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DRDO News

DRDO Technology News

Sat, 04 Jun 2022

How India's Astra Missile on IAF's SU-30 can Change Air Dynamics in Indian Ocean Region

India's ASTRA: Beyond Visual Range (BVR) class of air-to-air missile

India is developing the Astra Mk-I missile. The missile is set to be integrated into the Su-30 MK-I fighter aircraft. It will also be integrated into the MiG-29K fighter aircraft. The missile with a range of over 100 km is equipped with the latest navigation and midcourse guidance system including the RF seeker based terminal guidance which can hit the target with accuracy.Astra is a Beyond Visual Range (BVR) class of air-to-air Missile (AAM) system designed to be mounted on fighter aircraft.

DRDO's ASTRA

The ASTRA is designed to engage and destroy highly manoeuvring supersonic aircraft and has all-weather day and night capability.The Indian government has reportedly placed an order worth Rs 2,971 crore for the manufacture of the indigenously built missile.The missile has been developed by DRDO and manufactured by Hyderabad-based Bharat Dynamics Limited.India's defence ministry said: "Based on the staff requirements issued by the Indian Air Force catering for beyond visual range as well as close combat engagement, reducing the dependency on oreign sources."

Indian Navy is set to integrate Astra Mk-I missile

DRDO has already completed the technology transfer and the production has already begun, reports say. According to BDL, the missile can also be offered to friendly foreign countries. The Indian Navy is set to integrate the missile into the MiG 29K fighter aircraft which forms part of the Vikramaditya aircraft carrier. According to the DRDO, the missile is being developed in multiple variants to meet 'specific requirements'.

BrahMos

The Indian Air Force(IAF) had earlier conducted "live firing" of BrahMos supersonic cruise missile from a Su30- MKI fighter aircraft. The IAF said the missile hit a decommissioned Indian Navy ship. The exercise was undertaken in "close coordination" with the Indian Navy.

The air-launched missile is the heaviest and most powerful weapon in IAF's arsenal. The government had moved to integrate the BrahMos jet into Sukhoi fighter jets in 2016 in order to enhance IAF's air capability. The IAF had inducted the first Sukhoi-30MKI fighter aircraft squadron at the Thanjavur airbase in Tamil Nadu.

BrahMos at Mach speed

According to BrahMos Aerospace, BrahMos is a two-stage missile with a solid propellant booster engine as its first stage which brings it to supersonic speed and then gets separated. The liquid ramjet or the second stage then takes the missile closer to 3 Mach speed in cruise phase.

Missile fitted with stealth technology

The missile is fitted with stealth technology and guidance system with advanced embedded software which provides the missiles with special features. The missile maintains supersonic speed all through the flight, leading to shorter flight time, consequently ensuring lower dispersion of targets, quicker engagement time and non interception by any known weapon system in the world.

222 Squadron, the Tigersharks

Earlier, the IAF had said that Sukhoi fighters were the second frontline fighter squadron to be based in south India. The latest batch of Sukhoi jets are armed with the indigenous developed BrahMos cruise missiles. IAF had earlier announced the resurrection of the 222 Squadron of Tigersharks with the Sukhois.

Indian Ocean Region (IOR)

The presence of the elite fighter jets in the Indian Ocean Region (IOR) will give India the strategic edge with the central maritime spread, bordering three continents. The Sukhoi fighters will be equipped with 2.5 ton air-launched BrahMos missile with a target range of over 300 kms giving the Indian Air Force formidable firepower.

https://www.wionews.com/photos/how-indias-astra-missile-on-iafs-su-30-can-change-air-dynamics-in-indian-ocean-region-485091

The EurAsian Times

Sun, 05 Jun 2022

With the 'Devil' Behind, India's Fastest Missile 'Astra' can Down Enemy Jets at Almost Hypersonic Speeds

The last few days have been quite eventful for the Indian Air Force (IAF). On the one hand, there are unconfirmed reports that the Air Force may be asked by the government to cut down on its planned addition of Medium-Range Fighter Aircraft MRFA requirement from 114 units to just 57 units, which, in turn, will be will be "Make in India" with the transfer of technology from the original equipment manufacturer (OEM) to an Indian company of its choice.

This decision, if true, is likely to tilt the scale further in favor of the French Rafale, the fighter aircraft, which, as the EurAsian Times has been pointing out, was already ahead in the race vis a vis its competitors from the US, Russia and Europe.

On the other hand, the Indian government (Ministry of Defence or MoD) is doing everything possible to give the Air Force the best of the world's missiles for its armor. In fact, the school of thought that is prevailing in India's MoD at the moment gives more emphasis to the weapons that the platform (aircraft) will carry than to the platform itself.

Secondly, while the IAF can always be proud of possessing the ever-improving Brahmos Cruise Missile, one of the world's fastest, and the similar powerful ones procured from abroad or being manufactured in collaboration with the foreign OEM (Python 4, Python 5, Hammer AASM and Novator KS 172 etc.), it can now also be endowed with equally deadly missiles that are indigenous, thus making the force less dependent on foreign OEMs.

In what is said to be a major boost to Prime Minister Narendra Modi's vision of 'Aatmanirbhar Bharat' (Self-Reliant India), the MoD signed on May 31 a contract with Bharat Dynamics Limited (BDL) for the supply of ASTRA MK-I Beyond Visual Range (BVR) Air to Air Missile (AAM) and associated equipment for the IAF & Indian Navy at a cost of Rs 2,971 crore (approximately $382.96 million) under Buy (Indian-IDDM) category.

Until now, the technology to manufacture missiles of this class indigenously was not available. ASTRA MK-I BVR AAM has been indigenously designed & developed by Defence Research and Development Organisation (DRDO) based on the Staff Requirements issued by the IAF catering for Beyond Visual Range as well as Close Combat Engagement reducing the dependency on foreign sources.

Air to Air missile with BVR capability provides large Stand-Off Ranges to own fighter aircraft which can neutralize the adversary aircraft without exposing themselves to adversary Air Defence measures, thereby gaining & sustaining superiority of the Air Space. This missile is technologically and economically superior to many such imported missile systems.

Astra Missile

'Astra BVRAAM' is designed to provide the power needed by a modern combat aircraft for dominating an air space. It can be launched irrespective of the relative position of the target with respect to the missile (and the aircraft launching it). Astra has advanced Electronic Counter Counter Measures (ECCM) features that improve the missile's target tracking capability by reducing the effect of electronic countermeasures on the enemy targets in jamming environments. The ECCM features give the missile capability to overcome defensive measures (ECM) attempted by the enemy. Further, it also has high effectiveness in multi-target scenarios and is equipped with an indigenous RF seeker-based active radar terminal guidance system. It offers the pilot option to choose between "Lock on Before Launch – LOBL" and "Lock on After Launch – LOAL" and later allows the aircraft to shoot and scoot to safety after firing the missile in the direction of the target. While evasive measures in most modern combat aircraft involve up to 9g forces (positive, vertical), 'Astra BVRAAM' has been designed to carry out maneuvers involving forces exceeding 30g, thus enabling superb maneuverability against the latest generations of supersonic combat fighters.

With all these advanced features the indigenous Astra BVRAAM is capable of operating under all weather conditions, both day and night and offers high overall reliability and a very high

”Single Shot Kill Probability – SSKP”. The length of the weapon system is 3.8m, while its diameter is 178mm, and the overall launch weight is 160kg. Its low all-up weight provides high launch range capability. Astra MK-I missile and all associated systems for its launch, ground handling & testing have been developed by the DRDO in coordination with the IAF. The missile, for which successful trials have already been undertaken by the IAF, is fully integrated on the Su 30 MK-I fighter aircraft & will be integrated with other fighter aircrafts such as Mirage-2000, MIG-29, and the Light Combat Aircraft (Tejas) in a phased manner. The Indian Navy will integrate the missile on the MiG 29K fighter aircraft.

The Astra missile was developed as part of the Integrated Guided Missile Development Programme (IGMDP). DRDO carried out mission analysis, system design, simulation and post-flight analysis of the weapon system. The MK-I variant of the new air-to-air missile was first tested in May 2003, from the Interim Test Range (ITR) at Chandipur, Odisha, and a series of developmental ground tests, captive flight trials and user associate launches were conducted in varying weather conditions. After that many trials were conducted at various places, involving Su-30 MKI combat aircraft. And the final flight tests with Su-30 MKI fighter aircraft were conducted at the same Chandipur in 2019. The trials dealt with all possible threat scenarios, demonstrating its end game capability in combat configuration with the warhead. The missile also had a direct hit on the target at maximum range. The Astra Mk-I has a range of 80 to 110 km in a head-on chase and can travel at 4.5 Mach speed (almost hypersonic).

