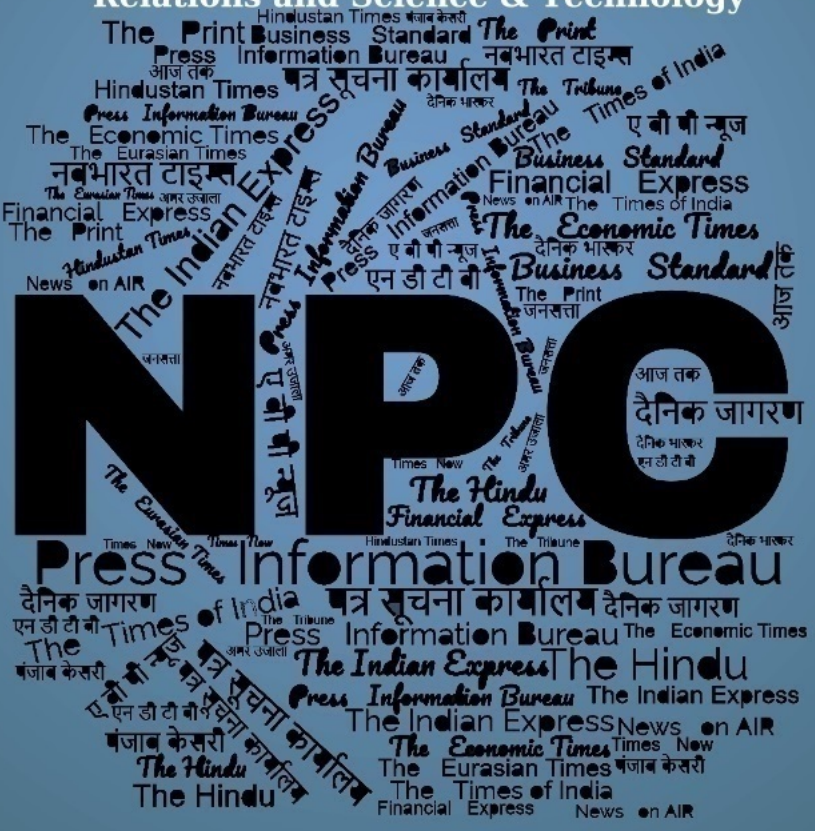
जून
June
2024

खंड/Vol. : 49 अंक/Issue :115
22-24/06/2024

# समाचार पत्रों से चयनित अंश
# Newspapers Clippings

डीआरडीओ समुदाय को डीआरडीओ प्रौद्योगिकियों, रक्षा प्रौद्योगिकियों, रक्षा नीतियों, अंतर्राष्ट्रीय संबंधों और विज्ञान एवं प्रौद्योगिकी की नूतन जानकारी से अवगत कराने हेतु दैनिक सेवा

**A Daily service to keep DRDO Fraternity abreast with DRDO Technologies, Defence Technologies, Defence Policies, International Relations and Science & Technology**




रक्षा विज्ञान पुस्तकालय
**Defence Science Library**
रक्षा वैज्ञानिक सूचना एवं प्रलेखन केंद्र
**Defence Scientific Information & Documentation Centre**
मेटकॉफ हाउस, दिल्ली - 110 054
**Metcalfe House, Delhi - 110 054**

# CONTENTS

**DRDO News**

**DRDO Technology News**

अमर उजाला

***Sat, 22 Jun 2024***

# **Indian Navy:** समुद्री सीमा को और सुरक्षित बनाने की पहल, डीआरडीओ से चार तापस ड्रोन खरीदेगी भारतीय नौसेना

भारतीय नौसेना समुद्री क्षेत्र पर निगरानी और चौकस करने के लिए रक्षा अनुसंधान एवं विकास संगठन की तरफ से विकसित किए गए ड्रोन का इस्तेमाल करना चाहती है। रक्षा अधिकारियों ने जानकारी देते हुए बताया, कि भारतीय नौसेना चार तापस ड्रोन का ऑर्डर देने जा रही है और भारतीय नौसेना इन ड्रोन का समुद्री निगरानी अभियानों के लिए इस्तेमाल करेगी। इस ड्रोन का निर्माण भारत इलेक्ट्रॉनिक्स लिमिटेड (बीईएल) और हिंदुस्तान एयरोनॉटिक्स लिमिटेड (एचएएल) के एक समूह की तरफ से किया जाएगा।

24 महीने के अंदर तैयार होगा पहला ड्रोन

रक्षा अधिकारियों ने बताया, समूह की तरफ से डिलीवरी तेजी से की जाएगी, क्योंकि पहला ड्रोन अनुबंध पर हस्ताक्षर करने के 24 महीने के भीतर डिलीवरी के लिए तैयार हो जाएगा। इस ड्रोन का इस्तेमाल परीक्षण करने और उनकी क्षमताओं को बेहतर बनाने के लिए किया जाएगा। तापस ड्रोन परीक्षण में रक्षा बलों की आवश्यकताओं को पूरा करने में सक्षम नहीं रहे हैं, लेकिन डीआरडीओ के तापस ड्रोन प्रोजेक्ट को मध्यम-ऊंचाई, लंबी-धीरज (एमएएलई) को और विकसित करने के लिए कर रहा है।

कुछ ड्रोन नहीं पूरा कर पाए थे मिशन

बता दें कि एयरोनॉटिकल डेवलपमेंट एस्टेब्लिशमेंट लेबोरेटरी की तरफ से विकसित किए जा रहे तापस ड्रोन लगातार 24 घंटे से अधिक समय तक 30 हजार फीट की ऊंचाई पर उड़ान भरने की संयुक्त सेवा गुणात्मक आवश्यकताओं को पूरी तरह से पूरा नहीं कर पाए हैं। और यही वजह है कि उन्हें मिशन मोड परियोजनाओं की श्रेणी से बाहर रखा गया है। तापस ड्रोन का परीक्षण रक्षा बलों की तरफ से किया गया है और इस परीक्षणों के दौरान ड्रोन 28 हजार फीट की ऊंचाई तक पहुंचने में सफल रहे और 18 घंटे से अधिक समय तक उड़ान भर पाया।

चित्रदुर्ग में भारतीय नौसेना ने किया था परीक्षण

वहीं भारतीय नौसेना के अधिकारियों की तरफ से कर्नाटक के चित्रदुर्ग में एक हवाई क्षेत्र से एक परीक्षण के दौरान ड्रोन को उड़ान भरने के बाद कुछ घंटों के लिए अरब सागर के ऊपर चलाया गया था। सूत्रों के मुताबिक, तापस ड्रोन को उड़ान भरने के लिए जरूरी रनवे की लंबाई बहुत लंबी नहीं है और इसका उपयोग द्वीप क्षेत्रों और मुख्य भूमि के कुछ छोटे हवाई क्षेत्रों से किया जा सकता है।

https://www.amarujala.com/india-news/indian-navy-to-order-four-made-in-india-tapas-drones-from-drdo-2024-06-22

ANI
South Asia's Leading Multimedia News Agency

***Sun, 23 Jun 2024***

# Indian Navy to order four Made-in-India Tapas drones from DRDO

In a major boost to enhancing indigenous unmanned surveillance capabilities of defence forces , the Indian Air Force has made a proposal to the central government to buy 10 Tapas drones, officials said on Sunday. Out of the 10, six Made-in-India drones would be for the Indian Air Force, while the remaining four would be for the Indian Navy, defence officials told ANI.

The Indian Air Force will be the lead agency for the induction and acquisition of the Tapas drones into the defence forces, they said. The proposal by the IAF is expected to be soon taken up for discussion by the Defence Ministry. These two forces are only buying the drones at the moment, the officials said.

Tapas drones are medium-altitude long, endurance-category drones that have been developed indigenously by the Defence Research and Development Organisation and have to be manufactured by a consortium of Bharat Electronics Limited and Hindustan Aeronautics Limited.

The drones have not been able to meet the requirements of the defence forces but the limited inductions by the services are going to help them be upgraded and refined in the near future to meet larger requirements, the officials said. The IAF has a fleet of Israeli-origin Searcher, Heron Mark-1 and Mark-2 drones and is looking to induct the American Predator MQ-9B drones in the future as part of a tri-services acquisition.

The six indigenous Tapas drones would help it improve unmanned surveillance on both the northern and western fronts, they said. In recent times, the Indian Air Force has emerged as one of the staunchest supporters of Make in India in Defence, with orders for 180 LCA Mark 1A and 156 LCH attack choppers worth around Rs 1.6 lakh crore getting placed or are about to be placed by it. The Indian Navy intends to use the Tapas for surveillance activities over the maritime zone. The deliveries would be made faster by the consortium as the first bird would be ready for delivery within 24 months of signing the contract, they said.

DRDO is continuing with the Tapas project to further develop the system. The Tapas drones being developed by the Aeronautical Development Establishment Laboratory have not been able to fully meet the Joint Services Qualitative Requirements of flying at 30,000 feet for over 24 hours at a stretch and have been excluded from the category of mission mode projects. The Tapas drones have been tested by the defence forces and during the trials, they managed to reach 28,000 feet altitude and could fly for over 18 hours.

https://www.aninews.in/news/national/general-news/iaf-to-acquire-6-tapas-drones-lead-military-acquisition-for-made-in-india-uavs20240623180601/

# Defence News

# Defence Strategic: National/International

Press Information Bureau
Government of India

**Ministry of Defence**

***Sat, 22 Jun 2024***

## SAMEER, MeitY and MCTE, Indian Army Forge Strategic Partnership For Technological Advancement

In a landmark event today, Military College of Telecommunication Engineering (MCTE), Indian Army and Society for Applied Microwave Electronics Engineering & Research (SAMEER), an autonomous R&D laboratory under the Ministry of Electronics & Information Technology (MeitY) signed a Memorandum of Understanding (MoU) to advance collaboration in 'Next Generation Wireless Technologies for Indian Army'. The MoU was signed by Lt Gen K H Gawas, Commandant MCTE and Colonel Commandant Corps of Signals and Dr P H Rao, Director General SAMEER. The event was conducted in the esteemed presence of Shri S K Marwaha, Group Coordinator MeitY, and Maj Gen C S Mann, AVSM, VSM, Additional Director General of Army Design Bureau, Indian Army, reflecting the importance of this strategic initiative for the nation's defence and technological landscape.

This initiative marks a significant milestone in strengthening the Indian Army's technological capabilities which is aligned towards declared vision for 2024 as 'Year of Technological Absorption for Indian Army' by Chief of Army Staff

Today's MoU signing is expected to reinvigorate this collaboration, with plans to establish an 'Advanced Military Research and Incubation Centre' at MCTE. This centre aims to focus on Advanced Wireless Technologies for the Indian Army.

The partnership between SAMEER and MCTE is beyond an agreement and represents a shared commitment in exploring new technological frontiers, addressing modern battlefield challenges. Merging SAMEER's expertise in wireless technologies and MCTE's application skills in communications, electronic warfare, and cyber operations, the collaboration promises substantial advancements in defence and strategic sectors.

**The key objectives of this partnership include:**

•**Joint Research and Development.** Collaborative projects will target deployable solutions, leveraging combined expertise in 5G, 6G, advanced cellular technologies, Software Defined Radios & Cognitive Radios, Satellite Communications, Antenna Design, Free Space Optics, and Tropo-scatter communications, as well as AI, Quantum, and military-specific chip design.

•**Incubation Centre.** The centre will support the development of military-specific innovative solutions from conceptualization to large-scale production, involving MSMEs and start-ups.

•In addition, the MoU also aims at knowledge exchange, training and development aspects.

The collaboration between SAMEER and MCTE aims to enhance national security and technological infrastructure, with potential benefits that will not only be limited to military but will go much beyond. The advancements achieved could impact telecommunications, emergency response, and public safety, demonstrating a commitment to a holistic approach to national security.

The signing of this MoU marks a pivotal moment in the partnership between SAMEER and MCTE, signalling a future filled with innovation and collaborative success. This strategic alliance is poised to set new standards for cooperation between government R&D institutions and military educational bodies, driving significant technological progress.

During the MoU signing ceremony, Maj Gen C S Mann, AVSM, VSM, Additional Director General of Army Design Bureau elaborated the Indian Army perspective on absorption of niche technologies. He explained the efforts taken towards creating an ecosystem for development of various emerging technology-based solutions for military applications.

Shri S K Marwaha, Group Coordinator MeitY highlighted various MeitY initiatives for defence and strategic applications. He also elaborated the contributions of SAMEER and CDAC in strategic and defence sectors.

