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CONTENT

S. No.	TITLE	Page No.
DRDO News		1-10
DRDO Technology News		1-10
1.	BrahMos, Akash and Nirbhay: India rolls out its missiles to counter Chinese threat	1
2.	ब्रह्मोस, आकाश, निर्भय सभी तैयार, चीनी खतरे से निपटने के लिए भारत ने मिसाइलों से बनाया 'चक्रव्यूह'	2
3.	लद्दाख में भूलकर भी कोई गलती न करे चीन, हर खतरे से निपटने के लिए ब्रह्मोस, आकाश और निर्भय तैयार	3
4.	LAC standoff: India deploys long-range missile Nirbhay to tackle Chinese threat	4
5.	Indian Navy, Air Force to get indigenous 'Smart Anti-Airfield Weapon' with 100 Km Range for standoff precision strike	5
6.	India's DRDO completes AHSP transfer of Pinaka weapon system	6
7.	Rajnath Singh unveils new Defence Acquisition Procedure	7
8.	2,290 cr defence proposals to include 72,000 more assault rifles from US: Rajnath Singh	8
9.	Deoghar, the holy city in Jharkhand all set to have a new airport, flight operations to start soon	9
Defence News		10-22
Defence Strategic National/International		10-22
10.	Indian Air Force to see major reshuffle at top level on October 1	10
11.	How the Indian Air Force is using familiarization exercises to spook Chinese military	11
12.	Second batch of Rafale fighter jets from France to arrive in India in October	12
13.	राफेल आने से मिली थोड़ी राहत, अब चीता और चेतक जैसे हल्के हेलिकॉप्टरों की भारी कमी, सेना ने सरकार को फिर किया आगाह	13
14.	Explained: Gunners Day and role of Artillery in the Indian Army	14
15.	India fast tracks procurement of 72,000 assault rifles for the Indian Army	16
16.	Will be eyes & ears of fleet, say Navy's first woman air combatants to operate from warship	17
17.	Eye on China, India goes for Heron tech upgrade, missile-firing Guardian drones	19
18.	India-Australia's growing partnership built on military ties and concerns about China's rise	20
Science & Technology News		23-32
19.	New machine to probe the ultrafast motion of matter	23
20.	Quieter wind beneath the wings	25
21.	Quantum entanglement realized between distant large objects	26
22.	Plasmonic enhancement of stability and brightness in organic light-emitting devices	28
23.	Researchers develop unique printing technology for 'invisible' images	30
COVID-19 Research News		31-32
24.	Covid-19 vaccine portal launched, all data linked to research, clinical trial on it, says Harsh Vardhan	31
25.	IIT Delhi research finds more effective drug in treating COVID -19 virus; Check details	32

BrahMos, Akash and Nirbhay: India rolls out its missiles to counter Chinese threat

India-China standoff: India's main stay in the stand-off weapons is the BrahMos air-to-air and air-to-surface cruise missile with its 300 kilogramme warhead

By Shishir Gupta

New Delhi: The 500 km-range BrahMos cruise missile, 800 km-range Nirbhay cruise missiles along with Akash surface-to-air missile (SAM) with a capability to target aerial threats 40 km away are at the core of India's stand-off weapon deterrence to People's Liberation Army (PLA) missile deployment in Xinjiang and Tibet regions.

While the PLA's western theatre command has deployed stand-off weapons up to 2,000 km range and long-range SAMs in Tibet and Xinjiang after the Ladakh stand-off started, people familiar with the matter told Hindustan Times that the supersonic Brahmos, subsonic Nirbhay as well as Akash have been deployed to counter them by India in the worst-case scenario. The Chinese deployment is not limited to occupied Aksai Chin but is located in depth positions from Kashgar, Hotan, Lhasa and Nyingchi along the 3,488 km Line of Actual Control (LAC).

India's main stay in the stand-off weapons is the Brahmos air-to-air and air-to-surface cruise missile with its 300 kilogramme warhead which can take care of airstrips in Tibet and Xinjiang, or a warship in Indian Ocean.

The Brahmos missile has been deployed in sufficient numbers in the Ladakh sector with the option to deliver the stand-off weapon from a Su-30 MKI fighter. Besides, the Brahmos can be used to create choke points in the Indian Ocean using the Car Nicobar air base in India's island territories. The IAF's Car Nicobar air base is the advanced landing ground for SU-30 MKI's which can use air-to-air refuellers to protect against any PLA warship threat coming from the Strait of Malacca to Sunda Strait across Indonesia, a senior government official said.

While a limited number of Nirbhay subsonic missiles have been produced and deployed, the stand-off weapon system has a range that can reach up to 1,000 km, and has both sea skimming and loitering capability. This means that the missile is capable of flying between 100 metres to four km from ground and pick up the target before engaging it. The Nirbhay missile has only a surface-to-surface version.

The third stand-off weapon used by Indian military is the Akash SAM, which has also been deployed in sufficient numbers to counter any PLA aircraft intrusion across the LAC in Ladakh sector. The PLA Air Force fighter activity in occupied Aksai Chin continues albeit at a reduced



The Indian Air Force has deployed the Brahmos missile in sufficient numbers with the option to deliver the stand-off weapon from a Su-30 MKI fighter (Brahmos.com)

level. However, there is concern over PLA air activity across the Daulat Beg Oldi sector near Karakoram pass.

The Akash missile with its three-dimensional Rajendra, a passive electronically scanned array radar that has the capacity to track 64 targets at a time and simultaneously engage 12 of them. The missile has the capacity to engage all aerial targets including fighter planes, cruise missiles and ballistic missiles.

<https://www.hindustantimes.com/india-news/brahmos-akash-and-nirbhay-india-rolls-out-its-missiles-to-counter-chinese-threat/story-USsylvwt4wxOaXzrml07DgJ.html>

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Tue, 29 Sept 2020

ब्रह्मोस, आकाश, निर्भय सभी तैयार, चीनी खतरे से निपटने के लिए भारत ने मिसाइलों से बनाया 'चक्रव्यूह'

भारत के स्टैंडऑफ हथियारों में प्रमुख रूप से हवा से हवा में मार करने वाली ब्रह्मोस एवं हवा से सतह पर मार करने वाली क्रूज मिसाइलें हैं, ये अपने साथ 300 किलोग्राम का वारहेड ले जा सकती हैं।

मुख्य बातें

- लद्दाख में तनाव बढ़ाने के बाद चीन ने तिब्बत और शिनजियांग में मिसाइलें तैनात की हैं
- चीन की किसी भी हरकत का जवाब देने के लिए भारतीय सेना ने भी अपनी तैयारी की है
- स्टैंड ऑफ वेपन के रूप में ब्रह्मोस, आकाश और निर्भय मिसाइलों की तैनाती हुई है

नई दिल्ली: चीन के किसी भी तरह का दुस्साहस का जवाब देने के लिए भारतीय सेना ने अपनी पूरी तैनाती की है। सीमा पर तनाव बढ़ाने के बाद चीन की पीपुल लिबरेशन आर्मी (पीएलए) की पश्चिमी थियेटर कमान ने लद्दाख में तनाव बढ़ने के बाद तिब्बत एवं शनिजियांग में 2000 किलोमीटर तक मार करने वाली लंबी दूरी की अपनी स्टैंडऑफ सतह से हवा में मार करने वाली (एसएएम) मिसाइलों की तैनाती की है। चीन की इस तैयारी का देखते हुए भारत ने भी जवाबी कदम उठाए हैं।

स्टैंड ऑफ हथियार के रूप में मिसाइलें तैयार

'हिंदुस्तान टाइम्स' की रिपोर्ट के मुताबिक भारत 500 किलोमीटर की दूर तक मार करने वाली ब्रह्मोस क्रूज मिसाइल, 800 किलोमीटर की क्षमता वाली निर्भय क्रूज मिसाइल के साथ सतह से हवा में मार करने वाली मिसाइलों को स्टैंड ऑफ हथियार के रूप में तैयार रखा है। भारत की ये मिसाइलें दुश्मन की मिसाइलों 40 किलोमीटर दूर हवा में निशाना बना सकती हैं। बता दें कि स्टैंडऑफ हथियार वे मिसाइलें अथवा बम होते हैं जिन्हें एक दूरी से लॉन्च किया जाता है ताकि अग्रिम मोर्चे पर तैनात जवानों को टारगेट एरिया से होने वाले डिफेंसिव फायर से अपना बचाव कर सकें। खासकर स्टैंडऑफ हथियारों का इस्तेमाल आक्रामक अभियानों में जमीन एवं समुद्र स्थित लक्ष्यों को निशाना बनाने में किया जाता है।



ब्रह्मोस, आकाश, निर्भय सभी तैयार, चीनी खतरे से निपटने के लिए भारत ने मिसाइलों का बनाया 'चक्रव्यूह'।

| तस्वीर साभार: PTI

चीन की हरकत का जवाब देने के लिए तैनाती

रिपोर्ट के मुताबिक इस घटनाक्रम की जानकारी रखने वाले लोगों ने बताया कि अत्यंत खराब स्थितियों में चीन पर जवाबी कार्रवाई करने के लिए सुपरसोनिक ब्रह्मोस, सुपरसोनिक निर्भय के साथ-साथ आकाश मिसाइलों की तैनाती की गई है। चीन ने अपने इन हथियारों की तैनाती केवल अपने कब्जे वाले अकसाई चिन में ही नहीं बल्कि 3488 किलोमीटर लंबी वास्तविक नियंत्रण रेखा (एलएसी) के निकट गहराई वाले सैन्य ठिकानों-काशगर, होटान, ल्हासा और नियांगची में भी की है।

तिब्बत, शिनजियांग स्थित ठिकाने निशाने पर

भारत के स्टैंडऑफ हथियारों में प्रमुख रूप से हवा से हवा में मार करने वाली ब्रह्मोस एवं हवा से सतह पर मार करने वाली क्रूज मिसाइलें हैं, ये अपने साथ 300 किलोग्राम का वारहेड ले जा सकती हैं। इन मिसाइलों से तिब्बत एवं शिनजियांग के रन-वे अथवा हिंद महासागर में युद्धपोत को तबाह किया जा सकता है।

हिंद महासागर में चीनी युद्धपोत को रोक सकता है सुखोई-30 एमकेआई

सरकार के एक वरिष्ठ अधिकारी ने बताया कि लद्दाख सेक्टर में ब्रह्मोस मिसाइल की तैनाती पर्याप्त संख्या में की गई है। स्टैंड ऑफ वेपन के रूप में इन्हें सुखोई-30 एमकेआई लड़ाकू विमानों से दागा जा सकता है। यही नहीं हिंद महासागर में चोक प्वाइंट्स बनाने के लिए कार निकोबार वायु सेना ठिकाने से ब्रह्मोस मिसाइलें छोड़ी जा सकती हैं। अधिकारी का कहना है कि वायु सेना का कार निकोबार एयरबेस से सुखोई-30 एमकेआई आसानी से उड़ान भर सकता है। इस लड़ाकू विमान में हवा में ईंधन भरा जा सकता है और यह मलक्का स्ट्रेट से लेकर इंडोनेशिया की तरफ से सुंडा स्ट्रेट तक पीएलए के युद्धपोतों को रोक सकता है।

<https://www.timesnowhindi.com/india/article/brahmos-akash-and-nirbhay-india-rolls-out-its-missiles-to-counter-chinese-threat/314708>



Tue, 29 Sept 2020

लद्दाख में भूलकर भी कोई गलती न करे चीन, हर खतरे से निपटने के लिए ब्रह्मोस, आकाश और निर्भय तैयार

शिशिर गुप्ता

नई दिल्ली: भारत-चीन के बीच लद्दाख में महीनों से चले आ रहे सीमा विवाद की वजह से किसी भी संभावित खतरे से निपटने के लिए भारतीय सेना ने पूरी तैयारी कर ली है। सेना ने लद्दाख की वास्तविक नियंत्रण रेखा (एलएसी) पर सैनिकों की बड़ी संख्या में तैनाती कर रखी है। इस बीच, सेना ने 500 किलोमीटर रेंज वाली ब्रह्मोस क्रूज मिसाइल, सतह से हवा में मार करने वाली आकाश मिसाइल और 800 किलोमीटर की रेंज वाली निर्भय मिसाइल को भी तैयार रखा है।