The missile also has a locally developed Ku-band active radar guidance system and a 15 kg warhead. DRDO is now developing the Mk-II variant, which will have a higher range of 160km by using a dual-pulse solid-fuel rocket motor. It is based on the advanced solid fuel ducted ramjet (SFDR) engine technology that was tested in 2018, 2019 and recently in March 2021. The Astra Mk-III, a future variant, is also being developed in collaboration with Russia. Its prototype is expected to be out soon; it will have the newly developed solid fuel ducted ramjet (SFDR) technology with a range of 350 km. Meanwhile, the Transfer of Technology from DRDO to BDL for the production of the Astra MK-I missile and all associated systems has been completed and production at BDL is in progress.

Indian analysts say that this project will act as a catalyst for the development of Infrastructure and Testing facilities at BDL. And the MoD thinks that this project will also create opportunities for several MSMEs in aerospace technology for a period of at least 25 years. In short, the project essentially embodies the spirit of ‘Aatmanirbhar Bharat’ and will help facilitate realizing the country’s journey towards self-reliance in Air to Air Missiles.

India Zooms Ahead

India has really come a long way since the early days of “Devil”, the first surface-to-air missile that was indigenously developed during the 1970s and had undergone a series of trials, but, much to the disappointment of the team, was not inducted into the IAF. Apparently, the quality was not good enough for the IAF. Nevertheless, the process of development and trials of the Devil left behind very valuable lessons – technological and otherwise. And they proved handy when under the leadership of Dr. APJ Abdul Kalam (who later rose to become the country’s President) the Integrated Guided Missile Development Programme – IGMDP – created one history after another in efforts toward making India self-reliant in the arena of both strategic and tactical missiles. For developing missiles like Astra, the Defence Research and Development Laboratory (DRDL) and its two sister laboratories – Research Centre Imarat (RCI) and Advanced Systems

Laboratory (ASL), have led the design development and evaluation of missiles with the dedicated support of Terminal Ballistics Research Laboratory (TBRL), Institute System Studies and Analysis (ISSA) and the Integrated Test Range (ITR), have played a big role.

In fact, these very establishments are now working for other deadly indigenous air to air missiles for the IAF. In April, the ANTI-Tank Guided Missile (ATGM) HeliNa, the helicopter-launched version of the Nag missile, was tested both in the northern high altitude mountain regions and desert regions of Pokhran. Like all Nags, it can also be fired in a way, which allows the pilot to just lock-on to a target, fire the missile and not track the shot. The DRDO is also working on another variant of the HeliNa, called the SANT, or the Standoff Anti-tank Guided Missile, which has an extended range of 25 kms. The DRDO is also in the process of developing and building an indigenous anti-radiation missile, which will be capable of disabling enemy radar and transmitters. This missile is said to have a range of over 110 kms. It is called NGARM or Rudra-1. The IAF has already started its trials. If successful and inducted, India will be the 4th country after the US, Russia & Germany to have a missile that can disable enemy radar stations and transmitters in an area.

https://eurasiantimes.com/with-the-devil-india-fastest-missile-astra-can-hypersonic/

#SWARAJYA

Sat, 04 Jun 2022

UP Investors Summit 2022: PM Modi Visits BrahMos Aerospace's Display Showcasing India's Firepower

Prime Minister Narendra Modi visited the display by BrahMos Aerospace showcasing the firepower of India at the third Groundbreaking Ceremony of Uttar Pradesh Investors Summit 2022 on Friday (3 June). PM Modi was accompanied by Defence Minister Rajnath Singh and Uttar Pradesh Chief Minister Yogi Adityanath. During his address at the Groundbreaking Ceremony, PM Modi said that the defence corridor being built in UP will present great possibilities for the state.

It should be noted that several defence firms including BrahMos Aerospace have signed pacts with the Uttar Pradesh Expressways Industrial Development Authority (UPEIDA) for establishing manufacturing units in the defence corridor. BrahMos Aerospace, an Indo-Russian joint venture between India's DRDO and Russia's NPO Mashinostroyenia, is the manufacturer of world's fastest supersonic cruise missile BrahMos. The defence firm had earlier signed an agreement with UPEIDA to set up the BrahMos manufacturing centre, a modern and state-of-art facility in the Lucknow node of UP Defence Industrial Corridor (UPDIC).

The foundation stone of the BrahMos manufacturing facility was laid by Defence Minister Rajnath Singh in December last year. The facility will be spread over 200 acres and produce the new BRAHMOS-NG (Next Generation) variant, which carries forward the lineage of the BRAHMOS weapons system. The manufacturing centre would be ready over the next two to three years and will commence production at a rate of 80-100 BRAHMOS-NG missiles per year.

The UPDIC is one of the two defence corridors being set up in the country to support the growth of the defence sector and enhance manufacturing capacity in the sector.

https://swarajyamag.com/defence/up-investors-summit-2022-pm-modi-visits-brahmos-aerospaces-display-showcasing-indias-firepower

INDIA BLOOMS

Sat, 04 Jun 2022

Brahmos Aerospace to Roll Out 80 to 100 Missiles Every Year

Lucknow/UNI: BrahMos Aerospace will produce 80 to 100 new Brahmos missiles every year at its Lucknow facility starting mid-2024. BrahMos Aerospace CEO and MD Atul D Rane said, "Construction work is in full swing in Lucknow. Production of the current version of Brahmos can start once the facility is set up. Assuming all things are smooth in the setup and professional attestation of the facility, the first Brahmos of the current version can be rolled out by mid-2024."

BrahMos missile was displayed at one of the 110 stalls in an exhibition at the venue of Ground Breaking Ceremony 3 in the state capital on June 3.The missile, which is a joint collaboration between India and Russia, is going to be built in the Lucknow node of the Defence Corridor. It was the center of attraction in the exhibition. The Prime Minister paid special attention and couldn't take his eyes off the prestigious BrahMos missile autonomous launcher, which was

Rane said, "Whereas the feasibility study of the missile is nearing completion, once these preliminary studies are over, a detailed design of the system will start, if things go smooth, the joint venture of DRDO India and NPOM of Russia has planned to finish detail designing within two years followed by system trials."

The timeline to roll out the future generation of missiles (BRAHMOS-NG) will be five to seven years from now. This new manufacturing hub will empower the missile industry consortium in-country and will help to create an ecosystem for futuristic weapons and technology within the state and the country. BrahMos Aerospace has planned to deliver 80-100 missiles a year from the Lucknow facility. "Numbers are highly dependent on the orders we receive," Rane said.

The Defence Research and Development Organisation (DRDO) is establishing a BrahMos manufacturing center in the state capital. Spread in an area of 200 acres, BrahMos Aerospace will manufacture the World's best Supersonic Cruise missile system designated as BRAHMOS-NG that can be launched from submarine, ship, aircraft, or land.

The manufacturing center will be a modern, state-of-art facility. The foundation stone for the center, along with that for the Defence Technology and Test Centre (DTTC), was laid by Defence Minister Rajnath Singh on December 26, 2021. The Brahmos-NG is smaller, lighter and has smarter dimensions and is being designed for deployment on a wider number of modern military platforms. It will hugely bolster the Indian military's modern combat capability and flexibility during the next few years.

The project will provide direct employment to about 500 engineers and technicians. Apart from this, 5,000 people will get indirect employment. With the establishment of ancillary units related to the defence industry, about 10,000 people will get employment.

https://www.indiablooms.com/news-details/N/81979/brahmos-aerospace-to-roll-out-80-to-100-missiles-every-year.html

DRDO On Twitter

Defence News

Defence Strategic: National/International

Press Information Bureau
Government of India

Ministry Of Defence

Sun, 05 Jun 2022 7:06 PM

India Bangladesh Joint Military Exercise "Ex SAMPRITI-X" to Commence in Bangladesh

As part of the ongoing India Bangladesh bilateral defence cooperation, a joint military training exercise Ex SAMPRITI-X is being conducted at Jashore Military Station in Bangladesh from 05 June to 16 June 2022. Exercise SAMPRITI is an important bilateral defence cooperation endeavour conducted alternately by both countries which aims to strengthen and widen the aspects of interoperability and cooperation between both the armies. The aim of the exercise is to strengthen interoperability between the two armies and to understand each other's tactical drills and operational techniques. The Indian contingent of company strength is being represented by a Battalion of the DOGRA Regiment and the contingent departed by road for the exercise location on 4 Jun 2022.