Dr P H Rao, Signatory of the MoU from SAMEER's side, gave the glimpses of volume of work of SAMEER in defence sector along with ambitious vision for the MoU to develop field deployable solutions for Indian Army, especially in critical technological domains.

Lt Gen K H Gawas, PVSM, VSM, Commandant MCTE and Colonel Commandant Corps of Signals, brought out the significance of the MoU and MCTE's expectations from the MoU to develop field deployable solutions in tactical battle area achieved through the collaborative efforts involving MCTE, SAMEER, academia, industry, researchers and startups coming together to develop the ecosystem with whole-of-nation approach.

He expressed confidence that this partnership will pave the way for groundbreaking achievements and set a new standard for collaboration between government R&D institutes and military educational institutions and play an instrumental role in the national initiative of 'Atmanirbhar Bharat'.

https://pib.gov.in/PressReleasePage.aspx?PRID=2028014

Press Information Bureau
Government of India

**Ministry of Defence**

***Sat, 22 Jun 2024***

# INS Sunayna At Port Louis, Mauritius

INS Sunayna on long range deployment to South West IOR, entered Port Louis, Mauritius on 20 Jun 24. Prior entering harbour, the ship was engaged in maritime surveillance of Mauritian EEZ along with Mauritius Coast Guard (MCG) Ship Barracuda and MPF Dornier. The joint EEZ patrol in the region reinforces Indian Navy's shared commitment towards cooperative maritime security in the region.

On arrival, the ship was accorded a warm welcome by MCG Dornier and Mauritius Police Force Band. The ship is on a three day visit to port and engaged in wide range of professional & social interactions, harbour training of MCG personnel, community service, medical camp and sports activities. Joint Yoga session was also conducted onboard INS Sunayna and MNCG Barracuda at Port Louis on the occasion of International Day of Yoga (IDY 2024), bringing together personnel from Indian Navy and National Coast Guard, Mauritius. More than 200 personnel including Indian diaspora and memebers of High Commission of India participated in the event promoting holistic wellness and harmony. The ship will remain open to visitors on 22 Jun 24.

The visit of INS Sunayna strengthens maritime security cooperation and bilateral ties between the two nations of the region.

https://pib.gov.in/PressReleasePage.aspx?PRID=2027843

Press Information Bureau
Government of India

**Ministry of Defence**

***Fri, 21 Jun 2024***

# India’s pursuit for Aatmanirbharta in Defence crucial for achieving Strategic Independence: CDS

## Gen Anil Chauhan inaugurates the maiden Armed Forces BEML Synergy Meet 2024

India’s pursuit of defence indigenisation and self-reliance is crucial for achieving strategic independence in the defence sector. This was stated by Chief of Defence Staff Gen Anil Chauhan while addressing the maiden Armed Forces BEML Synergy Meet 2024 on June 21, 2024 in New Delhi. Chief of the Air Staff, Air Chief Marshal VR Chaudhari along with senior officials from Army, Navy, Air Force and Coast Guard also attended the event.

Underlining the objectives of Aatmnirbharta in defence, Gen Anil Chauhan said, “The concept of Atmanirbharta underscores our aim to attain autonomy in defence production and establish an ecosystem that positions India as a leading global defence exporter.”

This first of its kind event was aimed at deepening understanding and delivering cutting-edge solutions to meet military needs in the near future and to further strengthen Aatmnirbharta in defence.

Gen Anil Chauhan commended BEML for their efforts and endorsed the collaborative development of indigenous defence equipment. He emphasized the importance of joint integration to achieve synergy in line with the Government of India’s agenda for military modernization.

The event served as a platform for open interactions, strengthening the relationships between BEML and the armed forces. These discussions were aimed at fostering mutual growth and ensuring that the defence sector can meet the evolving challenges and demands of modern military operations with the equal collaboration from Defence PSU like BEML.

CMD BEML Shri Shantanu Roy in his address reiterated the commitment of the defence PSU to enhancing the nation’s indigenization efforts in army vehicles and solutions. He said, the synergy meet will provide valuable insights into the evolving needs of the Army, Navy and Air Force, and we stand ready with our research and execution capabilities to meet these requirements.”

The synergy meet paved the way for future collaborations, enhancing the efficiency and effectiveness of defence solutions and contributing to the nation’s security and technological advancement.

https://pib.gov.in/PressReleasePage.aspx?PRID=2027734

THE ECONOMIC TIMES

***Mon, 24 Jun 2024***

# Indian envoy visits Berighat Air Base to meet IAF contingent in Egypt

The defence cooperation between India and Egypt continues to strengthen with the fourth joint exercise between the Air Forces of the two nations being held from June 21-26. India's Ambassador to Egypt, Ajit Gupte, visited Berighat Air Base to interact with the Indian Air Force (IAF) contingent.

In a post on X, Indian Embassy in Egypt stated, "India-Egypt defence cooperation continue to strengthen, with 4th joint exercises b/w IAF and EAF being held in Egypt from 21 to 26 June 2024. Amb @AjitVGupte visited Berighat Air Base to interact with IAF contingent. C 17, IL-78 and Rafales are participating in HOPEX with EAF."

Egyptian President Abdel Fattah El-Sisi congratulated Prime Minister Narendra Modi on his victory in the Lok Sabha elections. El-Sisi expressed Egypt's aspiration for joint work in the coming years to open new horizons for Cairo-Delhi ties. Taking to X, El Sisi wrote, "I extend

my sincere congratulations to Mr Narendra Modi, Prime Minister of India, on the occasion of the Indian people's renewed confidence in their leadership for a new term. Wishing the Indian Prime Minister success and the friendly people of India further development and prosperity."

In response, PM Modi on X wrote, "Grateful for your warm words President @AlsisiOfficial. Sustained engagement between India and Egypt has provided a new momentum to our ties. I look forward to working with you to attain unprecedented heights in the years to come."

Prime Minister Narendra Modi has secured a third term, along with the support of other parties in the coalition, primarily -- the Nitish Kumar-led JD(U) and the Chandrababu Naidu-led TDP. According to the Election Commission of India, the BJP won 240 seats.

President Droupadi Murmu administered the Oath of Office and Secrecy to Prime Minister Narendra Modi and other members of his Union Council of Ministers at Rashtrapati Bhavan on June 9.

Notably, India and Egypt share close political understanding based on a long history of contacts and cooperation in bilateral, regional and global issues. The joint announcement regarding the establishment of diplomatic relations at the Ambassador level was made on 18 August 1947.

The two nations have cooperated closely in multilateral fora and were the founding members of the Non-Aligned Movement. India and Egypt marked the 75th anniversary of diplomatic relations in 2022.

https://economictimes.indiatimes.com/news/defence/indian-envoy-visits-berighat-air-base-to-meet-iaf-contingent-in-egypt/articleshow/111216668.cms

THE ECONOMIC TIMES

***Sun, 23 Jun 2024***

# Estonia promotes tech sharing, joint production with Indian defence companies

NATO member Estonia, known for its expertise in IT and cyber security, is seeking closer cooperation with India when it comes to jointly developing defence technology and has invited Indian companies to tie up with its startups and tech players and identify specific areas of interest.

An Indian defence industry delegation was recently hosted by Estonia, which included visits to the country’s defence manufacturing facilities, centers for innovation and the political leadership. Estonian Defence Minister Hanno Pevkur, who met the Indian delegation, said that Indian companies are encouraged to reach out for partnership.s “The first point of contact definitely is our defence, space industry association.

They have all the necessary contacts and I know that they are very open for cooperation. I see that there is a rapidly growing defence industry in India and I see that as a developing country, you definitely have a lot of future," he said. The Indian industry delegation, which also included major players like L&T, Bharat Forge and Tata, is believed to have already signed some MoUs to explore specific areas for joint development.

"We reached an understanding for cooperation with Eesti Arsenal OÜ in Estonia. Together, both companies have agreed to work in areas of emerging technologies to bring forth select new products for the aerospace sector," Col Ramit Arora (retd), CEO of defence startup Aeroshul Technologies, who was part of the delegation said.

He added that the aim is to utilise the best competencies available in both India and Estonia and to avail resilient supply chains and manufacturing efficiencies present in India. The agreement also seeks to explore market access to Asian markets through India and to the European markets through Estonia.

Indian defence companies are keen to explore high technology available in Estonia in fields like - Cyber Security, software development, military robotics, Unmanned Ground Vehicles and Drone Sensor payloads. Leading Indian protection solutions provider MKU Limited has also partnered with Estonian firm Vegvisir to bring in Mixed Reality Situational Awareness System (MRSAS) for an upcoming requirement of Indian Army's armoured vehicles.

https://economictimes.indiatimes.com/news/defence/estonia-promotes-tech-sharing-joint-production-with-indian-defence-companies/articleshow/111210747.cms

THE ECONOMIC TIMES

***Sat, 22 Jun 2024***

# India, Russia prepare to sign military logistics pact soon

India and its trusted strategic partner Russia are readying a military logistics agreement to be signed in the near future boosting their defence partnership. The agreement will give either side access to each other's military facilities, including for the Russian Navy operating in the Indian Ocean Region (IOR) and India in the Arctic.

The pact will streamline procedures for Russian and Indian military units participating in joint exercises, ensuring seamless operations, sources said. It may also enhance a collective Eurasian security framework amid rising geopolitical tensions and expanding the International North South Transport corridor.

The pact may also help in visa and immigration protocols for military personnel to reflect current requirements. India has been encouraging Russia to be active in the IOR to counterbalance the growing Chinese presence in the region. The Russian Navy is expected to set up a military base in Port Sudan for its Indian Ocean Region outreach.

Russia is also planning to expand its military presence in Myanmar and Vietnam in the Indo-Pacific region. Simultaneously, India is being encouraged to play an active role in the

resource rich Arctic and use the Northern Sea Route. Earlier, India has signed a logistics pact with other countries, including the US, Australia, Japan, France, Singapore and South Korea.

These agreements provide the Indian military with access to the military facilities of other countries, in exchange for fuel and other provisions, thus allowing greater interoperability and increased operational turnaround for the Indian Navy, when operating in the high seas.

https://economictimes.indiatimes.com/news/defence/india-russia-prepare-to-sign-military-logistics-pact-soon/articleshow/111194981.cms

THE ECONOMIC TIMES

*Sun, 23 Jun 2024*

# Indian Army signs Mou for 'next generation wireless technologies'

In a landmark event, Military College of Telecommunication Engineering (MCTE), Indian Army and Society for Applied Microwave Electronics Engineering & Research (SAMEER), an autonomous R&D laboratory under the Ministry of Electronics and Information Technology (MeitY) signed a Memorandum of Understanding (MoU) to advance collaboration in 'Next Generation Wireless Technologies for Indian Army, said a statement from Ministry of Defence on Saturday.

The MoU was signed by Lt Gen K H Gawas, Commandant MCTE and Colonel Commandant Corps of Signals and Dr P H Rao, Director General SAMEER, added the statement. This initiative marks a significant milestone in strengthening the Indian Army's technological capabilities which are aligned towards a declared vision for 2024 as 'Year of Technological Absorption for Indian Army' by Chief of Army Staff.

Today's MoU signing is expected to reinvigorate this collaboration, with plans to establish an 'Advanced Military Research and Incubation Centre' at MCTE. This centre aims to focus on Advanced Wireless Technologies for the Indian Army. The partnership between SAMEER and MCTE is beyond an agreement and represents a shared commitment in exploring new technological frontiers and addressing modern battlefield challenges.

Merging SAMEER's expertise in wireless technologies and MCTE's application skills in communications, electronic warfare, and cyber operations, the collaboration promises substantial advancements in defence and strategic sectors. The key objectives of this partnership include, collaboration between SAMEER and MCTE aims to enhance national security and technological infrastructure, with potential benefits that will not only be limited to military but will go much beyond, mentioned the official statement.

The advancements achieved could impact telecommunications, emergency response, and public safety, demonstrating a commitment to a holistic approach to national security. The signing of this MoU marks a pivotal moment in the partnership between SAMEER and

MCTE, signalling a future filled with innovation and collaborative success. This strategic alliance is poised to set new standards for cooperation between government R&D institutions and military educational bodies, driving significant technological progress. During the MoU signing ceremony, Maj Gen C S Mann, AVSM, VSM, Additional Director General of Army Design Bureau elaborated the Indian Army perspective on the absorption of niche technologies.