वहीं, पीएलए के पश्चिमी थिएटर कमांड ने लद्दाख गतिरोध शुरू होने के बाद तिब्बत और शिनजियांग में 2,000 किमी रेंज वाली सतह से हवा में मार करने वाली मिसाइल और हथियारों को तैनात किया था। इस मामले से परिचित लोगों ने सहयोगी अखबार हिन्दुस्तान टाइम्स को बताया कि भारत ने भी किसी भी स्थिति का सामना करने के लिए सुपरसोनिक ब्रह्मोस, सबसोनिक निर्भय और आकाश को तैयार कर लिया है। चीन की तैनाती कब्जे वाले अकसाई चिन तक ही सीमित नहीं है, बल्कि वास्तविक नियंत्रण रेखा के काशगर, होटान, ल्हासा, निंगची की डेपथ पॉजिशन तक है।

भारत के तैयार हथियारों में ब्रह्मोस मिसाइल शामिल है, जोकि हवा से हवा और हवा से सतह तक मार करने की क्षमता रखती है। 300 किलोग्राम के वॉरहेड वाली क्रूज मिसाइल के जरिए तिब्बत और शिनजियांग के एयरस्ट्रिप पर नजर रखी जा सकती है। ब्रह्मोस मिसाइल को लद्दाख सेक्टर में पर्याप्त संख्या में तैयार रखा गया है। इसके अलावा, ब्रह्मोस का इस्तेमाल भारत के द्वीप क्षेत्रों में कार निकोबार एयर बेस का उपयोग करके हिंद महासागर में चोक पॉइंट बनाने के लिए किया जा सकता है।

एक वरिष्ठ अधिकारी ने कहा कि भारतीय वायुसेना का कार निकोबार एयर बेस SU-30 MKI के लिए सबसे शानदार लैंडिंग ग्राउंड है, जिसका एयर-टू-एयर रिफ्यूलेर्स का उपयोग कर सकते हैं। यह इंडोनेशिया में मलक्का स्ट्रेट से सुंडा स्ट्रेट तक आने वाले किसी भी पीएलए युद्धपोत के खतरे से सुरक्षा प्रदान करता है।

वहीं, निर्भय सबसोनिक मिसाइल की सीमित संख्या में तैनाती की गई है। 1,000 किमी की पहुंच वाली यह मिसाइल समुद्री स्किमिंग और लोडट्रिंग दोनों की क्षमता रखती है। इसका मतलब है कि यह मिसाइल जमीन से 100 मीटर से चार किमी के बीच उड़ान भरने में सक्षम है और टारगेट तय कर लेती है। निर्भय मिसाइल सतह से सतह मार करने वाली मिसाइल है।

भारतीय सेना द्वारा तैयार रखा गया तीसरा हथियार आकाश है, जिसे लद्दाख सेक्टर में एलएसी के पार से किसी भी पीएलए विमान की घुसपैठ का मुकाबला करने के लिए पर्याप्त संख्या में तैनात किया गया है। कब्जे में अक्साई चिन में पीएलए वायुसेना की लड़ाकू गतिविधियां जारी हैं। पहले की तुलना में इनकी संख्या काफी कम हो गई है। हालांकि, काराकोरम दर्रे के पास दौलत बेग ओल्डी सेक्टर में पीएलए की हवाई गतिविधियों को लेकर जरूर चिंताएं हैं।

<https://www.livehindustan.com/national/story-india-china-standoff-brahmos-akash-and-nirbhay-india-rolls-out-its-missiles-to-counter-chinese-threat-3522600.html>



Tue, 29 Sept 2020

LAC standoff: India deploys long-range missile Nirbhay to tackle Chinese threat

Amid the simmering border tensions with China, India has deployed home-grown subsonic missile Nirbhay to counter the deployment of missile by Chinese armed forces along the Line of Actual Control (LAC)

Edited By Tanweer Azam

Highlights

- 1. Amid the simmering border tensions with China, India has deployed home-grown subsonic missile Nirbhay to counter the deployment of missile by Chinese armed forces along the LAC.*
- 2. Nirbhay is a surface-to-surface missile with a reach of up to 1,000 km.*
- 3. This missile is capable of low-level stealth strike on targets, which means Nirbhay can fly between 100 metres to 4km from ground and pick up the target before destroying it.*

Amid the simmering border tensions with China, India has deployed home-grown subsonic missile Nirbhay to counter the deployment of missile by Chinese armed forces along the Line of Actual Control (LAC).

Nirbhay is a surface-to-surface missile with a reach of up to 1,000 km. This missile is capable of low-level stealth strike on targets, which means Nirbhay can fly between 100 metres to 4km from ground and pick up the target before destroying it.

Nirbhay is an all-weather missile and its long range is a threat for China because it is capable of hitting at target located as far as Tibet, reported India Today.

Developed by the Defence Research and Development Organisation (DRDO), Nirbhay has been in the testing since 2013 and this is the first time that Indian armed forces has developed this home-grown missile along the LAC.

The latest satellite images from LAC showed a sudden increase in China's deployment of surface-to-air missiles (SAMs) at new locations in Tibet along the LAC. Reports also claim that Chinese missile sites have also come up in some areas bordering Sikkim, Arunachal Pradesh, Uttarakhand and Ladakh.

Meanwhile, the Indian Army has also deployed several tanks and armoured personnel carriers in forward locations at eastern Ladakh in order to tackle the Chinese threat.

A new video has surfaced showing rows of T-90 tanks and BMP vehicles in Chumar-Demchock, sending a clear message that Indian Army is now determined to strengthen security in the whole area.

Major General Arvind Kapoor, the Chief of Staff of 14 Corps informed that the Fire and Fury Corps is the only formation in the Indian Army and probably in the world to have actually deployed mechanised forces in such harsh terrain.

<https://zeenews.india.com/india/lac-standoff-india-deploys-long-range-missile-nirbhay-to-tackle-chinese-threat-2313199.html>



#SWARAJYA

Tue, 29 Sept 2020

Indian Navy, Air Force to get indigenous 'Smart Anti-Airfield Weapon' with 100 Km Range for standoff precision strike

At its meeting earlier today, the Defence Acquisition Council, headed by the Defence Minister, cleared the procurement of the indigenously developed 'Smart Anti-Airfield Weapon' or SAAW for the Indian Navy and the Indian Air Force.

Developed by the Defence Research and Development Organisation (DRDO), SAAW has a range of around 100 km and weighs around 125 kg.

The weapon, which is being procured at an approximate cost Rs 970 crore, will give the Air Force and the Navy the capability to hit enemy airfields and runways from a standoff distance with high precision during conflicts.

Given that this weapon can be launched from standoff ranges, the aircraft launching it can remain at a safe distance from the enemy target. In many cases, the weapon can be fired by IAF fighters from within the Indian air space.

Apart from SAAW, the DAC also cleared the procurement of Static HF Trans-receiver sets for field units of the Indian Army and the Air Force at an approximate cost of Rs 540 crore to enable seamless communication.

<https://swarajyamag.com/insta/indian-navy-air-force-to-get-indigenous-smart-anti-airfield-weapon-with-100-km-range-for-standoff-precision-strike>



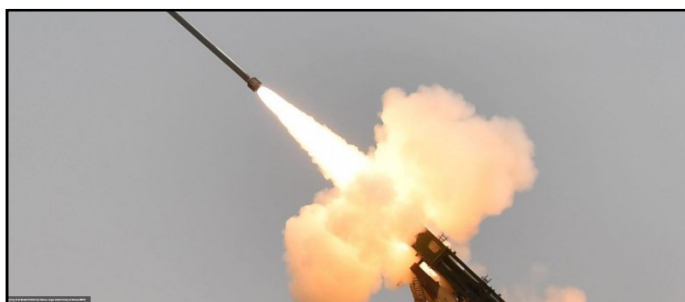
India's DRDO completes AHSP transfer of Pinaka weapon system

India's Defence Research and Development Organisation (DRDO) has transferred Authority Holding Sealed Particulars (AHSP) responsibility of Pinaka weapon system to the Directorate General of Quality Assurance (DGQA)

India's Defence Research and Development Organisation (DRDO) has transferred Authority Holding Sealed Particulars (AHSP) responsibility of Pinaka weapon system to the Directorate General of Quality Assurance (DGQA).

The move serves as a key step to support the production of Pinaka rockets, launchers and associated equipment.

In a statement, Indian Ministry of Defence said: "AHSP transfer marks successful establishment of production of Pinaka rockets, launchers, battery command posts, loader-cum-replenishment and replenishment vehicles, as well as successful establishment of quality assurance processes.



Test firing of the Guided PINAKA from Pokhran ranges. Credit: Ministry of Defence (GODL-India).

"AHSP handing over took place at ARDE, Pune wherein the documentation required by various production agencies, quality assurance agencies, Maintenance agencies and Users were formally handed over by Armament Research and Development Establishment (ARDE), HEMRL and VRDE to CQA (A)."

DGQA is an entity designed to ensure quality specifications and standards of all defence equipment.

The Pinaka weapon system features a multi-barrel rocket launcher capable of firing 12 rockets in 44 seconds.

The system is developed locally by Pune's DRDO lab, Armament Research & Development Establishment (ARDE) in association with HEMRL, VRDE and CAIR. It has a range of around 37.5km.

Last month, the Government of India signed contracts worth Rs25.8bn (\$353.63m) for the Pinaka missile system.

The agreements were signed with Bharat Earth Movers (BEML), Tata Power Company (TPCL) and Larsen & Toubro (L&T) for six Pinaka regiments.

Once delivered, the missile systems will be deployed along the northern and eastern borders of India.

<https://www.army-technology.com/news/indias-drdo-completes-ahsp-transfer-of-pinaka-weapon-system/>

Rajnath Singh unveils new Defence Acquisition Procedure

Under the new policy, the offset guidelines have also been revised to give preference to defence majors offering to manufacture products in India instead of meeting the offset obligations through other means, officials said

New Delhi: Defence minister Rajnath Singh unveiled on Monday a new Defence Acquisition Procedure (DAP) that features steps to turn India into a global manufacturing hub of military platforms, reduce timelines for procurement of defence equipment and allow purchase of essential items by the three services through capital budget under a simplified mechanism.

Under the new policy, the offset guidelines have also been revised to give preference to defence majors offering to manufacture products in India instead of meeting the offset obligations through other means, officials said.

The DAP also incorporates new chapters on information and communication technologies, post-contract management, acquisition of systems developed by the state-run defence entities like the DRDO and Defence Public Sector Undertakings (DPSUs), they said.

In what is seen as a significant move, the DAP featured measures to reduce delay in procurement of essential items by the three services as it proposed a new enabling provision to acquire them through capital budget under a simplified procedure in a time-bound manner.

Singh said the DAP has also included provisions to encourage foreign direct investment (FDI) to establish manufacturing hubs both for import substitution and exports while protecting the interests of Indian domestic industry.

“The offset guidelines have also been revised, wherein preference will be given to manufacture of complete defence products over components and various multipliers have been added to give incentivisation in discharge of offsets,” the defence minister tweeted.

He said the DAP has been aligned with the vision of the government’s ‘Aatmanirbhar Bharat’ (self-reliant India) initiative and to empower Indian domestic industry through ‘Make in India’ projects with the ultimate aim of turning the country into a global manufacturing hub.

The policy also provides for single-stage accord of AoN (Acceptance of Necessity) in all cases up to Rs 500 crore to cut delays in approval of acquisition proposals.

The DAP also mentioned measures to reform pre-induction testing of defence equipment.

“Scope of trials will be restricted to physical evaluation of core operational parameters. Other parameters may be evaluated based on vendor certification, certification by accredited laboratories, computer simulations of parameters etc,” it said.