During the joint military exercise Ex SAMPRITI-X, armies of both the Nations will share expertise in multiple simulated scenarios of Counter Terrorism, Humanitarian Assistance & Disaster Relief and UN Peacekeeping Force under UN mandate. The exercise schedule is progressively planned in such a manner that the participants will initially get familiar with each other's organisational structure and tactical drills. As the exercise progresses, joint tactical exercises will be conducted wherein the joint battle drills of both contingents will be practised. The exercise will culminate with a final validation exercise in which troops of both armies will jointly practice a Counter-Terrorism Operation in a simulated environment.

In addition to sharing best practices and understanding each other at the tactical level, this exercise is an opportunity for greater cultural understanding to strengthen trust and cooperation between armies of both the Nations. The exercise will benefit both the armies by gaining from each other's vast experience which will further contribute to peace and stability in the region.

https://www.pib.gov.in/PressReleasePage.aspx?PRID=1831346

INDIA TODAY

Sat, 04 Jun 2022

Defence Forces Brief PM Modi on 'Tour of Duty' Recruitment Scheme for Soldiers

The three Defence forces chiefs on Saturday briefed Prime Minister Narendra Modi on the Tour of Duty scheme for soldiers' recruitment which will pave the way for induction of troops into the forces for short-term tenures. Top government sources told India Today that the Department of Military Affairs under Lt Gen Anil Puri along with the three Defence forces chiefs made a presentation to Prime Minister Narendra Modi on the programme.

The new scheme is named Agnipath, under which youngsters will join forces for a period of four years and serve the country. The scheme is a part of Prime Minister Narendra Modi's major reform towards reducing expenditure and age profile of the defence forces.The catchment areas for recruitment could also be significantly expanded.

At the end of four years, most of the soldiers would be relieved from duty and would get assistance from the armed forces for further employment avenues. Several corporations will also have an interest in reserving jobs for such trained and disciplined youth who have served their nation.

Initial calculations by the Armed Forces had projected thousands of crores in savings in pay, allowances and pension if a considerable number of soldiers are taken in under the tour of duty concept. The best among the recruited youth could also get an opportunity to continue their service, in case vacancies are available.

https://www.indiatoday.in/defence/story/defence-forces-pm-modi-tour-of-duty-recruitment-scheme-soldiers-agnipath-1958448-2022-06-04

INDIA TODAY

Sun, 05 Jun 2022

India, Bangladesh Hold Joint Military Exercise as Part of Bilateral Defence Cooperation

A joint military training exercise between India and Bangladesh commenced on Sunday, June 5 at Jessore military station in Bangladesh. The exercise 'Ex SAMPRITI-X' will continue till June 16 as part of bilateral defence cooperation. The military training exercise is aimed at strengthening the aspects of interoperability and cooperation between both armies.

"The aim of the exercise is to strengthen interoperability between the two armies and to understand each other's tactical drills and operational techniques," the Indian Army said in a statement. The Indian contingent is being represented by a battalion of the Dogra regiment.

During the joint military exercise, the armies of both nations will share expertise in multiple simulated scenarios of counter-terrorism, humanitarian assistance and disaster relief, and UN peacekeeping force under the UN mandate. The exercise will culminate with a final validation exercise in which troops from both armies will jointly practice a counter-terrorism operation in a simulated environment. "This exercise is an opportunity for greater cultural understanding to strengthen trust and cooperation between the armies of both nations. The exercise will benefit both the armies by gaining from each other's vast experience, which will further contribute to peace and stability in the region," the Indian Army said in a release.

https://www.indiatoday.in/defence/story/india-bangladesh-joint-military-exercise-bilateral-defence-cooperation-1958749-2022-06-05

THE ECONOMIC TIMES

Mon, 06 Jun 2022

Rajnath Singh to Hand Over 12 High-Speed Boats During Vietnam Visit

Defence minister Rajnath Singh will hand over 12 high speed interceptor boats and visit an army software park being established with Indian funding during a three-day visit to Vietnam this week. The minister will hold discussions with the top Vietnamese leadership and review defence cooperation with Vietnam as well. "The minister will hold bilateral talks with General Phan Van Giang, during which both the ministers will review defence cooperation between the two countries and explore new initiatives to further strengthen the defence engagements," officials said, adding that the visit will start from June 8. The minister is also scheduled to call on President of Vietnam Nguyen Xuan Phuc and Prime Minister Pham Minh Chinh. He will also visit training institutions in Vietnam and pay his respects at the war memorial.

https://economictimes.indiatimes.com/news/defence/rajnath-singh-to-hand-over-12-high-speed-boats-during-vietnam-visit/articleshow/92024684.cms?from=mdr

TIMESNOW

Sun, 05 Jun 2022

Defence Acquisition Council Meeting to Focus on Indigenous Contents

India's atmanirbharata efforts take off during tomorrow's *Defence Acquisition Council* (DAC) meeting with virtually all major deals having indigenous content. Even deals to be placed before the DAC headed by Defence Minister *Rajnath Singh* and including the three chiefs, that had some foreign content have been tailored to be as indigenous as possible.

The Successor AD or Air Defence Gun for the *Army* is one such example. Initially, about 25 guns were to have been imported and the rest, made here. Now, all 220 guns will be made here as will the 150,000 rounds of ammunition. This is a Rs 6,000 crore project. Once the project is cleared, there will be trials and then the acceptable candidates will be asked for quotations. The

T-72 Bridge Laying Tank is also a local order as they are made indigenously. These 45-50 BLTs will cost about Rs 550-600 crore. The Army's requirement of 105 wheeled armoured fighting vehicles to go with the tanks is being looked at. They are wheeled (and not tracked) and therefore, will be effective not in the desert, but in the plains of Punjab, or the plateaus of Ladakh and Sikkim. Armed with an anti-tank guided missile, the 105 vehicles are likely to cost about Rs 3,500 crore.

For the Army and also, the *Navy* and *Indian Air Force*, there are 1868 Rough Terrain Forklift vehicles. This is indigenous and is currently a Rs 900 crore project. It is not certain whether the purchase of 12 *Swati Weapon*. Locating Radars for the Army, to replace the aging American ANTPQs will come up at the DAC. As it's made in India and is a repeat order, it should be cleared either tomorrow or in the near future.

https://www.timesnownews.com/india/exclusive-defence-acquisition-council-meeting-to-focus-on-indigenous-contents-article-92019293

FINANCIAL EXPRESS
Read to Lead

Fri, 03 Jun 2022

IAF to Vault Multi Role Fighter Aircraft Program Under Buy Global, Make India; 114 Aircraft in the Pipeline Intact

IAF's mega $20 billion Multi Role Fighter Aircraft (MRFA) project is under debate again. Against the fast-depleting squadron of Indian Air Force, the MRFA program which is about acquiring 114 Multi-Role Fighter Aircraft is one such program Indian Armed Forces and Government attach utmost importance to. On the criticality of such serious concern and against the lurking threats from the Northern and Western adversaries, the MRFA is under consideration to be placed on fast track under the 'Buy Global, Make in India', proposing a shift from strategic partnership model. Assessed upon the fact, the number of combat aircraft which was originally marked for the acquisition remains—114. The assessment is based on factual analysis with highly placed experts on the matter. The talk of cutting down the number of aircraft is not a viable option in the emerging scenario where the Indian Air Force has already projected 500 combat jets in near future to be able to maintain critical air power.

Last year, Chief of Air Staff (CAS), Air Chief Marshal VR Chaudhari added the element of 'make in India' to the project MRFA emphatically and announced that the ambitious procurement must embrace indigenisation. The competition is intense with world leading OEMs are in fray for the MRFA, including Lockheed Martin's F-21, Boeing's Super Hornet F/A-18 E/F, Dassault's Rafale, Saab's Gripen JAS-39 E/F, Russian MiG-35 and SU-35, and the European consortium led Eurofighter Typhoon. Along with them, Boeing is also mulling to offer its upgraded F-15EX which was approved by the US government for India. Beyond the intense competition the quest for 114 fighter jets has seen the tumultuous and torturous journey, calling it a never-ending saga of high ambitions on low trajectory. The quest has been about laying ground for aerospace ecosystems of advanced capabilities within the country which has seen

some success in taking LCA Tejas off the ground over the many decades of trials and tribulations. MRFA is based on the idea of expanding such ground, assimilating advanced technologies from the world of aerospace and defence which could be designed and built in India.

