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DRDO hands over technology of extreme cold weather clothing system ECWCS to five Indian companies

Three-layered ECWCS designed to provide thermal insulation between +15° to -50° Celsius

Secretary, Department of Defence R&D and Chairman Defence Research and Development Organisation (DRDO) Dr G Satheesh Reddy handed over technology for indigenous extreme cold weather clothing system (ECWS) to 05 Indian companies in New Delhi on December 27, 2021.

The extreme ECWS is required by Indian Army for its sustained operations in glacier and Himalayan peaks. The Army, till recently has been importing extreme cold weather clothing and several Special Clothing and Mountaineering Equipment (SCME) items for the troops deployed in high altitude regions.

The DRDO designed ECWCS is an ergonomically designed modular technical clothing with improved thermal insulation and physiological comfort based on the insulation required at various ambient climatic conditions in Himalayan regions during different levels of physical activity.

The ECWCS embodies physiological concepts related to reduction in respiratory heat and water loss, unhindered range of motions and rapid absorption of sweat while providing water proof, wind proof features with adequate breathability and enhanced insulation as well as strength features required for high altitude operations. The three layered ECWCS is designed to suitably provide thermal insulation over a temperature range of +15 to -50° Celsius with different combinations of the layers and intensity of physical work.

Considering the widely fluctuating weather conditions in the Himalayan peaks, the clothing provides an advantage of fewer combinations to meet the required insulation or IREQ for the prevailing climatic conditions, thereby providing a viable import alternative for the Indian Army. Speaking on the occasion, Dr G Satheesh Reddy emphasised on the need for developing indigenous industrial base for SCME items, not only to cater to the existing requirements of the Army but also to tap its potential for export.

https://pib.gov.in/PressReleasePage.aspx?PRID=1785810

पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Tue, 28 Dec 2021 3:55PM

डीआरडीओ ने पांच भारतीय कंपनियों को अत्यधिक ठंडी मौसम वस्त्र प्रणाली ईसीडब्ल्यूसीएस की तकनीक सौंपी

तीन स्तरों वाली यह ईसीडब्ल्यूसीएस प्रणाली को +15° से -50° सेल्सियस तापमान के बीच थर्मल इंसुलेशन प्रदान करने के लिए डिज़ाइन किया गया है

रक्षा अनुसंधान एवं विकास विभाग के सचिव और रक्षा अनुसंधान और विकास संगठन (डीआरडीओ) के अध्यक्ष डॉ. जी. सतीश रेड्डी ने 27 दिसंबर, 2021 को नई दिल्ली में पांच भारतीय कंपनियों को अत्यधिक ठंडी मौसम वस्त्र प्रणाली ईसीडब्ल्यूसीएस की तकनीक सौंपी है।

यह ईसीडब्ल्यूएस प्रणाली की ग्लेशियर और हिमालय की चोटियों में अपने निरंतर संचालन के लिए भारतीय सेना को जरूरत पड़ती है। अभी हाल तक सेना ईसीडब्ल्यूएस वस्त्र प्रणाली और अनेक विशेष कपड़ों और पर्वतारोहण उपकरण (एससीएमई) वस्तुओं का ऊंचाई वाले क्षेत्रों में तैनात सैनिकों के लिए आयात करती रही हैं।

डीआरडीओ द्वारा डिज़ाइन की गई ईसीडब्ल्यूसीएस प्रणाली शारीरिक गतिविधि के विभिन्न स्तरों के दौरान हिमालयी क्षेत्रों में विभिन्न परिवेशी जलवायु परिस्थितियों में अपेक्षित इन्सुलेशन पर आधारित बेहतर थर्मल इन्सुलेशन शारीरिक सहूलियत के साथ एक एर्गोनॉमिक रूप से डिज़ाइन की गई मॉड्यूलर तकनीकी कपड़ा प्रणाली है।

ईसीडब्ल्यूसीएस में सांस की गर्मी और पानी की कमी, गति की निर्बाध सीमा और पसीने को तेजी से सोखने से संबंधित शारीरिक अवधारणाओं सहित पर्याप्त सांस लेने की क्षमता और उन्नत इन्सुलेशन के साथ-साथ अधिक ऊंचाई वाले संचालन के लिए वाटर प्रूफ और गर्मी प्रूफ विशेषताएं उपलब्ध कराने की अवधारणाएं शामिल है। तीन स्तर वाली ईसीडब्ल्यूसीएस प्रणाली को विभिन्न संयोजनों और शारीरिक कार्य की तीव्रता के साथ +15 से -50 डिग्री सेल्सियस के तापमान रेंज में उपयुक्त रूप से थर्मल इन्सुलेशन उपलब्ध कराने के लिए डिजाइन किया गया है।

हिमालय की चोटियों में मौसम की स्थिति में व्यापक उतार-चढ़ाव को ध्यान में रखते हुए यह कपड़ा प्रणाली मौजूदा जलवायु परिस्थितियों के लिए आवश्यक इन्सुलेशन या आईआरईक्यू को पूरा करने के लिए कुछ संयोजनों का लाभ उपलब्ध कराती है जिससे भारतीय सेना के लिए एक व्यवहार्य आयात विकल्प उपलब्ध हो रहा है। इस अवसर पर डॉ. जी. सतीश रेड्डी ने न केवल सेना की मौजूदा जरूरतों को पूरा करने के लिए, बल्कि निर्यात के लिए अपनी क्षमता का लाभ उठाने के लिए भी एससीएमई वस्तुओं के लिए स्वदेशी औद्योगिक आधार विकसित करने की जरूरत पर जोर दिया है।

https://pib.gov.in/PressReleasePage.aspx?PRID=1785841

INDIA TODAY

Wed, 29 Dec 2021

DRDO shares tech with 5 firms for making extreme weather clothes for army jawans

The Defence Research and Development Organization (DRDO) has partnered with five companies to develop extreme weather clothing for army personnel.