<https://www.hindustantimes.com/india-news/rajnath-singh-unveils-new-defence-acquisition-procedure/story-fJuUZXYIP1a80mqg1Z1foL.html>



Singh said the DAP has also included provisions to encourage foreign direct investment (FDI) to establish manufacturing hubs both for import substitution and exports while protecting the interests of Indian domestic industry.(PTI file photo)

2,290 cr defence proposals to include 72,000 more assault rifles from US: Rajnath Singh

- *To equip the frontline troops of the Indian Army, the DAC accorded approval for procurement of assault rifles at a cost of ₹780 crore*

New Delhi: To make the defence acquisition simpler and faster, Defence Minister Rajnath Singh-headed Defence Acquisition Council (DAC) meeting on Monday approved proposals for Capital acquisitions of various equipment required by the Indian Armed Forces at an approximate cost of ₹2,290 crore, including the procurement of 72,000 assault rifles from the United States, amid the ongoing border dispute in eastern Ladakh with China.

The new policy will include procurement from both domestic industry as well as foreign vendors and is aligned with Prime Minister Narendra Modi's vision of Atmanirbhar Bharat and empowering the Indian domestic industry through Make in India initiative.

Under the Buy Indian (IDDM) category, the DAC approved procurement of Static HF Tans-receiver sets and Smart Anti Airfield Weapon (SAAW). The HF radio sets will enable seamless communication for the field units of Army and Air Force and are being procured at an approximate cost of ₹540 crore. The Smart Anti Airfield Weapon being procured at an approximate cost of ₹970 crore will add to the fire power of Navy and Airforce.



Indian Army trucks movement on Manali-Leh highway on Monday

Further, to equip the Frontline Troops of the Army, the DAC also accorded approval for procurement of SIG SAUER Assault Rifles at a cost of approximately ₹780 crore.

All about the new Defence Acquisition Procedure

The new Defence Acquisition Procedure (DAP) features steps to turn India into a global manufacturing hub of military platforms, reduce timelines for procurement of defence equipment and allow purchase of essential items by the three services through capital budget under a simplified mechanism.

Under the new policy, the offset guidelines have also been revised to give preference to defence majors offering to manufacture products in India instead of meeting the offset obligations through other means, officials said.

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<https://www.livemint.com/news/india/rajnath-singh-led-dac-approves-defence-proposals-worth-rs-2-290-crore-11601297258283.html>

ETNOWNEWS.COM

Tue, 29 Sept 2020

Deoghar, the holy city in Jharkhand all set to have a new airport, flight operations to start soon

With environment-friendly architectural design and state-of-the-art passenger facilities, the terminal building will be a composite structure inspired by the Shikhars of the Baidyanath Temple

New Delhi: In a major boost to regional air connectivity, Deoghar, the holy city in Jharkhand is all set to have a new airport. Airports Authority of India (AAI) has teamed up with the Defence Research and Development Organisation (DRDO) and the state government to initiate the project work. The airport will be spread across 653.75 acres of land while the terminal building will be built across 4000 sqm area.

As per the AAI, the airport is to be designed with eco-friendly dynamics and state-of-the-art passenger facilities. The new airport terminal building will draw inspiration from Shikhars of the popular Baidyanath Temple of Deoghar. With 2,500 meter-long runway, the airport will be suitable for AB-320 type aircraft. The terminal building will have six check-in counters and two arrival belts with peak hour handling capacity of 200 passengers.

With environment-friendly architectural design and state-of-the-art passenger facilities, the terminal building will be a composite structure inspired by the Shikhars of the Baidyanath Temple. The interiors will depict local tribal arts, handicrafts, and pictures of local tourist destinations highlighting the culture of the region.

Deoghar Airport, the second airport in Jharkhand after Ranchi, a six-hour drive away, is situated on the North-Eastern side of the state and will have a wide catchment area including Northern West Bengal and South-Eastern Bihar. Development of this airport is expected to give an impetus to local tourism and will generate employment as a large part of the local population depends on tourism for its livelihood. The development of Deoghar Airport would also improve the overall economic development of the region.

Talking about the new airport, Civil Aviation Minister Hardeep Singh Puri tweeted, "Deoghar Airport will be operational soon. Due to its strategic location, it will provide aviation connectivity to Santhal region & will also serve people of Patna, Banka, Khagaria, Munger, Sheikhpura, Bhagalpur & Jamui in Bihar."

Prime Minister Narendra Modi laid the Foundation Stone of the development of Deoghar Airport through a video link from an event in Sindri, Jharkhand on 25th May 2018. The



Deoghar, the holy city in Jharkhand all set to have a new airport, flight operations to start soon | Photo Credit: Twitter

development of the airport with a project cost of Rs 401.34 crore is underway and will be completed very soon.

Earlier this month, Puri conducted a review of preparations at the temple town and said that flight operations at the upcoming airport are expected to commence from the first week of November. BJP's MP from Godda Nishikant Dubey along with a battery of officials from AAI, Ranchi airport and Deoghar district administration were present during the review.

Talking to reporters in Deoghar, Puri had then said, "Covid-19 has slightly delayed the airport development work here but things are still pretty much on track. We are now planning to commence flight operations from the first week of November." He also stated that they would be holding a meeting with all stakeholders in Delhi to chalk out the modalities after which a final date for the commencement of air services would be announced.

It is worth mentioning that once ready, Deoghar will be Jharkhand's second airport after Ranchi's Birsa Munda international terminal and is expected to boost regional connectivity and promote tourism.

<https://www.timesnownews.com/business-economy/industry/article/deoghar-the-holy-city-in-jharkhand-all-set-to-have-a-new-airport-flight-operations-to-start-soon/659043>

Defence News

Defence Strategic: National/International



Tue, 29 Sept 2020

Indian Air Force to see major reshuffle at top level on October 1

Earlier, Indian Air Force saw a major reshuffle at the top level on August 1, 2020, with five Air Marshals taking charge at new positions.

By Mayank Singh

New Delhi: Indian Air Force is slated for another major reshuffle on the top, with the two commands getting new Air Officers Commander in Chief (AOC in C) taking charge and the top officer looking after the personnel of the force will be changing from October 1.

In August also five senior officers had taken new positions due to retirement, posting and promotion. Air Force has total of seven commands.

Air Marshal RD Mathur currently the AOC in C of the EAC is shifting as the AOC in C of the Training Command, Bengaluru as the AOC-IN-C in place of Air Marshal AS Butola who is superannuating from the service on September 30.

With effect from October 1 Air Marshal Amit Dev will be taking charge as the AOC in C of the Shillong based Eastern Air Command (EAC) handling air security of the eastern part of the country including the northern areas with China in Arunachal Pradesh and Sikkim.

Air Marshal RJ Duckworth currently serving as the Senior Air Staff Officer (SASO) of the Delhi based Western Air Command is getting posted as the Air Officer in charge Personnel (AOP). AOP is incharge of the personnel related matters of the entire force. In a Command SASO, rank of Air Marshal, functions under the AOC in C as the head of the operational matters.

Under the AOC in C of a command, apart from SASO, a command has the Senior Maintenance Staff Officer looking after the maintenance, Senior Administration Officer taking of the Administrative matters and the Senior Medical Officer for the medical related issues.

Air Vice Marshal V Singh is being promoted as Air Marshal and will be posted as the Senior Air Staff Officer (SASO) of the Western Air Command (WAC) entrusted with the responsibility of the Western and Northern borders including Ladakh. It is the WAC which is operationally handling the standoff with China in Eastern Ladakh.

Indian Air Force saw a major reshuffle at the top level on August 1, 2020, with five Air Marshals taking charge at new positions. This was set in motion after the retirement of Air Marshal B Suresh on July 30.

<https://www.newindianexpress.com/nation/2020/sep/29/indian-air-force-to-see-major-reshuffle-at-top-level-on-october-1-2203206.html>

THE ECONOMIC TIMES

Tue, 29 Sept 2020

How the Indian Air Force is using familiarization exercises to spook Chinese military

1. Message to the adversary

At a ceremony in Ambala on September 10 where five Rafale jets were inducted into the IAF, Defence Minister Rajnath Singh said the induction of the fleet was crucial considering the atmosphere being created along the frontier and that it is a "big and stern" message to those eyeing India's sovereignty.

2. IAF war games

It is significant that the deployment of French-made Rafale jets in Ladakh came less than 10 days after they were formally inducted into the IAF. The multirole Rafale jets are known for air-superiority and precision strikes. "The Rafale jets are flying around Ladakh," said a source without elaborating. The IAF has also deployed almost all its frontline fighter jets like Sukhoi 30 MKI, Jaguar and Mirage 2000 aircraft in the key frontier air bases in eastern Ladakh and elsewhere along the LAC. The IAF is also carrying out night time combat air patrols in the eastern Ladakh region.



3. Locked and loaded

"We are very proud to be equipping the IAF's Rafales with a full comprehensive weapon package that includes the game-changing Meteor and MICA air-to-air missiles and the SCALP cruise missile to conduct deep strike missions in a complex and severe environment," CEO of missile maker MBDA Eric Beranger had said when Rafales were formally inducted. Speaking on the occasion, Air Chief Marshal RKS Bhadauria had said induction of Rafale jets could not have happened at a more opportune time considering the security scenario.

4. Setting up air defence

On September 12, Central Air Command chief, Air Marshal Rajesh Kumar met Uttarakhand Chief Minister Trivendra Singh Rawat to seek land for setting up facilities that will help the IAF carry out its activities in the border areas. The Air Officer Commanding-in-Chief (AOC-in-C), Central Air Command, during his meeting with Rawat also discussed the availability of land for installing air defence radars and advance landing ground in the hilly areas of the state due to their strategic significance. Uttarakhand shares its borders with China and Nepal.

5. American-made muscle

The IAF has also deployed Apache attack choppers as well as Chinook heavy-lift helicopters to transport troops to various forward locations in eastern Ladakh.

<https://economictimes.indiatimes.com/news/defence/how-the-indian-air-force-is-using-familiarization-exercises-to-spook-chinese-military/american-made-muscle/slideshow/78359425.cms>

ThePrint

Tue, 29 Sept 2020

Second batch of Rafale fighter jets from France to arrive in India in October

The formal induction ceremony of the first 5 Rafale fighters is to be held at the Ambala Air Station on 10 September

By Snehash Alex Philip

New Delhi: The second batch of Rafale fighter jets — likely to be four in number — is set to arrive at the Ambala Air Force Station in October as part of the Rs 59,000-crore deal with the French government, ThePrint has learnt.

These will land here after the formal induction ceremony of the first five Rafale fighters, which is to be held on 10 September. The ceremony would be attended by Defence Minister Rajnath Singh and his French counterpart Florence Parly.

Sources in the defence and security establishment said the French defence minister has already confirmed her presence.

Sources said once the ceremony is done, the next set of Rafale fighters would arrive in October. “The next set of fighters, which are likely to be four in number, will arrive in the country in October,” a source said.

Five Rafale jets, including two twin-seaters, had landed on 29 July at the Ambala Air Force Station, home of the first squadron of the French fighters.

They had flown 8,500 km from Merignac in France, with a stopover in UAE.

The Rafales

Known as the 4.5 generation aircraft, the Rafale is considered to be one of the finest fighters in the world and is described as an ‘omnirole’ aircraft that can take up several missions on a single flight.

While India had ordered 36 Rafale fighters in 2016, the numbers are just too small for the IAF, which at present has a strength of 31 squadrons as against the sanctioned one of 42 Squadrons.

Even though the IAF is supposed to come out with a Medium Multi Role Combat Aircraft (MMRCA) 2.0 for 114 fighters, work on it has been rather slow with a formal tender yet to be issued.

ThePrint had reported that this tender could take time and the main focus right now is to firm up the order of 83 LCA Tejas Mk 1A.

Meanwhile, talks of additional 36 Rafale fighters have also been doing the rounds for long in defence corridors.

