Apache stealth attack helicopters were inducted into the IAF in September last year, significantly boosting the force’s firepower capability. The three Chinooks flew in ‘vic’ formation followed by the Apache, the latest attack helicopters of the Indian Air Force. Five Apache helicopters flew past the huge crowd in ‘arrowhead’ formation.

After Apache came the “Eye in the Sky- Netra” formation, comprising a single AEW&C flanked by two Su-30 MKIs. Thereafter, three C-17 Globemasters, in “displaced trail vic” formation called “Globe” formation flew past the dais, showcasing the IAF’s heavy lift capabilities. Besides Rafale, the IAF tableau also depicted scaled-down models four other systems recently added to its inventory — indigenously developed light combat aircraft Tejas, surface-to-air guided weapon Aakash missile and Astra missiles.

The Navy’s tableau also showcased model of country’s first indigenous aircraft carrier Vikrant with MiG-29K aircraft and depicted the force’s humanitarian assistance during the Maharashtra floods last year.

<https://www.asianage.com/india/all-india/270120/drdo-flaunts-anti-satellite-weapon-system.html>

R-Day celebrations: DRDO displays A-SAT weapon system

With space becoming a vital dimension of any country's economic and military superiority, A-SAT (Anti-Satellite) weapons play a critical role in providing the necessary strategic deterrence. In March last year, the DRDO launched 'Mission Shakti', India's first A-SAT mission and demonstrated its anti-satellite technology

New Delhi: The DRDO Anti-Satellite (A-SAT) Weapon System was on display at Rajpath in the Republic Day parade on Sunday.

With space becoming a vital dimension of any country's economic and military superiority, A-SAT (Anti-Satellite) weapons play a critical role in providing the necessary strategic deterrence.

In March last year, the Defence Research Development Organisation (DRDO) launched 'Mission Shakti', India's first A-SAT mission and demonstrated its anti-satellite technology.

A live orbiting satellite in the Low Earth Orbit (LEO) was destroyed in a "Hit to Kill" mode with 10 centimetre accuracy, with the satellite and the missile approaching each other at a high speed of nearly 11 km per second.

The covert technology of 'hit to kill', developed for the first time by India for such applications, enables it to destroy an enemy satellite by directly colliding with it with pin-point accuracy.

The successful demonstration has placed India at par with the elite club of three nations -- US, Russia and China -- that possess this capability.

<https://economictimes.indiatimes.com/news/defence/r-day-celebrations-drdo-displays-a-sat-weapon-system/printarticle/73629331.cms>

परेड में किया गया एंटी सेटेलाइट मिसाइल और एयर डिफेंस रडार का प्रदर्शन, दुनिया को दिखाई धमक

गणतंत्र दिवस पर राजपथ पर आयोजित परेड में इस बार डीआरडीओ की मिशन शक्ति की एंटी-सेटेलाइट मिसाइल और एयर डिफेंस टैक्टिकल कंट्रोल रडार का भी प्रदर्शन किया गया।

नई दिल्ली: 71वें गणतंत्र दिवस के मौके पर रविवार को राजपथ पर आयोजित परेड में इस बार डीआरडीओ की मिशन शक्ति की एंटी-सेटेलाइट मिसाइल और एयर डिफेंस टैक्टिकल कंट्रोल रडार का भी प्रदर्शन किया गया। बता दें कि इन दोनों ने ही भारत की रक्षा प्रणाली को मजबूत किया है। इसके बाद भारत उस खास क्लब का हिस्सा बन गया, जिसमें सिर्फ अमेरिका, चीन और रूस शामिल थे।

पिछले साल 27 मार्च को भारत ने एंटी सैटलाइट मिसाइल का सफल परीक्षण किया था। परीक्षण के दौरान इस मिसाइल ने पृथ्वी की सतह से 300 किलोमीटर की ऊंचाई पर स्थित 'लो अर्थ ऑर्बिट' पर अपने ही एक डीकमीशन हो चुके सैटलाइट को मार गिराया था। इस मिसाइल के सफल परीक्षण के साथ ही अमेरिका, रूस और चीन के बाद इस तरह की ताकत का प्रदर्शन करने वाला भारत चौथा देश बन गया था। पीएम नरेंद्र मोदी ने इस सफलता के लिए राष्ट्र के नाम देश के लोगों को संबोधित किया था।