The IAF first floated the Medium Multi-Role Combat Aircraft (MMRCA) tender to procure 126 new combat jets from foreign OEMs in 2007. It was proposed to continue building upon the capabilities and keeping the sanctioned strength of combat jets as the Light Combat Aircraft (LCA) Tejas, a planned indigenous replacement for the IAF's aging fleet, needed more time to be able to fill the gaps. In 2012, the Eurofighter Typhoon and Dassault Rafale emerged as final contenders with Rafale winning the competition for the contract but the program couldn't take off due to certain clauses over the contractual guarantee and other disagreement with the selected OEM. Finally, in 2015, the project MMRCA was cancelled. Under the circumstances as severe for IAF to maintain the operational capabilities, the Government instead decided to acquire 36 Rafales in fly-by condition from the French entity Dassault's. This was formalised under the government-to-government deal which is to make procurement much faster and deployable. In 2018, the government put out a new plan which is rechristened as 'MMRCA 2.0', by floating a Request for Information (RFI) for the procurement of 114 MRFA.

Air power and Capability gaps

A look at the geopolitics and global conflicts gives the clear indication that aerial dimension of warfare has established unprecedented superiority. The next generation technological breakthroughs in aerial warfare are already unfolding in sheer magnitude and in the shape of unmanned systems, hypersonic combat aircraft and laser energy weapons. It is almost redefining the concept of modern warfare in air and in space. How does IAF embrace such a shift in terms of evolving threats and capability? The IAF has currently planned for 83 LCA, 70 HTT-40, two Sqns of AMCA Mk-I and five Sqns of AMCA MK-II. Additionally, the order for LCH and other developments in the helicopter fleet will provide for 400/450 aircraft. In the long term IAF will have the LCA version AMCA and MRFA in its flight line along with 56 C-295 for tactical airlift. Nowhere in the world is such a commitment of 450 aircraft made. This depicts IAF's plan for capability building.

Last year, in an exclusive interaction with the author, Air Chief Marshal Chaudhari spelt out his thoughts on building and acquiring such capabilities, said: "In the long term IAF will have LCA version AMCA and MRFA in its flight line along with 56 C-295 for tactical airlift. Nowhere in the world is such a commitment of 450 aircraft made. This depicts IAF's plan for capability building." But dichotomy remains on bridging the capability gaps in building an advanced aerospace base for such next generation combat jets against the faster acquisition of such airassets amid depleting squadron numbers. How do we address the factors like joint production and tech development with OEMs in India? So, in depleting squadron number or technology is priority or balance timeline? But the question is largely not about the policy uptick and the shift of the 'Strategic Partnership (SP)' model to 'Buy Global, Make in India' category under Defence Acquisition Procedure (DAP) 2020. It is about laying ground for a capability building roadmap and that is about leveraging the project MRFA for substantial technological gains and building systems and subsystems of global standards. India's aerospace ecosystem is ticking for tech flows across the dimensions for next generation combat jets. It is also about taking a good leap in our manufacturing technology which we have learned over the years for LCA Tejas. Besides the number of aircraft, the focus for IAF remains on the need for next generation tech ready for the

future conflicts. The advancement across the spectrum of aerospace is breaking boundaries in areas like stealth, speed, electronic and sensor suite and networked platforms on quantum combat cloud, teaming with unmanned aerial systems with greater firepower. Besides the security dimension, the MRFA project worth $20 billion makes a compelling case for India in terms of the economy of scale when we have the ability to design, develop and produce 5 to 6 generation fighter jets. At present, Tejas Mk1 FOC version aircrafts are under delivery by HAL. The production of LCA Mk 1A is likely to commence by 2023-2024. The LCA Mk-1A will have better capabilities with indigenous technologies such as AESA Radar, Integrated Electronic Warfare (EW) Suite, Long Range Beyond Visual Range (BVR) missile, Air to Air Refuelling with better maintainability and avionics suite.

Another breakthrough project, AMCA program by Defence Research and Development Organisation (DRDO) and IAF was conducted in Aug 2020, while the Critical Design Review is being looked into. DRDO) along with active support of IAF, is working towards development of Next Generation Technology Demonstrator. Such complex projects need the greater flow and collaboration with the global innovators from the world of aerospace and defence manufacturing.

As IAF Chief VR Chaudhari again pointed out to the author during the interaction last year, remarked: "IAF envisages AMCA to encompass state of the art design and better multi role capability with infusion of 6th Gen technologies. The experience of producing LCA will influence the design of AMCA to suit operational requirements of the future."

But the most important aspect of MRFA is the possibilities for acquiring and developing elusive jet engine technology. The depth of negotiation lies in addressing such gaps whether under the 'SP' model or Buy Global, Make in India. In totality, the need is to address the suitable jet engine for projected 500 fighter aircraft for India's next generation Advance Medium Combat Aircraft & Tejas Mk-2. What is lacking for India is the elusive jet engine capability. While the DRDO project on military gas turbines has achieved certain Technology Readiness Level (TRL) in producing crucial propulsion systems for unmanned aerial vehicles & weapon platforms along with long range weapon delivery systems, jet engines remain a complex task. As G. Satheesh Reddy, Secretary DDR&D & Chairman explained: "As you are aware, these engines are denied by global OEMs for strategic applications." The international outreach in this case will enable India to jointly develop under the open architecture matrix, having full access and rights of the aeroengine.

It is worth noting that China is already upgrading upon J-20 and J-31 aircrafts and working on the new fighter jets with sixth generation capabilities in areas across stealth capability with hypersonic weapons. China is taking the lead on the aerial dimension of Laser and precision warfare capabilities based on AI.

Clarity is the key to make substantial progress on crucial projects like MRFA. Policy conundrum that blocks the time frame defeats the purpose. The proposed 114 MRFA needs to pass through such trails to build an advanced aerospace industrial base and IAF to cement its formidable position in aerial warfare.

https://www.financialexpress.com/defence/iaf-to-vault-multi-role-fighter-aircraft-program-under-buy-global-make-india-114-aircraft-in-the-pipeline-intact/2548146/

THE ECONOMIC TIMES

Mon, 06 Jun 2022

Pakistan Approves 6% Hike in Defence Budget for 'Critical Shortfalls'

The Pakistan government has increased the defence budget for the outgoing fiscal year by nearly 6 per cent to over PKR 1.45 trillion to meet the critical needs of the country's armed forces. This decision to increase the budget was taken by Pakistan's Economic Coordination Committee (ECC) to meet the enhanced salary requirements and other key needs, The Express Tribune newspaper reported Besides the decision to increase the defence budget by another PKR 80 billion, PKR 182 billion in supplementary grants was approved in total. According to the Tribune report, the Pakistan Defence Ministry had demanded an additional PKR 80 billion defence budget for "critical shortfalls". Moreover, additions were made for spending on the Jinnah Naval base, the Naval Base Turbat and the multi-functional office building in the headquarters.

Finance Minister Miftah Ismail presided over the ECC meeting that approved PKR 80 billion supplementary budget for the Pakistan armed forces, the newspaper report said. According to the Stockholm International Peace Research Institute (SIPRI), world military expenditure reached an all-time high of USD 2.1 trillion in 2021. The top three largest spenders are the United States, China and India "Total global military expenditure increased by 0.7 per cent in real terms in 2021, to reach USD 2113 billion. The five largest spenders in 2021 were the United States, China, India, the United Kingdom and Russia, together accounting for 62 per cent of expenditure," the Stockholm based said in a report released in April. "Even amid the economic fallout of the Covid-19 pandemic, world military spending hit record levels," said Dr Diego Lopes da Silva, Senior Researcher with SIPRI's Military Expenditure and Arms Production Programme. "There was a slowdown in the rate of real-terms growth due to inflation. In nominal terms, however, military spending grew by 6.1 per cent."