<https://theprint.in/defence/second-batch-of-rafale-fighter-jets-from-france-to-arrive-in-india-in-october/490764/>



A Rafale takes off | Photo: Dassault Aviation

राफेल आने से मिली थोड़ी राहत, अब चीता और चेतक जैसे हल्के हेलिकॉप्टरों की भारी कमी, सेना ने सरकार को फिर किया आगाह

सुरक्षा बलों की चिंताओं के प्रति भारत सरकार के लापरवाह रवैये का अंदाजा इस बात से लगाया जा सकता है कि एयरफोर्स पिछले 15 सालों से नए हल्के हेलिकॉप्टरों की मांग कर रही है और आज जब पूर्वी लद्दाख में चीन के साथ संघर्ष छिड़ा हुआ है तो इसकी जरूरत का अहसास सिद्धत से किया जा रहा है।

By Naveen Kumar Pandey

हाइलाइट्स:

- भारतीय सेना के तीनों अगों के पास हल्के हेलिकॉप्टरों की भारी किल्लत पड़ने वाली है
- सेना ने सरकार को आगाह किया है कि चीता और चेतक जैसे हेलिकॉप्टरों की उम्र पूरी हो रही है
- इन हेलिकॉप्टरों का उपयोग सियाचिन जैसे ऊंचाई वाले इलाकों में भी होता है
- पूर्वी लद्दाख में चीन के साथ जारी तनाव के बीच इन हेलिकॉप्टरों की उपयोगिता बढ़ गई है

नई दिल्ली: बीते कुछ दशकों में देश की सुरक्षा को ताक पर रखते हुए सैन्य बलों की जरूरतों को किस तरह नजरअंदाज कर दिया गया, आए दिन इसका पता चलता रहता है। 20-30 सालों में वायुसेना की हालत ऐसी हो गई है कि इसके लिए अनुमोदित 42 स्क्वैड्रन की जगह सिर्फ 30 फाइटर स्क्वैड्रन हैं। यानी, भारतीय वायुसेना (Indian Airforce) युद्धक विमानों की भारी किल्लत का सामना कर रही है।

इन 30 स्क्वैड्रन में भी मुख्य रूप से मिग-21 रूसी जेट्स हैं जो पुराने पड़ चुके हैं। हालांकि, फ्रांस से 36 राफेल विमानों की डील के तहत पहले चरण में पांच जेट्स आने से वायुसेना की हालत कुछ जरूर सुधरी है। तब तक हल्के इस्तेमाल के हेलिकॉप्टरों (Light Utility Choppers) के मोर्चे पर अलार्म साउंड बजने लगा है।



भारतीय सेना को चीता और चेतक जैसे हेलिकॉप्टरों की कमी।

एयरफोर्स ने सरकार को किया आगाह

एयरफोर्स ने कहा है कि चीता और चेतक हेलिकॉप्टरों की 'टोटल टेक्निकल लाइफ' 2023 से खत्म होनी शुरू हो जाएगी। वायुसेना ने सरकार से 'मेक इन इंडिया' अभियान के तहत ऐसे लाइट यूटिलिटी हेलिकॉप्टरों के निर्माण की परियोजना पर तेज कदम बढ़ाने का आग्रह किया है। साथ ही, रक्षा उत्पादन कंपनी हिंदुस्तान एयरोनॉटिक्स लिमिटेड (HAL) में बन रहे हेलिकॉप्टरों की डिलिवरी भी समय सीमा के अंदर किए जाने की दरकार बताई गई है। वायुसेना ने सरकार से कहा कि एचएएल के अंदर पर्याप्त संख्या में हेलिकॉप्टरों का निर्माण सुनिश्चित किया जाए।

इंडियन एयरफोर्स के एक सीनियर ऑफिसर ने कहा, 'रक्षा मंत्रालय को कहा गया है कि पुरानी पीढ़ी के सिंगल इंजन वाले चीता और चेतक हेलिकॉप्टरों की उम्र पूरी होने के कगार पर है। ऐसे में युद्ध अभियानों के लिहाज से हेलिकॉप्टरों के भारी अभाव की स्थिति पैदा हो रही है क्योंकि उनमें से ज्यादातर 40 साल पुराने हैं।'

15 सालों से हो रही है मांग

सुरक्षा बलों की चिंताओं के प्रति भारत सरकार के लापरवाह रवैये का अंदाजा इस बात से लगाया जा सकता है कि एयरफोर्स पिछले 15 सालों से नए हल्के हेलिकॉप्टरों की मांग कर रही है और आज जब पूर्वी लद्दाख में चीन के साथ

संघर्ष छिड़ा हुआ है तो इसकी जरूरत का अहसास सिद्धत से किया जा रहा है। अभी आर्मी, एयरफोर्स और नेवी के पास 187 चेतक जबकि 205 चीता हेलिकॉप्टर्स हैं जिनका इस्तेमाल सियाचिन जैसे ऊंचाई वाले इलाकों में भी होते हैं। लेकिन, अब ये इतने पुराने पड़ चुके हैं कि लगातार क्रैश हो जा रहे हैं और इनकी सर्विसिंग की भी गंभीर समस्या है।

483 यूटिलिटी चॉपर्स की जरूरत

अभी भारतीय सेना के तीनों अंगों को 483 नए लाइट यूटिलिटी चॉपर्स की जरूरत है। इसकी पूर्ति के लिए 2015 में ही भारत और रूस की सरकारों ने संयुक्त उद्यम (Joint Venture) खोलने पर दस्तखत किए थे। इसके तहत दो इंजनों वाले 200 Kamov-226T हेलिकॉप्टरों का निर्माण किया जाना है। ये हेलिकॉप्टर बनने पर 135 आर्मी और 65 एयरफोर्स को मिलेंगे। इनकी लागत 20 हजार करोड़ रुपये आएगी। लेकिन, समझौते के पांच साल बाद भी अभी तक यह तकनीकी आकलन लेवल पर ही है, ठेके की आखिरी प्रक्रिया तो बहुत दूर की बात है।

रक्षा मंत्रालय को कहा गया है कि पुरानी पीढ़ी के सिंगल इंजन वाले चीता और चेतक हेलिकॉप्टरों की उम्र पूरी होने के कगार पर है। ऐसे में युद्ध अभियानों के लिहाज से हेलिकॉप्टरों के भारी अभाव की स्थिति पैदा हो रही है क्योंकि उनमें से ज्यादातर 40 साल पुराने हैं। वायुसेना के सीनियर ऑफिसर

12 स्क्वैड्रन में 192 फाइटर जेट्स की कमी

ध्यान रहे कि 16 युद्धक विमानों और पायलट ट्रेनिंग के दो विमानों से मिलकर भारतीय वायुसेना का एक स्क्वैड्रन बनता है। ऐसे में अगर एयरफोर्स के पास 42 की जगह 30 स्क्वैड्रन होने का मतलब कम-से-कम 192 फाइटर जेट्स और 24 ट्रेनर एयरक्राफ्ट की कमी है। यह कमी तब है जब भारत को चीन और पाकिस्तान जैसे पड़ोसियों से लगातार चुनौती मिलती रहती है।

<https://navbharattimes.indiatimes.com/india/forces-raise-alarm-to-government-as-cheetah-and-chetak-choppers-are-obsolete/articleshow/78376204.cms>



Tue, 29 Sept 2020

Explained: Gunners Day and role of Artillery in the Indian Army

The foundation of the Regiment of Artillery was laid on September 28 in 1827 when Bombay Artillery, later renamed 5 Bombay Mountain Battery, was raised.

This day is celebrated by the Regiment of Artillery as Gunners Day

By Sushant Kulkarni

The Regiment of Artillery of the Indian Army is celebrating the 193rd Gunners Day today marking the date in 1827 when the Five Bombay Mountain Battery, equipped with 2.5 inch guns, was raised in the British Indian Army.

The Artillery and its Gunners

One of the basic warfare lessons is that greater the distance from which one can target the enemy, greater the flexibility one can achieve for ground manoeuvres. From the catapults and cannons used in ancient times, the evolution of mechanical projectiles, to the modern day artillery guns which are integrated with network centric warfare, the role of gunners has always been a winning factor in the battlefield, proving to be a crucial support system to the other fighting arms.



The Regiment of Artillery of the Indian Army is celebrating the 193rd Gunners Day today. (Source: Twitter/@SpokespersonMoD)

The artilleries of Mughals, Marathas and those of Sikh armies among other historic entities have played a major role in their successful campaigns. The foundation of the Regiment of Artillery was laid on September 28 in 1827 when Bombay Artillery, later renamed 5 Bombay Mountain Battery, was raised. This day is celebrated by the Regiment of Artillery as Gunners Day.

In May 1857, the mutiny by Indian soldiers started in the artillery of the Army of the Bengal Presidency. The incident prompted a complete ban on Indian artillery units, except the mountain artillery batteries in select provinces. The decision was reversed in the mid-1930s when the first of the field regiments — which support the other formations on the field — of the Indian Army were raised.

With the motto ‘Sarvatra Izzat-O-Iqbal – Everywhere with Honour and Glory’, the regiment boasts of one Victoria Cross, one Distinguished Service Order, 15 Military Crosses during the pre-independence era and one Ashok Chakra, seven Maha Vir Chakras, nine Kirti Chakras, 101 Vir Chakras, 63 Shaurya Chakras, six Bar to Sena Medal, 485 Sena Medals besides many other decorations.

The present day Artillery

Today, the Artillery of Indian Army consists of a dynamic inventory which ranges from Ballistic Missile, Multi-Barrel Rocket launchers, High Mobility Guns, Mortars Precision Guided Munitions for destruction of enemy targets to Radars, UAVs and Electro optic devices for locating and carrying out Post Strike Damage Assessment (PSDA). The Regiment of Artillery has played a key role in all the post independence conflicts with the neighbours including the Kargil War.

The importance of the artillery in conventional warfare remains intact, especially with the artillery guns playing a major role in the ‘Integrated battle groups’. These battle groups are formations comprising artillery, mechanised infantry and armoured and infantry elements along with the modern day force multipliers like UAVs and electronic warfare systems. The artillery fire can be used for suppressive and destructive purposes to get an upper hand over the enemy.

Around 30 years after the acquisition of the Bofors guns in 1980s which proved decisive in Kargil war, two more artillery guns — the K9 Vajra of the Indian-South Korean make and US sourced M777 Ultra Light Howitzers — were inducted into the Indian Army in 2018. While Defence Research and Development Organisation’s (DRDO) Dhanush is in the pipeline for induction, its Advanced Towed Artillery Gun System (ATAGS) is in its trial stages.

The evolving role of the Artillery

Along with its role in conventional battlefield, artillery is extensively being deployed and used in the counter insurgency (CI) battles. Earlier the artillery used to be avoided in counter insurgency operations because of the concern of the collateral damage, but with the advent of precision ammunition, its role has attained a lot of importance. Artillery formations have been deployed in counter insurgency operations in Jammu and Kashmir as well as the north eastern theatre by the Indian Army.

With the introduction of self-propelled and automated artillery weapon systems, the footprint of artillery has reduced because of removal of ancillary systems. These advancements have also helped in increasing the survivability of the systems against the enemy fire because their ability to manoeuvre in all types of terrains has also increased. The introduction of ‘force multipliers’ like satellite communication, UAVs, networked electronic systems and artificial intelligence have increased the efficacy of artillery and have again underlined its role as a decisive arm on the battlefield.

<https://indianexpress.com/article/explained/explained-gunners-day-and-role-of-artillery-in-the-indian-army-6619364/>

Tue, 29 Sept 2020

India fast tracks procurement of 72,000 assault rifles for the Indian Army

These rifles are being procured at a cost of Rs 780 crore through the Fast Track Procedure (FTP) for the modernisation of the Infantry arm of the Indian Army. Today's approval comes close on the heels of the ongoing tension along the Line of Actual Control (LAC) between India and China

By Huma Siddiqui

Ahead of the 2+2 Indo-US Ministerial Dialogue scheduled for October the Defence Acquisition Council (DAC) gave its approval for buying additional 72,000 SiG Sauer Assault Rifles from the US. And these are expected to be used by the Indian Army troops along the 3,500 Km border with China.