By Abhishek Bhalla

New Delhi: The Defence Development and Research Organisation (DRDO) handed over technology for indigenous Extreme Cold Weather Clothing System (ECWCS) to five Indian companies in New Delhi on Monday.

DRDO hands over technology of extreme cold weather clothing system ECWCS to five Indian companies (Photo: Twitter)

The extreme ECWS is required by the Indian Army for its sustained operations in glaciers and Himalayan peaks.

The Indian Army, till recently, has been importing extreme cold weather clothing and several Special Clothing and Mountaineering Equipment (SCME) items for the troops deployed in high altitude regions.

The DRDO designed ECWCS is ergonomically designed modular technical clothing. It has improved thermal insulation and physiological comfort based on the insulation that is required in various ambient climatic conditions in Himalayan regions during different levels of physical activity.

(Photo: India Today)

The ECWCS embodies physiological concepts related to reduction in respiratory heat and water loss, unhindered range of motions and rapid absorption of sweat while providing waterproof, wind-proof features with adequate breathability and enhanced insulation, as well as strength features required for high altitude operations.

The three-layered ECWCS is designed to suitably provide thermal insulation over a temperature range of +15 to -50 degree Celsius with different combinations of layers and intensity of physical work.

Considering the widely fluctuating weather conditions in the Himalayan peaks, the clothing provides an advantage of fewer combinations to meet the required insulation or IREQ for the prevailing climatic conditions, thereby providing a viable import alternative for the Indian Army.

DRDO chief G Satheesh Reddy said there was a need to develop an indigenous industrial base for SCME items, not only to cater to the existing requirements of the Indian Army but also to tap its potential for export.

https://www.indiatoday.in/defence/story/drdo-shares-tech-with-5-firms-for-making-extreme-weather-clothes-for-army-jawans-1893352-2021-12-28

TIMESNOWNEWS.COM

Wed, 29 Dec 2021

Safer skies! DRDO to launch next gen anti-radiation missile soon

It is a tactical, air-launched missile that detects enemy radar positions and then, seeks and destroys them. This means that the missile, fired from an aircraft about 100 km from the target, will detect it, home on to it and destroy it.

By Srinjoy Chowdhury

New Delhi: The Defence Research and Development Organisation (DRDO) is preparing for the launch of the new next-generation anti-radiation missile (also known as Rudram) very shortly.

It is a tactical, air-launched missile that detects enemy radar positions and then, seeks and destroys them. This means that the missile, fired from an aircraft about 100 km from the target, will detect it, home on to it, and destroy it. The destruction of radar systems will blind the enemy making it easier for the Indian Air Force to attack other targets. The NGARM can be fired from IAF fighters like the Sukhoi-30 and the Mirage-2000. It is accurate and can track a radar system even if it is not operating.

The NGARM is yet another missile being readied. (Representative Pic) | Photo Credit: iStock Images

The NGARM is yet another missile being readied. While several launches have happened, today's launch, if successful, will then allow for its serial production, placing it in the arsenal of the armed forces. The launch comes in the wake of the recent successful launches of the strategic long-range Agni-P and the tactical surface to surface Pralay missiles.

https://www.timesnownews.com/india/article/safer-skies-drdo-to-launch-next-gen-anti-radiation-missile-soon/844258

Business Standard

Wed, 29 Dec 2021

Indian Air force clears Tejas Mark 2 design, production in 2023

The Deputy Chief of Air Staff (DCAS), Air Marshal Narmdeshwar Tiwari, accepted the comprehensive design review (CDR) of the LCA Mark 2

By Ajai Shukla

New Delhi: With the Indian Air Force (IAF) placing orders for 123 Tejas fighters and the Royal Malaysian Air Force (RMAF) also evaluating the nippy light fighter, the country's home-grown light combat aircraft (LCA) is evolving from its current, single-engine, Mark 1 avatar to a more sophisticated, twin-engine, fifth-generation fighter that can dominate the South Asian skies.

A major landmark in that evolution was passed on November 15, when the Deputy Chief of Air Staff (DCAS), Air Marshal Narmdeshwar Tiwari, accepted the comprehensive design review (CDR) of the LCA Mark 2.

A CDR is a multi-discipline, technical review that is a critical step in designing an aircraft. It involves examining the air frame design to ascertain that the aircraft is ready for fabrication and testing and it would achieve its stipulated performance within cost, schedule and risk.

The Indian Air Force's (IAF's) acceptance of the CDR clears the way for Hindustan Aeronautics Ltd (HAL) to start releasing drawings for fabricating the Mark 2's first prototype.

Alongside building the Mark 2 prototype, HAL and the Aeronautical Development Agency (ADA) – the Defence Research and Development Organisation (DRDO) agency that oversees the entire Tejas programme – must still resolve a few glitches that remain in the Mark 1 fighter; and also complete delivery of the IAF's order of 40 Mark 1 (two squadrons) and 83 Mark 1A (four squadrons).

During an exclusive visit to HAL's Tejas production line in Bengaluru, *Business Standard* was briefed in detail on the status of the indigenous fighter project. This includes the evolution of the Mark 1 and 1A into the Mark 2; simultaneous development of the navy's eponymous Twin-Engine Deck Based Fighter (TEDBF) for its aircraft carriers; design and development of the fifth-generation Advanced Medium Combat Aircraft (AMCA), and the development of the Combat Air Teaming System (CATS), a futuristic combination of manned-unmanned aircraft that is the future of air warfare.

The first two Mark 1 squadrons are already operational in Sulur, near Coimbatore. Each of them is authorized 20 fighters, including four twin-seat trainers. The trainers' specifications were finalised late, so they will be built along with the 16 trainers of the four Mark 1A squadrons.