As a result of the economic recovery from the COVID-19 pandemic, defence spending amounted to 2.2 per cent of global GDP, while in 2020 this figure reached 2.3 per cent. According to the Stockholm based institute, India's military spending of USD 76.6 billion ranked third highest in the world. This was up by 0.9 per cent from 2020 and by 33 per cent from 2012.

https://economictimes.indiatimes.com/news/defence/pakistan-approves-6-hike-in-defence-budget-for-critical-shortfalls/articleshow/92004758.cms?from=mdr

THE ECONOMIC TIMES

Fri, 03 Jun 2022

BSF Developing Counter Drone, Anti-Tunnel Tech: DG

The Border Security Force is continuously working to develop counter-drone and anti-tunnel technologies to effectively check cross-border drugs and arms smuggling and terrorist infiltration bids along the India-Pakistan border, force chief Pankaj Kumar Singh said on Friday. The BSF director general said the force has shot down a total of 7 drones over the last six months (December 2021-May 2022) and has detected three underground tunnels along the Pakistan border between January, 2021 to May, 2022.

"We are keeping a strict vigil on cross-border drone activities through which drugs and arms are smuggled and underground tunnels which are used for infiltration by terrorists. The BSF is also working to develop effective technologies to check drones and underground tunnels," he said. Singh was speaking during an investiture ceremony and the annual 'Rustamji Memorial Lecture' of the border force. The about 2.65 lakh personnel strong force was raised in 1965 and it is primarily tasked to guard Indian borders with Pakistan and Bangladesh.

Minister of state for home Nityanand Rai delivered the keynote speech and also honoured a total of 16 personnel, including two posthumously, with the police medal for gallantry. Those decorated include second-in-command rank officer Deepak Kumar Mandal who laid down his life in 2017 while stopping cross-border cattle smuggling in Tripura. Mandal, commanding the 145th battalion of the border guarding force, was grievously hit by a four-wheeler by the smugglers on October 16 that year and he succumbed to his injuries four days later.

Thirteen BSF personnel were also awarded the gallantry medals for killing three terrorists who attacked the Srinagar (Jammu and Kashmir) airfield on October 3, 2017. Those awarded for thisoperation include Assistant Sub Inspector Brijkishor Yadav (posthumously) and deputy nspectors general S S Guleria and Hari Lal among others.

https://economictimes.indiatimes.com/news/defence/bsf-developing-counter-drone-anti-tunnel-tech-dg/articleshow/91990478.cms?from=mdr

DefenseNews

Sat, 04 Jun 2022

Major Baltic Sea Exercise Kicks Off as Swedish, Finnish NATO Bids Wait on Turkey

With the decks of the massive amphibious assault ship Kearsarge loaded with MV-22 Osprey and AH-1 Cobra rotary-wing aircraft, U.S. Marines and allied forces were getting ready to retake islands from a fictional aggressor in a war exercise showcasing allied firepower in Northern

Europe. The NATO exercise BALTOPS – to be held on the Baltic Sea next week – is the latest showing of unity and military strength as Sweden and Finland trade neutrality for NATO's embrace in the wake of Russia's three-month-old invasion of Ukraine.

Journalists were invited aboard the 844-foot Kearsarge, whose port visit marked the first time a U.S. naval vessel of its size has visited Stockholm, for a press conference with U.S. Gen. Mark Milley, the chairman of the Joint Chiefs of Staff, as well as Swedish Prime Minister Magdalena Andersson, and the Swedish military's top civilian and uniformed leaders. Roughly 7,000 troops, 45 ships and more than 75 aircraft from 14 NATO allies, plus Sweden and Finland, are taking part in the alliance's 51st annual BALTOPS exercises. Andersson said the drill was "a strong signal to the world" that U.S. President Joe Biden's security assurances, expressed when she and Finnish Predient Sauli Niinistö met him at the White House in May, "is actually followed with concrete action ... and for this we are very very grateful."While membership in the mutual-defense alliance would provide new security for Sweden, Andersson said Sweden and Finland "want to be security providers and provide strong security for our part of the Baltic region." Sweden, she said, would be ready to stand behind NATO's mutual defense agreement, known as Article 5.

For his part, Milley praised Sweden and Finland's interoperability and intelligence sharing with NATO allies, and modern military capabilities. He also said their strategic locations would limit Russian military adventurism. With Finland and Sweden's NATO membership, which is still pending, the famously shallow Baltic Sea would be surrounded almost exclusively by alliance countries, with Russia maintaining its access through naval sites in Kaliningrad in the south and the St. Petersburg region at the far eastern end. "So from a Russian perspective that would be very problematic for them, militarily speaking, and it would be very advantageous to NATO," Milley said. "The Baltic Sea is a very important area strategically, but the purpose of the alliance is not offensive, its purpose is defensive."

Over the next few days, U.S. Marines will rehearse their core task, an amphibious assault, against enemy beachheads on nearby islands. With Russia's Baltic Sea fleet based in Kaliningrad 300 miles away, Russian seizures of neighboring islands is a scenario Sweden fears and prepares for. On Saturday, reporters accompanied Milley on a tour of the Kearsarge that highlighted how its forces would perform an amphibious assault. The ship or any of the rotary wing aircraft from its massive flight deck could bombard an enemy beachhead with ordnance before Marines would make an amphibious landing. A Marine Cobra pilot, Capt. Ryan Mortensen, told Milley his helicopter was armed with sidewinder missiles that have a two-mile range, air-to-ground 2.75-inch unguided rockets and a 652-round Gatling gun. Mortensen, whose job is to "clear out the zone" before the ship's Ospreys will land assault troops, said he can communicate easily with allied troops.

"We have two radios, and we'll be speaking with other forces from our armed allies on a common frequency, talking directly to personnel who are controlling fires from the ground, clearing us hot," he said. "Foreign nations have joint tactical air controllers and they'll be calling in fires." Interoperability takes practice, though. Transiting into the Stockholm harbor was tricky, with sometimes less than 10 feet of water under the Kearsarge's keel. Steering the ship, whose pilot house is off-center to accommodate its flight deck, meant three Swedish mariners had to visit the ship a week in advance to practice steering it into port.

“That’s probably the most difficult transit we’ve done,” said Tera Geoffroy, a Navy lieutenant junior grade aboard the ship. All NATO members must approve the two Nordic nations’ bids to join the alliance, which were propelled by Russia’s invasion of Ukraine. Turkey has said it won’t allow their accession unless certain steps are taken, raising questions about the actions NATO allies will take with Finland and Sweden as negotiations drag on.

Andersson told reporters Saturday she’s spoken with Turkey’s president, Recep Tayyip Erdogan, as part of a dialogue over Turkey’s concerns that Sweden harbors Kurdish groups Turkey considers terrorists, and she defended Sweden’s laws as tough on terrorists. Meanwhile, uptick in exercises is already in the works. U.S. President Joe Biden and Defense Secretary Lloyd Austin are having U.S. European Command work with NATO to “develop options to modestly increase” previously planned drills, Milley said. “We’re looking at things that we can do on the ground, with either Marines, or Army. There are things we can do with special operations forces, things we can do with air or maritime forces,” Milley said. Meanwhile, Swedish Defense Minister Peter Hultqvist said aboard the Kearsarge that a series of planned multinational exercises with naval and air elements will send a strong signal that Sweden is willing to act with its friends. “I see a future here with a lot of exercises that makes our part of Europe more secure and can fulfill what we need during this time of sensitivity, from now and until we are full members of NATO,” he said.

Already, the Kearsarge is one of a number of U.S. ships that have sailed to European waters since Russia’s invasion of Ukraine. Part of the Kearsarge Amphibious Ready Group, it deployed from Naval Station Norfolk on March 16 with elements of the 22nd Marine Expeditionary Unit, meant to serve as a multi-mission “sea-based, expeditionary crisis response force,” the Navy said. The Kearsarge and other ships have been participating in international drills in the Baltic Sea region and elsewhere in Europe for more than a month, aimed at showing allied interoperability and high-end maritime warfare capabilities. On a single day in late May, the Kearsarge was in Talinn, Estonia, while the guided-missile destroyer Paul Ignatius was in Haakonsvern, Norway; the destroyer Gravely and amphibious dock landing ship Gunston Hall were in Helsinki; and the guided-missile destroyer Jason Dunham was in Durres, Albania, according to 6th Fleet, which is headquartered in Naples.

