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पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

28 Jul 2022 4:25PM

स्वदेशी विमान वाहक (आईएसी) 'विक्रांत' की डिलीवरी

भारतीय नौसेना ने आज अपने निर्माता कोचीन शिपयार्ड लिमिटेड (सीएसएल), कोच्चि से प्रतिष्ठित स्वदेशी विमान वाहक (आईएसी) 'विक्रांत' की डिलीवरी लेकर समुद्री इतिहास का सृजन किया है। भारतीय नौसेना के इन-हाउस डायरेक्टर ऑफ़ नेवल डिज़ाइन (डीएनडी) द्वारा डिज़ाइन किया गया और शिपिंग मंत्रालय के तहत एक सार्वजनिक क्षेत्र के शिपयार्ड सीएसएल द्वारा निर्मित इस वाहक का नाम एक शानदार पूर्ववर्ती भारत के पहले एयरक्राफ्ट कैरियर के नाम पर रखा गया है, जिसने 1971 के युद्ध में महत्वपूर्ण भूमिका निभाई थी। भारत की आजादी की 75वीं वर्षगांठ 'आजादी का अमृत महोत्सव' के उपलक्ष्य में होने वाले समारोहों के साथ विक्रांत का पुनर्जन्म बड़ी हुई समुद्री सुरक्षा की दिशा में देश के उत्साह और सामर्थ्य का एक सच्चा प्रमाण है जिससे समुद्री सुरक्षा को बढ़ावा मिलेगा।

यह वाहक 262 मीटर लंबा है जिसका पूर्ण विस्थापन है लगभग 45,000 टन है और यह अपने पूर्ववर्ती की अपेक्षा बहुत बड़ा और आधुनिक है। इस जहाज में 88 मेगावाट बिजली की चार गैस टर्बाइनें लगी हैं और इसकी अधिकतम गति 28 (नौट) समुद्री मील है। लगभग 20,000 करोड़ की कुल लागत से निर्मित यह परियोजना रक्षा मंत्रालय और सीएसएल के बीच अनुबंध के तीन चरणों में आगे बढ़ी है, जो क्रमशः मई 2007, दिसंबर 2014 और अक्टूबर 2019 में पूरी हुई हैं। जहाज की नींव फरवरी 2009 में रखी गई थी, इसके बाद अगस्त 2013 में इसे लॉन्च किया गया था। इस जहाज में कुल मिलाकर 76 प्रतिशत स्वदेशी सामग्री लगी है और यह "आत्मनिर्भर भारत" के लिए देश की खोज का एक आदर्श उदाहरण है जो सरकार की 'मेक इन इंडिया' पहल पर जोर देता है। विक्रांत की डिलीवरी से भारत ऐसे देशों के चुनिंदा समूह में शामिल हो

गया है जिनके पास स्वदेशी रूप से विमान वाहक डिजाइन और निर्माण करने की विशिष्ट क्षमता मौजूद है।

विक्रांत को मशीनरी संचालन, जहाज नेविगेशन और उत्तरजीविता के उच्च स्तर के स्वचालन के साथ निर्मित किया गया है और इसे 'फिक्स्ड विंग' और रोटरी विमानों के वर्गीकरण को समायोजित करने के लिए डिजाइन किया गया है। यह जहाज स्वदेश निर्मित उन्नत किस्म के हल्के हेलीकाप्टर (एएलएच) और हल्के लड़ाकू विमान (एलसीए) के अलावा एमआईजी-29 के लड़ाकू जेट, कामोव-31, एमएच-60आर और मल्टी रोल हेलीकाप्टरों के साथ 30 विमानों से युक्त एयर विंग के संचालन में सक्षम है। एसटीओबीएआर (शॉर्ट टेक-ऑफ बट, आरेस्टेड लैंडिंग) के रूप में जाना जाने वाले एक नए विमान चालन मोड का उपयोग करते हुए यह आईएसी विमान को लॉन्चिंग के लिए स्की-जंप और जहाज पर उनकी रिकवरी के लिए 'एरेस्टरवायरों' के सेट से सुसज्जित है।

जहाज में बड़ी संख्या में स्वदेशी उपकरण और मशीनरी लगी है जिसमें देश के प्रमुख औद्योगिक घराने जैसे- बीईएल, भेल, जीआरएसई, केल्ट्रोन, किलोस्कर, लार्सन एंड टुब्रो, वार्टसिला इंडिया से साथ-साथ ही 100 से अधिक एमएसएमई शामिल हैं। स्वदेशीकरण के प्रयासों ने सहायक उद्योगों के विकास के अलावा, रोजगार के अवसरों के सृजन और अर्थव्यवस्था पर स्थानीय और साथ ही अखिल भारतीय स्तर पर 'प्लोबैक' प्रभाव को बढ़ावा दिया है। इसका एक प्रमुख स्पिन-ऑफ नौसेना, डीआरडीओ और भारतीय इस्पात प्राधिकरण (सेल) के बीच साझेदारी के माध्यम से जहाज के लिए स्वदेशी युद्धपोत ग्रेड स्टील का विकास और उत्पादन करना है जिसने हमारे देश को युद्धपोत के संबंध में आत्मनिर्भर बनाने में सक्षम बनाया है। आज देश में बन रहे सभी युद्धपोतों का निर्माण स्वदेशी इस्पात से किया जा रहा है।