The IAF has cleared the "final operational certification" (FOC) for the Mark I fighter, even though that involved granting 25 concessions – or performance shortfalls from the IAF's specified requirements. HAL, ADA and the IAF are working together to resolve these shortfalls.

Twelve issues have already been resolved, the most important one being: Equipping the Tejas to re-fuel in-flight, by day or night. In recent trials at Gwalior, the Tejas proved it could refuel into internal fuel tanks or external drop tanks, from IL-78 refuellers or from Sukhoi-30MKI acting as "buddy refuellers." This capability is operationally vital, since it effectively increases the range of the Tejas.

Another shortfall that has been resolved is the capability to monitor fuel levels in the Tejas through an integrated Environmental Control and Fuel Management (ECFM) system. This tells the pilot, via a smart multi-function display in the Tejas' glass cockpit, the fuel level in each of the tanks.

Also being proved is the firing of the Tejas Mark 1's Gasha 23 mm gun. The gun had been integrated onto the fighter, but live firing was pending. Now butt firing trials and air-to-air firing is being carried out in Nashik.

Waiting to be integrated onto the Tejas is the indigenous Astra air-to-air missile and Safran's Highly Agile Modular Munition Extended Range (HAMMER) air-to-ground bomb. Towards this, HAL does the mechanical and electrical integration, while the DRDO handles the software and the weapons algorithm.

The 13 shortfalls that still remain include fatigue tests to establish the fighter's service life span. These tests involve taking an aircraft from the production line and subjecting it to repetitive loading. All combat aircraft are initially released with a designated service life – 500 hours in the case of the LCA. As more and more hours are logged and the data accumulates, the manufacturer increases the designated lifespan proportionately. It takes about nine years of fatigue testing to establish 3,000 hours of service life of the aircraft.

While these capabilities are being tested on the Tejas Mark 1, the Mark 1A is being fitted with an active electronically scanned array (AESA) radar, an electronic warfare (EW) suite that includes a jammer, the Combined Interrogator and Transponder (CIT) – an IFF plus system – and a digital map generator.

The digital map generator, designed by HAL's MCSR&DC (Mission and Combat Systems R&D Centre), carries the complete map data of the country and neighbouring areas. Depending upon the Tejas' mission, it extracts the digitised map of the current mission area and transfers it to the pilots' display, where he can easily access it.

HAL is also integrating the Advanced Short Range Air-to-Air Missile (ASRAAM) onto the Mark 1A. The ASRAAM, which has a range of 60-70 kilometres was bought by the IAF from MBDA UK, for upgrading its Jaguar fighters. Now each Tejas too will carry two of these missiles on its outboard stations.

Another modification involves reshaping the cockpit floor to enable bigger pilots – with shoe size up to 10, which includes 95 per cent of all IAF pilots – to fit into the cockpit and fly the aircraft comfortably.

"The IAF has allotted HAL a Tejas Mark 1, numbered SP-25 (series production aircraft number 25), for integrating these modifications. We are almost through and will start flight testing in December. It will take about two years to complete flight testing, i.e., by end-2023," said HAL chairman, R Madhavan.

Meanwhile, flight-testing continues. The first Mark 1A is to be delivered in February 2024 with all modifications installed. Since the last Tejas Mark 1 is being completed in the same timeframe, the jigs, fixtures and assembly line used to build the Tejas Mark 1 will be diverted to building the Mark 1A.

https://www.business-standard.com/article/current-affairs/indian-air-force-clears-tejas-mark-2-design-production-in-2023-121122900035_1.html

DRDO on Twitter

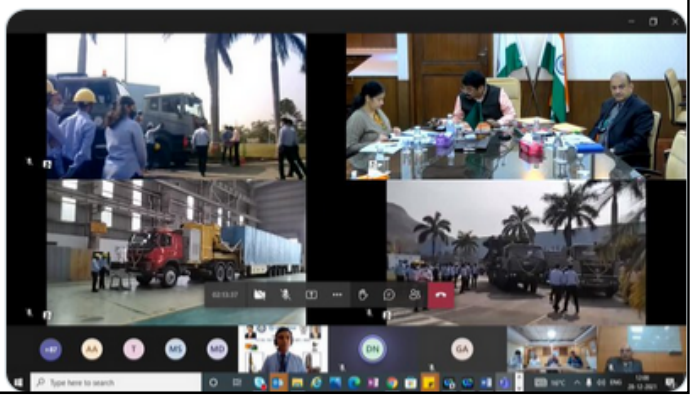
PRO Defence Pune @PRODefPune · 11h

Secretary, Department of Defence R&D and Chairman @DRDO_India Dr G Satheesh Reddy handed over technology for indigenous extreme cold weather clothing system to 05 Indian companies in New Delhi on December 27, 2021.
pib.gov.in/PressReleasePa...

@SpokespersonMoD
@PIBMumbai
@DDNewslive

DRDO @DRDO_India · 4h

Leveraging #AtmaNirbharDefence & #MakeinIndia, Mobile Launcher Systems (MLS), Short Span Bridging Systems (SSBS) & Transport-cum-Tilting vehicle (TCT) developed by DRDO & produced by industry partner flagged-off by Secretary DDR&D today. #SakshamBharat #AmritMahotsav



DRDO @DRDO_India · 5h

DRDO hands over technology of extreme cold weather clothing system ECWCS to five Indian companies. #LeadingInnovations #AmritMahotsav
pib.gov.in/PressReleseDet...

THE HINDU

Wed, 29 Dec 2021

Vice Admiral Puneet K. Bahl takes charge as Commandant of INA, Ezhimala, Kannur district

He has held an array of operational, staff and training assignments

Kanur: Vice Admiral Puneet K. Bahl has taken over as the Commandant of the Indian Naval Academy (INA), Ezhimala, Kannur district.