He explained the efforts taken towards creating an ecosystem for the development of various emerging technology-based solutions for military applications. S K Marwaha, Group Coordinator MeitY highlighted various MeitY initiatives for defence and strategic applications.

He also elaborated the contributions of SAMEER and CDAC in strategic and defence sectors. Dr P H Rao, Signatory of the MoU from SAMEER's side, gave the glimpses of volume of work of SAMEER in defence sector along with ambitious vision for the MoU to develop field deployable solutions for Indian Army, especially in critical technological domains.

Lt Gen K H Gawas, PVSM, VSM, Commandant MCTE and Colonel Commandant Corps of Signals, brought out the significance of the MoU and MCTE's expectations from the MoU to develop field deployable solutions in tactical battle area achieved through the collaborative efforts involving MCTE, SAMEER, academia, industry, researchers and start-ups coming together to develop the ecosystem with the whole-of-nation approach.

He expressed confidence that this partnership will pave the way for groundbreaking achievements and set a new standard for collaboration between government R&D institutes and military educational institutions and play an instrumental role in the national initiative of 'Atmanirbhar Bharat'.

https://economictimes.indiatimes.com/news/defence/indian-army-signs-mou-for-next-generation-wireless-technologies/articleshow/111201018.cms

Hindustan Times

***Sat, 22 Jun 2024***

# Lockheed considers India unit amid 3-firm race to bag cargo aircraft deal

The Indian Air Force’s (IAF) hunt for new medium transport aircraft (MTA) is set to gather speed in Prime Minister Narendra Modi’s third consecutive term in office, and US aerospace firm Lockheed Martin has begun exploring the possibility of setting up a manufacturing line in India for its C-130J aircraft as it competes with two other global plane makers – Airbus and Embraer – for the multi-billion-dollar order.

“The MTA competition provides us a significant opportunity to meet IAF’s tactical airlift requirements. We are exploring options for setting up an assembly line for the C-130J in India,” Anthony G Frese, vice president, business development (air mobility and maritime missions), Lockheed Martin, told HT.

IAF currently operates a fleet of 12 C-130J medium-sized airlifters that have been extensively used for a variety of missions, including support to the military’s forward deployments in the Ladakh sector where the dragging border standoff between India and China is now in its fifth year.

The two other players vying for the MTA order, European Airbus Defence and Space with its A-400M aircraft and Brazilian Embraer Defense and Security with its C-390 Millennium, also have presence in the Indian defence market.

Airbus is jointly executing a ₹21,935-crore project with Tata Advanced Systems Limited (TASL) to equip the air force with 56 C-295 aircraft to modernise its transport fleet, and Embraer has thus far supplied eight jets to India for VVIP travel and use as airborne early warning and control aircraft.

The C-130J’s performance is proven in IAF service, and the aircraft has an availability rate (measure of airworthiness) of almost 90%, said Frese, who, along with other Lockheed officials this week, met IAF’s leadership including its chief Air Chief Marshal VR Chaudhari. “It has an impressive track record of accomplishing missions and that places us in an advantageous position in this competition” Frese said.

The three-cornered contest to equip IAF with 40 to 80 aircraft is in line with the government’s Make in India initiative to boost self-reliance in the defence manufacturing sector. IAF is looking for a new transport aircraft in the 18 to 30-tonne cargo-carrying capacity to meet its growing airlift needs.

TASL is one of the Indian companies that Lockheed Martin could partner with to bid for the project for which the air force sought information from original equipment manufacturers (OEMs) last year on the aircraft they can offer to meet its requirements, HT has learnt. However, no decision has been taken yet. The two firms already operate a joint venture in India.

Located in Hyderabad, Tata Lockheed Martin Aerostructures Limited (TLMAL) is the single, global source of empennages (tail assembly) for the C-130J aircraft and the JV has delivered over 220 such assemblies since it began operations in 2010. The empennage assemblies built by TLMAL have been installed on C-130Js produced in Marietta in the US and delivered by Lockheed Martin to its global customers, including IAF.

In February, Embraer and Mahindra signed a memorandum of understanding to bid for the MTA order. Airbus has not yet announced who it will partner with to compete for the project, though TASL and state-run plane maker Hindustan Aeronautics Limited (HAL) could be among the likely options, HT has learnt.

India will float a tender for the MTA procurement after the defence acquisition council (DAC) grants its acceptance of necessity (AoN) for the project. DAC is India’s apex military procurement

body and headed by defence minister Rajnath Singh. Under India's defence procurement rules, AoN by the council is the first step towards buying military equipment.

IAF has seen a level of success with the existing fleet and that will continue with the new C-130Js, said Frese. "Apart from the aircraft's versatility, reliability and low operating costs, there will also be commonality in training, maintenance, spares and logistics support," he added. In February, Embraer and Mahindra signed a memorandum of understanding to bid for the MTA order. Airbus has not yet announced who it will partner with to compete for the project, though TASL and state-run plane maker Hindustan Aeronautics Limited (HAL) could be among the likely options, HT has learnt.

India will float a tender for the MTA procurement after the defence acquisition council (DAC) grants its acceptance of necessity (AoN) for the project. DAC is India's apex military procurement body and headed by defence minister Rajnath Singh. Under India's defence procurement rules, AoN by the council is the first step towards buying military equipment. IAF has seen a level of success with the existing fleet and that will continue with the new C-130Js, said Frese. "Apart from the aircraft's versatility, reliability and low operating costs, there will also be commonality in training, maintenance, spares and logistics support," he added.

The information sought by IAF from OEMs last year related to scope of technology transfer; possible methods to enhance indigenisation, and to setup a dedicated manufacturing line, including design, integration and manufacturing processes in India; capability to undertake indigenous manufacture of systems, subsystems, components and spares; and making India a regional or global hub for manufacturing and maintenance, repair and overhaul (MRO) of the equipment.

In the request for information for MTA, IAF asked foreign vendors to provide a general estimate of the cost of aircraft and associated equipment for a batch of 40, 60 and 80 aircraft. The C-130J can carry a load of 20 tonne compared to C-390's 26 tonne and A-400M's 37 tonne.

IAF needs transport aircraft in the 18 to 30-tonne class to carry out a variety of roles, and it should select a plane that best meets its requirements and can be indigenised the most, Air Marshal Anil Chopra (retd), former director general, Centre for Air Power Studies, earlier said.

https://www.hindustantimes.com/india-news/lockheed-considers-india-unit-amid-3-firm-race-to-bag-cargo-aircraft-deal-101718993760122.html

THE ECONOMIC TIMES

***Sun, 23 Jun 2024***

# Modi-Hasina talks: India, Bangladesh ink 10 MoUs; defence ties get a boost

India and Bangladesh signed 10 memoranda of understanding (MoUs) following the meeting of Prime Minister Narendra Modi and his counterpart Sheikh Hasina in New Delhi, with both leaders endorsing a vision statement on peace and prosperity that underscored longstanding ties between the two nations.

Three of the pacts were renewals of existing accords. The Bangladeshi Prime Minister's visit is the first by a head of state or government after the inauguration of the new Modi government and comes ahead of her trip to Beijing. The Modi-Hasina talks focused on boosting defence ties, management of the Mongla port in Bangladesh and cross-border power trade. Defence Services Staff College, Wellington, and Defence Services Command and Staff College, Mirpur (Bangladesh) will cooperate in the field of strategic and operational studies. . ET had first reported last week that defence ties will likely get a boost at the meeting.

The Modi government has decided to send a technical team to Bangladesh for the proposed Teesta river conservation and management project, the Indian Prime Minister told reporters after the summit. China has shown interest in funding the Bangladesh plan to conserve Teesta river water that could cost $1 billion. There are also plans to construct a special economic zone (SEZ) in the area.

The Indian move could serve as a counter to Chinese interest, experts said. The two sides "have kept connectivity, commerce and collaboration as our focus," Modi said. The two sides had restored the connectivity that existed before 1965 in the last 10 years, according to him. Defence Services Staff College, Wellington, and Defence Services Command and Staff College, Mirpur (Bangladesh) will cooperate in the field of strategic and operational studies. ET had first reported last week that defence ties will likely get a boost at the meeting.

The Modi government has decided to send a technical team to Bangladesh for the proposed Teesta river conservation and management project, the Indian Prime Minister told reporters after the summit. China has shown interest in funding the Bangladesh plan to conserve Teesta river water that could cost $1 billion. There are also plans to construct a special economic zone (SEZ) in the area.

The Indian move could serve as a counter to Chinese interest, experts said. The two sides "have kept connectivity, commerce and collaboration as our focus," Modi said. The two sides had restored the connectivity that existed before 1965 in the last 10 years, according to him.

https://economictimes.indiatimes.com/news/india/modi-hasina-talks-india-bangladesh-ink-10-mous-defence-ties-get-a-boost/articleshow/111195883.cms?from=mdr

THE ECONOMIC TIMES

***Mon, 24 Jun 2024***

# MDL in advanced talks with Defence Ministry for Rs 35,000 crore Kalvari submarine deal

Talks on acquiring additional Kalvari-class (Scorpene) submarines for the Navy have progressed, with state-owned Mazagaon Dockyard Limited (MDL) in advanced discussions

for a potential ₹35,000-crore deal that will help boost India's underwater strength. Sources said that the new submarines -- three additional Kalvari-class which are under negotiation -- will be larger than their predecessor and will be packed with modern electronics that will give them better strength and longer endurance. Technological advances in propulsion will also be integrated on the new boats, which will be able to travel further than their predecessors that have already demonstrated the ability to reach as far as Australia as part of operational deployments.

MDL has submitted a detailed techno-commercial bid for the contract to the defence ministry, which has promised at least 60% indigenous content in the new boats, with a large chunk of the work going to Indian sub suppliers and the MSME sector. While the final pricing will be determined after hard negotiations between MDL and the ministry, the deal could be valued at around Rs 35,000 crore, sources said, adding that this would be in line with international prices for new submarines of the class.

The order is also expected to create close to 5,000 jobs over the years and a major part of the contract value will remain within the India ecosystem. Given the high percentage of indigenous content, MDL and its suppliers are also expected to gain significant technology transfer, paving the way for future submarines of the class to be fully designed, developed and manufactured indigenously.

MDL is currently constructing the Kalvari class of submarines under Project 75 with French assistance, with the sixth and final one likely to be delivered by the end of this year. As per MDL's proposal, the additional submarines can be delivered within six years. This will come as a relief for the Navy given the urgent requirement of conventional submarines as the largest current fleet of Russian-origin Kilo class boats are already stretching their service life.

The Navy is also in parallel pursuing a case to construct six conventional submarines in India under Project 75I.

https://economictimes.indiatimes.com/news/defence/mdl-in-advanced-talks-with-defence-ministry-for-rs-35000-crore-kalvari-submarine-deal/articleshow/111212437.cms

Business Standard

***Sat, 22 Jun 2024***

# INDUS-X defence initiative between US, India marks 1st anniversary

The India-US Defence Acceleration Ecosystem has advanced the commitment of the two strategic partners to building a defence innovation bridge under the Critical and Emerging Technology Initiative, the US has said on the partnership's first anniversary.

INDUS-X, which stands for enhanced strategic and defence partnership between India and the US, was launched on June 21 last year by the US Department of Defence and the Indian Ministry of Defence during Prime Minister Narendra Modi's state visit to Washington, DC.

"In its first year, INDUS-X has advanced both countries' commitment to build a defence innovation bridge under the initiative on Critical and Emerging Technology (iCET)," the Department of Defence said in a press release on Friday.

The iCET was launched by Prime Minister Modi and US President Joe Biden on the sidelines of the QUAD summit in Tokyo on May 24, 2022.

"INDUS-X has strengthened private sector cooperation between the United States and India by facilitating partnerships among defence technology companies, investors, and researchers," the press release said.

The third INDUS-X Summit will take place in Silicon Valley in September 2024 with a focus on harnessing private capital for defence innovation, it said, citing a recent announcement by the White House. The summit will be co-hosted by the US-India Strategic Partnership Forum (USISPF) and Stanford University. The India-US defence and strategic ties have been on an upswing in the last few years.

The two countries have inked key defence and security pacts over the past few years, including the Logistics Exchange Memorandum of Agreement (LEMOA) in 2016 that allows their militaries to use each other's bases for repair and replenishment of supplies.

The two sides also signed COMCASA (Communications Compatibility and Security Agreement) in 2018 which provides for interoperability between the two militaries and also provides for the sale of high-end technology from the US to India.