इस वाहक के डिजाइन को आकार देने में नौसेना डिजाइन निदेशालय द्वारा 3डी वर्चुअल रियलिटी मॉडल और उन्नत इंजीनियरिंग सॉफ्टवेयर के उपयोग सहित कई डिजाइन पुनरावृत्तियों का उपयोग किया गया है। सीएसएल ने इस जहाज के निर्माण के दौरान अपने जहाज निर्माण के बुनियादी ढांचे के साथ-साथ उत्पादकता कौशल को भी उन्नत बनाया है।

विक्रांत की डिलीवरी को भारतीय नौसेना की ओर से विक्रांत के पदनामित कमांडिंग ऑफिसर, नौसेना मुख्यालय और युद्धपोत निगरानी दल (कोच्चि) के प्रतिनिधियों और कोचीन शिपयार्ड लिमिटेड की ओर से इसके अध्यक्ष और प्रबंध निदेशक द्वारा स्वीकृति दस्तावेजों पर हस्ताक्षर करके चिह्नित किया गया था। इस अवसर पर भारतीय नौसेना और कोचीन शिपयार्ड के वरिष्ठ अधिकारियों की भी उपस्थिति रही।

अगस्त 2021 और जुलाई 2022 के बीच किए गए व्यापक उपयोगकर्ता स्वीकृति परीक्षणों के बाद सीएसएल द्वारा विक्रान्त को भारतीय नौसेना को सौंपा गया है। जिसके दौरान जहाज के कार्य प्रदर्शन में पतवार, मुख्य प्रणोदन (प्रोपल्सन), पीजीडी, सहायक उपकरण, विमानन सुविधाएं, हथियार और सेंसर के साथ-साथ समुद्री रखरखाव भी शामिल हैं। इसकी पेंतरेबाज़ी क्षमता परीक्षण प्रोटोकॉल और सिस्टम मापदंडों के अनुसार संतोषजनक सिद्ध हुए हैं। विक्रान्त की डिलीवरी आज एक लंबे डिजाइन, निर्माण और परीक्षण चरण का परिणति है, जिसके दौरान भारतीय नौसेना और सीएसएल दोनों को कोविड-19 महामारी और उसके बदले हुए भू-राजनीतिक परिदृश्य सहित कई अभूतपूर्व तकनीकी और तार्किक चुनौतियों से निपटना था। स्वदेशी वाहक की सफल डिलीवरी, एक महत्वपूर्ण गतिविधि और ऐतिहासिक घटना है जो दो दशकों से अधिक समय से भारतीय नौसेना, शिपयार्ड, उद्योग, ओईएम और एमएसएमई के बड़ी संख्या में मौजूद हितधारकों के समर्पित प्रयासों का प्रमाण है।

इस स्वदेशी विमान वाहक को जल्द ही भारतीय नौसेना में एक भारतीय नौसेना जहाज (आईएनएस) विक्रान्त के रूप में शामिल किया जाएगा जो हिंद महासागर क्षेत्र (आईओआर) में भारत की स्थिति और समुद्र में नौसेना के कार्य निष्पादन को बढ़ावा देगा।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1845941>



Maritime History Created! Indian Navy Takes Delivery of Indigenous IAC ‘Vikrant’

By Huma Siddiqui

Thu, 28 Jul 2022

The Indian Navy on Thursday took the delivery of the first indigenous aircraft carrier (IAC) ‘Vikrant’ from Cochin Shipyard Limited (CSL), Kochi. With this delivery, India joins a niche group of countries which have the capability to build aircraft carrier with almost 76 percent of indigenous content on board. The IAC has been designed by the Directorate of Naval Design (DND) of the Indian navy and built by CSL, which is a Public Sector Shipyard and functions under the Ministry of Shipping. Next month IAC will be commissioned into the Indian Navy and then it will be — Indian Naval Ship (INS) Vikrant , at a ceremony to celebrate 75th anniversary of India’s independence. With IAC commissioning the navy will be in a position to bolster its position in the Indian Ocean Region (IOR) and its quest for the Blue Water Navy.

Built at an overall cost of around Rs 20,000 crore the IAC which has a maximum speed of 28 knots will be powered by four Gas Turbines giving output of 88 MW power. Financial Express

Online earlier this month had reported that the 262 meter long carrier has a full displacement of close to 45,000 tonnes. This IAC is larger and more advanced than her predecessor. According to the Indian Navy “The reincarnation of Vikrant is a true testimony to the country’s zeal and fervour in pursuing capability build up towards enhanced maritime security.” The IAC project progressed in three phases of the contract between the Ministry of Defence and CSL – concluded in 2007, second phase in December 2014 and October 2019, said the Indian Navy in an official statement.