कॉवर्ट टेक्नॉलॉजी को विकसित करने वाला पहला देश बना भारत

सेटेलाइट को 'हिट टू किल' मोड में 10 सेंटीमीटर की दूरी पर नष्ट किया गया। इस दौरान सेटेलाइट और मिसाइल 11 किलोमीटर प्रति सेकंड की रफ्तार से एक-दूसरे की तरफ बढ़ रहे थे। सटीक तरीके से दुश्मन के सेटलाइट को मार गिराने वाली इस कॉवर्ट टेक्नॉलॉजी को विकसित करने वाला पहला देश भारत बना। खास बात है कि डीआरडीओ DRDO ने इस पूरे सिस्टम को बनाने, डिजाइन करने, इंटीग्रेट और सफलतापूर्वक परीक्षण करने में सिर्फ 2 साल का समय लिया।

<https://www.jagran.com/news/national-r-day-celebrations-drdo-displays-a-sat-weapon-system-19972589.html>

Anti-drone tech used for first time to guard VVIPs at parade

Anti-drone weapons, including those indigenously manufactured by the Defence Research and Development Organization (DRDO), were deployed at Janpath to protect high-value targets at the parade

By Shishir Gupta

New Delhi: National security planners on Sunday deployed anti-drone weapons to secure VVIPs during the Republic Day parade - the first instance of India attempting to neutralise the growing threat from unmanned aerial vehicles (UAVs) -- according to people familiar with the matter.

While security agencies are tight-lipped on the details of its classified action, HT has learnt that anti-drone weapons, including those indigenously manufactured by the Defence Research and Development Organization (DRDO), were deployed at Janpath to protect high-value targets at the parade.



The decision to deploy anti-drone weapons was taken by Union home minister Amit Shah after intelligence agencies reported the possibility of terrorists using UAVs to target VVIPs in a bid to embarrass the Narendra Modi government on the global stage. Though India's anti-drone capability is limited, DRDO and security forces responded by setting up a platform.

DRDO uses electro-optical laser pulses and radars to track hostile drones, and then either jams the radio frequency between the machine and the operator or destroys UAVs using laser technology. Interestingly, the classified drone weapon was on the day DRDO showcased its anti-satellite weapon at the parade.

Indian security agencies are concerned about the growing threat from drones, with the Pakistani deep state using Chinese-made UAVs to deliver weapons payloads across the Punjab border and the Line of Control (LoC) in recent months.

At least four Chinese drones have been recovered by Punjab Police since August 2019. They were used to drop assault rifles, satellite phones, grenades and pistols to terror operatives in Punjab. Security officials said the same modus operandi is used to drop weapons in Jammu & Kashmir. They added that the threat is even more serious with China developing armed drones, which fire missiles to destroy high-value targets.

“Rather than sending a human across the LoC, drone provides a cheap and effective way to stockpile weapons in J&K by Pakistan-based jihadist groups. Even if the drone gets shot down, there is total deniability, and handlers don't have to pay huge sums of money to the family of the weapon courier if he gets killed by Indian security forces,” said a senior official who asked not to be named.

Meanwhile, the Bureau of Civil Aviation Security (BCAS) – in a high-level meeting of a committee under BCAS director general Rakesh Asthana last week -- finalised specifications for a system to counter rogue drones at Indian civilian airports. The specifications have now been sent to the civil aviation minister for approval.

<https://www.hindustantimes.com/india-news/anti-drone-tech-used-for-first-time-to-guard-vvips-at-parade/story-TiscnVEtoThdt9csDCqxVN.html>

DRDO to exhibit more than 500 products in defence expo

New Delhi: The Defence Research and Development Organisation (DRDO) has decided to exhibit more than 500 products from all technology clusters in the five-day mega Defence Expo 2020 in line with the event's theme "Digital Transformation of Defence".

"The display of various indigenously-developed military systems and technologies by DRDO will bring alive the spirit of self-reliance and national pride at the forthcoming DefExpo 2020," the DRDO said in a statement.

The 11th edition of the biennial expo will be held at Lucknow from February 5 to February 9.

The DRDO's participation is marked with the live demonstration of the Advanced Towed Artillery Gun System (ATAGS), the Main Battle Tank (MBT) Arjun MK IA, the Wheeled Armoured Platform (WhAP), the Counter Mine Flail, the 15m Advanced Composite Modular Bridging System (ACMBS) and modular bridge.