In October 2020, India and the US sealed the BECA (Basic Exchange and Cooperation Agreement) pact to further boost bilateral defence ties. The pact provides for the sharing of high-end military technology, logistics and geospatial maps between the two countries.

https://www.business-standard.com/external-affairs-defence-security/news/indus-x-defence-initiative-between-us-india-marks-1st-anniversary-124062200126_1.html

Business Standard

***Sat, 22 Jun 2024***

# India, Qatar hold talks on sale of 12 used Mirage-2000 fighter jets

India and Qatar on Friday held key discussions in New Delhi on the proposal to buy 12 second-hand Qatari Mirage-2000-5 fighter jets for the Indian Air Force (IAF).

A presentation was made to the Indian officials on the current state of the fighter jets, news agency ANI reported, citing defence sources. The report added that the aircraft are in very “good condition” and have a lot of life left in them, officials said.

The Indian authorities are evaluating the proposal, while considering the compatibility of the offered Mirage-2000-5 jets with India's existing fleet of Mirage-2000 aircraft, which are more advanced.

According to the report, it would be easier for India to maintain the two sets of aircrafts as they have the same engines.

However, the price of the jets still remains a key discussion point in the talks. While the Qatari side has offered a deal worth Rs 5,000 crore for the 12 aircrafts, India is seeking a more reasonable price.

The Qatari aircraft would come with missiles and additional engines for flying operations. If the deal goes through, the aircrafts would be used for flying operations, the officials said, noting that they would not be meant for spare and maintenance requirements.

The IAF already has a significant amount of spare and equipment, bought from a French vendor during the Covid-19 pandemic. In 2021, IAF signed a deal with a French company to purchase phased-out Mirage 2000 aircraft to be used as spares. The deal worth Rs 300 crore was sealed on August 31.

If the deal with Qatar takes place, the IAF's fleet of Mirage aircraft will rise to 60. The fleet has been a part of several key operations of the IAF, including the Kargil war, and Balakot air strikes.

https://www.business-standard.com/external-affairs-defence-security/news/india-qatar-hold-talks-on-sale-of-12-used-mirage-2000-fighter-jets-124062200261_1.html

FINANCIAL EXPRESS
Read to Lead

***Sun, 23 Jun 2024***

# Chinese military developments and national security challenges for India

**- By Bhartendu Kumar Singh**

A major national security challenge that the government would face in this tenure is the momentous developments in Chinese military preparedness affecting the Line of Actual Control (LAC) and the Indo-Pacific area. While China's military modernisation has been an ongoing process for the last few decades (and so has been India's defensive response), its pace has accelerated in recent times. The LAC that was 'relatively peaceful' until a decade ago, has metamorphosed into an active front with looming war threats. Unless deftly handled, the bilateral military power balance would soon become too asymmetrical and may critically imperil the LAC sanctity.

Much of the current modernisation goals for the PLA were finalised in the 20th Party Congress of the Chinese Communist Party in October 2022. The military dimension of the Report to the Congress focused on 'intensifying and accelerating the PLA's modernisation goals'. Accordingly,

by 2027, the Chinese Peoples' Liberation Army (PLA) is to aim towards finishing its first phase of modernisation process. This is the time when the PLA would have completed 100 years of its foundation. The second phase of military modernisation would complete by 2035. By 2049, China aims to metamorphose its PLA into a world-class armed force capable of out rightly taking on the US military muscle in the Indo-Pacific region.

Even while 2027 is still a couple of years ahead, we can already see many visible and demonstrative changes in countless aspects of the PLA's force modernisation. For instance, China has successfully completed the reorganisation of its PLA into integrated theater commands since 2016 and is running with an eight-year advantage. The Western Theater Command, headquartered at Chengdu, has been quite active through construction of roads, rails and new settlement colonies near the LAC. One only has to visit the Chinese Ministry of Defence website to get a first-hand glimpse of the day-to-day developments on military logistics and advancements, whether in Western Theater Command or elsewhere.

While there are many sources of information on Chinese military developments, probably the most accurate reporting about Chinese military developments on an updated basis is published by the US Department of Defence. Called the Annual Report to the Congress on 'Military and security developments involving the People's Republic of China', the 2023 version brings out some major policy and logistics developments related to the PLA not covered succinctly elsewhere. For example, the report adequately exposes the offensive aspects of China's so-called 'active defence' policy. Similarly, since 2022, the Chinese Communist Party (CCP) appears to have been increasingly using the term 'integrated national strategic systems and capabilities'. On the weapons front, China has moved quite ahead with deployment of hypersonic weapons. By 2027, China would have achieved substantial progress in the field of mechanisation, informatisation, and intelligentisation of its armed forces.

China is also making commendable progress in many other areas that are going to affect its military modernization in the coming days. For instance, the Chinese realise that military innovation is the key to maintain an edge in military modernisation and dominate neighbouring rivals. President Xi Jinping has launched an innovation-driven defence development strategy (IDDS). China is resorting less to 'reverse engineering' of foreign weapons as was the case in the past and has invested heavily in high tech weapons. Techno-nationalism has played a key role in the expansion and consolidation of its domestic military industrial complex (MIC). Similarly, China's progress in artificial intelligence and robotics is much better than many countries. It is gainfully deploying robots in mundane soldiering duties and counter-terrorism operations.

Apart from the conventional build-up of forces, China has also resorted to, in recent times, what Fiona S Cunningham of University of Pennsylvania calls as 'strategic substitution'. China is using information-age weapons such as cyber operations to enhance its strategic leverage and coercive powers. While China is using this as 'an increasingly capable instrument of state craft' against the US, India is not immune to Chinese subtle adventures. For example, it is said that Chinese cyber-attacks were behind the Mumbai power grid failure of March 2021. In February 2024, the Washington Post reported that Chinese intelligence and cyber-surveillance accessed 95.2 gigabytes of Indian immigration data. These are just representative examples. The actual quantum of attacks from the Chinese cyber hackers spans across different sectors, including financial markets.

In the coming days, the LAC itself would witness increased activities on the Chinese side. The Chinese PLA may increase the frequency and intensity of coercive and risky operations near the LAC. There could be more military exercises and force mobilisation in a teasing manner. Concurrently, China would try to wean away Bhutan through border agreement without involving India. It would also bring Nepal closer through project finalisation and financing of railways extension from the Tibet side to Kathmandu. Finally, we may see more espionage activities from the Chinese side into Indian territories!

The LAC would, therefore, remain an area of utmost national security concern to India. Unfortunately, strategic experts and military planners in India remain caught in a binary about national security challenges emanating from China. Against the long, real and perpetuating threat from the Chinese aggressive posturing on the LAC, we are often told about a larger threat emanating from China's increasing footsteps in the Bay of Bengal and the wider Indian Ocean region. While there is no doubt that the Chinese are making increasing maritime forays near India's southern waters, we are perhaps making the mistake of treating both the threats on the same level-playing platform. Outright confrontation with China on the oceanic front will only mean more diversion of scarce defence logistics and resources.

Fortunately, at the policy level, India's defensive preparations against Chinese military development near the LAC has been calibrated, thoughtful and on the right trajectory. The border infrastructure has improved with new roads and more are in offing! Realising that technology is the key to rise in great power status along with robust defence preparedness, India has been investing in military technology and innovation. However, getting inputs about China's military developments from western sources may not sub-serve our knowledge requirements. The focus of the Pentagon annual report on Chinese military developments, for example, is on the PLA's force mobilisation along the Taiwan Straits. These reports do not focus on LAC and touch them only tangentially. Thus, we may be certainly missing out on many important military developments across the LAC. Probably, it is time for an indigenous assessment of Chinese military developments on a regular basis.

https://www.financialexpress.com/business/defence-chinese-military-developments-and-national-security-challenges-for-india-3532450/

THE TIMES OF INDIA

***Sun, 23 Jun 2024***

# Russia could reduce decision time for use of nuclear weapons, lawmaker says

Russia, the world's biggest nuclear power, could reduce the decision-making time stipulated in official policy for the use of nuclear weapons if Moscow believes that threats are increasing, parliament's defence committee chairman said.

The war in Ukraine has triggered the biggest confrontation between Russia and the West since the 1962 Cuban Missile Crisis, with President Vladimir Putin last month saying that Russia might change its official nuclear doctrine setting out the conditions under which such weapons could be used.

On Sunday Andrei Kartapolov, the head of the Russian lower house of parliament's defence committee, was quoted by state news agency RIA as saying that if threats increased then the decision-making time for using such weapons could be changed.

"If we see that the challenges and threats increase, it means that we can correct something in (the doctrine) regarding the timing of the use of nuclear weapons and the decision to make this use," RIA quoted Kartapolov as saying.

Kartapolov, who once commanded Russian forces in Syria and now serves as a lawmaker from the ruling United Russia party, added that it was too early to speak about specific changes to the nuclear doctrine.

Russia's 2020 nuclear doctrine sets out when its president would consider using a nuclear weapon: broadly as a response to an attack using nuclear or other weapons of mass destruction or conventional weapons "when the very existence of the state is put under threat". Russia and the United States are by far the world's biggest nuclear powers, holding about 88% of the world's nuclear weapons, according to the Federation of American Scientists.

Both are modernising their nuclear arsenals while China is rapidly boosting its nuclear arsenal. Putin said this month that Russia had no need to use nuclear weapons to secure victory in Ukraine, the Kremlin's strongest signal to date that Europe's deadliest conflict since World War Two will not escalate into nuclear war.

**Pressure From Hardliners**

But he also said he did not rule out changes to Russia's nuclear doctrine. The was viewed as a nod to pressure from hardliners in the Russian elite who believe that Putin should be able to act more swiftly on nuclear escalation and reduce the threshold for use.

Putin said again last week that the nuclear doctrine might have to be changed because Russia's adversaries were developing ultra-low-yield nuclear devices. Both Moscow and Washington made heavy cuts to the number of their weapons as the Soviet Union crumbled, but the Cold War arms control architecture has crumbled and many diplomats say they now fear a new arms race.

The United States may have to deploy more strategic nuclear weapons in coming years to deter growing threats from Russia, China and other adversaries, a senior White House aide said this month.

Russia says it is interested in discussing arms control with the United States, but only as part of a broader discussion involving European security and the future of Ukraine. The U.S. 2022 Nuclear Posture Review says that Russia and China are both developing their nuclear arsenals so that by the 2030s "the United States will, for the first time in its history, face two major nuclear powers as strategic competitors and potential adversaries".

https://timesofindia.indiatimes.com/world/europe/russia-could-reduce-decision-time-for-use-of-nuclear-weapons-lawmaker-says/articleshow/111205673.cms

The EurAsian Times

*Sun, 23 Jun 2024*

# S-500 Prometheus: India To Keep An Eye On Russian AD System, Designed To Kill Stealth Jets, ICBMs & Satellites

Russia has reportedly moved some elements of its formidable S-500 air defense system to Crimea. After successful Ukrainian attacks on the S-400 missile system, questions are being raised about whether Russia is exposing its still combat-untested, cutting-edge resource by putting it in the possible range of Ukrainian strikes.

Russia is known to have just one active S-500 regiment, comprising just two battalions with two air-defense batteries each. Details of what elements have been moved are not clear. Air-defense systems of this type have several operational components, including command posts, radars, and launchers. Has the system been deployed to protect the vital Kerch Bridge in Crimea? Were there no alternative choices? Is this just a narrative building by either side? The S-500 is still at the experimental stage, and Moscow has indicated it expects to serially produce the system by 2025. However, Russian media reported in 2021 that the first S-500 had already been deployed around Moscow.

**Ukraine Regularly Targeting Crimea**

Ukraine is making it increasingly difficult for Russia to sustain Crimea through attacks on air defenses, connecting bridges, rail links, and power supply and water connections.

Ukraine has hit Russian oil storage. The Tuapse refinery in Krasnodar Krai, southern Russia, was hit, and required several months of repairs. A joint Ukrainian navy and army operation hit a ferry crossing and oil terminal at the port of Kavkaz, located on the Russian side of the Kerch Strait that divides Crimea from Russia.

Earlier, they hit the Crimean side of the Kerch ferry crossing, damaging two rail ferries that are crucial to Russia's ability to keep Crimea supplied. The Kerch Strait Bridge was significantly damaged after the Ukrainian attacks in 2022 and 2023, impacting the ability to take heavy train traffic such as military logistics, heavily armored vehicles, etc.