As reported earlier, the ship’s keel was laid in Feb 2009, and it was launched in 2013 and followed by launching in Aug 2013. And it has been built with a high degree of automation for machinery operation, ship navigation and survivability. Based on its design the new IAC will have more space to accommodate different rotary and fixed wing aircraft. On board will be 30 aircraft including the newcomer MH-60R multi-role helicopters from Lockheed Martin, Russian MIG-29K fighter jets, Kamov-31 helicopters. And in addition there will be indigenously built Advanced Light Helicopters (ALH) from state-owned Hindustan Aeronautics Limited (HAL) and Light Combat Aircraft (Naval Version).

The new IAC also has a unique aircraft-operation mode known as STOBAR (Short Take- Off but Arrested Landing), which means it is equipped with a ski- jump for launching aircraft, and also has on board a set of ‘arrestor wires’ for their recovery onboard. Recently top officials of the Indian Navy confirmed they will soon assess the performance report of the F/A-18 Block III Super Hornet from the US based Boeing Company and Rafale Marine (M) from Dassault Aviation of France. Both these aircraft had landed in Goa from demonstrating their deck based capabilities. The two companies are competing to get the Indian Navy’s order for 26 fighter jets to join the naval aviation fleet on board the IAC.

Indigenous Content

Major companies including BHEL, BEL, Keltron, GRSE, Kirloskar, Larsen & Toubro (L&T), Wartsila India and others and more than 100 MSMEs are behind the large number of indigenous equipment and machinery, which is fitted on board the IAC ‘Vikrant’. Financial Express Online had reported earlier that the aircraft carrier has been built using indigenous warship grade steel which has been developed and produced through a partnership between the Navy, Sail Authority of India and Defence Research and Development Organisation (DRDO). In fact, all the ships being built in the country are using the indigenous warship grade steel.

In the designing of the ship the in-house design bureau of the Indian Navy used several design iterations, including use of 3D Virtual Reality models and advanced engineering software. And while building the ship CSL managed to upgrade their infrastructure and also enhanced their productivity skills. The IAC was handed today after extensive user acceptance trials which were conducted between August 2021 and July 2022, in accordance with trial protocols and system parameters. The performance of the ship, including main propulsion, hull, aviation facilities, weapons & sensors, PGD, auxiliary equipment, sea keeping & manoeuvring capabilities were monitored and were proved satisfactory.

<https://www.financialexpress.com/defence/maritime-history-created-indian-navy-takes-delivery-of-indigenous-iac-vikrant/2609672/lite/>

Government Encourages Private Sector Participation in Defence Sector: Rajnath Singh

Mr Rajnath Singh, Defence Minister, Government of India said that ammunitions and components are equally important for all defence services. "There is a need to have a strong base of ammunition manufacturing in India. We need to emphasize on indigenous designs," he added. Looking at India's regional and geo-political imperatives along with the security challenges, the vision of Atmanirbharta in defence production cannot be left behind, highlighted Mr Singh. Addressing the 2nd conference on Military Ammunition 'AMMO India 2022', organized by FICCI, jointly with CENJOWS, Raksha Mantri added that Atmanirbhar Bharat does not mean India closing the doors for the world. India is ranked in top 10 countries as far as defence expenditure is concerned which makes it an attractive destination for defence manufacturing. "Ministry of Defence is promoting foreign OEMs (original equipment manufacturers) to not only invest in Indian defence market but provide opportunity to export from India also," he added.

He further stated that while embarking on the journey of Atmanirbhar Bharat, it is important to have a healthy mix of local endeavors along with thrust on foreign collaborations. "Whenever a country embarks on a new growth journey, all stakeholders with collective approach including public-private sector, R&D establishments, start-ups, academia along with individual innovators are needed. The same collective approach is also needed in the Indian ammunition manufacturing sector as well," highlighted Mr Singh. Speaking on the role of private sector, the Defence Minister stated that the government understands the capabilities of the private sector. The government has taken a series of steps to increase private sector participation in the defence sector. "The government is working to remove all barriers to help the industry including relaxation in certain conditions financial eligibility criteria, credit ratings etc. to facilitate and incentivize participation by the private sector," he added.

https://www.business-standard.com/article/news-cm/government-encourages-private-sector-participation-in-defence-sector-rajnath-singh-122072800422_1.html



Indigenous Aircraft Carrier INS Vikrant Handed Over to Indian Navy

The Cochin Shipyard on Thursday handed over to the Navy the indigenous aircraft carrier Vikrant, which was designed by the Navy's in-house Directorate of Naval Design and will likely be commissioned on August 15. It is named after India's first aircraft carrier, the Indian Naval Ship (INS) Vikrant, which played a significant role in the 1971 war. The 262-metre-long carrier has a full displacement of close to 45,000 tonnes, much larger and advanced than her

predecessor. The aircraft carrier is powered by four gas turbines totalling 88 MW power and has a maximum speed of 28 knots. Built at an overall cost of close to Rs 20,000 crore under a contract between the defence ministry and the shipyard, the project progressed in three phases ending in May 2007, December 2014 and October 2019 respectively. Its keel was laid in February 2009. The aircraft carrier will be initially with the western naval command.