DRDO will showcase over 23 products in the India Pavilion at DefExpo, which has been set up to showcase the combined strength of DRDO, public and private sector in defence manufacturing.

Disclaimer: This story has not been edited by Outlook staff and is auto-generated from news agency feeds. Source: IANS

<https://www.outlookindia.com/newscroll/drdo-to-exhibit-more-than-500-products-in-defence-expo/1716970>



Mon, 27 Jan 2020

Tamil DRDO scientist honoured

The event was presided by President of Sastra Alumni Association Sridhar Gopalan

Chennai: The 2019 Sastra Distinguished Alumni Excellence Award was presented to S Pazhanikumar, a 1992 mechanical engineering graduate and a scientist at DRDO-CVRDE for his outstanding public service and contributing to India's defence.

The 2019 Sastra Distinguished Alumni Excellence award for Corporate Service was awarded to 1994 electrical engineering graduate SV Ramanan, CEO India and Asia, Intellect Design Arena.

Girish Mathroobotham, founder and CEO of Freshworks was presented the award for his exceptional entrepreneurial excellence.

All awards were presented in the Sastra Alumni Global meet in Chennai on Sunday. The event was presided by President of Sastra Alumni Association Sridhar Gopalan.

Corporate service award

The 2019 Sastra Distinguished Alumni Excellence award for Corporate Service was awarded to 1994 graduate SV Ramanan, CEO India and Asia, Intellect Design Arena.

<https://www.newindianexpress.com/states/tamil-nadu/2020/jan/27/tamil-drdo-scientist-honoured-2094933.html>



Indian Air Force Tejas vs Pakistan's JF-17 Thunder: Which One is the better home-made fighter jet

Here's how the Indian Air Force's Tejas LCA and Pakistan Air Force's JF-17 Thunder stack against each other

By Arjit Garg

In the early hours of February 26, 2019, 12 Indian Air Force Mirage-2000 fighter jets from Dassault Aviation, the French company who also manufactures the Rafale Medium Multi-Role Combat Aircrafts, entered Pakistani airspace and dropped 1,000-kg laser-guided bombs on Jaish-e-Mohammed terror launch pads across the Line of Control.

The very next day, Pakistan Air Force deployed its US sourced F-16 Falcon and Pakistan-China co-developed JF-17 Thunder fighter jets. Pakistan recently updated its homemade JF-17 Thunder to add more firepower to the jet that competes against the IAF's Tejas LCA.

Here's how the Indian Air Force's Tejas LCA and Pakistan Air Force's JF-17 Thunder stack against each other:

Tejas LCA

History

Tejas LCA: India has long borrowed its fighter jets from countries like Russia, France and Britain under a license agreement to manufacture it locally by Hindustan Aeronautics Limited. However, back in the 1980s, HAL started the Light Combat Aircraft (LCA) programme to replace the ageing Soviet sourced MiG-21. With India's former Prime Minister giving the LCA its name – Tejas – the indigenously built fighter aircraft was inducted in the Indian Air Force with the IAF placing a 20 jet order initially and the first Tejas Squadron was formed in 2016 called the Flying Daggers. Till now IAF has placed an order of 40 Tejas Mk 1, including 32 single-seat aircraft and eight twin-seat trainers. IAF has also initiated procurement of a further 83 single-seat fighters in Mk 1A configuration.

JF-17 Thunder: Pakistan has long been dependent on China, United States and Russia for their air firepower. In 1995, Pakistan and China signed a MoU for joint design and development of a new fighter. The same year, USSR's Mikoyan (known for MIG series of planes) had joined the project to provide "design support". The result was the JF-17 Thunder or CAC FC-1 Xiaolong that was primarily developed to meet the Pakistan Air Force's requirement for an affordable, modern, multi-role combat aircraft. The development of JF-17 was headed by Yang Wei, China's "ace designer" who has also designed China's Chengdu J-20. The fighter jet is made using 58% of the airframe from Pakistan and 42% from Chinese/Russian-origin. As of 2017 Pakistan Aeronautical Complex has manufactured 70 Block 1 type jets and 33 jets of the Block 2 type in the country for use by the Pakistan Air Force.