Russia was thus forced to use Ukrainian mainland occupied territory for its road and rail connection, which was in the much easier range of Ukrainian attack. The sea-based logistics was also affected after Ukraine destroyed four and damaged five Russian landing ships. Ukraine has used drones and missiles to destroy or damage at least 27 Russian warships and one submarine. The peninsula's air defenses have also been degraded by constant attacks. AD capability against drones and missiles has been under test elsewhere, including in the Red Sea crisis and the Israel-Hamas conflict.

**S-500 Prometheus Air Defence System**

The S-500 Prometheus is a Russian surface-to-air missile/anti-ballistic missile system that supplements the S-400 and the A-235 ABM missile systems. This air defense system is a cutting-

edge advancement in Russian military technology designed to address the evolving threats posed by modern aerial warfare. It is a theatre ballistic missile defense system. Like its predecessors, the S-500's adaptability is its core feature. The system can launch various types of missiles tailored to specific threats and operational requirements, enhancing its versatility and efficacy in countering evolving airborne dangers.

The S-500's radar and targeting systems are among the most advanced in the world, providing engagement ranges of up to 600 kilometers. One of its most notable features is its ability to engage a wide variety of targets, including stealth aircraft, hypersonic missiles, and low-orbit satellites, significantly enhancing Russia's defensive posture. The sophisticated radar complex consists of four radar vehicles per battery. These include the 91N6E(M) S-band acquisition radar, the 96L6-TsP C-band acquisition radar, the 76T6 multi-mode engagement radar, and the 77T6 anti-ballistic missile engagement radar.

By using multiple radar frequencies and sophisticated signal processing, the S-500 can identify and track stealth aircraft, reducing their effectiveness in penetrating defended airspace. Thus, the S-500 poses a potential threat to American F-22 Raptor and F-35 stealth fighter aircraft. The system can engage 10 targets simultaneously and has a response time of three to four seconds, shorter than the S-400. The more powerful jam-proof radar can detect "near space" targets.

These cutting-edge radar systems enable the S-500 to detect both ballistic and airborne targets at remarkable distances, with capabilities extending up to 2,000 kilometers for ballistic targets and 800 kilometers for airborne threats. This long-range capability allows the system to identify and track targets well before they enter its engagement zone, providing a significant tactical advantage. The radar can operate in multiple modes, including tracking and engagement simultaneously, ensuring continuous coverage and rapid response to emerging threats.

The S-500 has several types of missiles tailored for different targets and engagement ranges. These missiles can reach altitudes of up to 200 kilometers, enabling the S-500 to intercept ballistic missiles during their mid-course phase and engage low-orbit satellites. The S-500 comprises four 40N6M long-range surface-to-air missiles or two 77N6 interceptors mounted on a launch vehicle. The 40N6M long-range missiles have a reach of up to 400 kilometers, while the 77N6 series interceptors are capable of reaching approximately 600 kilometers. The altitude of a target engaged is claimed to be as high as 180–200 km.

The deployment follows rigorous testing. The S-500 features rapid launch capabilities and a high rate of fire, allowing it to engage multiple targets simultaneously. This makes it highly effective in a saturated threat environment, where numerous incoming threats must be addressed quickly and efficiently. The system is claimed to be highly resilient to electronic interference and can ensure effectiveness even in the face of sophisticated electronic warfare attacks.

On paper, an S-500 battery includes three radars—two of which are identical to the radars that cue an S-400. The third radar, the 77T6 ABM engagement radar, is optimized for detecting fast-moving ballistic missiles and rockets. The 77N6 was originally meant to be a "hit to kill" missile which is without a warhead. It destroys its target by literally running into it. By removing the warhead, the missile becomes lighter, more maneuverable, and more accurate. Details of the system are still shrouded in mystery.

The Kremlin claims that the S-500 is the sole weapon capable of intercepting Russia's air-launched Kinzhal "hypersonic" ballistic missile. Russian reports indicate that the S-500 successfully tracked and intercepted hypersonic targets in early 2024. The S-500 system may be delivered in two separate AD complexes: the long-range air defense missile system and the anti-missile defense complex. The timeline for S-400 system operationalisation has kept getting extended. The S-500 has been in development for more than a decade. Full-scale deployments are currently planned for 2025. As per the original plan, ten S-500 battalions were to be purchased for the Russian Aerospace Defence (VKO). The series production is around five years behind schedule. A naval version is the likely armament for the new Lider-class destroyer is also under development.

**S-500 In Crimea**

The S-500 had been reportedly deployed to protect the Russian-built Kerch Bridge, which President Vladimir Putin unveiled in 2018. The 20-kilometre-long link connects Crimea with the Russian mainland. It is crucial for keeping Russian troops on the peninsula and in Russian-controlled mainland Ukraine supplied. Ukraine has repeatedly targeted the bridge. Protecting the bridge is a priority for Russia.

The S-500 air defense missile system considered a significant upgrade from its predecessor, the S-400, has been positioned in a critical strategic location. This move comes after Russia lost parts of S-300 and S-400 air-defense batteries to Ukraine's American-made Army Tactical Missile System (ATACMS) rockets, highlighting vulnerabilities in its existing air defense infrastructure. The S-500 is now operational, protecting the Kerch Strait from a site in Russian-occupied Crimea, reports indicate. Russia has just one S-500 air defense system. The fact that some parts of the full system have been deployed in combat underscores the importance of safeguarding Crimea. It could also be to operationally test those sub-parts. Yet risking the sole system to an artillery or cruise missile attack is questionable.

**Conclusion**

The S-500's capabilities are attributed to its powerful radars, potent ballistic computer, and highly maneuverable interceptors. This Almaz-Antey-designed and produced system reportedly has a unit cost of around $2.5 billion. Ukraine is concerned about Russia's air defense assets and wants to degrade the forward-deployed ones before it inducts its fleet of F-16 fighter jets.

Defense against a large coordinated rocket attack backed by drones is not easy. The S-500 is a modest improvement over the older S-400. Ukrainian rocket attacks have already been degrading the S-300 and S-400 AD batteries. The 1,500 Kg precision-guided ATACMS rocket can scatter hundreds of lethal sub-munitions over a wide area. Hitting any delicate part of the S-500 elements could render the system sub-optimal in performance. This is a reality all AD operators have to factor and contend.

While the Crimean deployment marks the S-500's first known combat role, Russia's ultimate plan is to fully ring the Moscow region with these formidable systems by 2025. As tensions with the West escalate, Russia is busy perfecting its "doomsday" missile defense system. Typically designed to 'kill' stealth fighters, missiles, and satellites, the S-500's ability to live up to its game-changing defensive powerhouse expectations remains in question.

In September 2021, Russian Deputy Prime Minister Yury Borisov said that India could be a prospective and probably the first S-500 customer. Even China could be interested in the system. Earlier, China was the first customer of the S-400 and acquired six batteries. India has received three batteries, and two more will be inducted by 2026. China will support significant coverage in the East and South China Seas and take on threats emanating from Japan, Taiwan, and US aircraft carriers. It will also release more S-400s for the Himalayan border with India. Similarly, if India were to acquire the S-500, it would keep the PLA Air Force further away from the Line of Actual Control (LAC) and supplement the ABM system. Clearly, it is a wait-and-see time for both and evaluate how the S-500 performs against unconventional attacks. India will draw lessons from the Ukrainian attacks on the S-400 and plan appropriate dispersion and camouflage. Active defense against drones and small high-speed projectiles must be factored in, and redundant systems must be built.

https://www.eurasiantimes.com/s-500-prometheus-designed-to-kill-stealth/

The EurAsian Times

***Sat, 22 Jun 2024***

# F-35, F-22 Developer Coming To India! Lockheed Mulls Setting-Up C-130J Super Hercules Assembly Line Under 'Make In India'

Bringing more skin in the game to bag the deal to supply Medium Transport Aircraft to the Indian Air Force (IAF), Lockheed Martin, the US defense giant behind cutting edge stealth fighters like F-35 and F-22, is considering setting up an assembly line for the special operations aircraft C-130 J Super Hercules in India. The IAF is looking to replace its upgraded Russian An-32 transport aircraft fleet. The IAF operates about 100 aircraft, which will complete 44 years of service in 2031-32. They are planned to be phased out then.

The IAF had initially planned to procure MTA under a joint developmental project with Russia. The two countries had inked a pact for the co-development of the aircraft in 2012. India would have bought 45 aircraft, and Russia would have purchased around 100. The deal, however, fell through in 2016 after the two countries failed to reach an agreement about the engine and design of the aircraft. As reported by the EurAsian Times earlier, the other companies in the fray are Brazilian firm Embraer Defense & Security, which joined hands with Indian firm Mahindra in February to manufacture the C-390 Millennium multi-mission aircraft in India. European Airbus Defense and Space, with its A-400 M aircraft, is also in contention.

Lockheed Martin also has the advantage as the C-130J is already in the IAF's fleet. The IAF operates 12 Super Hercules for tactical airlifting. The Lockheed Martin C-130J Super Hercules, introduced in 1999, has four turboprop engines and is mostly used as a military transport aircraft. Lockheed Martin's C-130 Hercules had received a complete upgrade with the C-130J that contained new engines, a flying deck, and other equipment.

The Hindustan Times quoted Anthony G Frese, Vice President of Business Development (air mobility and maritime missions), Lockheed Martin, saying that the American firm is also considering setting up an assembly line for the C-130 J in India. “The MTA competition provides us a significant opportunity to meet IAF’s tactical airlift requirements. We are exploring options for setting up an assembly line for the C-130J in India,” Frese said. Lockheed Martin already has a joint venture with Tata Advanced Systems Limited (TASL), the global source of empennages (tail Assemblies) for C-130J. It remains to be seen if Lockheed Martin will again use the Indian firm to bid for the IAF’s tender. Airbus has already partnered with TASL to supply the IAF with C-295 transport aircraft. The IAF is looking to induct 40-80 aircraft in line with the Indian government’s Make in India initiative. The new transport aircraft are expected to have an 18—to 30-tonne cargo-carrying capacity.

In the request for information for the MTA, the IAF has asked the foreign vendors to provide a general estimate of the cost of aircraft and associated equipment for a batch of 40, 60, and 80 aircraft. The C-390 can carry a payload of 26 tonnes compared to the C-130J’s 20 tonnes and A-400 M’s 37 tonnes. The IAF has asked OEMs to furnish information about the scope of technology transfer; methods to enhance indigenization and to set up a dedicated manufacturing line, including design, integration, and manufacturing processes in India; capability to undertake indigenous manufacture of systems, subsystems, components, and spares; and making India a regional or global hub for manufacturing and maintenance, repair and overhaul (MRO) of the equipment.

The prolonged standoff with China has underscored the information on military transport aircraft. After the Galwan clash in 2020, India deployed its transport fleet of C-17 and C-130Js to ferry over 68,000 additional troops, along with nearly 90 tanks and over 300 infantry combat vehicles, into the icy heights of Ladakh.

**Technology Transfer Key To Deal**

**C-390 Vs C-130J**

Lockheed Martin’s statement has come after Embraer Defense & Security signed a Memorandum of Understanding with Mahindra. The MoU was signed by Embraer Defense & Security and Mahindra Defence Systems, a 100 percent owned subsidiary of Mahindra, which focuses on armored transport and security-related products, including electronics. The C-390 Millenium is a multi-mission, twin-engine, jet-powered, tactical transport aircraft. It is the most modern military transport aircraft in the market, can carry more payload (26 t) than other medium-sized military transport aircraft, and flies 870 km/h (470 knots).

It entered the Brazilian Air Force in 2019. Since then, it has been inducted into the Brazilian Air Force, Portuguese Air Force, Hungarian Air Force, Austrian Air Force, Czech Republic Air Force, and Royal Netherland Air Force. South Korea opted for it in December 2023. In 2020, the Royal Netherlands Air Force chose the C-390 Millenium over the C-130 J. Because of its speed and load capacity, the Brazilian aircraft could complete a mission with fewer aircraft than the competition.

The C-130J can only cruise at 248 kt; however, the KC-390 can reach a top speed of 470 kt and has a higher operating ceiling of 36,000 feet, as opposed to the C-130J’s 28,000 feet. The C-130J has a range of 2,100 miles, whereas the KC-390 has slightly less (1,750 miles). According to Embraer, a

fleet of six KC-390s flying 1,350 nm (2,500 km) round trips could carry 1,000 passengers and 500 tons of cargo in less than two days. That is 40 percent faster than the C-130J, claims Embraer.