With an overall indigenous content of 76 per cent, the aircraft carrier is a perfect example of the quest for Aatma Nirbhar Bharat and provides a thrust to the government's Make in India initiative, the Navy said. With the delivery of Vikrant, India has joined a select group of nations having the niche capability to indigenously design and build an aircraft carrier.

Vikrant has been built with a high degree of automation for machinery operation, ship navigation and survivability, and has been designed to accommodate an assortment of fixed-wing and rotary aircraft. The ship would be capable of operating an air wing consisting of 30 aircraft comprising MIG-29K fighter jets, Kamov-31, MH-60R multi-role helicopters, in addition to indigenously manufactured advanced light helicopters and light combat aircraft. Using a novel aircraft-operation mode known as STOBAR (Short Take-Off but Arrested Landing), the aircraft carrier is equipped with a ski-jump for launching aircraft, and a set of "arrester wires" for their recovery onboard.

The aircraft carrier has a large number of indigenous equipment and machinery from major industrial houses in the country such as BEL, BHEL, GRSE, Keltron, Kirloskar, Larsen & Toubro, Wartsila India etc as well as over 100 micro, small and medium enterprises. The indigenisation efforts has also led to the development of ancillary industries besides the generation of employment opportunities and bolstering of plough-back effect on the economy, both locally and nationally. A major spin-off of this is the production of indigenous warship-grade steel through a partnership between the Navy, DRDO and the Steel Authority of India (SAIL), which has enabled the country to become self-sufficient with respect to warship steel. Today all the warships being built in the country are being manufactured using indigenous steel, defence officials said.

The delivery of Vikrant was marked by the signing of acceptance documents on behalf of the Navy by the commanding officer-designate of Vikrant, representatives of the naval headquarters and the warship overseeing team (Kochi) and the chairman and managing director on behalf of the Cochin Shipyard. The aircraft carrier was delivered to the Navy following extensive user-acceptance trials between August 2021 and July 2022, during which performance of its hull, main propulsion, auxiliary equipment, aviation facilities, weapon and sensors as well as its sea-keeping and manoeuvring capabilities were proved to be satisfactory. The delivery is the culmination of a long design, build and trials phase, during which both the Navy and the shipyard had to overcome a multitude of unprecedented technical and logistic challenges, including the Covid pandemic and the changed geopolitical scenario.

<https://indianexpress.com/article/india/cochin-shipyard-delivers-countrys-first-indigenously-made-aircraft-carrier-vikrant-to-navy-8056637/>

Thu, 28 Jul 2022

Romeos are Coming to India! Long Wait for MH-60R Multi-Mission Helicopter for Indian Navy is Over

US based Lockheed Martin/ Sikorsky on Thursday morning posted a teaser announcing the expected arrival of three MH-60r multi-mission helicopters for the Indian Navy. The social media handle of Lockheed Martin said in a tweet that “Romeos are approaching India.” According to the tweet Romeos IV, V and VI are approaching India.

More about the MH-60R Romeo multi-mission helicopter

Earlier this year Financial Express Online had reported that three MH-60 R helicopters will be landing in India during summer and will be joining the first ever multi-role helicopter squadron. The Indian Navy has ordered 24 multi-mission helicopters from the US based Lockheed Martin, which is considered to be the most advanced maritime helicopter in the world. For the Indian Navy these helicopters are going to add more power to the Indian Navy’s anti-submarine and anti-surface warfare capabilities in the Indian Ocean Region and Indo-Pacific Region. The helicopters the Indian Navy is getting will be modified and on board there will be state of the art sensors and avionics and India Unique Weapons and Equipment. “These multi-mission helicopters have C4I capabilities and are designed for anti-submarine (ASW) and Anti-Surface Warfare ((ASuW), and they are capable of engaging targets which are over the horizon,” a C4I expert had told Financial Express Online earlier this year.

Indian Navy and Interoperability

The Indian Navy is already flying the P-8I maritime patrol aircraft and now will receive three MH-60R helicopters and later this year is expected to get Sea Guardian Drones from the US. Right now the Indian Navy has leased two Sea Guardian from the US based General Atomics and they are already deployed. This means now the focus will be interoperability between the assets from the US vendors which is critical for the Navy and the Indo-Pacific Region. All the three systems from the US come with encrypted systems, which will strengthen the capabilities and help to take interoperability between the three assets to the next level. This will also be useful when the navies of QUAD member countries as well as the MALABAR Drill takes place.

To carry out surveillance in the Indian Ocean Region (IOR), P-8I maritime patrol aircraft from Boeing Company is operated by the Indian Navy and has so far logged in more than 35,000 flight hours since its induction in 2013. The aircraft with its maritime surveillance and reconnaissance capabilities and operational readiness is an important asset for the navy. Once the Sea Guardians join the Indian Navy, they will fly in sync with the P-8i, the MH-60R helicopters. Earlier Milind Kulshreshtha, C4I expert, had told Financial Express Online, that the P-8Is are an advanced airborne platform with in-built inter-operability capabilities, making them a multi mission aircraft with C4I based Concept of Operations.