Specification

Tejas LCA: The HAL-made fighter jet is ideally a single seat fighter jet but can be made into a twin seat jet depending on armed forces' requirements, which is mostly for training purposes. The jet is light and simple as compared to other foreign-made fighter jets and is famous for its delta wing arrangement. It is powered by a single General Electric engine rated at 53.9 kN (12,100 lbf) thrust dry, 90 kN (20,200 lbf) with afterburner. It has a length of 13.2 metre and a wingspan of 8.2 metre. The plane weighs 6500 kg (dry) and has a total takeoff weight of 13000 kg. The Tejas has a maximum

speed of Mach 1.8 (2222 kmph) and can travel 500 km with drop tanks. The Tejas can carry laser guided bombs, air-to-air and air-to-surface missiles, anti-ship missiles, and has Israel's Elta EL/M-2032 multi-mode fire control radar on board.

JF-17 Thunder: The JF-17 Thunder is available in both single-seat and double seat configurations and is a single engine aircraft. It has a maximum high speed of Mach 1.6 (1975 kmph), a length of 14.93 metre and a wingspan of 9.48 metre. The plane weighs 6,586 kg (dry) and has a maximum takeoff weight of 12,383 kg. The Thunder uses a single Klimov RD-93 afterburning turbofan engine with digital electronic engine control (DEEC) and has a 49.4 kN (11,100 lbf) dry thrust and 85.3 kN (19,200 lbf) with afterburner. The JF-17 can carry air-to-air and air-to-surface missiles, laser guided bombs and also has a china-made Airborne Pulse Doppler Fire-Control Radar on-board.

Summary

The HAL Tejas is fully indigenous made fighter jet, while the JF-17 is a Pakistan-China jointly developed jet. The HAL Tejas is both faster, lighter than the JF-17 and has a more powerful engine too. The payload carrying capacity is more than the JF-17 too. The HAL Tejas is also modified to use for Naval forces and can take-off and do arrested landing on battleships, as recently demonstrated by HAL and Indian Navy.

<https://www.news18.com/news/auto/indian-air-force-tejas-vs-pakistans-jf-17-thunder-which-one-is-the-better-home-made-fighter-jet-2472105.html>

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THE PRICE OF PERFORMANCE

AFTER IT delivers all 100 K9 Vajra Self-Propelled Howitzers to the Indian Army by July, L&T's Armoured Systems Complex (ASC) in Hazira has no further orders. It was set up for around ₹200 crore to execute the ₹5,000 crore order won in 2015 with South Korea's Hanwha Techwin.

The ASC recently hosted Defence Minister Rajnath Singh where the firm rolled out its 51st howitzer. There are no large armoured vehicles contracts in the pipeline which the firm can



Defence Minister Rajnath Singh boarding a K9 Vajra.

bid for. A glimmer of hope exists for the ASC if the Army converts an existing order for 180 wheeled self-propelled howitzers into an additional order for 100 more tracked howitzers.

Larsen & Toubro, Mazagon Dock Shipbuilders Ltd set for submarine clash

The six Project 75I submarines will be built by one of the two chosen firms in collaboration with a foreign technology partner for around Rs 45,000 crore. L&T and MDL are the only two in-country submarine builders, which is why the MoD ejected newbies Adani Group and Reliance Defence

By Sandeep Unnithan

New Delhi: The Ministry of Defence's January 22 nomination of Larsen & Toubro (L&T) and the state-owned Mazagon Dock Shipbuilders Ltd (MDL), to build six conventional submarines has pitted the two Indian submarine builders in an exciting contest.

The six Project 75I submarines will be built by one of the two chosen firms in collaboration with a foreign technology partner for around Rs 45,000 crore. L&T and MDL are the only two in-country submarine builders, which is why the MoD ejected newbies Adani Group and Reliance Defence.



L&T has fabricated hulls for India's fleet of four 6,000-tonne Arihant class submarines, one of which is in service.

MDL is building six 1,800-tonne Scorpene class submarines, two of which are in service.

The P75I - being built by the two Indian yards in collaboration with a pool of five shortlisted foreign manufacturers - aims to build six new diesel-electric submarines equipped with Air Independent Propulsion (AIP).

What's next? The Navy is currently firming up detailed specifications for the subs.

Request for Proposals will be issued to the two firms by the middle of this year. Significantly, the MoD doesn't envisage any funds outgo on this project for at least two years - the contract will be placed on to the lowest bidding consortium only around 2022.