While in Talinn, the Kearsarge and elements of the 22nd MEU drilled in the Estonian-led Siil exercise – “a multi-day, force-on-force exercise, as well as the execution of a vertical assault raid,” according to the Navy – that took them to about 15 miles from the Russian border, to the town of Võru. It participated in exercise Northern Viking 2022 in Keflavik, Iceland, on April 2, with the Gunston Hall and amphibious transport dock ship Arlington. With France, Germany, Iceland, Norway, Portugal and the UK, they practiced amphibious landings, search and rescue, and humanitarian assistance operations. From there, the Kearsarge made two port visits to Tromso, Norway, 217 miles north of the Arctic Circle. The ship crossed the Arctic Circle on April 7, which was a challenge because of the weather, its commanding officer said in an update to families of its crew, posted to Facebook late last month. “Operating there was tough, The weather changed in seconds. Often it felt like the weather came up out of the ocean all around us. We spent a lot of time in low visibility, with low cloud cover, in fog and blizzard-like conditions,” Capt. Tom Foster said in the note. “Learning how to operate safely with our NATO parters was the mission, and we executed.”

https://www.defensenews.com/global/europe/2022/06/04/major-baltic-sea-exercise-kicks-off-as-swedish-finnish-nato-bids-wait-on-turkey/

INDIA TODAY

Mon, 06 Jun 2022

US, South Korea Fire Missiles to Sea, Matching North Korea's Launches

The US and South Korean militaries launched eight ballistic missiles into the sea Monday in a show of force matching a North Korean missile display a day earlier that extended a provocative streak in weapons demonstrations. South Korea's Joint Chiefs of Staff said the allies' live-fire exercise involved eight Army Tactical Missile System missiles fired into South Korea's eastern waters across 10 minutes. It said the drill was aimed at demonstrating an ability to respond swiftly and accurately to North Korean attacks. The South's military on Sunday detected North Korea firing eight short-range missiles over 35 minutes from at least four different locations, including from western and eastern coastal areas and two inland areas north of and near the capital, Pyongyang, in what appeared to be a single-day record for the country's ballistic launches. It was North Korea's 18th round of missile tests in 2022 alone — a streak that included the country's first launches of intercontinental ballistic missiles in nearly five years.

South Korean and U.S. officials also say North Korea is preparing to conduct its first nuclear test since September 2017 as leader Kim Jong Un pushes a brinkmanship aimed at cementing the North's status as a nuclear power and negotiating economic and security concessions from a position of strength. U.S. and South Korean forces conducted a similar live-fire drill following North Korea's previous ballistic launches on May 25, which South Korea's military said involved an ICBM flown on medium-range trajectory and two short-range weapons.

Those tests came as Biden wrapped up his trip to South Korea and Japan, where he reaffirmed the U.S. commitment to defend both allies. North Korean state media have yet to comment on Sunday's launches. They came after the U.S. aircraft carrier Ronald Reagan concluded a three-day naval drill with South Korea in the Philippine Sea on Saturday, apparently their first joint drill involving a carrier since November 2017, as the countries move to upgrade their defense exercises in the face of North Korean threats. North Korea has long condemned the allies' combined military exercises as invasion rehearsals and often countered with its own missile drills, including short-range launches in 2016 and 2017 that simulated nuclear attacks on South Korean ports and U.S. military facilities in Japan. Hours after the North Korean launches, Japan and the United States conducted a joint ballistic missile exercise aimed at showing their “rapid response capability” and “strong determination” to counter threats, Japan's Defense Ministry said.

The United States has vowed to push for additional international sanctions if North Korea conducts a nuclear test, but the prospects for meaningful new punitive measures are dim with the U.N. Security Council's permanent members divided. Russia and China vetoed a U.S.-sponsored resolution that would have imposed additional sanctions on North Korea over its latest ballistic tests on May 25, insisting that Washington should instead focus on reviving negotiations with Pyongyang.

Those talks have stalled since 2019 over disagreements in exchanging the release of crippling U.S.-led sanctions for the North's disarmament steps. Despite facing harsh challenges at home, including a decaying economy and a COVID-19 outbreak, Kim has shown no willingness to fully surrender an arsenal he sees as his strongest guarantee of survival. His government has so far rejected the Biden administration's offers for open-ended talks and is clearly intent on converting the dormant denuclearisation negotiations into a mutual arms-reduction process, experts say.

https://www.indiatoday.in/world/story/us-south-korea-fire-missiles-to-sea-north-korea-1958780-2022-06-06

THE ECONOMIC TIMES

Sun, 05 Jun 2022

Spain to Deliver Anti-Aircraft Missiles and Tanks to Ukraine - El Pais

Spain is to supply Ukraine with anti-aircraft missiles and Leopard battle tanks in a step up of its military support to the country, according to government sources cited by newspaper El Pais on Sunday. Spain will also provide essential training to the Ukrainian military in how to use the tanks. It would take place in Latvia, where the Spanish Army has deployed 500 soldiers within the framework of NATO's Enhanced Advanced Presence operation. A second phase of training could take place in Spain, according to the sources cited by El Pais. The paper said Spain's defence ministry is finalising a delivery to Kyiv of low-level Shorad Aspide anti-aircraft missiles, which the Spanish Army has replaced with a more advanced system. Spain has so far supplied ammunition, individual protection equipment and light weapons. Sources told El Pais the offer of increased support was raised when prime minister Pedro Sanchez visited Ukraine and met President Volodymyr Zelenskiy on April 21, but had been delayed by the complexity of the operation.

https://economictimes.indiatimes.com/news/defence/spain-to-deliver-anti-aircraft-missiles-and-tanks-to-ukraine-el-pais/articleshow/92017409.cms

#SWARAJYA

Fri, 03 Jun 2022

Adani Defence & Aerospace to Set Up South Asia's Largest Integrated Ammunition Manufacturing Complex in Kanpur, Uttar Pradesh

Adani Defence & Aerospace announced today (Jun 3) that it will set up South Asia's largest integrated ammunition manufacturing complex in defence industrial corridor of Uttar Pradesh.

The UP Government signed a memorandum of understanding (MoU) with the Adani Defence & Aerospace in regard during the investment summit at Lucknow on Friday. "This is the largest private sector investment in UP defence corridor," Gautam Adani, the chairman of the conglomerate, said. "Our large investments are the sign of our confidence that Uttar Pradesh of today will define India of tomorrow," he added. Adani Defence is likely to invest Rs 1500 crore for setting up the state-of-the-art ammunition development and manufacturing complex in Kanpur node of the UP Defence Industrial Corridor.

The complex spread over more than 250 acres will have state-of-the-art technology across small and medium caliber ammunition, along with short-range air defence missiles. Adani Defence has already established India's first unmanned aerial vehicles manufacturing facility, India's first private sector small arms manufacturing facility and is currently in process of setting up India's first comprehensive aircraft MRO facility in Nagpur. The company already has presence in small arms, unmanned aerial systems, radars, defence electronics & avionics, tactical communication systems, and electro-optical systems.

Adani said Prime Minister Narendra Modi is building a new India that works to restore its past glory. He credited CM Yogi Adityanath with building a foundation on which UP's trillion-dollar economy will be built. "Honourable Prime Minister from the day you became chief minister of Gujarat I had the privilege to have closely observed as you conceptualised, executed and institutionalised an economic model driven by tremendous focus on industrialisation and balanced development for all now as the prime minister you are implementing the same Gujarat model across the country and the effect is transformational," Adani said.

"Uttar Pradesh is a symbol of this quantum leap forward," he added. Prime Minister Narendra Modi addressed the "ground-breaking" ceremony of the investors' summit. On the occasion, the Prime Minister laid the foundation stone of 1,406 projects worth over Rs 80,000 crore in the state.

https://swarajyamag.com/news-brief/adani-defence-aerospace-to-set-up-south-asias-largest-integrated-ammunition-manufacturing-complex-in-kanpur-uttar-pradesh

WION

Fri, 03 Jun 2022

Anti-Hypersonic Tech? China Claims it has Developed AI Powered Defence Against Hypersonic Missiles

China's AI-powered air defence system to track hypersonic missiles

According to reports, Chinese scientists have developed technology which can predict the course of a hypersonic glide missile as it hits the target in what can be called an anti-hypersonic technology. China has been working on hypersonic technology for years. A rocket is used to launch a hypersonic glide vehicle when it hits a target. It is almost impossible to track the path of the hypersonic missile due to its unpredictable trajectory.

However, according to Chinese researchers, an AI-powered air defence system can reportedly predict the trajectory of the missile and launch a counterattack within minutes.

China's new hypersonic air-breathing engine

As China, Russia and the US along with the North Korea battle each other in hypersonic technology, reports say China has tested a new air-breathing engine during a simulated flight test achieving hypersonic speed. The new innovation would reportedly help to power a plane or a missile upto to five times the speed of sound, or maybe even faster and the rotating detonation engine could provide both velocity and fuel economy in the future.