These aircraft can detect unknown submarines and ships which are lurking around in the waters and have the capability to launch submarine detection sono-buoys — both active and passive, as part of ASW operations. This will help in locating submarines which are below the water surface. For any fleet which is moving on the high seas, ASW assets are very important to have on board. As these assets will help to alert about threats of an attack by a stealth submarine of an enemy. These assets provide an ASW screen and will help to neutralize any hostile submarine or underwater threats and both P-8I and MH-60 R have the capability to fire torpedoes.

Interoperability

Once the COMCASA is implemented it will enable interoperability between the US and India all the assets including the MH-60R, P-8Is and Indian Navy warships would be able to operate as part of the digital network of the QUAD (Japan, Australia, India and the US) Navies, with NATO specified protocols compatible to US Link-22/Link-16 data link.

Aircrew of MH-60 completed its training

Financial Express Online had reported recently that the first batch of MH 60R ‘Romeo’ aircrew completed its 10 month long training at Naval Air Station, North Island, San Diego, US. The crew was trained on MH-60 H and their course included conversion training and other advanced qualifications. The Indian Navy in April had said that the aircrew flew from Helicopter Maritime Strike Squadron – 41 (HSM 41) and during the training process onboard a US Navy Destroyer the crew achieved day and night deck landing qualification. This is the crew which will be responsible for the induction of ‘Romeo’ into the Indian Navy.

More about MH-60R

These helicopters are coming through Foreign Military Sales (FMS) route in a deal which is worth USD 2.6 billion and are being manufactured by the US based Lockheed Martin. And will play a very important role in the IOR where the Chinese Navy continues to increase its presence and also in the Indo-Pacific Region. During the visit of the former US President Donald Trump the Cabinet Committee on Security (CCS) had put its stamp of approval for these helicopters following the Defence Acquisition Council’s (DAC) approval in 2018.

These helicopters which are going to replace the ageing British Sea King which are currently being flown are the naval version of Sikorsky UH-60 Black Hawk. These helicopters are fourth generation and are members of the Sikorsky S-70 family. These can be loaded with missiles and torpedoes for ASW action. And the 24 machines will be delivered in five years from the time the contract has been signed.

<https://www.financialexpress.com/defence/romeos-are-coming-to-india-long-wait-for-mh-60r-multi-mission-helicopter-for-indian-navy-is-over/2609515/lite/>

9,000 Crores of Budget Already Given to Indian Defence Industries for Ammunitions: Army Chief

Emphasising the need for self-reliance and sufficiency in critical defence requirements, the Chief of the Indian Army staff, General Manoj Pande, on Thursday, said that a budget of 9,000 crore has already been given to Indian Defence industries for ammunitions. According to the Army Chief, our forces need a large quantity of ammunition as we are one of the largest armies with live borders, for which “Four of the categories that are under trial and 9,000 crore of the budget has already been given to the Indian Defence industries for ammunitions. Although, there are challenges that need to be addressed and processes that need to be simplified,” he said.

“Our external dependence on armaments and ammunitions have been a matter of concern and the reversing of this trend which we are witnessing is quite encouraging,” he said addressing a special session of the second conference on Military Ammunition ‘Ammo India 2022’ on its second day. Highlighting the potential for domestic and foreign players in the Indian defence production, he stated, “Atmanirbharta does not mean isolating from the world, but it is self-sustaining and self-generating capability to promote efficiency, quality and resilience.”

“It has been unequivocally stated that collaboration with foreign Original Equipment Manufacturers (OEMs) is intrinsic to Atmanirbhar Bharat and we have moved from a relationship of buyer-seller to a co-development and co-production with our foreign partners,” he said, adding that the situation on the Northern borders has taught us to be self-reliant.

Speaking on the ongoing world affairs, he mentioned that external dependence on other countries for weapons should be reversed. “Russia-Ukraine conflict, the uncertainty in our neighbourhood has taught us that our armed forces should be able to handle the wide spectrum of tasks,” he said. He further emphasised that the futuristic approach in defence production is important for strengthening the national interest. Research and Development and technological advancements are also important for strong self-reliant capabilities, and the capabilities to forecast the impact using Artificial Intelligence is also important, he added.

He termed the ongoing reforms in the defence sector as an ‘opportunity’ for the foreign OEMs to partner with Indian companies and work for shared objectives. There is a huge potential for exports which can also contribute to the vision of our honourable Prime Minister’s vision of a \$5 trillion economy. “Therefore, the vision of achieving Atmanirbharta in ammunition requires a synergised approach from all stakeholders. Together with the need to turn the initiative into another success story and a win-win situation for all,” he said while underscoring the potential in exports to contribute to Prime Minister Narendra Modi’s vision of a USD 5 trillion economy. Self-reliance is among the key factors for the military capability of any nation, he said that a holistic, all-encompassing, well-calibrated, multi-pronged and futuristic approach in defence production is fundamental to ensure safeguarding the national interest.

“Atmanirbharta in defence production does mean limited to production but it should also encompass evolving homegrown capabilities and technologies. For a holistic and self-reliant

strategy, it is imperative that ammunition life cycle management capabilities are concurrently established,” he asserted while mentioning that a significant investment was also needed in establishing Research and Development infrastructure, testing and evaluation capabilities to meet our ammunition needs. He further stated that a pragmatic and actionable indigenous defence production strategy is needed to ensure a secure and sustained supply of ammunition and armaments as per our national security needs.