This suits the cash-strapped Navy which has had to cut back on its acquisitions after seeing a steep decline in its budgetary allocations. Who will the two shipyards tie-up with? The Defence Acquisition Council has shortlisted five foreign original equipment manufacturers - Navantia (Spain), Rubin Central Design Bureau (Russia), ThyssenKrupp Marine Systems (Germany), DSME (South Korea) and Naval Group (France).

Theoretically, both yards could even tie-up with the same foreign supplier, though this seems unlikely. MDL is already building Scorpenes with Naval Group which means the existing infrastructure will enable it to significantly reduce its bidding price. L&T has in the past indicated a partnership with Russia's Rubin.

If these legacy tie-ins materialise, it could see another interesting contest between two of India's strategic partners France and Russia.

<https://www.indiatoday.in/mail-today/story/larsen-toubro-mazagon-dock-shipbuilders-ltd-set-for-submarine-clash-1640401-2020-01-27>

China is expanding into the Indian Ocean—Here are five things the Indian Navy can do about it

Two emerging superpowers square off. Who wins?

By Sebastien Roblin

For decades, the Indian Navy has been the dominant regional power in the Indian Ocean, and has even boasted a carrier aviation capability that was nearly unique in Asia.

But as outlined in a report by the Center for New American Security (CNAS), the growth of Chinese military power in the last two decades has dramatically eclipsed India's own attempts to modernize and expand its forces—particularly in the maritime domain. This is problematic due to New Delhi's tense relations with Beijing since a 1962 border war.

While the vast majority of the People's Liberation Army Navy (PLAN) is naturally concentrated on the Pacific Ocean, in recent decades it has struck agreements giving it access to bases and ports in Bangladesh, Myanmar, Pakistan and Sri Lanka. It has also established a military base in. Together, these form a 'String of Pearls' designed to envelope India geographically. The PLA Navy has also increasingly dispatched ships on patrols of the Indian Ocean, including a nuclear-powered attack submarine that could be used to hunt India's new ballistic missile submarines.

While India still retains numerical superiority in the Indian Ocean today, China is laying the groundwork to rapidly expand its presence in the region if desired.

In the last two decades, the United States has keenly invested in a de facto alliance with India to counterbalance China's rise. However, as the CNAS report makes clear, budgetary limitations and deep flaws in procurement mean it's unrealistic to expect New Delhi to tackle the PLAN ship for ship and airplane for airplane.

While a companion article looks at how India can more efficiently secure its land border with China along the Himalayan Line of Actual Control, in this article we'll look at the CNAS report's recommendations on how the Indian Navy and Air Force can affordably continue to maintain a dominant posture in the Indian Ocean despite the growing power asymmetry with China.

Invest in More Affordable Submarines Instead of a Third Carrier

The PLA Navy is far larger than India's, but India can leverage one huge advantage in securing its regional waters: PLAN ships based in China can only efficiently transit into the Indian Ocean via the narrow chokepoints of the Strait of Malacca (adjacent Singapore, Malaysia, and Sumatra) or the Sunda Strait (between Sumatra and Java).

Thus, the CNAS study suggests that India's Navy should build a large force of twelve to eighteen individually less expensive short-range diesel-electric submarines that could interdict traffic through those straits without being vulnerable to China's formidable anti-ship missiles. In particular, they recommend adoption of air-independent propulsion submarines, which boast greater stealth and endurance than traditional diesel-electric submarines. New lithium-ion battery submarines may also appeal to India for similar reasons.

Additionally, a smaller force of new Indian nuclear-powered attack submarines capable of sustained, high-speed, long-range operations could sortie into the Pacific Ocean to impose additional risks, delays and costs on PLAN shipping.

To afford accelerated submarine construction, the study recommends cancelling plans to build a third, nuclear-powered aircraft carrier to follow India's second carrier *Vikrant*, due for commissioning

in the 2020s. Though potent weapons for projecting power against weaker adversaries, India's carriers would struggle to avoid detection and destruction by the heavy anti-ship firepower of the PLA Navy.

Enhance Maritime Domain Awareness

The Indian Navy must also consolidate its ability to track the movements of ships and submarines in nearby waters through procurement of more Intelligence, Surveillance and Reconnaissance (ISR) systems. India's deployment of P-8I Poseidon maritime patrol planes is a promising start on this mission.

However, the Indian Navy will require additional surveillance assets, including satellites and long-endurance drones—possibly such as the U.S. Navy's MQ-4C Triton or some domestic Indian equivalent.