An alumnus of NDA Khadakwasla, the Flag Officer was commissioned into the Indian Navy on July 1, 1984. He passed Staff Course at DSSC, Wellington, and Naval Higher Command Course from the College of Naval Warfare, Mumbai.

(left) Rear Admiral A.N. Pramod, Deputy Commandant and Chief instructor of the Indian Naval Academy, handing over the baton to Vice Admiral Puneet K. Bahl, Commandant, INA, Ezhimala | Photo Credit: Special Arrangement

An experienced maritime reconnaissance pilot, he has flown six different types of aircraft. His operational experience includes active participation in Operation Tasha and Operation Vijay. He is also a qualified ship's diver. He has held an array of operational, staff and training assignments.

He has had tenures at *INS Garuda*, *INS Rajali*, AFS Yelahanka and CGAS 700 while on flying duties and ship tenures onboard *INS Vikrant* and at Betwa, Godavari, Sujata and Porbandar. His training and staff assignments include tenures as directing staff at DSSC, Wellington, and JDNAS (aviation plans) at the Naval Headquarters where he successfully steered cases for aircraft inductions and drafted the Naval Aviation Perspective and Infrastructure plans.

Command tenures

His command tenures include the guided missile frigate *INS Betwa*, *INS Sujata* and INS Rajali, one of the premier strategic airbases of the country. While in command of INS Rajali, he successfully oversaw the smooth induction and operationalisation of the P8I aircraft from the base, which was awarded the Unit Citation by the Chief of the Naval Staff during his tenure.

He was also based at the Embassy of India in Tokyo from 2007-10 as the Defence Attache, Japan, with concurrent accreditation to the Republic of Korea where he was instrumental in coordinating and facilitating a landmark joint declaration on security cooperation between India and Japan and also for drawing up an action plan for furthering defence and security cooperation between the two countries.

Post elevation to the flag rank in January 2015, he has held the appointments of Assistant Chiefs of Integrated Defence Staff (ACIDS) (WSOI) at New Delhi, Flag Officer Commanding Goa Naval Area and Flag Officer Naval Aviation at Goa, Flag Officer Commanding Maharashtra Naval Area at Mumbai, Chief Staff Officer (Training), HQSNC, and Chief Instructor (Navy), DSSC, Wellington. On promotion to the rank of Vice Admiral on January 1, 2021, he took over as the Director General, Project Seabird.

The Flag Officer was awarded Ati Vishisht Seva Medal in 2020, Vishisht Seva Medal in 2015, Commendation by the Chief of the Naval Staff in 2005 and the Lentaigne Medal at DSSC, Wellington, in 1998.

https://www.thehindu.com/news/national/kerala/vice-admiral-puneet-k-bahl-takes-charge-as-commandant-of-ina-ezhimala-kanur-district/article38055742.ece

THE DIPLOMAT
Read The Diplomat, Know the Asia-Pacific

Wed, 29 Dec 2021

How does China aim to use AI in Warfare?

AI in particular is seen as a "game-changing" critical strategic technology.

By Yuan-Chou Jing

Having observed U.S. theater operations and war campaigns for more than three decades, the leaders of the People's Liberation Army (PLA) are keenly aware of the huge disparity between its capabilities and those of the U.S. military in information and communication technology (ICT), and the gap seems unlikely to be eliminated in the near future.

Credit: Depositphotos

Aside from ICT, cutting-edge technologies, also called disruptive technology, including artificial intelligence (AI), quantum, big data, cloud computing and the Internet of Things are all becoming relevant to the military domain. AI in particular is seen as a "game-changing" critical strategic technology; increased machine speed and processing power are expected to be applied to military planning, operational command and decision support as part of the "intelligentization" of warfare.

AI is most meaningful to the PLA as it provides an opportunity for Beijing to compete with Washington on an even footing to develop an emerging technology. China's AI policy was first described in "The Development Plan on the New Generation of Artificial Intelligence," issued by the State Council in 2017, the plan named using military-civilian fusion (MCF) as one of the "Main Duties" for AI development. MCF is being used as an approach to develop AI on the basis of China's belief that it can accomplish "corner-overtaking" to surpass the United States.

As Xi Jinping outlined in his work report to the 19th Party Congress in October 2017, the PLA must "accelerate the development of military intelligentization, [and] improve joint operations capabilities and all-domain combat capabilities based on network information systems" to fulfill China's military development aims. The remark reflects Xi's determination to elevate the concept of intelligentization as a guideline for future Chinese military modernization.

Echoing this, a 2019 defense white paper called attention to the changing landscape of modern warfare, stating that "the evolution of warfare nowadays is opening up toward an informationized mode, indicating a horizon of intelligentized warfare on the rise." Meanwhile, in line with the Third Offset Strategy, the U.S. subsequently opts for AI to develop brand-new battle modes such as swarm and centaur. Beijing is certainly aware of these U.S. strategic moves, the 2019 defense white paper also expressed its vivid concern that "U.S. is engaging in technological and institutional innovation in pursuit of absolute military superiority."

The PLA's Views on Intelligentized Warfare

In an article published after the Fifth Plenary Session of the 19th Central Committee of the Communist Party of China, Xu Qiliang, vice-chairman of the Central Military Commission, noted that as the PLA has entered the era of intelligentization, it must promote the integrated development of the "three modernizations" of mechanization, informatization, and intelligentization. Xu also emphasized the need for China to "broaden strategic thinking and

accelerate the transition from adapting to the way of operations passively to designing it proactively." Xu's statements show that China aims to use disruptive technology to conceptualize and win a new type of warfare.

Chinese military thinkers believe that under conditions of informatized warfare, dominating a system of systems confrontation rather than the large-scale attrition of enemy forces is the key factor in winning. Therefore, the PLA's main strategy to defeat an adversary on the battleground is by creating disruption or paralysis on the enemy side through a system of systems operations. AI is believed to play a central role in intelligentized warfare to target and crash key elements of opponent operational systems. A PLA Senior Colonel Li Minghai pointed out that algorithms, unmanned platforms and extreme domains are emerging factors contributing to the form of intelligentized warfare.