“There is also a need to share the experiences and technical knowledge of DRDO, OFBs and other PSU units with the industry to build new capabilities. We need to have a more collaborative and cooperative framework in which all stakeholders would work together to reduce the import dependence and provide the required impetus to the domestic capabilities,” Army Chief added.

<https://theprint.in/india/9000-crores-of-budget-already-given-to-indian-defence-industries-for-ammunitions-army-chief/1059567/>

THE ECONOMIC TIMES

Thu, 28 Jul 2022

Four-Point 'Consensus' Reached at Latest India-China Military Talks to Resolve Ladakh Standoff: Chinese Military

China's military on Thursday said that a four-point "consensus" has been reached at the recent Corps Commander-level meeting with India which included maintaining the momentum of resumption of bilateral ties, effectively managing differences and safeguarding the stability at the borders. India and China failed to make any breakthrough in resolving outstanding issues on the remaining friction points in eastern Ladakh at the 16th round of military talks on July 17, but agreed to maintain dialogue to arrive at a mutually acceptable resolution at the earliest. A day after the talks, the two sides, in a joint statement, reaffirmed that the resolution of the pending issues would help in the restoration of peace and tranquility along the Line of Actual Control (LAC) in the region and enable progress in bilateral relations.

At the talks, India strongly pressed for early disengagement of troops from all the remaining friction points in the region and demanded the restoration of the status quo ante as of April 2020 -- before the start of the military standoff, official sources said in New Delhi. Commenting on the 16th round of China-India Corps Commander-Level Meeting, Senior Colonel Wu Qian, a spokesperson for China's Ministry of National Defence, said the two sides discussed issues in a "constructive and forward-looking way, and reached four consensuses." The Commanders meeting discussed the settlement of the friction points along the Line of Actual Control (LAC), the China military online, the official portal of the Chinese military, quoted Sr. Col. Wu as saying. They reached a four-point "consensus," he told an online media briefing here on Thursday.

Asked to elaborate on the consensus, he said the first point was to adhere to the political guidance and earnestly implement the important consensus reached by the leaders of the two countries. The second consensus was to focus on the overall situation and maintain the

resumption momentum of bilateral relations, he said. The third consensus was to effectively manage and control differences, and safeguard the security and stability in border areas until the issue is solved. The fourth consensus reached by the two sides was to maintain communication and dialogue, and reach a mutually acceptable solution as soon as possible, the spokesperson said. He said at present, the situation in the border areas between China and India is generally stable, and the communication through the military and diplomatic channels between the two sides has never stopped.

The eastern Ladakh border standoff erupted on May 5, 2020, following a violent clash in the Pangong lake areas. Both sides gradually enhanced their deployment by rushing in tens of thousands of soldiers as well as heavy weaponry. As a result of a series of military and diplomatic talks, the two sides completed the disengagement process last year on the north and south banks of the Pangong lake and in the Gogra area. Each side currently has around 50,000 to 60,000 troops along the Line of Actual Control (LAC) in the sensitive sector.

<https://economictimes.indiatimes.com/news/defence/four-point-consensus-reached-at-latest-india-china-military-talks-to-resolve-ladakh-standoff-chinese-military/articleshow/93193563.cms?from=mdr>

Science & Technology News



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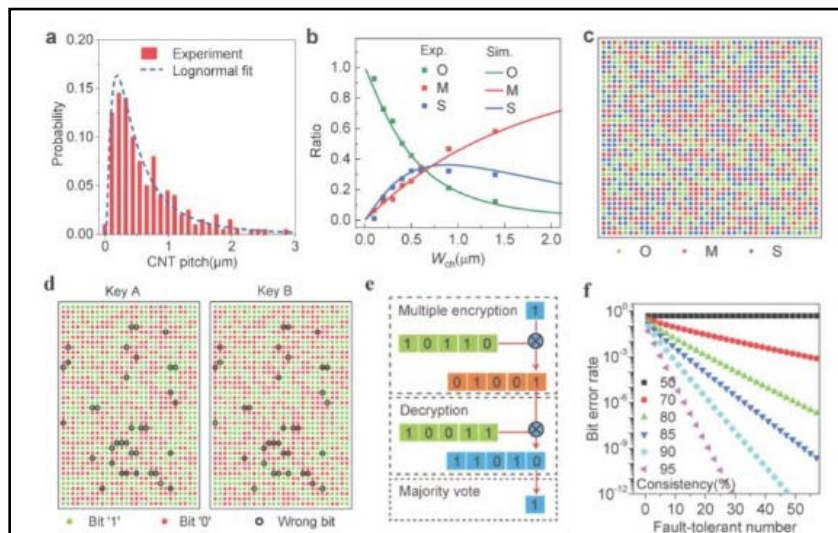
Twin Physically Unclonable Functions (PUFs) Based on Carbon Nanotube Arrays to Enhance the Security of Communications

As the amount of data stored in devices and shared over the internet continuously increases, computer scientists worldwide are trying to devise new approaches to secure communications and protect sensitive information. Some of the most well-established and valuable approaches are cryptographic techniques, which essentially encrypt (i.e., transform) data and texts exchanged between two or more parties, so that only senders and receivers can view it in its original form. Physical unclonable functions (PUFs), devices that exploit "random imperfections" unavoidably introduced during the manufacturing of devices to give physical entities unique "fingerprints" (i.e., trust anchors). In recent years, these devices have proved to be particularly valuable for creating cryptographic keys, which are instantly erased as soon as they are used.