Instituting intelligence-sharing with the United States and/or France could also solidify India's maritime domain awareness.

In the event of conflict, India will also need to investigate capabilities designed to protect its ISR assets from attack—as well as offensive electronic warfare, cyber or space capabilities that can threaten adversary ISR assets seeking to observe the Indian Ocean. As India has a large talent pool in adjacent civilian sectors, the CNAS study asserts India could develop such capabilities readily and affordably.

Arm for Asymmetric War at Sea

Besides diesel-electric submarines, the CNAS argues that India should invest in other relatively affordable anti-ship systems rather than attempt to build large surface combatants meant to go toe-to-toe with the PLAN's Type 055 destroyers in some (unlikely) twenty-first century Battle of Jutland.

In particular, cheap, expendable and heavily armed stealth drone warships (USVs) such as those the U.S. Navy is already procuring, long-range land-based anti-ship missile such as supersonic Brahmos cruise missile—which could even be fitted onto P-8 maritime patrol planes—could affordably increase India's anti-ship firepower in ways would be survivable and attritable, unlike fleets of larger, non-expendable warships that would be very indiscrete on radar.

Bolster Alliances

Since Indian prime minister Jawarharlal Nehru founded the Non-Aligned Movement during the Cold War, New Delhi has historically remained averse to close international alliances and their entangling obligations. It's engagement with the United States is on a limited scale by Washington's standards compared to other military partnerships, and New Delhi has avoided antagonizing Beijing on issues outside its immediate interests.

However, India could probably gain a lot through deepened cooperation even while stopping short of needlessly provoking China. Simply participating in more military exercises annually with the U.S. and other Asian countries could both increase the proficiency of Indian military formations and their ability interoperate with other countries.

India and the U.S. have yet to fully leverage a 2016 agreement to open military facilities to each other. It would be particularly convenient to “test the waters” of an expanded arrangement by allowing Indian P-8I based in Andaman and Nicobar islands and U.S. Navy P-8s based on the island of Diego Garcia to occasionally “swap” bases, thereby broadening their patrol circuits for mutual benefit.

Due to its island possessions of Reunion and Mayotte, France also has a significant maritime intelligence capability in the Indian Ocean. Paris and New Delhi could thus both mutually benefit from increased intelligence-sharing.

Other relationships could be profitably nurtured include those with Australia, Japan, The Philippines, and even Vietnam. Developing foreign allies in India's near-abroad could also be essential to boxing out further expansion of the String of Pearls.

Ultimately, the CNAS study concludes that by focusing on defensive strategy and adopting asymmetric capabilities, the Indian Navy can retain dominance of its maritime domain without having

to build a large fleet like China's. Yet such an approach might run counter to the desire for more "expeditionary" firepower that would come from an enlarged carrier force, as well as India's plans to expand its ballistic missile submarine force.

Of course, in the end it's up to politicians in New Delhi, not defense analysts in Washington, to determine what approach the Indian Navy will adopt to advance its interests.

<https://nationalinterest.org/blog/buzz/china-expanding-indian-ocean%E2%80%9494here-are-five-things-indian-navy-can-do-about-it-117106>

The Indian **EXPRESS**

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Explained: What is Vyommitra's space job?

Before India's first human spaceflight, a half-humanoid will travel solo to help determine if the trip is safe enough. How ISRO is preparing for the unmanned and manned trips, and where the half-humanoid fits in

By Johnson T A

Bengaluru: On Wednesday, Vyommitra, a "half-humanoid" being developed by the Indian Space Research Organisation (ISRO), announced herself in Bengaluru. She is the prototype for a half-humanoid that will eventually fly to space on an unmanned mission later this year, aiming to lay the ground for ISRO's manned mission Gaganyaan in 2022.

What is a half-humanoid?

A humanoid is basically a robot with the appearance of a human being. ISRO's Vyommitra (vyoma = space, mitra = friend) is also being called a half-humanoid since she will only have a head, two hands and a torso, and will not have lower limbs.

Like any robot, a humanoid's functions are determined by the computer systems to which it is connected. With the growth of artificial intelligence and robotics, humanoids are being increasingly used for repetitive jobs, such as that of a waiter at a restaurant. The artificial intelligence technologies that power modern systems such as autonomous cars, or voice-operated systems such as Alexa, Siri, Google Assistant, Cortana and Bixby, are extended in a humanoid to perform simple functions that include walking, moving things, communicating and obeying commands.