Operating on temporary or unpaved runways like packed earth, soil, and gravel, it may carry out a broad range of operations, including hauling and dropping soldiers and goods, medical evacuation, search and rescue, aerial firefighting, and humanitarian missions. The KC-390, an aircraft equipped with air-to-air refueling capabilities, has demonstrated its ability to refuel from the air as a tanker and receiver. In one instance, it accomplished this by utilizing underwing pods to accept fuel from another KC-390. The KC-390 is fifteen percent quicker, eighteen percent more capable of carrying cargo, and forty-one percent less expensive than the C-130J. The KC-390 has an aerial refueling capability as standard equipment; however, its range is 15% less than that of the C-130J. Only a few specific sub-variants of the C-130 are equipped with this capacity.

**A-400M – The Heavy Lifter**

The third contender in the tender is the A-400 M, which is sized between the Lockheed C-130 Hercules and the Boeing C-17 Globemaster III. It can carry heavier loads than the C-130 and use rough landing strips. Apart from transport, the A-400M can perform aerial refueling and medical evacuation when equipped with the appropriate gear, a role performed by the Russian Ilyushin Il-78 in the IAF. The Airbus A-400M Atlas is a European four-engine turboprop military transport aircraft designed by Airbus Military (now Airbus Defence and Space). However, its size is beyond the upper limit of the transport aircraft's cargo-carrying capacity that the IAF is looking for. The IAF wants a transport aircraft in the 18-30 tonne category. The C-390 can carry a payload of 26 tonnes compared to the C-130J's 20 tonnes and A-400 M's 37 tonnes.

The A-400M demonstrated its ability to serve as an airborne launcher for unmanned aerial vehicles unmanned aerial vehicles (UAVs) in 2022. During a recent test, an A400M deployed a drone from its opened rear cargo ramp door while airborne, validating its capability to air-launch drones. In recent times, the Government of India has considered strategic interests when pursuing defense deals. It would be interesting to see which firm emerges as a winner in this multi-billion-dollar deal.

https://www.eurasiantimes.com/f-35-f-22-developer-coming-to-india-lockheed/

The EurAsian Times

***Sun, 23 Jun 2024***

# Thunder Or Blunder? Pakistan's "Cutting Edge" Fighter Meets 5th Crash In 13 Years; IAF Experts Review JF-17 Aircraft

On June 5, 2024, a JF-17 Thunder Block 2 fighter jet crashed in the Jhang district of Punjab, Pakistan. There had been a lot of social media buzz about the crash, with several videos circulating on the internet but no official confirmation from Islamabad. While the mainstream Pakistani media

and Air Force remained tight-lipped about the incident, confirmation came from unexpected quarters. On June 11, Martin-Baker, the maker of the ejection seat, took to X to confirm the news.

"On Wednesday, 5th June, a Pakistan Air Force JF-17 Block 2 aircraft crashed near the Jhang district. The pilot successfully ejected using the Martin-Baker PK16LE Seat," the Martin Baker post read. The JF-17 fighter is a single-engine, lightweight, multi-role combat aircraft jointly developed by the Pakistan Aeronautical Complex and China's Chengdu Aircraft Industry Corporation. The workhorse of the Pakistan Air Force (PAF), the jet is manufactured 58% in Pakistan and 42% in China.

The JF-17 was conceived as the successor to the French and Chinese third-generation fighter jets in the Pakistani Air Force's fleet, namely the A-5C, F-7P/PG, Mirage III, and Mirage V. As of today, the PAF has about 150 JF-17s in service; however, a significant chunk of them remain grounded, as per a report published in Sputnik India. As per data published by the Flight Safety Foundation's Aviation Safety Network, this is the 5th confirmed crash of the Sino-Pakistani fighter jet in its 13-year-long service. On the other hand, JF-17's Indian counterpart, Light Combat Aircraft (LCA) Tejas, has suffered just one crash in almost eight years of service.

**Problems Reported With JF-17 Thunder**

**1. Maintenance Problems With The Engine**

Using Chinese-supplied RD-93 engines in the JF-17 is causing serious operational headaches for the PAF. As per an article published in SP's Aviation in 2023, 40 JF-17 Block 1 and 2 fighters were grounded and categorized as un-airworthy. Guide vanes, exhaust nozzles, and flame stabilizers had developed cracks in a substantial number of engines. As reported earlier by EurAsian Times, even the Chinese People's Liberation Army Air Force (PLAAF) found it lacking on several fronts and did not induct it in its fleet.

In 2021, Air Marshal Anil Chopra (retired) spoke about the inferior JF-17 engine, stating that India's LCA Tejas had a much more reliable engine than its Pakistani counterpart. Thus, the PAF and the China National Aero-Technology Import and Export Corporation (CATIC) want to substitute a Chinese RD-93 engine by sourcing it directly from Moscow. However, this shift is not as easy as it sounds. The JF-17 Thunder uses the RD-93 engine, which is officially manufactured by Russian engine maker Klimov. After a certain number of flying hours, aircraft engines must be regularly replaced by the original equipment manufacturer (OEM).

However, such maintenance activities have become extremely cumbersome due to the strict economic sanctions imposed by the West against the original equipment supplier, 'JSC Rosoboronexport,' since the onset of the Russia-Ukraine conflict. Since 2018, it has been the only state-controlled firm in Russia for exports and imports of all military equipment, technology, dual-purpose goods, services, etc. Naturally, this makes any military collaboration between Islamabad and Moscow highly undesirable for a Pakistani state already crippled by an economic crisis due to the growing fear of American sanctions.

Due to the sanctions, Rosoboronexport cannot conduct transactions in US dollars. This means complexities for the banks and the two governments in making and receiving payments and mounting maintenance costs for the Pakistani Air Force due to the country's fast-depreciating currency.

**2. Other Technical Snags and Shortcomings**

According to IAF Group Captain DK Pandey's analysis, the JF-17 is unreliable for air defense roles. Its indigenously developed Link-17 data link does not have a sufficient data transfer rate. The fighter has limited interoperability as it cannot be integrated with the Link-16 of the Pakistani F-16s. Additionally, the jet does not have an effective Beyond Visual Range (BVR) or Airborne Interception Radar.

The JF-17's precision strike capability is also under serious doubt following the poor performance of the JF-17s during Operation Swift Retort on February 27, 2019, following effective jamming by the Indian pilot. All of PAF's Range Extension Kit (REK) bombs failed to hit any target of significance. Thus, the JF-17 has serious flaws such as low endurance, poor accuracy, unreliable airborne interception radar, low payload carrying capacity, maintenance problems, low credibility of aircraft main computers, and frequent failures of a number of its modules.

**3. Poor Performance**

To their credit, Pakistan has found many clients for its JF-17, exporting them to countries such as Nigeria and Myanmar. In addition, deals have reportedly been finalized with Azerbaijan and Iraq.

As per the Aviation Industry Corporation of China (AVIC) statement, "JF-17s were built to meet the requirements of international customers and the global market. This statement clearly shows that these fighter jets were not meant for the domestic markets but for nations that required a low-cost, multi-role, lightweight, single-engine fighter jet. It was never intended to be a state-of-the-art fighter jet but rather one that would be the cheapest option available in the category.

As reported by the Irrawaddy Times, Myanmar, the first country after Pakistan to purchase the JF-17s, was forced to ground its fleet after suffering technical malfunctions. Analysts and Former Myanmar Air Force Pilots told the news outlet that the planes have "structural cracks and other technical issues." They added, "The aircraft, which are supposed to be capable of interception, ground attack, and bombing missions, have turned out to be unfit for service, and the Myanmar military lacks the technical expertise to fix the problem."

They further lamented that a crucial part of the JF-17 avionics is the Chinese-made KLJ-7 AI radar, which has poor accuracy and maintenance issues. The aircraft lacks a lethal BVR missile and an airborne interceptor radar. Additionally, the malfunction of the Weapons Mission Management Computer has caused launch zones of BVR air-to-air missiles to shrink during combat exercises. According to a former Myanmar Air Force Pilot, "Furthermore, the airframe is vulnerable to damage, especially in its wingtips and hardpoints, when the aircraft encounters strong gravitational forces."

Myanmar inked the deal with China for 16 JF-17s in 2016 at an estimated cost of $25 million each. While the first six planes were delivered in 2018, the status of the other 10 remains unclear. The first four jets were inducted into the Myanmar Air Force in December 2018 and the other 2 in December 2019. However, after nearly five and a half years since commissioning the first lot, Burmese JF-17s remain grounded. Nigeria became the second customer of the Sino-Pak aircraft in 2016, ordering three units. Since being commissioned into the Nigerian Air Force in 2021, it has been deployed in counter-terror and insurgency operations, predominantly against Boko Haram and the Islamic State affiliate in north-eastern Nigeria.

While expectations of a fresh order were reasonably high, the Nigerian Air Force signed an agreement with Italian firm Leonardo for the purchase of 24 M-346FA aircraft that are slated to arrive in 4 batches, with the first arriving at the end of this year. The planes, originally twin-seater jet trainers, have been modified for combat roles and will be accompanied by a 25-year logistical support package for operational efficiency and longevity. Unlike the JF-17 disaster in Myanmar, these planes have a proven track record in Italy, Israel, Qatar, Poland, and Singapore.

**Positives Of JF-17 Thunder**

However, despite all the criticisms of the fighter jet, the PAF seems quite confident in its operational capabilities. The latest JF-17 Block 3 version debuted at the Dubai Airshow in November 2023. The PAF issued a statement laden with praise of the fighter. It read, "The JF-17 Thunder Block 3 fighter jet epitomizes the pinnacle of modern aerial warfare technology. Equipped with state-of-the-art avionics, enhanced weaponry, and advanced electronic warfare systems, the JF-17 Block 3 boasts superior maneuverability, extended range, and enhanced combat capabilities. Its participation in the Dubai Airshow signifies PAF's confidence in this Indigenous marvel, highlighting Pakistan's commitment to fostering self-reliance in the defense industry."

The JF-17 Block 3 has been described as a "fourth-generation plus" by PAF officials. This latest version of the fighter jet was inducted into the PAF in November 2023. As reported by EurAsian Times earlier, this variant comes with "superior maneuverability, extended range, and enhanced combat capabilities." Additionally, it comes with better stealth features, such as a reduction in the aircraft's radar cross-section, resulting from the greater use of composites and better avionics. This version will be equipped with the active electronically scanned array (AESA) radar.

The radar system is the Nanjing Research Institute of Electronics Technology (NRIET) KLJ-7A X-band airborne 3D fire control radar (FCR). Its predecessor in the Block 2 variant, the KLJ-7 V2 radar, can detect any aircraft with a radar cross-section of 3 meters at a maximum range of 150 km. The latest version is said to have better multi-targeting capability, increased resilience to jamming, easier maintenance, and increased range. It is said that by the end of 2024-2025, Pakistan will have 50 of this superior Block 3 variant, making them a sizeable threat.

Additionally, in 2021, the Chinese state-run daily tabloid, the Global Times, stated that the JF-17 fighter would be paired with China's most advanced air-to-air combat missile, i.e., the PL–10, a missile used in China's 5th generation J-20 fighter jet. Quoting an unnamed military expert in Beijing, the Global Times wrote, "With the PL-10, the JF-17 Block 3 will gain tremendous dogfight capability and have an edge even against its heavier opposing counterparts in homeland air defense."

Senior Indian defense analyst Abhijit Iyer Mitra, a senior fellow at the Institute of Peace and Conflict Studies, New Delhi, has heaped praise on the JF-17 on various occasions. Speaking on the popular YouTube channel 'The Jaipur Dialogues, ' he stated that even the JF-17 Block 1 would be better than Tejas MK 3.

Additionally, on another popular YouTube channel named 'Abhinav Prakash,' he added that the JF-17's low cost has made the PAF believe that they will be able to throw a large number of them into the battlefield and eventually take down even the much superior Indian Rafales, relying on the quality-quantity paradigm. In an earlier interaction with EurAsian Times, Mitra had highlighted the

positives of the JF-17, opining that it slots into the Chinese supply chain and has a huge variety of proven and demonstrable weapons. Further, he added that whatever upgrades the plane has seen are "solid and proven."

https://www.eurasiantimes.com/thunder-or-big-blunder-pakistans-cutting/

The EurAsian Times

***Sun, 23 Jun 2024***

# BVR Combat: F-15 Eagles 'Battle' IAF Rafales During Red Flag 2024 Drills; Revenges 2004 Drubbing By Su-30?

Years after its Sukhoi Su-30 MKI "over-powered" USAF F-15s, the Indian Air Force (IAF) Rafale fighters gave a tough fight to American-made warplanes during the recently concluded Red Flag exercises. In the 2008 edition of Red Flag, the IAF sent its Su-30MKI and went up against F-15s and F-16s. Following the wargames, U.S. Air Force pilots anonymously put an assessment on YouTube. They said that the American fighters would soon lose their competitive edge to the Russian fighters. It was the first time the Su-30MKI featured in an international wargame of this scale and crossed swords with advanced Western fighters.