These rifles are being procured at a cost of Rs 780 crore through the Fast Track Procedure (FTP) for the modernisation of the Infantry arm of the Indian Army. Today's approval comes close on the heels of the ongoing tension along the Line of Actual Control (LAC) between India and China.



(Image Courtesy: SiGSauer.com)

Financial Express Online has reported earlier that the process of acquiring modern weapons for the Indian Army including 44,000 light machine guns (LMGs), nearly 44,600 carbines, and seven lakh rifles, started in Oct 2017. These are expected to replace the obsolete and ageing weapons and to help in enhancing the fighting capability of the Indian Army.

According to sources, the government has used the option of buying additional assault rifles through the FTP, and under this procedure the delivery will be soon.

What is the Indian Army using?

Currently 5.56×45 mm INSAS Rifles which have been built and developed by the state-owned Ordnance Factory Board (OFB) is in use and these need to be replaced with the latest technology and a compact 7.62×51 mm Assault Rifle.

The American Assault Rifles are going to be manufactured at the SiG Sauer's New Hampshire facilities.

Why the American Rifle?

An assault rifle made by the Rifle Factory, Ishapore, was rejected by the user when it failed the firing tests. In September 2018, this led to a competitive process and finally, the SIG716 was down-selected when it had beaten the UAE based Caracal which was also bidding for the Close Quarter Carbines.

How many does the Army need?

The requirement approximately is for 7-8 lakh new 7.62mm assault rifles, which will replace the glitch-prone 5.56mm INSAS (Indian small arms system) rifles.

The defence trade between India and the US has witnessed a significant upswing in the last few years touching almost USD 18 billion mark in 2019. This is a reflection of the growing defence procurement from that country.

The two countries have a dialogue scheduled for later next month when the military trade and other issues of mutual importance will be talked about and also the options of jointly manufacturing locally here in India.

The US in June 2016 has designated India as a 'Major Defence Partner' which means it has been elevated to a position where defence trade and technology sharing will commensurate with that of the closest partners and allies.

<https://www.financialexpress.com/defence/india-fast-tracks-procurement-of-72000-assault-rifles-for-the-indian-army/2093525/>

ThePrint

Tue, 29 Sept 2020

Will be eyes & ears of fleet, say Navy's first woman air combatants to operate from warship

In an interview to ThePrint, Sub Lieutenants Riti Singh & Kumudini Tyagi said they are lucky to be making history as first woman air combatants to stay on warship and operate from its deck

By Amrita Nayak Dutta

New Delhi: The day they first filled up the form to join the Indian Navy, Sub Lieutenants Riti Singh, 25, and Kumudini Tyagi, 24, never knew they would one day serve on warships.

But with the Navy last week paving the way for both these young officers to operate as the first woman air combatants to stay on a warship and operate from its deck, they said they are eagerly looking forward to the challenge.

In an interview to ThePrint, the officers said they are lucky to be making history.

Women do not serve as sailors in the Indian Navy. Women officers were not permitted on corvettes, destroyers and aircraft carriers until now. The first woman officers to be posted onboard a warship was Surgeon Commander Vinita Tomar and Sub Lieutenant Rajeshwari Kori on INS Jyoti, a fleet support vessel, in 1997.

Sub Lt Singh told ThePrint: "Not everybody gets to be a part of history, but I think many more women will be sitting in place of us in the near future and lot of responsibility rests on our shoulders to do well."

She added, "Not every 20-year-old gets to do something, which no one has done before. As much as we are looking forward to it, a lot of effort has been put into our training. We will continue to qualify on our specific aircraft for the next 9-10 months."

They said they are also often told by other women officers to do well in the job as that will pave the way for other women officers, who are waiting to serve in the Navy.

The officers are now gearing up for a difficult and competitive training for the next few months before they are finally deployed for operations.

Talking about fewer women in the Navy, they agreed there is a lack of general awareness about the opportunities that the Navy offers, which they said could be one of the reasons why fewer women enroll in the service.

"Being a graduate, I never thought I will be in a helicopter or will be firing torpedoes or dropping depth charges in the near future," Sub Lt Tyagi said. "It is not a 9-5 job, it is a way of life," she added.



Sub Lieutenants Riti Singh and Kumudini Tyagi of the Indian Navy | By special arrangement

There are over 600 women personnel in the Indian Navy, with some serving in indirect combat roles, such as observers and tactical operators on the armed maritime patrol aircraft — the P8I and the IL 38.

How their roles are different

As observers in the Navy, Sub Lt Singh said, they will not only assist the pilots in navigating aircraft, but they will also be in charge of all weapons and sensors in the aircraft.

The observers' responsibility is also to designate an aircraft or ship as friend or enemy and provide information to their own fleet, she said.

“We are the eyes and ears of the fleet. We go out there, we have speed advantage over the ships and we provide them with information in a quick manner,” she said.

Explaining how their roles would be different from other women officers who serve as observers in aircraft such as the P8I, Sub Lt Tyagi said the role of helicopter observers would mean taking off and landing in a ship, which is a moving platform, as against a fixed base.

“Women officers were inducted in the observer cadre in 2009. But they currently serve on fixed wing aircraft, where they take off from a fixed base and land there,” she said.

“In ship-borne helicopters, you take off from the ship and when you are to land, the ship is somewhere else as it is a moving platform,” she said.

The challenge, they said, will lie in the operation to be carried out.

‘Can’t be a greater opportunity if a woman commands a ship’

If the young officers opt for permanent commission in future and get selected, they can command a ship as well.

Asked about the prospect, the officers said if a woman officer gets to command a ship years down the line, there could not be a greater opportunity than it.

“We go ahead and take whatever chance we are given. If women are given that, they will take that too,” Singh said. “But it is too early for us to comment on that,” she added.

The journey so far

Talking about her journey, Sub Lt Tyagi told ThePrint that she decided to join the armed forces in 2015 and was inspired by Lt Kiran Shekhawat, the Navy woman officer who died in the line of duty in a Dornier crash in 2015.

Her journey, however, was far from smooth as she was from a civil background, where people had limited knowledge about armed forces. She cleared the tough Services Selection Board (SSB) exams in her third attempt.

“I cleared SSB in my third attempt, but every time I realised that I’m closer to my aim,” she said, adding that her passion for the armed forces kept her going.

She said her family was very supportive too despite a general lack of awareness about the armed forces and the opportunities the Navy had to offer.

Sub Lt Singh, who comes from a Navy background, was inspired to join the Navy from the time she was a child. She said she specifically opted for a BTech degree as it increased her chances of getting into the armed forces.

“I was surrounded by men in uniform. My father was a naval officer. Whenever I talked to them, I realised they are knowledgeable and disciplined.”

She said clearing the SSB was an obstacle with the large number of students applying for the exam, but just limited seats available. “I took it as one step at a time,” she added.

<https://theprint.in/defence/will-be-eyes-ears-of-fleet-say-navys-first-woman-air-combatants-to-operate-from-warship/512156/>

Eye on China, India goes for Heron tech upgrade, missile-firing Guardian drones

The drone revolution in the Indian military has come after it was felt that India had no answer to Chinese armed drone and surveillance drone capabilities, with the PLA deploying the unmanned devices in significant capacities in Ladakh

By Shishir Gupta

New Delhi: India has decided in favour of the weaponised MQ-9B Sky Guardian drone from the US and to upgrade its existing Israeli Heron fleet with satellite communication capability in an attempt to enhance its range as well as surveillance capabilities in the midst of the Ladakh military standoff with China.

At the same time, the face-off between the Indian Army and People's Liberation Army (PLA) has spurred the Indian private sector and the Defence Research and Development Organisation (DRDO) to start manufacturing short-range tactical drones as well as anti-drone systems to boost border defences.

The three services have come to a conclusion that India should opt for a weaponised drone rather than the 22 reconnaissance and surveillance Sea Guardian drones approved in 2017 by the US administration for supply to India, according to authoritative government officials with knowledge of the matter.

The MQ-9B, manufactured by General Atomics, has a 40-hour endurance with a maximum altitude of 40,000 feet and payload or weapon carrying capacity of over 2.5 tonne, including air-to-surface missiles and laser-guided bombs. "We are in negotiations with the Trump administration, which is willing to provide India with the latest armed drone technology. In this, it is the prohibitive cost of the system that is a hurdle, not the Trump administration," said a South Block official who requested anonymity.

Besides, India has asked Israel to upgrade its existing Heron medium-altitude, long-endurance surveillance drone by upgrading its communication links. Presently, due to lack of a satellite link in the Heron, two such unmanned aerial drones have to be flown in tandem with a time gap so that information is relayed back to base through the second drone in case of long-range surveillance.

The upgrade involves fitting the Heron drone with a satellite package so that the unmanned aerial vehicle (UAV) links with the satellite above and information is sent on a real-time basis. The upgrade will allow the Heron to conduct long-range surveillance without the fear of losing contact with the base or go into no contact zone. The Heron upgrade program was approved by the defence ministry last month.

The drone revolution in the Indian military has come after it was felt that India had no answer to Chinese armed drone and surveillance drone capabilities, with the PLA deploying the unmanned devices in significant capacities in the Ladakh theatre apart from sensors and surveillance cameras that provide advance warning on moves by the adversary.

<https://www.hindustantimes.com/india-news/drone-tech-upgrades-to-boost-lac-defence/story-witXKwQMZcaIzkhkkYOGAO.html>

India-Australia's growing partnership built on military ties and concerns about China's rise

The Australia-India defence relationship now encompasses almost every major area of military partnership

By Dhruva Jaishankar

After five decades of testy or distant strategic relations, India and Australia began in the early 2000s to forge an increasingly cooperative defence and security partnership. The primary drivers were similar concerns about China's rise, behaviour, and assertiveness, as well as converging views about the regional strategic landscape.

Today, the bilateral relationship between India and Australia is far broader and more cooperative than it has been at any time in history. India has become Australia's fifth-largest export destination (up from twelfth at the turn of the century), and Australia is now a top-20 trade partner for India. There is also growing political cooperation, including in multilateral institutions such as the Commonwealth, G20, and the Indian Ocean Rim Association (IORA). For example, in IORA, India and Australia coordinated closely in establishing the secretariat in Mauritius, and in working with Indonesia during its chairmanship of the organisation in 2015-2016. India's nuclear status is now a non-issue following the mainstreaming of its program, the lifting by Australia of its uranium ban, and the India-Australia civilian nuclear agreement. And people-to-people contacts have widened, with large numbers of Indian tourists, students, and immigrants contributing to Australia's economy and society.



File photo of Prime Minister Narendra Modi with Australian PM Scott Morrison | Representational image | ANI

The Australia-India defence relationship now encompasses almost every major area of military partnership, namely (i) strategic dialogues, coordination, and intelligence exchanges, including those involving third countries; (ii) military exercises involving ground, air, and especially maritime forces that reflect a growing degree of interoperability; (iii) military-to-military exchanges and training; and (iv) defence commerce and technological cooperation. However, all four areas, and especially the last, are at a nascent stage of partnership with considerable room for improvement.

Defence policy planning and dialogues are at the senior-most level, represented by regular meetings of the two countries' defence ministers, as well as annual meetings of the foreign ministers. Defence policy talks, which "used to be hard going" according to a senior Australian defence official, have become easier. Additionally, the 2+2 dialogue, initiated in 2017 involving the foreign and defence secretaries of the two countries, has subsequently been upgraded to the ministerial level. This mirrors a format that India and Australia have with both the United States and Japan. In terms of military dialogues, staff talks involving all three services take place regularly. A maritime security operations working group has also been established. At a more tactical level, improvements have been made in maritime domain awareness (MDA) following the two countries' White Shipping Agreement. This has resulted in inputs six times each day into India's maritime 'information fusion centre' tracking merchant vessels.