Why is ISRO developing a humanoid?

ISRO plans to send a human into space for the first time by 2022. It is racing against time to develop a crew module and rocket systems that will ensure the safe travel and return of the Indian astronaut. Other countries that have successfully launched humans into space did so after having used animals for conducting tests of their rockets and crew recovery systems, while ISRO will use the humanoid to test the efficacy of its GSLV Mk III rocket to transport a human to space and back. The humanoid is under development at a robotics laboratory at the Vikram Sarabhai Space Centre.

ISRO's GSLV Mk III rocket is currently undergoing improvisation to ensure that it is human-rated or, in other words, declared safe to transport a human being to space. Its first unmanned mission with the human-rated rocket is planned for December 2020. The crew module system, too, is under development, and ISRO will attempt to carry out several tests over the next few months to launch and recover the module using new test launch rockets, which too are under development.

ISRO has considerable experience in building robotic systems for its space projects. Artificial intelligence was at the core of the Vikram lander system used for the September 2019 Chandrayaan 2 mission to the Moon by assessing distances, speeds and processing commands stored in the lander systems (the lander made a failed attempt to descend to the surface from an orbit around the Moon).

Once flown into space, ISRO's half-humanoid will be able to test systems in the crew module meant for the survival and safe travel of the first Indian astronaut in 2022.

What are the tasks that Vyommitra will perform in space?

A central character in the science-fiction film *Interstellar* (2014), which is about space and time travel, is an artificial-intelligence -and-robotics-powered computer system called TARS, which talks to the astronauts, assists them in mission functions, and even rescues them in times of crisis. TARS was not a humanoid, but a robotic system with exceptional capabilities.

The Vyommitra humanoid, which will test the ground for the human spaceflight, will be a very basic version of a TARS-type, artificial-intelligence-and-robotics system. The activities that Vyommitra will be able to perform, once fully developed for the unmanned flight, will include procedures to use equipment on board the spacecraft's crew module such as safety mechanisms and switches, as well as receiving and acting on commands sent from ground stations. Attaining launch and orbital postures, responding to the environment, generating warnings, replacing carbon dioxide canisters, operating switches, monitoring of the crew module, receiving voice commands, responding via speech (bilingual) are the functions listed for the humanoid.

Vyommitra, whose human-like face has already been on display, will have lip movement synchronised to mimic speech. She can also double up as an artificial buddy to an astronaut — providing audio inputs on aspects like the health of the spacecraft during the launch, landing and orbital phases of the manned mission.

Vyommitra will also report back to Earth on the changes occurring in the crew module during the spaceflight and return, such as heat radiation levels, to enable ISRO to understand the safety levels required in the crew module that will eventually fly a human being.

Have other space missions used humanoids?

There have been many space missions featuring dummy astronauts. There have also been many featuring humanoid robots like Vyommitra. The most recent mission with a dummy astronaut was in March 2019, when a mannequin called Ripley was flown on the Dragon crew capsule, launched on a SpaceX Falcon rocket, and sent to the International Space Station. Ripley was fitted with sensors to measure forces that act during a space flight as part of SpaceX preparations to send a human into space in 2020 for NASA.

An artificial intelligence robot ball called CIMON (Crew Interactive Mobile Companion) was deployed on the ISS by Airbus. Int-ball, a floating camera robot, was deployed on the ISS by JAXA space agency.

Kirobo, a humanoid robot astronaut built in Japan, was flown to the ISS along with the first Japanese commander of the ISS, Koichi Wakata, to serve as the astronaut's assistant in conducting experiments on the space station. Kirobo was equipped with technologies such as speech recognition, facial recognition, language processing and telecommunication capabilities.

A Russian humanoid robot, Fedor, was sent to the ISS in 2019 to carry out mechanical functions on the space station.

<https://indianexpress.com/article/explained/vyommitra-space-job-half-humanoid-isro-6234069/>

Gaganyaan: Know ISRO's Vyomamitra, the half-humanoid going to space?

Read more about her here!

The Indian Space Research Organisation (ISRO) on Wednesday unveiled Vyomamitra, a prototype for the half-humanoid which will be sent to space.