Is YJ-21 more powerful than DF-21D missile?

The YJ-21 is reportedly a ship-launched version of the ground-based DF-21D missile. China had earlier tested anti-ship ballistic missiles in the Xinjiang desert. US believes China is developing weapons to neutralise American warships. China wants to develop long-range precision strikes against ships US Navy regularly conducts operations in South China Sea which angers Beijing. China claims the majority of South China Sea islands. Taiwan is another point of friction between the US and China.

China has been developing anti-ship missiles for years

China has been developing anti-ship missiles for years, including ones capable of taking out aircraft carriers. In November satellite pictures showed what appeared to be full-scale outlines of American warships including an aircraft carrier, satellite imagery showed, possible targets to practise striking some of the most potent US weapons deployed in the Pacific. The US Navy's carrier battle groups - centered around massive aircraft carriers -- are among the most powerful weapons in the American arsenal.

NASA's hypersonic missiles

According to reports, NASA is working on creating a new hypersonic missile which can optimise missiles for maximum range and destruction. The technology allows the AI component to use the result of computational fluid dynamic (CFD) to work around a design of a scramjet missile. As a result, the hypersonic missile would be faster with a longer range than any missile produced by other nations. According to technology writer Will Lockett hypersonic missiles travel at over Mach 5 speed. Lockett explains: "Scramjet stands for supersonic combustion ramjet, and they work in exactly the same way as a jet on a plane, except with no moving parts." The US recently tested the DARPA HAWC (Hypersonic Air-breathing Weapon Concept), Lockett informs. He says the scramjet hypersonic missile is set to be next-generation technology which the US is working on. NASA's AI can therefore design a hypersonic missile that is far faster and with greater range.

US joins hypersonic race

Amid the Ukraine war, the US military said it has tested a new hypersonic missile. The US conducted an aircraft-launched hypersonic missile test. The missile maintained a speed of more than Mach 5, or five times the speed of sound. Hypersonic missiles pose a potential threat to the global military balance. They can deliver nuclear weapons precisely on target at speeds too fast to intercept.Weapons travelling at hypersonic speed allow attackers to overcome defence installations.

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Hypersonic systems built for the kill

Hypersonic systems are designed to operate in contested environments and must be capable of overcoming a wide range of defenses with the system moving at a mile every second needs to operate with an incredible degree of precise maneuverability. Basic operations like communications become a significant challenge during hypersonic flight. The system has to maintain connectivity to operators and decision makers through a global communications and sensor systems. The missile was built with tactical hardware and instrumented to collect thermal, mechanical and digital data from the flight vehicle through a telemetry stream and an on-board data recorder.

https://www.wionews.com/photos/anti-hypersonic-tech-china-claims-it-has-developed-ai-powered-defence-against-hypersonic-missiles-484715#hypersonic-systems-built-for-the-kill-368804

Sun, 05 Jun 2022

North Korea Launches Unidentified Ballistic Missile: Seoul

Seoul, South Korea:

North Korea launched multiple ballistic missiles into waters off its east coast Sunday, South Korea's military said, a day after Seoul and Washington completed their first joint drills involving a US aircraft carrier in more than four years. Pyongyang has doubled down on upgrading its weapons programme this year, despite facing crippling economic sanctions. "Our military detected eight short-range ballistic missiles fired from the Sunan area in Pyongyang, North Korea into the East Sea," Seoul's Joint Chiefs of Staff said, referring to the Sea of Japan.

The launches took place over about 30 minutes on Sunday morning, it added."While our military has strengthened surveillance and vigilance in preparation for additional launches, South Korea and the United States are closely cooperating and maintaining a full readiness posture." The launches took place at multiple locations, Tokyo said, adding that Pyongyang had tested missiles at "unprecedently high frequency" this year. "We can say the very large number of launches from at least three locations in a short period of time like this time is unusual," Japanese Defence Minister Nobuo Kishi said, confirming the North fired at least six missiles.

"This is absolutely unacceptable," he added. The launches came barely a day after South Korea and the United States wrapped up large-scale, three-day exercises involving the USS Ronald Reagan, a 100,000-tonne nuclear-powered aircraft carrier. They were the allies' first joint

military drills since South Korea's hawkish new President Yoon Suk-yeol took office last month, and the first involving an aircraft carrier since November 2017. Pyongyang has long protested against the joint exercises, calling them rehearsals for invasion.

"The exercise consolidated the two countries' determination to sternly respond to any North Korean provocations while demonstrating the US commitment to provide extended deterrence," the Joint Chiefs of Staff said in a statement. Go Myong-hyun, a researcher at the Asan Institute for Policy Studies, said Sunday's launch was likely a response to the US-South Korea manoeuvres. "It seems that they fired eight missiles because the scale of the joint drills has expanded in their view," he told AFP.

Nuclear test

Last month, during a summit with Yoon, US President Joe Biden said Washington would deploy "strategic assets" if necessary as part of efforts to bolster deterrence. Pyongyang test-fired three missiles, including possibly its largest intercontinental ballistic missile, the Hwasong-17, just days after Biden left South Korea following his summit with Yoon. US and South Korean officials have warned for weeks that Pyongyang may conduct a seventh nuclear test. Despite struggling with a recent Covid-19 outbreak, North Korea has resumed construction on a long-dormant nuclear reactor, new satellite imagery has indicated. South Korea's presidential office said last month that Pyongyang had carried out tests of a nuclear detonation device in preparation for its first nuclear test since 2017. Long-range and nuclear tests have been paused since North Korean leader Kim Jong Un met then US president Donald Trump for a bout of high-profile negotiations that collapsed in 2019.

But Pyongyang has since abandoned this self-imposed moratorium, carrying out a blitz of sanctions-busting weapons tests this year, including firing an intercontinental ballistic missile (ICBM) at full range. Analysts have warned Kim could speed up nuclear testing plans to distract North Korea's population from the disastrous coronavirus outbreak.

https://www.ndtv.com/world-news/north-korea-launches-unidentified-ballistic-missile-seoul-3039216

Press Information Bureau
Government of India

Ministry Of Science And Technology

Sun, 05 Jun 2022 6:47 PM

Prime Minister Narendra Modi Leading the Global Climate Movement: Union Minister Dr Jitendra Singh

The World is ready to be led by India in its fight against climate change:Dr Jitendra Singh

Greater clean energy production will meet the twin goals of 'Atmanirbhar Bharat' and Make-in-India: Union Minister

Mass awareness movement necessary to produce green biofuel from waste cooking oil: Dr Jitendra Singh

Prime Minister Narendra Modi is leading the global climate movement and the World is ready to be led by India in its fight against climate change- a concern that like the COVID pandemic; knows no borders, respects no wealth or any other artificial human division. The responsibility to equip us to fulfil this leadership role lies on the shoulders of women and men of our scientific community. The Union Minister Dr Jitendra Singh made this statement while addressing scientists at the Indian Institute of Petroleum at Dehradun today.

The Union Minister of State (I/C) Science & Technology; Minister of State (I/C) Earth Sciences; MoS PMO, Personnel, Public Grievances, Pensions, Atomic Energy and Space, Dr Jitendra Singh said that it was a happy coincidence on the World Environment Day that he was at an institution that represents the commitment of a modern and new India to protect the environment and find alternate indigenous sources of energy.

The Union Minister said that the last 8 years have witnessed the Indian crusade against climate change. We have already achieved our commitment of 40% energy production from renewable sources, way ahead of the 2030 Paris Agreement target. Dr Jitendra Singh added that Prime Minister Shri Narendra Modi is leading the global climate movement and other world leaders have followed suit. He added that apart from the thrust on renewable energy from solar and hydel, the Prime Minister announced major strides in Hydrogen energy from the ramparts of the Red Fort recently. The Minister said that this lays out the roadmap of our collective intention to fight for preserving the environment.

As a science researcher himself, the Union Minister said, one must speak with evidence. The Minister said that the project by CSIR-IIP for creating bio-diesel from waste cooking oil is one of many examples at the CSIR lab which demonstrate our national intent. The Union Minister

urged the scientific community to work towards making it a mass movement. Dr Singh said it must dawn on our people that they can make Rs 30 per litre from a waste cooking oil that they routinely throw out. The Minister added that we know now that we throw out more carbon than we need for our energy. Innovative ways to use this waste would meet the twin goals of 'Atmanirbhar Bharat' and Make-in-India. The curiosity engendered in the masses would lead to awareness and that will lead to the application of science and ease of living.