In the meantime, Guo Ruobing, dean of the National Security College of the National Defense University of China, believes that the PLA should have a unique way of intelligentized warfighting, based upon Mao Zedong's concept that "You fight your way and we'll fight our way." Guo argues that only in this way can the PLA successfully develop technological and military abilities to seize a new force posture and create its advantages of "exploiting strength to defeat weakness" in the intelligentization era. Namely, the PLA must develop its own AI military capabilities and target the U.S.' vulnerable underbelly rather than competing with the U.S. in a full-spectrum confrontation. Guo adds that China must be careful to avoid being trapped into an arms race and suffer the same experience of the former Soviet Union during the Cold War.

Innovation – the Doctrine of Developing Intelligentized Capabilities

In response to the U.S.' offset strategy, Xi Jinping highlights the wholehearted effort of "building an innovative people's army" and emphasizes the logic that "whoever implements scientific and technological innovation well will be able to get a head start and win an advantage."

With regard to technology, China also sees the task of developing AI as a national strategic project emphasized as strongly as the "two bombs, one satellite" in the 1950s and 1960s. Beijing believes that the success of the "two bombs, one satellite" project is grounded on the Party leaders' unwavering resolve, the devoted effort of the whole nation, spiritual attainment of those scientists as exemplified by Qian Xuesen, and the project managers with rich strategic competency. In the future, China will definitely continue with the same mindset and integrate all the resources to develop the AI weaponry.

On the other hand, the rapid development of disruptive technologies such as big data and cloud computing provides a marked contrast to conventional PLA-based military analysts, who tended to interpret military lessons via approaches such as generalization and deduction of cases in the past. Instead, the PLA in the near future may have the opportunities to develop military theory with innovative thinking before war occurs. In other words, the "design of war" has become feasible.

AI: An Effective Means in Blitzkrieg

Looking back in history, Wehrmacht highlighted the Blitzkrieg in its frontal attack to beat the rivals based upon its relative advantage of speed during WWII. For Chinese familiar with martial arts, a relevant well-known phrase captures the same: "There is no impregnable defense, but for the swiftness." Speed in history has been strongly featured as a critical factor that determines the outcome of war.

That is exactly the case of AI. One of the advantages of AI is to speed up military decision making. More specifically, AI is particularly fit for blitz tactics. In the scenario of the PLA waging a war against Taiwan, distance makes instant U.S. reinforcement difficult. The PLA therefore would take advantage of speed in the attack so that it can demotivate any U.S. intention to come to Taiwan's rescue. Taking advantage of AI, the PLA is expected to focus on algorithms, unmanned platforms and extreme domains and develop the intelligentized "assassin's mace" weapons, mainly including precision guided missile, hypersonic glide vehicle (HGV), UAV, cyberattack, targeting vulnerabilities of U.S. battle network systems, to exploit its relative advantages to fulfill Anti-Access/Area Denial (A2/AD).

AI: A Psychological Offensive Tool

It is also very likely to see the PLA apply AI to the domain of cognitive warfare, where out-of-the-ordinary tactics such as disinformation, misinformation, influence strategies in propaganda warfare are in use. Cognitive warfare is a psychological approach which is in line with the traditional Chinese military wisdom that "the supreme art of war is to subdue the enemy without fighting" and "it is better to win the heart of the people than to capture the city."

The main reason for the PRC's victory in the Chinese Civil War in 1949, and its tentative dominance in the Korean War, in 1950, lie in propaganda and psychological burnout as a tool to manipulate cognitive warfare. When entering an intelligentization era, China will try to use much more advanced AI skill to fulfill the same cognitive warfare effort. Deepfake, for instance, is one AI technology currently being developed by China to generate fake news, even video and satellite pictures, against rivals in an attempt to misguide opponents and regulate public opinion at home and abroad.

https://thediplomat.com/2021/12/how-does-china-aim-to-use-ai-in-warfare/

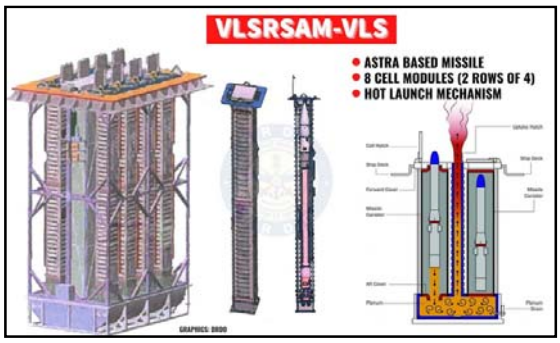
The EurAsian Times

Wed, 29 Dec 2021

Nuclear showdown – Why could India be preparing for a 'Nuclear Clash' with China despite their no first use policy?

By Prakash Nanda

Whether it is a coincidence or not, over the 20-month-long border standoff with China in Ladakh, India has tested several missile systems, ranging from SRBM to MRBM to ASCM to SLBM to ICBM to hypersonic cruise missiles verities, some of whom could carry nuclear warheads.



More than being perceived to be closing the missile gap with China, these tests have led to speculations about whether India is reconsidering its stated official policy of "no first use" (NFU) of its nuclear weapons.

In the past fortnight alone, India has tested two important systems. On December 22, it tested "Pralay" SRBM (short-range ballistic missile) that is maneuverable on its trajectory and can carry a payload capacity of 500-1000 kg with 350-500 km short-range. It has the potential to change the tactical battlefield dynamics.

Series of Missile Tests

On December 18, India tested for the second time (the first time was in June) its new "Agni-P" medium-range ballistic missile. It was officially described by New Delhi as a "new generation" nuclear-capable ballistic missile. "As our ballistic missiles grew in range, our technology grew in sophistication.