Vyomamitra will be sent on the first test flight for Gaganyaan

Gaganyaan: The Indian Space Research Organisation (ISRO) on Wednesday unveiled Vyomamitra, a prototype for the half-humanoid which will be sent to space. Vyomamitra will be sent on the first test flight for Gaganyaan, the first manned mission of India, which has been slated for 2022. The first test flight is scheduled to take off in December 2020. A humanoid is a robot that looks like a human being. Vyomamitra is a half-humanoid because it only has a head, a torso and two arms and hands, but no legs.

ISRO is planning to send a human into space by 2022. Therefore, it is developing rocket systems and a crew module that can ensure that the astronaut is safe and can return. Other countries that launched humans into space had used animals to test their rockets and crew systems. However, ISRO will use the half-humanoid. Vyomamitra is being development at the Vikram Sarabhai Space Centre, a research arm of ISRO in Thiruvananthapuram.

ISRO's GSLV Mk III rocket, which will be used to launch humans into space, is being improved to ensure that it is safe to carry a human. For the first test flight in December 2020, the crew module system is also being developed. Over the course of the next few months, ISRO will carry out several tests to launch and recover the crew module.

Once in space, ISRO's Vyomamitra will be able to test whether the flight would be safe to carry and bring back the astronaut in 2022.

What functions will Vyomamitra perform in space?

Once fully developed, Vyommitra will be able to use equipment on board the spacecraft. This equipment include safety mechanisms and switches. She will also be able to receive and act on commands from ground stations. Other functions that Vyomamitra can perform include responding to the environment, attaining launch and orbital postures, generating warnings, monitoring the crew module, replacing carbon dioxide canisters, receiving voice commands, and responding via speech.

Vyommitra's lip movement has been synchronised to mimic speech and she can act as an artificial companion for the astronaut. She can also give inputs the spacecraft's health during the launch, landing and orbital phases.

Apart from this, Vyommitra will also report on the changes that take place in the crew module during the flight and while returning. These inputs would enable ISRO to ensure that the crew module is safe to fly a human astronaut.

<https://www.financialexpress.com/lifestyle/science/gaganyaan-know-isros-vyomamitra-the-half-humanoid-going-to-space-read-more-about-her-here/1835055/>

Gagannauts will go to space at 400km altitude, could communicate with International Space Station

By Surendra Singh

New Delhi: India's gagannauts will be sent to space at an altitude of 400km, the same height the International Space Station (ISS) orbits around the Earth.

There is a possibility that gagannauts, could be one or three, will be able to communicate with ISS astronauts when they are sent to space by December next year.

Talking to TOI, ISRO chairman K Sivan said, "A human-rated advanced GSLVMkIII carrying the human crew capsule will be sent to space. The capsule carrying the astronauts will be positioned around 400km altitude, where they will perform various experiments, including microgravity tests."



Coincidentally, the International Space Station (ISS), a joint project of five space agencies — Nasa (US), Roscosmos (Russia), CSA (Canada), JAXA (Japan) and ESA (Europe) — maintains an orbit at the same altitude of 400km by means of reboost manoeuvres and circles around the Earth 15 times daily. About the possibility of interaction between gagannauts and ISS, the ISRO chief did not rule out the possibility but said, "We have not thought on those lines and right now, we don't have the facility.

" For setting up a communication system with gagannauts, Sivan said, "A constellation of two geo satellites constituting the Indian Data Relay Satellite System will establish the space communication system that will help the space crew talk to the ground station. The first geo satellite will be launched before the first unmanned testflight. The second satellite before the second unmanned testflight (June 2021) next year." There is a possibility that this system could be used by gagannauts to establish a contact with the ISS.

On whether animals would be sent to space before humans, Sivan said, "only a 'Vyommitra' (lady robot) will be sent to space in the unmanned flights. No animals will be taken." The Vyommitra will help test various systems on board to ensure they are compatible for humans to travel to space without any safety hazard.

While spacesuit and other components like crew seats and windows for the Gaganyaan mission will be provided by Russia, France is likely to provide medicine kit and train Indian flight surgeons to enable them to monitor the health of astronauts. The 11-month astronaut training of four shortlisted IAF pilots in Russia is going to start by January-end. Thereafter, the astronauts will undergo mission-specific training on simulators back in India.

<https://timesofindia.indiatimes.com/india/gagannauts-will-go-to-space-at-400km-altitude-could-communicate-with-international-space-station/articleshow/73646543.cms>