There is also enthusiasm for greater multilateral cooperation, such as the Australia-India-Japan and Australia-India-Indonesia trilateral dialogues (recently upgraded to a ministerial conversation). These represent what an Australian defence official has described as the region's

“thickening architecture”. India–Australia–Japan trilateral engagement represents the growth of a complementary middle power-led strategic architecture that hedges against US retrenchment from the Indo–Pacific. In September 2020, an India-France-Australia dialogue was also initiated, involving three capable resident maritime states in the Indian Ocean, at the level of foreign secretaries. Both India and Australia also take part jointly, with occasional coordination, in a host of regional and global forums. These include IORA, the G20, and the ASEAN-led groups — the ASEAN Regional Forum (ARF), ASEAN Defence Ministers’ Meeting Plus (ADMM–Plus), and the East Asia Summit (EAS). Newer, issue-based groupings involving both India and Australia have also emerged in 2020, including on 5G telecommunications, artificial intelligence, and supply chain resilience. The latter is an issue on which the governments of India and Australia, along with Japan, have taken a lead.

The Quad has been the subject of significant attention. Having met once in 2007 and several times after being resurrected in 2017, the dialogue was a low-level foreign ministry mechanism that served the purpose of political signalling in the region and was meant to improve coordination among these like-minded states. It was later elevated to a foreign minister-level engagement, although a proposed defence minister-led quadrilateral dialogue has yet to take place. While India made it clear that it wanted to de-link this dialogue from the *Malabar* naval exercises (nominally a bilateral India–US naval exercise to which Japan is a permanent invitee), Australia has made repeated requests to participate in *Malabar* as an observer. While Indian concerns related primarily to efforts at strengthening two parallel initiatives — the quadrilateral dialogue among the foreign ministries and the *Malabar* naval exercise — growing signs of Australia’s commitment have increased the prospect of a return to quadrilateral naval exercises in the near future. In the meantime, the Quad has formed the basis for other avenues of official consultation, especially following the global coronavirus pandemic. These have included a foreign secretary-level dialogue involving the United States, Japan, India, Australia, South Korea, New Zealand, and Vietnam (as chair of ASEAN) and a ministerial conversation involving the United States, Japan, India, Australia, South Korea, Brazil, and Israel.

Enhanced military engagement

Beyond consultations and institutional collaboration, military exercises and engagements have proliferated. Overall, by the reckoning of the Australian government, there has been an increase from 11 defence exercises, meetings, and activities in 2014 to 29 in 2017, and 38 in 2018. Naval engagement has been the most advanced, as is to be expected. The main bilateral exercise, AUSINDEX, was held every two years between 2015 and 2019. The 2019 edition of the exercise was particularly significant, representing a great degree of complexity and Australia’s largest ever defence deployment to India. Linked to Australia’s largest naval deployment, Indo–Pacific Endeavour 2019 (IPE 19), the exercise involved four ships, Australian Army forces, and support personnel from all three services, with a total involvement of more than 1000 Australian personnel. The ships visited Chennai and Visakhapatnam and included both Indian and Australian P-8 maritime patrol aircraft, as well as submarines from the two countries in sophisticated anti-submarine warfare (ASW) exercises. Of additional significance was the fact that US military personnel were observers in this exercise.

While AUSINDEX remains the mainstay of naval engagement, other efforts have been complementary. The Royal Australian Navy has been a regular participant (initially as an observer) in the *Milan* exercises since the early 2000s, including in the 2018 edition off the Andaman and Nicobar Islands. In 2018, for the first time, the Indian Navy took part in Australia’s multilateral *Kakadu* exercise in Darwin. And the same year, India took part as an observer in a submarine rescue exercise *Black Carillon* off Western Australia. Both countries have also been involved in third country-led exercises, notably the United States’ Rim of the Pacific Exercise (RIMPAC) and the Western Pacific Naval Symposium Multilateral Sea Exercise (WMSX) in the Singapore Strait and South China Sea. Australia’s involvement in allied operations in the Middle East and counter-piracy operations in the western Indian Ocean as part of Combined Task Force 150 have also provided opportunities for engagement with India, including regular port visits.

While not at the same frequency of contact, air force engagement has also increased. A major threshold was crossed with the Indian Air Force's first involvement as a full participant (rather than an observer) in the *Pitch Black* exercise in Darwin in 2018. A multilateral exercise involving air forces from several Australian ally and partner countries, India deployed four Sukhoi Su-30MKI fighters, a C-17 heavy transport, and a C-130 tactical transport aircraft. The exercise was additionally significant for staging the first mid-air refuelling of an Indian combat aircraft (Su-30MKI) by an Australian aircraft (KC-30A), revealing a much greater degree of coordination than had been demonstrated previously. Beyond exercises, subject matter expert exchanges involving flight controllers and safety and security have also taken place.

Army-to-army engagement is perhaps the least developed between the two countries. In 2017 and 2018, the second and third editions of AUSTRAL HIND, a Special Forces exercise, were held. Additionally, efforts at countering improvised explosive devices (IEDs) involving the two armies was jointly organised in India in 2018. The possibility of desert warfare exercises, as well as Indian participation in a longstanding Australian jungle warfare school, have also been proposed.

Going beyond exercises

Exercises are not the only reflection of interoperability, and a number of agreements have been finalised to improve the ability of the two militaries to work together. This began with an agreement on the protection of classified information. A mutual logistics supply agreement (MLSA) — a “high priority” according to Australian officials — was postponed due to changes in ministerial positions but eventually concluded in 2020 during the virtual summit between Prime Ministers Narendra Modi and Scott John Morrison. The agreement facilitates opportunities for both militaries to resupply each other, potentially extending their operational reach. A secure communications agreement would represent the next logical step in bilateral security cooperation, particularly following the conclusion of a similar agreement between India and the United States.

Military-to-military contacts have also increased. Senior Australian military officers take part in the year-long course at the National Defence College in New Delhi, as well as at the Defence Services Staff College (DSSC) in Tamil Nadu, and the Indian Navy's National Institute of Hydrography. The number of Indian participants in the Australian Command and Staff College in Canberra has been increased from two to three, along with an Indian student at the Australian Defence College in Canberra. Australia's National Security College has also made a concerted bid to attract Indian public servants for courses. Cadet exchanges have become more routine.

The two militaries also benefit from a growing number of shared platforms, increasing the opportunities for joint training and interoperability. These include C-17 strategic transport aircraft, C-130 tactical aircraft, P-8 maritime reconnaissance aircraft, and Chinook heavy-lift helicopters. Australian armed services have also provided classified briefings to the Indian military of potential future platforms, such as airborne early warning and control (AEW&C) aircraft.

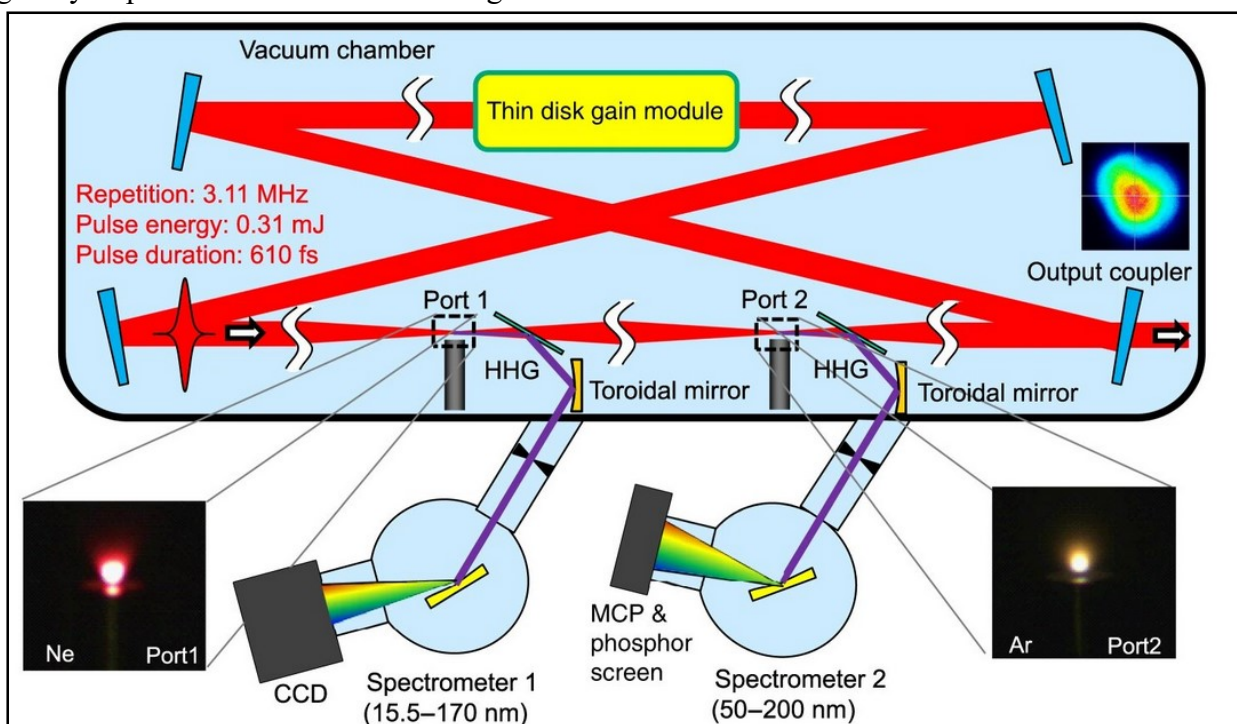
Defence industrial cooperation — an area that India prioritises given its own equipment requirements — offers limited potential. A Joint Working Group on Defence Research and Materiel Cooperation meeting between India's Defence Research and Development Organisation (DRDO) and Australia's Defence Science and Technology Group (DSTG) met in 2018. Among other issues, India has expressed interest in certain Australian defence products, including the Bushmaster and Hawkei armoured mobility vehicles, maritime training simulators, mobile health stations, and water purifiers. Australia also has considerable expertise in radar and undersea technologies. The acquisition of diesel submarines from France by both India and Australia offers some opportunities for long-term technical collaboration between the three countries in that domain.

(Dhruva Jaishankar is a Nonresident Fellow at the Lowy Institute and Director of the US Initiative at Observer Research Foundation in New Delhi. Views are personal.)

<https://theprint.in/opinion/india-australia-partnership-military-ties-china-rise/511879/>

New machine to probe the ultrafast motion of matter

Researchers have established a novel high-frequency laser facility at the University of Tokyo. The coherent extreme ultraviolet light source can reveal details of biological or physical samples with unprecedented clarity. It also allows for investigation of time-dependent phenomena such as ultrafast chemical reactions. Existing facilities for such investigations necessarily require enormous particle accelerators and are prohibitive to many researchers. This new facility should greatly improve access for a broad range of researchers.