Researchers at Peking University and Jihua Laboratory have recently introduced a new system to generate cryptographic primitives, consisting of two identical PUFs based on aligned carbon

nanotube (CNT) arrays. This system, introduced in a paper published in Nature Electronics, could help to secure communications more reliably, overcoming some of the vulnerabilities of previously proposed PUF devices. "Classical cryptography uses cryptographic algorithms and keys to encrypt or decrypt information, and the most popular strategies are Rivest, Shamir, and Adleman (RSA) encryption," Zhiyong Zhang, one of the researchers who carried out the study, told TechXplore. "In an asymmetric algorithm, the public key can be accessed by anyone, but the public key cracking requires factoring a very large number, which is extremely difficult for a classical computer. This task has, however, been shown mathematically to be accomplishable in polynomial time using a quantum computer."

One of the most employed cryptographic strategies today is symmetric encryption, which shares the same "secret keys" for encryption and decryption with all users participating in a specific conversation. These strategies generally store secret keys in a non-volatile memory, which is vulnerable to physical and side-channel cyber-attacks. In recent years, researchers have thus been exploring alternative cryptographic approaches, including quantum key distribution (QKD). QKD methods exploit concepts rooted in quantum theory to protect communications. Specifically, they leverage the intrinsic disturbances affecting quantum systems while they are being measured.



Performance of CNT twin PUFs and demonstration of secure communication. a, Distribution of CNT pitch and lognormal fit of the data. b, Ratios of three types of devices versus channel width of PUF devices.

QKD has been found to be particularly effective at detecting a third party's attempts to gain access to the secret key protecting communications. While some QKD strategies have attained remarkable results, they typically require sophisticated and highly expensive hardware. "To achieve a low-cost and hardware-based secure communication, we introduced a new technology, twin physically unclonable functions (PUFs)," Zhang said. "The basic idea behind PUFs is to utilize random physical imperfections existing in a physical entity caused by the fabrication process variations at a small scale and these imperfections cannot be predicted or cloned, even by

the original manufacturer." Due to their unique design, PUF devices are unclonable and unpredictable. This makes them incredibly effective at generating safe secret keys for encryption. Nonetheless, when PUFs are used to secure communications, the keys they produce need to be written on non-volatile memories and shared with other conversation participants that do not own a PUF device. These stored keys will thus be vulnerable to attacks.

The key objective of the recent work by Zhang and his colleagues was to overcome this limitation of PUF devices for securing communications. To do this, instead of cloning an existing PUF, they tried to create two identical (twin) PUFs. "We fabricated twin physically unclonable functions (PUFs) based on aligned CNT arrays," Zhang explained. "Firstly, we grew aligned CNT arrays on quartz substrate. On one hand, induced by the quartz lattice-CNT interaction, CNT arrays grew along the [2 -1 -1 0] crystal orientation for several hundred microns, which ensured that the properties of CNT arrays were identical parallel to the growth direction. On another hand, CNT arrays have random characteristics, such as chirality and position, perpendicular to the CNT growth direction."

To create their device, Zhang and his colleagues fabricated two rows of field-effect transistors (FETs) on CNT arrays. They used transistors with three channel types with different electrical properties, namely channels containing some metallic CNTs (M), purely semiconducting CNTs (S) and no CNTs at all (O). "Since the location and type of CNTs in the channel are determined by the stochastic nucleation and random catalyst distribution, FETs were fabricated on the CNT arrays," Zhang said. "Meanwhile, two rows of FETs fabricated in parallel on the same CNT array show O, S, and M types with the same order, so two identical PUFs (twin PUFs) can be fabricated together."

Zhang and his colleagues initially devised a model that would allow them to study the relationship between PUFs and both CNT arrays and device dimensions. This model allowed them to optimize the randomness and entropy of their PUFs. "We found that the CNT pitches (CPs) meet the lognormal distribution, which was verified by other CNT samples we grew with different densities and those published by other groups," Zhang said. Using simulations and the model they created as a reference, the researchers optimized their design and created CNT arrays with a CNT pitch of $0.65 \pm 0.58 \mu\text{m}$ and a metallic/semiconducting CNT ratio of approximately 0.4. They then used these arrays to create a prototype of their PUFs with ideal ternary bits. "We fabricated a total of 1600 FETs with a channel width of 600 nm, to generate a 40×40 ternary bit map, in which 532, 516, and 552 O-, S- and M-bits were counted, respectively," Zhang said. "Our PUFs also exhibited high randomness, uniformity, uniqueness, unpredictability, and reliability."