Now the early, short-range missiles, which incorporate older technologies, will be replaced by missiles with more advanced technologies. Call it backward integration of technology", it was said.

The Agni-P is India's first shorter-range missile to incorporate technologies now found in the newer Agni-IV and -V ballistic missiles, including more advanced rocket motors, propellants, avionics, and navigation systems. It is being developed as a successor to Agni-I and Agni-II missiles in the operational service of Strategic Forces Command.

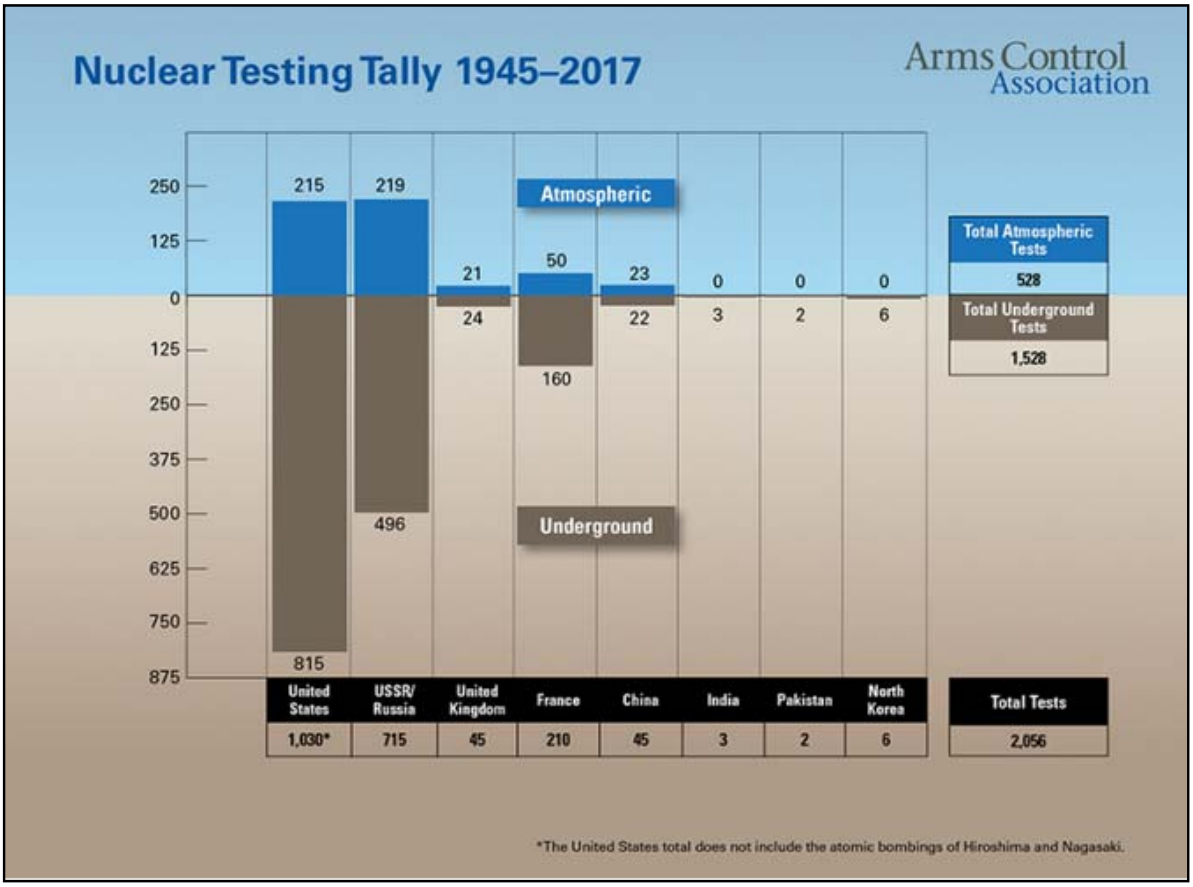
It may also be noted that India tested new Agni-V intermediate-range ballistic missiles in October last year. Although ICBMs are typically defined as having a range of 5,500 kilometers or more, independent assessments put the full range of the Agni-5 at 8,000 kilometers with a 1.5-ton warhead.

This test, unlike the five previous tests of the Agni-V, was launched in full operational configuration by the Strategic Forces Command, and that too for the first time the system was launched at night.

However, what is most noteworthy in all these missile tests is that the Agni-P and Agni–V are marked by the feature of "canisterization", which, in turn, has invited speculations about India changing its nuclear posture of NFU.

Canisterization of Missiles

Canisterization implies storing missiles inside a sealed, climate-controlled tube to protect them from the outside elements during transportation. In this configuration, the warhead can be permanently mated with the missile instead of having to be installed prior to launch, which would significantly reduce the amount of time needed to launch nuclear weapons in a crisis.



Credit: Arms Control Association

Canisterization is a new feature of India's Strategic Forces, which, earlier was against "pre-mating" of warheads with missiles. Warheads were kept separately, thereby meaning that India will not be using nuclear weapons at a short notice and that it would only consider using them only when attacked with nuclear weapons by any adversary.

The basic point that some nuclear experts make is that If Indian warheads are increasingly mated to their delivery systems, then it would be harder for an adversary to detect when a crisis is about to rise to the nuclear threshold.

With separated warheads and delivery systems, the signals involved with mating the two would be more visible in a crisis, and the process itself would take longer. But widespread canisterization with fully armed missiles that could be possibly stored at select airbases would shorten warning time.

'No First Use' Policy

India's Defense Minister Rajnath Singh has further interested these analysts by publicly questioning India's future commitment to its no NFU policy in a tweet in August 2019 that "India has strictly adhered to this doctrine. What happens in the future depends on the circumstances"

Of course, global arrangements or regimes are based on the declared policies of the governments of the member-states, not on the individual pronouncements of the ministers and ruling party members. Though in its manifesto for the 2014 general elections, the ruling Bharatiya Janata Party (BJP) had promised to review India's nuclear doctrine; so far, the Modi government has not officially pronounced any change of plan.