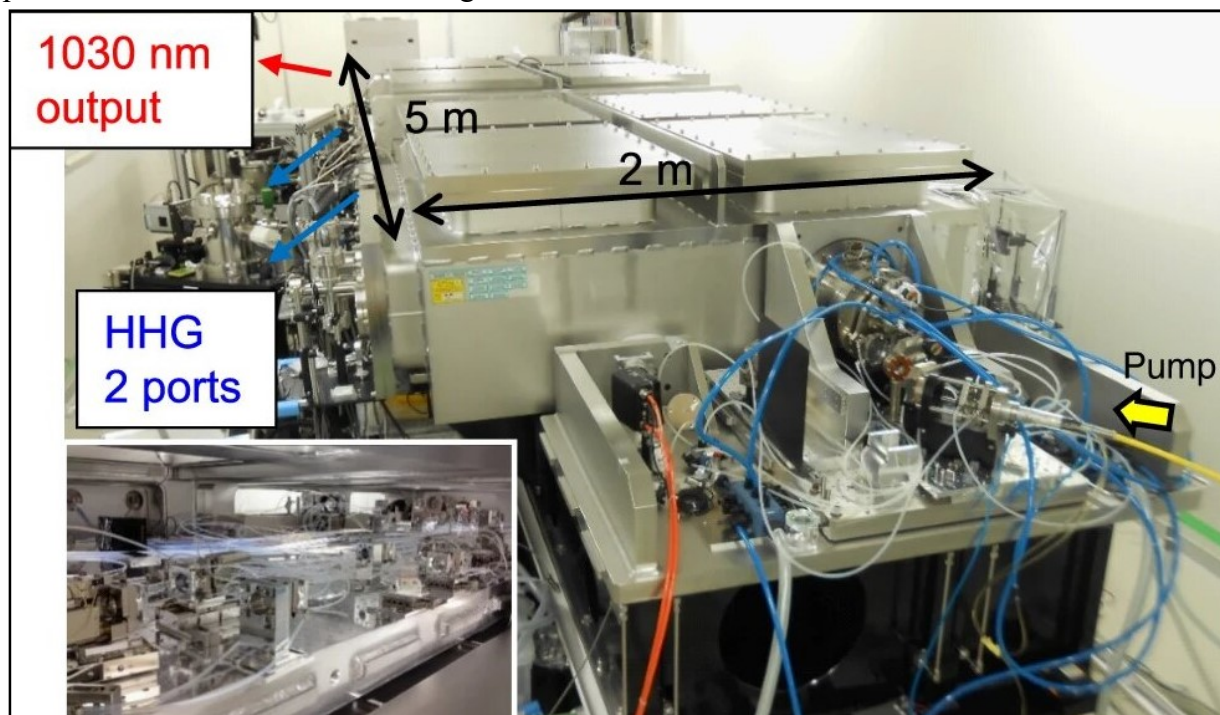
A schematic to show how the two beam sources are generated. Credit: Springer Nature

Ultraviolet (UV) light from the sun helps the body produce vitamin D and makes solar panels generate power, and X-rays can be used for medical imaging to find broken bones or other conditions. But beyond these aspects, UV light and X-rays are also essential tools for the investigation of the physical world. Researchers use these forms of light to reveal details of biological, chemical and physical samples such as their makeup, structure and behavior.

Two kinds of light that are especially useful for state-of-the-art investigations into fast-acting phenomena, such as certain chemical reactions or biological processes, are coherent extreme ultraviolet (XUV) and soft X-ray pulses. These are both very precise forms of light with finely controlled parameters, akin to laser pulses, crucial for performing good rigorous experiments. However, there are some drawbacks to how these beams are made.

"Facilities to produce coherent XUV and soft X-rays are huge machines based on particle accelerators—like smaller versions of the Large Hadron Collider in Europe," said Professor Katsumi Midorikawa from the UTokyo Institute for Photon Science and Technology and RIKEN

Center for Advanced Photonics. "Given the rarity of these facilities and the expense of running experiments there, it presents a barrier to many who might wish to use them. This is what prompted myself and colleagues at UTokyo and RIKEN to create a new kind of facility that we hope will be far more accessible for a greater number of researchers to use."



The water-cooled laser to feed the high-order harmonic generator. Credit: Springer Nature

The new XUV source facility is much, much smaller than any that has come before it. It is housed inside a relatively modest lab underground at the University of Tokyo. The bulk of the machine is a 5-by-2-meter vacuum container housing a 100-meter-long ring, or resonator, down which a high-power laser light is stored. At two locations on this coil are pockets of rare gases that alter the characteristics of the passing laser. This results in the two separate beams of XUV and soft X-rays, which are cast onto samples undergoing investigation. Light reflected off the samples is then read by high-speed imaging sensors.

"What is really novel about our approach is that the XUV and soft X-ray pulses are extremely short but occur at very high frequencies, in the region of megahertz, or millions of cycles per second," said Midorikawa. "For perspective, established XUV facilities that use synchrotron radiation pulses in the megahertz region have longer bursts that are less suitable for resolving dynamic phenomena. And those that use so-called X-ray-free electron laser sources have short pulses, but offer low frequencies of around 10 hertz to 100 hertz. So our facility offers the best of both worlds, with the added benefit of being only a fraction of the size and with far lower operating costs."

This new XUV source offers ultrashort pulses, useful for probing fast phenomena, and high frequencies, useful for investigating the structure and chemical properties of matter. This is possible due to the process that creates the pulses as the laser interacts with the gas. It is called high-order harmonic generation, and the facility is the first of its kind capable of producing multiple XUV and soft X-ray beams.

"I have been working in the field of XUV generation and application for 30 years. Although high-order harmonic generation brought a breakthrough in this field, the generation efficiency and pulse repetition rate were still insufficient for many applications," said Midorikawa. "When I proposed the idea of this facility to my colleagues, they were instantly interested and we were able to acquire a suitable budget to complete it. We all hope this will open the door to new research from materials scientists, chemists and biologists who can finally access this amazing and powerful investigative tool."

More information: Natsuki Kanda et al. Opening a new route to multipoint coherent XUV sources via intracavity high-order harmonic generation, *Light: Science & Applications* (2020). DOI: [10.1038/s41377-020-00405-5](https://doi.org/10.1038/s41377-020-00405-5)

Journal information: *Light: Science & Applications*
<https://phys.org/news/2020-09-machine-probe-ultrafast-motion.html>

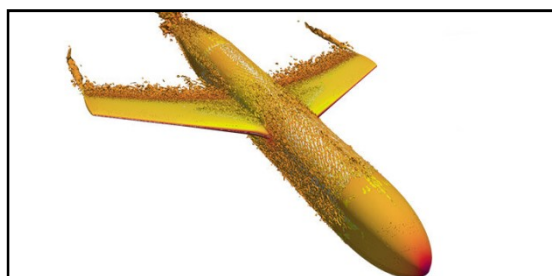


Tue, 29 Sept 2020

Quieter wind beneath the wings

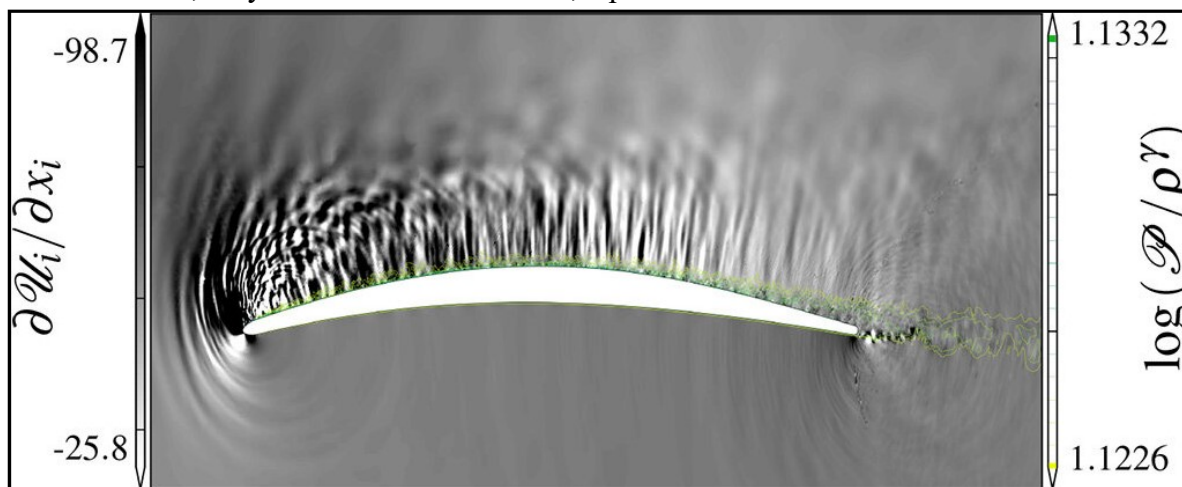
Efficiently simulating the noise generated by wings and propellers promises to accelerate the development of quieter aircraft and turbines.

A new simulation approach has enabled a first practical, and highly accurate, computation of the noise characteristics of complex three-dimensional airfoil designs under extreme operating conditions. By shortening simulations that would have taken months or weeks to run to just days or hours, the new approach could accelerate the development of quieter airfoil designs to enable the next generation of aircraft and urban airborne vehicles.



KAUST researchers are using simulations to better understand how airborne vehicles generate noise with the aim of reducing it. Credit: KAUST

"Aircraft noise is already a problem for many communities located near major airports, and this will only get worse with the expanded use of drones and, in the future, air taxis and private airborne vehicles," says Radouan Boukharfane, a postdoc at KAUST.



The researchers are modeling compressible airflows across surfaces under high turbulence to reveal the pressure waves we hear as sound. Credit: KAUST

Airfoils—wings, propellers and turbine blades—are typically designed and refined using relatively fast applied mathematical techniques. However, characteristics like noise generation are more complex. These typically require tests using experimental models because the direct numerical simulations capable of resolving such features are so computationally intensive that, even on today's fastest computers, they would take months to complete.

"In realistic engineering problems in aeroacoustics, the interactions between the turbulent airflow and the surface are important," says Boukharfane. "One of our main challenges was how to model compressible airflows across the surface under high turbulence with sufficient accuracy to predict the separation of the airflow over a smoothly curved surface and its reattachment near the trailing edge."

Rather than directly simulate the entire flow field at high resolution, Boukharfane, with colleagues Matteo Parsani, and Julien Bodart, applied a wall-modeled large-eddy simulation (WMLES) to model the near-surface flows at high resolution while reducing overall computational intensity by modeling only larger flow structures further from the airfoil.

"The WMLES approach used in this work allows us to reproduce many of the key qualitative features of the airflow seen in experiments, as well as noise-related characteristics such as the wall pressure spectra. Importantly, we have also shown that the method is valid for high speed and highly turbulent flow," says Boukharfane.

The algorithm described in the paper is the latest in a suite of tools developed by the Advanced Algorithms and Numerical Simulations Laboratory, and builds on a collaboration with the Higher Institute of Aeronautics and Space in France under the Clean Sky Joint Undertaking of the European Union. Some of these tools are currently being used and tested by NASA, Airbus and the National Institute of Aerospace in Virginia.

"Our team is uniquely placed at the intersection of numerical analysis, physics, and high-performance computing to develop novel and efficient algorithms that better account for physical phenomena and efficiently utilize modern computing architectures," says Parsani.

More information: Radouan Boukharfane et al. Characterization of pressure fluctuations within a controlled-diffusion blade boundary layer using the equilibrium wall-modeled LES, *Scientific Reports* (2020). DOI: [10.1038/s41598-020-69671-y](https://doi.org/10.1038/s41598-020-69671-y)

Journal information: [Scientific Reports](https://phys.org/news/2020-09-quieter-beneath-wings.html)
<https://phys.org/news/2020-09-quieter-beneath-wings.html>



Tue, 29 Sept 2020

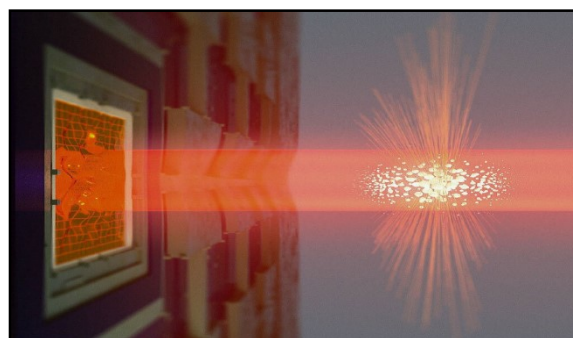
Quantum entanglement realized between distant large objects

A team of researchers at the Niels Bohr Institute, University of Copenhagen, have succeeded in entangling two very different quantum objects. The result has several potential applications in ultra-precise sensing and quantum communication and is now published in *Nature Physics*.

Entanglement is the basis for quantum communication and quantum sensing. It can be understood as a quantum link between two objects which makes them behave as a single quantum object.

Researchers succeeded in making entanglement between a mechanical oscillator—a vibrating dielectric membrane—and a cloud of atoms, each acting as a tiny magnet, or what physicists call "spin." These very different entities were possible to entangle by connecting them with photons, particles of light. Atoms can be useful in processing quantum information and the membrane—or mechanical quantum systems in general—can be useful for storage of quantum information.