In their experiments, the researchers successfully used their twin PUFs to attain fault-tolerant cryptography. Due to imperfections associated with the growth of the CNTs, including chirality transitions, the existence of broken tubes between catalyst stripes and misalignment, the team's twin PUFs initially showed a non-perfect consistency. This means that the encryption and decryption process could introduce wrong bits, which resulted in a high Bit Error Rate (BER).

"To reduce the BER, we designed fault-tolerant cryptography in which multiple key bits (≥ 3 , odd) are used to encrypt one plain text bit into multiple cipher text bits, and the multiple cipher text bits are decrypted and then generate one plain text bit through a majority vote," Zhang said. "The BER was exponentially reduced, with a fault-tolerant number for consistency greater than 80%. In our twin PUFs with a consistency of 95%, the BER can be reduced to one in a trillion when the fault-tolerant number is up to 29."

In the future, the twin PUFs devices created by this team of researchers could help to secure communications more reliably on a large-scale. In their next studies, Zhang and his colleagues would like to improve their devices further, for instance by optimizing the materials used in their recent work. "We plan to improve the cleanness of the quartz substrate and the airflow stability during CNT growth, which can reduce the occurrence of broken tubes and the chirality change," Zhang added. "In this paper we used a global bottom gate, but we now also plan to change it to top-gate structure for small operation voltage and easy integration with other circuits. Finally, while so far we used a probe station to test our PUF unit one by one, the next step will be to integrate our twin PUFs with peripheral circuits, which can automatically realize the encryption of information."

More information: Donglai Zhong et al, Twin physically unclonable functions based on aligned carbon nanotube arrays, Nature Electronics (2022). [DOI: 10.1038/s41928-022-00787-x](https://doi.org/10.1038/s41928-022-00787-x)

<https://techxplore.com/news/2022-07-twin-physically-unclonable-functions-pufs.html>



Thu, 28 Jul 2022

China Closely Tracking Debris of Its Most Powerful Rocket

Remnants of a large, newly launched Chinese rocket are expected to streak back through the atmosphere this coming weekend in an uncontrolled re-entry the Beijing government said on Wednesday would be closely tracked but poses little risk to anyone on the ground. The Long March 5B rocket blasted off Sunday to deliver a laboratory module to the new Chinese space station under construction in orbit, marking the third flight of China's most powerful rocket since its maiden launch in 2020. As occurred during its first two flights, the rocket's entire main-core stage – which is 100 feet (30 metres) long and weighs 22 tons (about 48,500 lb) – has already reached low orbit and is expected to tumble back toward Earth once atmospheric friction drags it downward, according to American experts.

Ultimately, the rocket body will disintegrate as it plunges through the atmosphere but is large enough that numerous chunks will likely survive a fiery re-entry to rain debris over an area some

2,000 km (1,240 miles) long by about 70 km (44 miles) wide, independent U.S.-based analysts said on Wednesday. The probable location of the debris field is impossible to pinpoint in advance, though experts will be able to narrow the potential impact zone closer to re-entry in the days ahead. The latest available tracking data projects re-entry will occur around 0024 GMT Sunday, plus or minus 16 hours, according to the Aerospace Corp., a government funded nonprofit research centre near Los Angeles.

The overall risk to people and property on the ground is fairly low, given that 75% of Earth's surface in the potential path of debris is water, desert or jungle, Aerospace analyst Ted Muelhaupt told reporters in a news briefing. Nevertheless, the possibility exists for pieces of the rocket to come down over a populated area, as they did in May 2020 when fragments of another Chinese Long March 5B landed on the Ivory Coast, damaging several buildings in that West African nation, though no injuries were reported, Muelhaupt said.

By contrast, he said, the United States and most other space-faring nations generally go to the added expense of designing their rockets to avoid large, uncontrolled re-entries – an imperative largely observed since large chunks of the NASA space station Skylab fell from orbit in 1979 and landed in Australia. Overall, the odds of someone being injured or killed this weekend from falling rocket chunks range from one-in-1,000 to one-in-230, well above the internationally accepted casualty risk threshold of one-in-10,000, he told reporters. But the risk posed to any single individual is far lower, on the order of six chances per 10 trillion. By comparison, he said, the odds of being struck by lightning are about 80,000 times greater.

Chinese foreign ministry spokesman Zhao Lijian said the probability of debris causing harm to aviation or to people and property on the ground was very low. He said most components of the rocket would be destroyed on re-entry. Last year, NASA and others accused China of being opaque after the Beijing government kept silent about the estimated debris trajectory or the reentry window of its last Long March rocket flight in May 2021. Debris from that flight ended up landing harmlessly in the Indian Ocean. A few hours after Zhao spoke on Wednesday, the China Manned Space Agency (CMSA) gave the approximate position of its latest rocket in a rare public statement. As of 4:00 p.m. (0800 GMT), the agency said the rocket was circling the globe in an elliptical orbit that was 263.2 km high at its farthest point and 176.6 km high at its nearest.

<https://indianexpress.com/article/technology/science/china-closely-tracking-debris-of-its-most-powerful-rocket-8056622/lite/>