It may be noted that in the strict sense of the term, India does not have a proper nuclear doctrine. Possibly, it is a part of India's strategic culture to keep things and policies as ambiguous as possible, leaving them to many and different interpretations.

What India actually has is a "draft nuclear doctrine", released on August 17, 1999, by the then-National Security Advisor Brajesh Mishra. Some clarifications on this draft were "shared with the public" on January 4, 2003, through a press release by the then Cabinet Committee on Security.

Salient Features of India's Nuclear Doctrine

India's draft doctrine at the moment has the following key features:

- While committed to the goal of a nuclear-weapon-free world through global, verifiable and non-discriminatory nuclear disarmament, India, till the realization of this goal, will possess nuclear weapons.
- India will build and maintain a credible minimum deterrent.
- India will not use nuclear weapons against non-nuclear-weapon states.
- India will not be the first to use nuclear weapons. But if it is attacked by nuclear weapons in its territory or on Indian forces anywhere, then its nuclear retaliation to a first strike will be massive and designed to inflict unacceptable damage to the aggressor.
- In the event of a major attack against India, or Indian forces anywhere, by biological or chemical weapons, India will also retain the option of retaliating with nuclear weapons.
- India will continue strict controls on the export of nuclear and missile-related materials and technologies, participation in the Fissile Material Cutoff Treaty negotiations, and continued observance of the moratorium on nuclear tests.
- India's Nuclear Command Authority comprises a Political Council and an Executive Council. The Political Council is chaired by the Prime Minister. It is the sole body, which can authorize the use of nuclear weapons. The Executive Council is chaired by the National Security Advisor. It provides inputs for decision-making by the Nuclear Command Authority and executes the directives given to it by the Political Council.

India 'Tweaked' Its Nuke Policy?

In the clarifications that were given in 2003, two important changes were made to the draft doctrine of 1999. The draft doctrine had said: "Any nuclear attack on India and its forces shall result in punitive retaliation with nuclear weapons to inflict damage unacceptable to the aggressor."

The 2003 clarifications said: "Nuclear retaliation to a first strike will be massive and designed to inflict unacceptable damage to the aggressor." The emphasis here should be given to the addition of the word "massive".

The second important change in the 2003 clarifications was that a new scenario was added under which India would retaliate with nuclear weapons, and that was the attack through biological or chemical weapons on India or on Indian forces anywhere.

What emerges from the above is that India's nuclear weapons posture, after the country went officially nuclear in 1998, did undergo changes during the Vajpayee regime itself. The point is that beliefs and principles are not immutable.

Nations and their leaderships change with the efflux of time. And circumstances require their national doctrines to be revisited, reviewed, and recast if deemed necessary.

Pros and Cons of NFU Policy

Many pundits argue that India's NFU policy really needs a healthy debate. The United States or for that matter, other western nuclear powers such as Britain and France do not have the NFU policy. Russia, which initially had an NFU pledge, has withdrawn it long ago. China, another country that professed NFU policy, is now ambiguous on it.

In September, former Chinese ambassador for disarmament affairs to the UN in Geneva, Sha Zukang, said China should review its policy of not being the first to use a nuclear weapon in a conflict.

Though China had pledged the NFU policy way back in 1964, Sha suggested that Beijing should now "fine-tune" that policy to counter a US military presence that had grown in the region since America started to regard China as a major rival, or even an adversary.

Even otherwise, China had asserted before that its NFU would not apply against countries that are in possession of the Chinese territory. That means that China's NFU does not apply to India as it asserts claims to Indian territories in Jammu and Kashmir, Ladakh, and Arunachal Pradesh.

That leaves Pakistan, India's other major adversary. But Pakistan too does not believe in NFU. It has developed "Nasr" ballistic missiles with a range of 60 km that is capable of carrying nuclear warheads.

These have been specifically built with the intention of targeting not only Indian cities but also Indian military formations on the battlefield.

The concept of NFU has other problems as well. For one, imagine that there is a conventional war between India and Pakistan (or for that matter China), and Indian forces target military establishments within the enemy territory.

They do not know which of these establishments are nuclear or nonnuclear and in the process of their operations, they hit an enemy target that turns out to be a nuclear one and the consequent results are strategically horrible. Will it mean that India did not observe its NFU pledge?

For another, imagine also a situation when the Indian forces engaged in conventional wars simultaneously against China and Pakistan find it difficult to carry on. And here, as the situation challenges the very integrity of the country, should one not exercise the nuclear option?

After all, India has already modified its nuclear posture in the events of chemical and biological attacks. Why should then it tie its hands with the NFU when faced with multi-fronted attacks on our territories or forces?

Thirdly, a review is also argued to be due on the concept of India's "massive" nuclear retaliation when attacked by nuclear weapons, particularly when Pakistan is openly preparing to use what it says tactical nuclear weapons (TNW) through "Nasr" missiles against India's superior conventional forces.

Now, suppose, one of India's Army's tank columns is attacked by Pakistan's tactical nuclear weapons. Should then India go for a massive retaliation to destroy the whole of Karachi or Lahore? Will not that be highly disproportionate and unethical? If so, should India not go for a proportionate retaliation with its own TNW?

And if India really goes for tactical nuclear weapons, then there will be a new problem. By their very nature, the TNWs and their eventual uses are better determined on the spot, that is, on the battlefield itself, by the military commanders concerned. How then will that go with the country's

strict provision that it is only the Prime Minister who will decide when and where to use our nuclear weapons?

All these are very tricky but vital questions. But answers to them are overdue, analysts say.