Dr Jitendra Singh said that after a long time, the political leadership and scientific community are working in tandem. The government is guided in all its actions by scientific priorities. The Minister added that the Research community must come together with academia and industry to be useful to the common people in their fight to secure dignity. The Union Minister called on the scientists to work closely with their stakeholders in government agencies and private entities. He said that it has become a practice in the Union Government to hold inter-ministerial meetings to create synergy. Dr Singh said that the atomic energy sector is a prime example of such collaboration. The Union Minister added that India is now a hub for the start-up ecosystem. However, he cautioned that we must not remain limited to IT-enabled services and that we must be open to the untapped opportunities in the Agrotech sector.

Dr Jitendra Singh said that it is clear that the world is facing a triple challenge: the earth is heating up faster than expected, we are losing habitat and species diversity; and the pollution continues unabated. He concluded by saying that, as we look towards the centenary of our freedom 25 years from now, we must work for the cause of generating clean energy cost-effectively.

https://www.pib.gov.in/PressReleasePage.aspx?PRID=1831341

Sun, 05 Jun 2022

Atomic-Scale Window into Superconductivity Paves Way for Advanced New Quantum Materials

New technique helps researchers understand unconventional superconductors. One of nature's most fascinating quantum phenomena is superconductivity. When a superconducting material is cooled below its critical temperature, electricity can flow without any losses and magnetic fields are expelled. These remarkable properties make superconductors very useful in a wide range of applications including magnetic levitation, magnetic resonance imaging (MRI), nuclear magnetic resonance (NMR), particle accelerators, particle detectors, power transmission, and much more.

Now, a new breakthrough in probing unconventional superconductors and understanding quantum materials could lead to new technologies for quantum computing. Superconductors are materials with no electrical resistance whatsoever, commonly requiring extremely low temperatures. They are used in a wide range of domains, from medical applications to a central role in quantum computers. Superconductivity is caused by specially linked pairs of electrons known as Cooper pairs. So far, the occurrence of Cooper pairs has been measured indirectly

macroscopically in bulk, but a new technique developed by researchers at Aalto University and Oak Ridge National Laboratories in the US can detect their occurrence with atomic precision.

The experiments were carried out by Wonhee Ko and Petro Maksymovych at Oak Ridge National Laboratory with the theoretical support of Professor Jose Lado of Aalto University. Electrons can quantum tunnel across energy barriers, jumping from one system to another through space in a way that cannot be explained with classical physics. For example, if an electron pairs with another electron right at the point where a metal and superconductor meet, it could form a Cooper pair that enters the superconductor while also "kicking back" another kind of particle into the metal in a process known as Andreev reflection. The researchers looked for these Andreev reflections to detect Cooper pairs.

To do this, they measured the electrical current between an atomically sharp metallic tip and a superconductor, as well as how the current depended on the separation between the tip and the superconductor. This enabled them to detect the amount of Andreev reflection going back to the superconductor, while maintaining an imaging resolution comparable to individual atoms. The results of the experiment corresponded exactly to Lado's theoretical model.

This experimental detection of Cooper pairs at the atomic scale provides an entirely new method for understanding quantum materials. For the first time, researchers can uniquely determine how the wave functions of Cooper pairs are reconstructed at the atomic scale and how they interact with atomic-scale impurities and other obstacles. "This technique establishes a critical new methodology for understanding the internal quantum structure of exotic types of superconductors known as unconventional superconductors, potentially allowing us to tackle a variety of open problems in quantum materials," Lado says. Unconventional superconductors are a potential fundamental building block for quantum computers and could provide a platform to realize superconductivity at room temperature. Cooper pairs have unique internal structures in unconventional superconductors which so far have been challenging to understand.

This discovery allows for the direct probing of the state of Cooper pairs in unconventional superconductors, establishing a critical new technique for a whole family of quantum materials. It represents a major step forward in our understanding of quantum materials and helps push forward the work of developing quantum technologies.

https://scitechdaily.com/atomic-scale-window-into-superconductivity-paves-way-for-advanced-new-quantum-materials/amp/

The Indian EXPRESS

Mon, 06 Jun 2022

Explained: How Ceramic Implants can Regenerate Broken Bones

When people need a bone replacement following a fracture, it is often based on a metal part. But metal parts are sometimes toxic over time, and will not help the original bone regrow.Calcium phosphate ceramics, the Tokyo Medical and Dental University (TMDU) noted in a press release, are in principle an ideal alternative to conventional metals because bone can eventually replace

the ceramic and regrow. Calcium phosphate ceramics are substitutes for the bone mineral hydroxyapatite. However, applications of such ceramics in medical settings have been limited, because there is insufficient control over the rate of absorption and replacement by bone after implantation.

Now, in a study recently published in Science and Technology of Advanced Materials, researchers from TMDU and collaborators have studied the transformation of a ceramic into the bone mineral. This work will help move bone regeneration research from laboratories to medical use. “Medical professionals have long sought a means of healing bone fractures without using implanted medical devices, but the underlying science that can make this dream a reality isn’t yet fully elaborated. Our careful analysis of the effect of the ceramic’s ester alkyl chain length on hydroxyapatite formation, in a simulated body fluid, may help develop a novel bone-replacement biomaterial,” the release quoted lead author Taishi Yokoi as saying. The researchers have reported that most of the studied ceramics underwent chemical transformations into particulate or fibrous hydroxyapatite within a few days“We now have specific chemical knowledge on how to tailor the rate of hydroxyapatite growth from calcium phosphate ceramics. We expect that this knowledge will be useful for bench researchers and medical practitioners to more effectively collaborate on tailoring bone reformation rates under medically relevant conditions,” Yokoi was quoted as saying.

The releases said the results of this study are important for healing bone fractures after surgery. By using chemical insights to optimise the rate of bone reformation after implantation of calcium phosphate ceramics, patient outcomes will improve, and returns to the hospital years later for further repairs will be minimised, it said.

https://indianexpress.com/article/explained/explained-how-ceramic-implants-can-regenerate-broken-bones-7954526/

DH DECCAN HERALD

Sun, 05 Jun 2022

1.2m Trisonic Wind Tunnel at NAL Completes 55 Glorious Years

The National Aerospace Laboratories (NAL) on Sunday commemorated the 55 years of the 1.2 metre trisonic wind tunnel which is the only industrial wind tunnel in the country providing high-speed aerodynamics data for the national aerospace programmes in both civil and military sectors. The facility, which was built in Bengaluru between 1963 and 67 by the Council of Scientific and Industrial Research (CSIR), has been a test facility for many missiles, launch vehicles and aircraft developed by the Defence Research and Development Organisation (DRDO) and Indian Space Research Organisation (ISRO).

That apart, India’s first Light Combat Aircraft (LCA-TEJAS) was conceived at this facility and many weapon integration programmes on LCA, Mirage-2000, Sukhoi-30, Jaguar, and MiG aircraft were also successfully carried out here. “This facility has completed 55 years of glorious service to the nation and has crossed the milestone of 55,000 blowdowns which is a very

commendable achievement indeed. The facility shall continue to meet the experimental aerodynamic data requirement of future programmes," the NAL said in a statement.

https://www.deccanherald.com/state/12m-trisonic-wind-tunnel-at-nal-completes-55-glorious-years-1115592.html

THE ECONOMIC TIMES

Sun, 05 Jun 2022

China Launches Mission to Complete Space Station Assembly

China on Sunday launched a new three-person mission to complete assembly work on its permanent orbiting space station. The Shenzhou 14 crew will spend six months on the Tiangong station, during which they will oversee the addition of two laboratory modules to join the main Tianhe living space that was launched in April 2021. Their spaceship blasted off from the Jiuquan Satellite Launch Center on the edge of the Gobi Desert at 10:44 a.m. (0244 GMT) atop the crewed space flight program's workhorse Long March 2F rocket. Commander Chen Dong and fellow astronauts Liu Yang and Cai Xuzhe will assemble the three-module structure joining the existing Tianhe with Wentian and Mengtian, due to arrive in July and October. Another cargo craft, the Tianzhou-3, remains docked with the station.

https://economictimes.indiatimes.com/news/international/world-news/china-launches-mission-to-complete-space-station-assembly/articleshow/92014022.cms?from=mdr