The F-15 pilots have gained amazing experience against the thrust vectoring capability of Lockheed Martin's F-22 which helped them exploit the vulnerability of the Su-30 in a hard turn. A USAF pilot shared his assessment of the two fighter jets going against each other. "So we start to pull in on him, and then all of a sudden you start to see the [Su-30's aft-] end kick down, and he starts doing vectored thrust," the pilot was quoted saying.

"But now he starts falling out of the sky. He's falling out of the sky so fast that you don't even have to go up," the pilot adds. "You just have to pull back on the stick a little bit, pull the throttle, go to guns, and come in and drill his brains out." Even so, the professionalism and skill of the IAF pilots at Red Flag gained the respect of the USAF pilots. Sixteen years later, the French-made Rafales in the IAF fleet matched the F-15s' capability in the Red Flag exercise at Eielson Air Force Base, Alaska. The two fighter jets did not engage in any dogfights.

Red Flag is an air combat exercise with multiple scenarios designed to provide realistic combat settings. The participating forces are divided into the Red Force, which simulates Air Defence elements, and the Blue Force, which simulates Offensive Composite elements. During this exercise, the Red Force was mainly constituted by the USAF Aggressor Squadron, which flew the F-16 and F-15 aircraft. This was the first time the IAF Rafale aircraft participated in Ex Red Flag, wherein they operated alongside the RSAF (Singapore), USAF F-16 and F-15s, and USAF A-10 aircraft. The missions included Beyond Visual Range (BVR) combat exercises as part of large force engagements (LFE) in Offensive Counter-Air and Air Defence roles.

An IAF source told the EurAsian Times: "The interaction was limited only to BVR, so limited interaction. But performance at higher levels was equivalent to ours." The F-15 fighter jet belonged

to Republic Singapore Air Force, but the weapons belonged to the USAF. Rafale's BVR rating is 90 percent, and it is armed with an Air-to-air missile (AAM) MBDA Meteor with a range of 100 kilometers. In comparison, F-15EX has a BVR rating of 88 percent. It has an AAM AIM-120 AMRAAM with a range of 75 kilometers. For dogfights, it has a 30 mm GIAT 30M/719B cannon, and the F-15EX has a 20 mm M61A1 Vulcan gun and AIM-7 Sparrow medium-range semi-active radar homing air-to-air missile.

IAF Rafales might not have got a chance to go up against F-15s, but the pilot assessing the 2008 performance of Su-30MKIs had high praises for MiG-21 Bison aircraft, modified with Israeli radar, active radar missiles, and electronic jammers as they were nearly "invisible" to F-15 and F-16's then mechanically-scanned arrays. It allowed the Indian pilots to sneak past the USAF radar screen and engage the two American fighter jets in dogfights. "The MiG-21 had the ability to get in the scissors with you at 110kts at 60 degrees nose high and go from 10,000 to 20,000 feet," he said.

**When USAF's F-15C Jets Were Creamed IAF**

This tale has been legendary in the history of the U.S. and Indian wargames. Cope India 04 was held at the Gwalior airbase of the IAF from February 15 to 27, 2004. During the exercise, the Indian pilots 'trounced' U.S. Air Force F-15C jets 90 percent of the time. The Pentagon later defended the outcome, stating that the Rules of Engagement were skewed in favor of the Indian fighter jets. The F-15s did not have the Advanced Active Electronically Scanned Array (AESA) radars. (The new F-15 EX has AESA Radars.)

Secondly, the air engagements typically involved six Eagles against up to eighteen IAF aircraft, with no chance to simulate any beyond-visual-range (BVR) combat (due to the Indian request not to use the AMRAAM). The other problem was that the IAF sent their most experienced pilots against the Americans, who had a mix of experienced and inexperienced pilots. David A. Fulghum, in its Cope India report, quoted Colonel Mike Snodgrass, commander of the 3rd Wing, as saying: "The outcome of the exercise boils down to (the fact that) they ran tactics that were more advanced than we expected…They could come up with a game plan, but if it wasn't working, they would call an audible and change (tactics in flight)."

The F-15Cs faced Su-30MKs, the less advanced fighter jets that also lacked the AESA radar. The other aircraft the F-15C faced was the MiG-21 Bison, an upgraded version of the Russian-made MiG-21. Low radar visibility, instantaneous turn rate, acceleration, and helmet-mounted sight combined with high-off-boresight R-73 air-to-air missiles were among the factors that made the upgraded MiG-21 a formidable adversary for the US F-15s.

https://www.eurasiantimes.com/bvr-combat-f-15-eagles-battle-iaf-rafales-during/

Press Information Bureau
Government of India

**Ministry of Science & Technology**

***Sat, 22 Jun 2024***

# India to have a robust National Research Foundation (Anusadhan NRF) which, once fully functional, will be huge transformation in research and development, also to act as a bridge for integration of public and private sector including industry and academia, says Union Minister Dr. Jitendra Singh

India to have a robust National Research Foundation (Anusadhan NRF) which, once fully functional, will be a huge transformation in research, development and also act as a bridge for integration of public and private sectors including industry and academia, said Union Minister Dr. Jitendra Singh here today.

The Minister made these observations when Dr. Sethuraman Panchnathan, Director of the U.S. National Science Foundation, currently on an India visit, called on him at the national capital.

Union Minister of State (Independent Charge) for Science & Technology, Minister of State (Independent Charge) for Earth Sciences, MoS PMO, Department of Atomic Energy, Department of Space, Personnel, Public Grievances and Pensions, Dr.Jitendra Singh said,there was no dearth of scientific acumen in India but what lacked was an enabling milieu to support development of science and technology, and motivate people in research and development. The leadership and vision of Prime Minister Narendra Modi provided that enabling milieu and brought revolutionary change in the scenario thus driving India on the forefront.

The Science and Technology Minister informed about the government’s efforts in making the National Geospatial policy and relaxing the drone policy to facilitate and encourage private sector players. He highlighted the government’s vision and plan to scale up research and development in India through Anusandhan National Research Foundation, a step in the direction to act as bridge for collaboration of efforts and bring best of both worlds from Public sector as well as Private sector and form multinational collaboration for development of world class technological innovations.

Dr Jitendra Singh also highlighted the opening of the Space sector for private players and supporting them for innovation. The rise of space startups is a testimony and their contribution is worth mentioning. He also highlighted India's progress in next generation technologies such as

AI/ML, quantum technologies and said “India on par with the rest of the world in next generation technologies.”

Dr.Jitendra Singh shared that the scale and amount of research currently happening in India under the guidance of PM Modi will help raise India from 5th Largest economy to 4th largest, then 3rd largest and so on subsequently in the coming days. He also discussed various areas for scientific collaboration.

Dr.Sethuraman Panchnathan, expressed confidence in India's efforts to bring a transformational change in the field of research and development and futuristic projects and technologies. He also congratulated Dr. Jitendra Singh for his consistent support to International collaboration in the scientific sector. He also wished India for its future endeavours.

https://pib.gov.in/PressReleasePage.aspx?PRID=2027677

***Sun, 23 Jun 2024***

# ISRO's Hat-Trick In Pushpak Safe Landing, Focus Now On Orbital Entry Trials

In a rare distinction for any space agency, the Indian Space Research Organisation (ISRO) today achieved a rare hat-trick of the safe landing of an uncrewed, autonomous winged reusable launch vehicle during an experiment in this century. ISRO said in a statement that it has proudly achieved a third consecutive success in the Reusable Launch Vehicle (RLV) Landing Experiment (LEX) today. "The third and final test in the series of LEX (03) was conducted at 07:10 IST at the Aeronautical Test Range (ATR) in Chitradurga, Karnataka," it said.

ISRO chairman S Somanath told NDTV, "ISRO achieved a hat-trick of safe landings by the Pushpak or Reusable Launch Vehicle, now this sets the stage for the orbital test of Pushpak. It will be launched on a rocket into space, and then it can safely land on Earth. Truly a game-changer technology to reduce cost of access to space. A uniquely atmanirbhar effort by ISRO to harness reusable rockets in a swadeshi way in the 21st century."

"Bringing the most expensive part of the rocket that houses the electronics is what makes Pushpak the futuristic rocket tech for India. ISRO continues to work hard to master technology," he said. The real big test will come when India goes in for the orbital test. Mr Somanath says, "The Orbital Re-entry Vehicle (ORV) will have high temperature protection tiles on its outer surface. Liquid rocket engines and a retractable landing gear. It will also have space for a payload that can be deployed through a door that will open."

The making of India's own delta winged 'space shuttle' of sorts, though uncrewed, it is indeed a big leap of faith at a point where other agencies are only attempting to bring back spent hollow rocket stages. A whole new vehicle much larger in size will be made for the orbital test based on the success of today's test and it will first be tested in a landing experiment before it is flown into space and brought back to Earth like a space plane. ISRO says following the success of the RLV

(Reusable Landing Vehicle) LEX-01 and LEX-02 missions, RLV LEX-03 re-demonstrated the autonomous landing capability of the RLV under more challenging release conditions (cross range of 500 m against 150 m for LEX-02) and more severe wind conditions.

The winged vehicle, 'Pushpak', was released from an Indian Air Force Chinook Helicopter at an altitude of 4.5 km. From a release point 4.5 km away from the runway, Pushpak autonomously executed cross-range correction manoeuvres, approached the runway and performed a precise horizontal landing at the runway centreline. Due to this vehicle's low lift-to-drag ratio aerodynamic configuration, the landing velocity exceeded 320 kmph, as compared to 260 kmph for a commercial aircraft and 280 kmph for a typical fighter aircraft. After touchdown, the vehicle velocity was reduced to nearly 100 kmph using its brake parachute, after which the landing gear brakes were employed for deceleration and stop on the runway. "During this ground roll phase, Pushpak utilises its rudder and nose wheel steering system to autonomously maintain a stable and precise ground roll along the runway," the ISRO statement said.

According to ISRO, this mission simulated the approach and landing interface and high-speed landing conditions for a vehicle returning from space, reaffirming ISRO's expertise in acquiring the most critical technologies required for the development of a RLV. Through this mission, the advanced guidance algorithm catering to longitudinal and lateral plane error corrections, which is essential for the future Orbital Re-entry Mission, has been validated. The RLV-LEX uses multi-sensor fusion including sensors like inertial sensor, Radar altimeter, Flush air data system, Pseudolite system and NavIC. Notably, the RLV-LEX-03 mission reused the winged body and flight systems as such without any modification, from the LEX-02 mission, demonstrating the robustness of ISRO's capability of design to reuse flight systems for multiple missions.

This mission simulates the approach and landing interface and high-speed landing conditions for a vehicle returning from space, which will reaffirm ISRO's expertise in acquiring the most critical technologies required for the development of a Reusable Launch Vehicle (RLV) asserts ISRO. mIndia embarked on making its own version of the swadeshi 'space shuttle' by planning about it more than 15 years ago, but actual work, it seems, started 10 years ago when a dedicated team of engineers and scientists plunged into making RLV a reality. The 6.5 metre aeroplane-like spacecraft weighs 1.75 tonnes.

During the descent phase, which is essentially a glider like event, small thrusters will help the vehicle to be navigated to the exact spot where it is supposed to land. The winged vehicle, 'Pushpak', was released from an Indian Air Force Chinook Helicopter at an altitude of 4.5 km. From a release point 4.5 km away from the runway, Pushpak autonomously executed cross-range correction manoeuvres, approached the runway and performed a precise horizontal landing at the runway centreline. Due to this vehicle's low lift-to-drag ratio aerodynamic configuration, the landing velocity exceeded 320 kmph, as compared to 260 kmph for a commercial aircraft and 280 kmph for a typical fighter aircraft. After touchdown, the vehicle velocity was reduced to nearly 100 kmph using its brake parachute, after which the landing gear brakes were employed for deceleration and stop on the runway. "During this ground roll phase, Pushpak utilises its rudder and nose wheel steering system to autonomously maintain a stable and precise ground roll along the runway," the ISRO statement said.