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https://eurasiantimes.com/why-india-could-be-preparing-nuclear-with-both-china-pakistan/

Science & Technology News

Wed, 29 Dec 2021

New data-decoding approach could lead to faster, smaller digital tech

By Scott Schrage

Most scientists would blanch at being labeled a spin doctor. But when it comes to Evgeny Tsymbal, Ding-Fu Shao and their colleagues, the lab coat fits.

The University of Nebraska–Lincoln physicists have charged to the forefront of spintronics, a next-gen class of data storage and processing poised to complement the digital electronics that have ruled the realm of high tech for decades.

Ahead of that future, though, loom nanoscale obstacles whose size belies their difficulty. With the wind of a $20 million National Science Foundation grant at their back, the physicists may be on their way to surmounting an especially tricky one: finding order amid disorder and data amid seeming disarray. Beyond that obstacle lie two prizes, density and speed, that could make modern-day devices look gluttonous and sloth-like in hindsight.

Digit spinners

Electronics read and speak the language of binary—1s and 0s—by measuring the charge of the electrons flowing through their circuits. Spintronics differs by measuring an electron's spin: a magnetism-related property that essentially points either up or down. Devices fluent in both dialects of binary can store and process much more data, at much faster speeds, with much less power than their electronics-only counterparts.

To date, most electronic and spintronic memory has relied on ferromagnets, the type with a permanent magnetic field probably best known for pinning photos to fridges. In ferromagnets, the spin of every atom points in the same direction, a direction that can be switched by applying an external magnetic field.

Those traits make them popular in so-called tunnel junctions, whereby two ferromagnets are sandwiched around an insulating barrier, with electrons "tunneling" through that barrier to move between the ferromagnets. If the spin of an electron matches the spin orientation of a ferromagnet, the electron encounters little resistance, increasing its probability of tunneling through. When those spins don't match, the odds plummet, substantially reducing the overall flow of electric current. The difference between those two states, known as the magnetoresistance effect, can be read as a 1 vs. 0. For as well as ferromagnets work, their cousins—antiferromagnets—boast even more promise. Antiferromagnets house alternating columns of atoms whose spins point in opposite directions, meaning that they generate virtually no net magnetic field. No magnetic field means no

chance of a tunnel junction interfering with the magnetic state of a neighbor, allowing engineers to pack more data-storage elements into a device without worrying about them corrupting each other's data. And if next-gen devices feel the need for speed, antiferromagnets are again the choice, Tsymbal said. The spins of a ferromagnet can be switched in mere nanoseconds. That seems fast until realizing that semiconductors can operate on the range of picoseconds—a picosecond is to a second as a second is to 31,710 years—or roughly 1,000 times faster than a ferromagnet can switch. Antiferromagnets, meanwhile, can keep pace, priming them for pride of place in much faster devices. Just one trifling issue: Encoding or decoding data in antiferromagnets can be a bit like trying to write with a dried-up pen or decipher the scribblings of a toddler.

"The difficulty—and it's a significant difficulty—is how to write and read information," said Tsymbal, George Holmes University Professor of physics and astronomy.

The same antiferromagnetic property that acts as a pro in one context—the lack of a net magnetic field preventing data corruption—becomes a con when it comes to actually recording data, Tsymbal said. Writing a 1 or 0 in a ferromagnet is a simple matter of flipping its spin orientation, or magnetization, via another magnetic field. That's not possible in an antiferromagnet.

And whereas reading the spin state of a ferromagnet is similarly straightforward, it's not easy distinguishing between the spin states of an antiferromagnet—up-down vs. down-up—because neither produces a net magnetization that would yield discernible differences in the flow of electrons. Together, those facts have impeded efforts to develop antiferromagnetic tunnel junctions with practical use in actual devices. "So this is one of the problems," Tsymbal said. "But I think we have proposed a very, very good way to solve this problem."

Telling up from down

In principle, an antiferromagnetic tunnel junction should operate somewhat akin to a ferromagnetic one. Rather than switching the overall magnetization of a ferromagnet to regulate the flow of electrons, an antiferromagnetic version relies on modifying the so-called Néel vector: the axis along which spins are pointing one way or the other.

But only specific types of antiferromagnets are suited to detecting spin-related differences in the flow of electrons, which are driven by a mismatch between the Néel vectors at either end of the tunnel junction. The secret of those antiferromagnets? Momentum-specific channels through which either spin-up or spin-down electrons will predominantly flow.

Tsymbal, Shao and colleagues identified ruthenium oxide as just such an antiferromagnet. They pinpointed another material, titanium dioxide, as the barrier through which electrons can tunnel. Critically, the atoms of the two respective oxides form the same crystalline structure, resulting in a seamless match that allows electrons to maintain their momentum—and their momentum-dependent spin—as they move between the materials.

By factoring those momenta into analyses of the resulting electric current, the Husker team has shown that it's possible to distinguish among the channels and, consequently, their responses to varying Néel vectors. According to the team's calculations, that channel-specific magnetoresistance effect is similar in magnitude to those produced by ferromagnetic tunnel junctions—marking it as an especially promising means of writing spintronic data that can also be read.

As the theoretician has done in the past, Tsymbal is collaborating with the University of Wisconsin-Madison's Chang-Beom Eom and other experimentalists who can fabricate and test the antiferromagnetic tunnel junction. He and fellow members of the Nebraska Center for Materials and Nanoscience are also busy considering other materials that share ruthenium oxide's unusual but not unique characteristics. "It's not so many antiferromagnets which have this property, but there are some of them," Tsymbal said. "And we are going to look at these materials in the future, as well." The team reported its findings in the journal *Nature Communications*.

More information: Ding-Fu Shao et al, Spin-neutral currents for spintronics, *Nature Communications* (2021). DOI: 10.1038/s41467-021-26915-3

Journal information: *Nature Communications*

https://phys.org/news/2021-12-data-decoding-approach-faster-smaller-digital.html