According to ISRO, this mission simulated the approach and landing interface and high-speed landing conditions for a vehicle returning from space, reaffirming ISRO's expertise in acquiring the most critical technologies required for the development of a RLV. Through this mission, the advanced guidance algorithm catering to longitudinal and lateral plane error corrections, which is essential for the future Orbital Re-entry Mission, has been validated. The RLV-LEX uses multi-sensor fusion including sensors like inertial sensor, Radar altimeter, Flush air data system, Pseudolite system and NavIC. Notably, the RLV-LEX-03 mission reused the winged body and flight systems as such without any modification, from the LEX-02 mission, demonstrating the robustness of ISRO's capability of design to reuse flight systems for multiple missions.

This mission simulates the approach and landing interface and high-speed landing conditions for a vehicle returning from space, which will reaffirm ISRO's expertise in acquiring the most critical technologies required for the development of a Reusable Launch Vehicle (RLV) asserts ISRO

India embarked on making its own version of the swadeshi 'space shuttle' by planning about it more than 15 years ago, but actual work, it seems, started 10 years ago when a dedicated team of engineers and scientists plunged into making RLV a reality. The 6.5 metre aeroplane-like spacecraft weighs 1.75 tonnes. During the descent phase, which is essentially a glider like event, small thrusters will help the vehicle to be navigated to the exact spot where it is supposed to land.

Mr Somanath congratulated the team for their efforts in maintaining the success streak in such complex missions. Dr S Unnikrishnan Nair, director of Vikram Sarabhai Space Centre, emphasised that this consistent success boosts ISRO's confidence in the critical technologies essential for future orbital re-entry missions.

https://www.ndtv.com/science/isro-pushpak-isros-hat-trick-in-pushpak-safe-landing-focus-now-on-orbital-entry-trials-5950142

Hindustan Times

***Sat, 22 Jun 2024***

# Space radiation can damage satellites − my team discovered that a next-generation material could self-heal when exposed to cosmic rays

Rochester, The space environment is harsh and full of extreme radiation. Scientists designing spacecraft and satellites need materials that can withstand these conditions. In a paper published in January 2024, my team of materials researchers demonstrated that a next-generation semiconductor material called metal-halide perovskite can actually recover and heal itself from radiation damage.

Metal-halide perovskites are a class of materials discovered in 1839 that are found abundantly in Earth’s crust. They absorb sunlight and efficiently convert it into electricity, making them a potentially good fit for space-based solar panels that can power satellites or future space habitats.

Researchers make perovskites in the form of inks, then coat the inks onto glass plates or plastic, creating thin, filmlike devices that are lightweight and flexible. Surprisingly, these thin-film solar cells perform as well as conventional silicon solar cells in laboratory demonstrations, even though they are almost 100 times thinner than traditional solar cells.

But these films can degrade if they're exposed to moisture or oxygen. Researchers and industry are currently working on addressing these stability concerns for terrestrial deployment. To test how they might hold up in space, my team developed a radiation experiment. We exposed perovskite solar cells to protons at both low and high energies and found a unique, new property.

The high-energy protons healed the damage caused by the low-energy protons, allowing the device to recover and continue doing its job. The conventional semiconductors used for space electronics do not show this healing. My team was surprised by this finding. How can a material that degrades when exposed to oxygen and moisture not only resist the harsh radiation of space but also self-heal in an environment that destroys conventional silicon semiconductors? In our paper, we started to unravel this mystery.

**Why it matters**

Scientists predict that in the next 10 years, satellite launches into near-Earth orbit will increase exponentially, and space agencies such as NASA aim to establish bases on the Moon. Materials that can tolerate extreme radiation and self-heal would change the game. Researchers estimate that deploying just a few pounds of perovskite materials into space could generate up to 10,000,000 watts of power. It currently costs about USD 4,000 per kilogram to launch materials into space, so efficient materials are important.

**What still isn't known**

Our findings shed light on a remarkable aspect of perovskites – their tolerance to damage and defects. Perovskite crystals are a type of soft material, which means that their atoms can move into different states that scientists call vibrational modes. Atoms in perovskites are normally arranged in a lattice formation. But radiation can knock the atoms out of position, damaging the material. The vibrations might help reposition the atoms back into place, but we're still not sure exactly how this process works.

**What's next?**

Our findings suggest that soft materials might be uniquely helpful in extreme environments, including space. But radiation isn't the only stress that materials have to weather in space. Scientists don't yet know how perovskites will fare when exposed to vacuum conditions and extreme temperature variations, along with radiation, all at once. Temperature could play a role in the healing behaviour my team saw, but we'll need to conduct more research to determine how.

These results tell us that soft materials could help scientists develop technology that works well in extreme environments. Future research could dive deeper into how the vibrations in these materials relate to any self-healing properties.

https://www.hindustantimes.com/science/space-radiation-can-damage-satellites-my-team-discovered-that-a-next-generation-material-could-self-heal-when-exposed-to-cosmic-rays-101719035533224.html

Hindustan Times

*Sun, 23 Jun 2024*

# ISRO completes its Reusable Launch Vehicle technology demonstrations through LEX trio

Bengaluru, Space agency ISRO on Sunday said it has achieved a third consecutive success in the Reusable Launch Vehicle Landing Experiment by demonstrating the autonomous landing capability of the launch vehicle under more challenging conditions.Space agency ISRO on Sunday said it has achieved a third consecutive success in the Reusable Launch Vehicle Landing Experiment by demonstrating the autonomous landing capability of the launch vehicle under more challenging conditions.

This mission simulated the approach and landing interface and high-speed landing conditions for a vehicle returning from space, reaffirming the Indian Space Research Organisation's expertise in acquiring the most critical technologies required for the development of a Reusable Launch Vehicle , the space agency said.

The third and final test in the series of Landing Experiment was conducted at 07:10 1ST at the Aeronautical Test Range in Chitradurga, Karnataka.

Following the success of the RLV LEX-01 and LEX-02 missions, ISRO in a release said, RLV LEX-03 re-demonstrated the autonomous landing capability of the RLV under more challenging release conditions and more severe wind conditions.

The winged vehicle, named 'Pushpak', was released from an Indian Air Force Chinook Helicopter at an altitude of 4.5 km "from a release point 4.5 km away from the runway. Pushpak autonomously executed cross-range correction manoeuvres, approached the runway and performed a precise horizontal landing at the runway centreline," it said.

Due to this vehicle's low lift-to-drag ratio aerodynamic configuration, the landing velocity exceeded 320 kmph, compared to 260 kmph for a commercial aircraft and 280 kmph for a typical fighter aircraft, it added.

ISRO said, after touchdown, the vehicle velocity was reduced to nearly 100 kmph using its brake parachute, after which the landing gear brakes were employed for deceleration and stop on the runway.

During this ground roll phase, Pushpak utilises its rudder and nose wheel steering system to autonomously maintain a stable and precise ground roll along the runway, it said.

According to the space agency, this mission simulated the approach and landing interface and high-speed landing conditions for a vehicle returning from space, reaffirming ISRO's expertise in acquiring the most critical technologies required for the development of a Reusable Launch Vehicle.

Through this mission, the advanced guidance algorithm catering to longitudinal and lateral plane error corrections, which is essential for the future Orbital Re-entry Mission has been validated, the space agency noted.

The RLV-LEX uses multi-sensor fusion including sensors like Inertial sensor, Radar altimeter, Flush air data system, Pseudolite system and NavIC, it said, adding "Notably, the RLV-LEX-03 mission reused the winged body and flight systems as such without any modification, from the LEX-02 mission, demonstrating the robustness of ISRO's capability of design to reuse flight systems for multiple missions."

The mission, led by Vikram Sarabhai Space Centre , was a collaborative effort involving multiple ISRO centres Space Applications Centre , ISRO Telemetry, Tracking and Command Network and Satish Dhawan Space Centre SHAR, Sriharikota.

The mission received significant support from the Indian Air Force, Aeronautical Development Establishment, Aerial Delivery Research and Development Establishment, Regional Centre for Military Airworthiness under Centre for Military Airworthiness and Certification, National Aerospace Laboratories, Indian Institute of Technology, Kanpur, Indian aerospace industrial partners, Indian Oil Corporation of India and Airport Authority of India.

S Somanath, Chairman, ISRO/Secretary, Department of Space, congratulated the team for their efforts in maintaining the success streak in such complex missions.

Dr S Unnikrishnan Nair, Director of VSSC, emphasised that this consistent success boosts ISRO's confidence in the critical technologies essential for future orbital re-entry missions.

J Muthupandian is the Mission Director and B Karthik is the Vehicle Director for this successful mission.

https://www.hindustantimes.com/science/isro-completes-its-reusable-launch-vehicle-technology-demonstrations-through-lex-trio-101719111662697.html

Hindustan Times

***Fri, 21 Jun 2024***

# Indian astronauts to space station soon: NASA chief's big update on ISRO collab

The National Aeronautics and Space Administration (NASA) administrator Bill Nelson has announced that the US space agency will enhance its collaboration with India, including a "joint effort" aboard the International Space Station (ISS) with an Indian astronaut.

This statement follows the iCET Dialogue between US national security adviser Jake Sullivan and Indian counterpart Ajit Doval, which revealed plans for advanced training for Indian Space Research Organisation (ISRO) astronauts in the US.

Nelson highlighted the growing partnership, saying, “Building on my visit to India last year, NASA continues to further the United States and India initiative on Critical and Emerging Technology for the benefit of humanity.”

"Together we are expanding our countries' collaboration in space, to include a joint effort aboard the International Space Station with an ISRO astronaut," Nelson, wrote on X on Wednesday.

"While specific details about the mission are still in work, these efforts will support future human spaceflight and improve life here on Earth," Nelson said.

In New Delhi, Sullivan and Doval announced the Strategic Framework for Human Spaceflight Cooperation, which aims to deepen interoperability in space. They discussed plans for advanced training for ISRO astronauts at NASA's Johnson Space Center and the first joint mission between NASA and ISRO astronauts at the ISS, marking a significant milestone in US-India space cooperation.

NASA will assist in training two Indian astronauts, one of whom is scheduled to fly to the International Space Station (ISS) later this year. ISRO chairperson S Somanath had previously mentioned that ISRO plans to select four astronauts for training.

Additionally, the two countries are preparing to launch the NASA-ISRO Synthetic Aperture Radar, a satellite that will map Earth's surface twice every 12 days to address climate change and other global challenges.

https://www.hindustantimes.com/science/indian-astronauts-to-space-station-soon-nasa-chiefs-big-update-on-isro-collab-101718945157268.html

***Sun, 23 Jun 2024***

# ISRO scientists reveal process of realising skull for Vyommitra humanoid robot

ISRO is approaching its human spaceflight programme in a more humane manner than other space programmes, by using a humanoid half-robot called Vyommitra to evaluate the safety of the Gaganyaan crew module before astronauts are launched into Earth Orbit using hardware primarily manufactured in India.

Other space agencies used dogs and chimpanzees for the same purpose. Vyommitra is a robot resembling the top-half of a human, and can operate the Gaganyaan crew module, and respond to spoken commands from Earth. For the demanding space applications, ISRO scientists opted for additive manufacturing or 3D printing using metals for realising the skull of Vyommitra.

Vyommitra will be sent to Earth orbit in Gaganyaan hardware on an uncrewed flight, and is a precursor to future robotic space missions. The researchers designed the skull using

Blender, an open source software, replicating the size and shape of a human head. The skull was designed to accomodate the face actuation mechanisms, keep the weight as low as possible, and strong enough to survive the rickety ride to Earth orbit.

**Lattice Structure for strength**

The skull incorporates a lattice structure that allows for the required strength and rigidity to withstand the vibrations experienced during launch, while minimising weight as much as possible.

The researchers used the Altair Inspire and Abaqus software for precisely designing the skull. Stress analysis was conducted on the structure as it was iteratively improved. Finally, the skull was 3D printed over the course of 50 hours. The 3D printed structure was sandblasted to obtain a better finish, and a 3-axis milling machine was used for finish machining of the skull, and remove stock material that was printed.

In all, the 3D printing approach allowed for the reduction of 20 per cent of the skull. A paper describing the process has been published inthe Journal of The Institution of Engineers (India): Series C.

https://www.news9live.com/science/isro-scientists-reveal-process-of-realising-skull-for-vyommitra-humanoid-robot-2588729