Professor Eugene Polzik, who led the effort, states that: "With this new technique, we are on route to pushing the boundaries of the possibilities of entanglement. The bigger the objects, the further apart they are, the more disparate they are, the more interesting entanglement becomes



Light propagates through the atomic cloud shown in the center and then falls onto the SiN membrane shown on the left. As a result of interaction with light the precession of atomic spins and vibration of the membrane become quantum correlated. This is the essence of entanglement between the atoms and the membrane. Credit: Niels Bohr Institute

from both fundamental and applied perspectives. With the new result, entanglement between very different objects has become possible."

To understand entanglement, sticking to the example of spins entangled with a mechanical membrane, imagine the position of the vibrating membrane and the tilt of the total spin of all atoms, akin to a spinning top. If both objects move randomly, but if observed moving right or left at the same time, that is called a correlation. Such correlated motion is normally limited to the so-called zero-point motion—the residual, uncorrelated motion of all matter that occurs even at absolute zero temperature. This limits knowledge about any of the systems.

In their experiment, Eugene Polzik's team entangled the systems, which means that they move in a correlated way with a precision better than the zero-point motion. "Quantum mechanics is like a double-edged sword—it gives us wonderful new technologies, but also limits precision of measurements which would seem just easy from a classical point of view," says a team member, Michał Parniak. Entangled systems can remain perfectly correlated even if they are at a distance from each other—a feature that has puzzled researchers from the very birth of quantum mechanics more than 100 years ago.

Ph.D. student Christoffer Østfeldt explains further: "Imagine the different ways of realizing quantum states as a kind of zoo of different realities or situations with very different qualities and potentials. If, for example, we wish to build a device of some sort, in order to exploit the different qualities they all possess and in which they perform different functions and solve a different task, it will be necessary to invent a language they are all able to speak. The quantum states need to be able to communicate, for us to use the full potential of the device. That's what this entanglement between two elements in the zoo has shown we are now capable of."

A specific example of perspectives of entangling different quantum objects is quantum sensing. Different objects possess sensitivity to different external forces. For example, mechanical oscillators are used as accelerometers and force sensors, whereas atomic spins are used in magnetometers. When only one of the two different entangled objects is subject to external perturbation, entanglement allows it to be measured with a sensitivity not limited by the object's zero-point fluctuations.

There is a fairly immediate possibility for application of the technique in sensing both for tiny oscillators and big ones. One of the biggest scientific pieces of news in recent years was the first detection of gravity waves, made by the Laser Interferometer Gravitational-wave Observatory (LIGO). LIGO senses and measures extremely faint waves caused by astronomical events in deep space, such as black hole mergers or neutron star mergers. The waves can be observed because they shake the mirrors of the interferometer. But even LIGO's sensitivity is limited by quantum mechanics because the mirrors of the laser interferometer are also shaken by the zero-point fluctuations. Those fluctuations lead to noise preventing observation of the tiny motion of the mirrors caused by gravitational waves.

It is, in principle, possible to generate entanglement of the LIGO mirrors with an atomic cloud and thus cancel the zero-point noise of the mirrors in the same way as it does for the membrane noise in the present experiment. The perfect correlation between the mirrors and the atomic spins due to their entanglement can be used in such sensors to virtually erase uncertainty. It simply requires taking information from one system and applying the knowledge to the other. In such a way, one could learn both about the position and the momentum of LIGO's mirrors at the same time, entering a so-called quantum-mechanics-free subspace and taking a step towards limitless precision of measurements of motion. A model experiment demonstrating this principle is on the way at Eugene Polzik's laboratory.

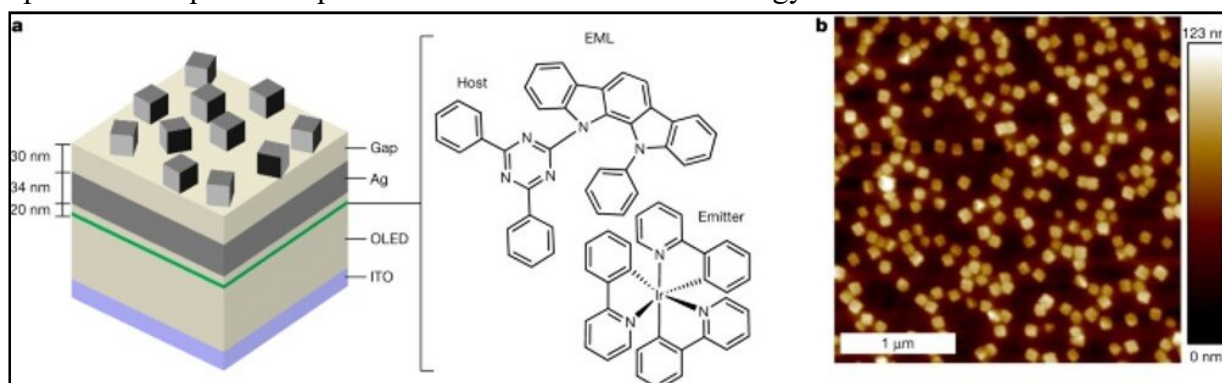
More information: Rodrigo A. Thomas et al. Entanglement between distant macroscopic mechanical and spin systems, *Nature Physics* (2020). DOI: [10.1038/s41567-020-1031-5](https://doi.org/10.1038/s41567-020-1031-5)

Journal information: [Nature Physics](https://www.nature.com/subjects/quantum-physics)
<https://phys.org/news/2020-09-quantum-entanglement-distant-large.html>

Plasmonic enhancement of stability and brightness in organic light-emitting devices

By Thamarasee Jeewandara

Scientists investigate free electrons and the resonant interactions of electromagnetic waves in the field of plasmonics. However, the discipline still remains to be extended to large-scale commercial applications due to the loss associated with plasmonic materials. While organic light-emitting devices (OLEDs) are incorporated into mass-scale commercial products due to properties such as good color saturation, versatile form factor and low-power consumption, their efficacy and stability remain to be optimized. During its function, OLEDs accumulate localized build-up of slow-decaying, triplet excitons and charges, which gradually reduce the brightness of the device in an "aging" process, which can then cause a burn-in effect on the display. As a result, it is important to improve the performance of the OLED technology.



Plasmonic device diagram and nanocube morphology. (a) Schematic of the plasmon NPA, with relevant layer thicknesses annotated. The EML position and width within the OLED are denoted by the green line. The chemical structures of the EML components, host (DIC-TRZ) and emitter (Ir(ppy)₃), are also presented. (b) Atomic-force micrograph of Ag nanocubes spun on top of the OLED. The fill fraction of Ag cubes is 15%, with a centre-to-centre spacing of ~200 nm. ITO, indium tin oxide. Credit: *Nature*, doi: 10.1038/s41586-020-2684-z

In a new report now published on *Nature*, Michael A. Fusella and a research team at the Universal Display Corporation U.S. developed an OLED (organic light emitting device) with plasmonic decay rate enhancement to increase device stability, they maintained the efficiency by including a nanoparticle-based out-coupling scheme to extract energy from the plasmon mode. The team used an archetypal phosphorescent emitter to achieve a two-fold increase in functional stability at the same brightness as a reference conventional device and extracted 16 percent of the energy from the plasmon mode as light. The new approach will improve the stability of OLED while avoiding material-specific design limitations. Possible applications include lighting panels, and television and mobile displays.

Surface plasmons and plasmon nanopatch antenna (NPA)

Surface plasmons are collective oscillations of electrons that reside at the interface of a metal and the surrounding dielectric environment. The phenomenon can contribute to large electric fields and improve the decay rate in orders-of-magnitude across the visible and near infrared regions for ideal use with organic light-emitting devices (OLEDs). Much work on ongoing OLED development focus on minimizing the quenched exciton energy loss that is dissipated as heat. Here, Fusella et al. optimized the device by coupling the energy to the surface plasmon mode of the OLED cathode. To accomplish this, they used a phosphorescent emitter hosted by a material abbreviated as DIC-TRZ, short for 2,4-diphenyl-6-bis(12-phenylindolo)[2,3-a]carbazole-11-yl)-1,3,5-triazine.

The team out-coupled light by randomly arranging silver nanocubes separated from the silver (Ag) cathode by a dielectric layer and named the device the plasmon nanopatch antenna (NPA), although the design paradigms varied from the NPA architecture used in previous work. The plasmon NPA developed here achieved a nearly three-fold stability increase compared to a reference device. The thinner device architecture of the plasmon NPA did not cause shorting during the life test and achieved dramatic enhancement of device stability without loss of efficiency.

Plasmon-enhanced lifetime and efficiency

In the experimental setup, the plasmon nanopatch antenna (NPA) had a transparent anode to convert energy coupled to the surface plasmon mode of the silver cathode to photons via randomly arranged silver nanocubes in its architecture to facilitate light emission from the top of the device. They noted the external quantum efficiency for the light emitted from the top of the plasmon nanopatch antenna to be eight percent (8%), while the same device without nanocubes had a top emission external quantum efficiency (TE EQE) of only negative one percent (-1%); highlighting the importance of nanocubes in out-coupling. Fusella et al. intentionally designed an architecture with simultaneous top and bottom emission to help the plasmon nanopatch antenna distinguish the energy coupled in and scattered out from energy that does not couple into the plasmon mode (bottom emission). When translating this experimental concept to a commercial device, scientists will need to eliminate any bottom emission light by coupling all excitons to the plasmon mode or by employing an opaque metal anode to reflect the bottom emission light back to the top of the device.

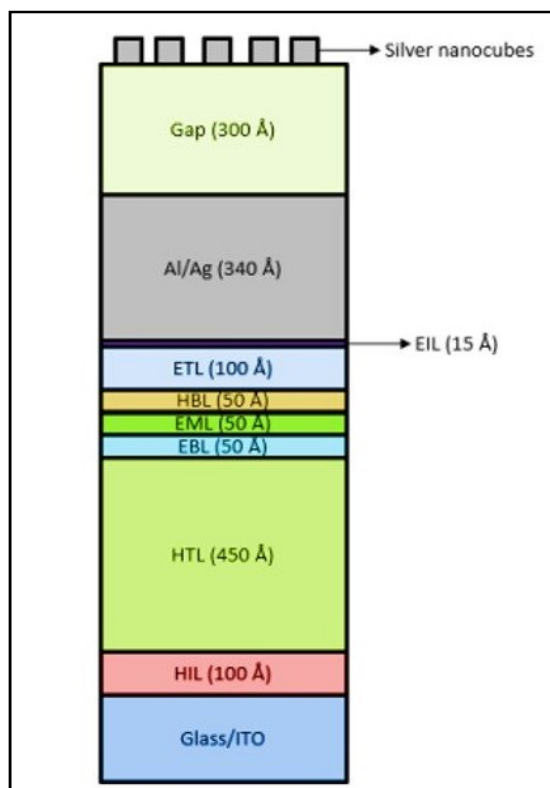
Optical properties of the plasmon nanopatch antenna (NPA)

The scientists next investigated the exciton dynamics inside the emissive layers of the three devices investigated in the study, including:

1. plasmon nanopatch antenna (NPA)
2. standard organic light emitting device incorporating organic phosphors (PHOLED)
3. a thin-emissive layer PHOLED

Of these, the plasmon NPA maintained its external quantum efficiency (EQE) at high current densities comparatively better than the reference devices, alongside shorter decay time and therefore greater stability. The device architecture of the plasmon NPA with 75-nm silver nanocubes separated from the planar silver cathode contributed to its high external quantum efficiency. This architecture deviated from the typical patch-antenna-based approach, allowing surface plasmon coupling to the planar silver cathode, while the silver nanocubes performed out-coupling. The mechanism resulted in broadband rate enhancement without compromising the device architecture.

Fusella et al. then used finite-difference time-domain modeling to calculate the external quantum efficiency of the device to estimate its ultimate efficiency and noted a considerable increase in the predicted values after including the silver nanocube architecture to the simulation. The results were in close agreement with the experimental outcomes. Although the results



Annotated device stack of the plasmon NPA structure. Note that the glass/ITO layers and silver nanocubes are not drawn to scale while the remaining layers are scaled relative to each other to provide a representation of the device structure. Where ETL: electron transport layer, HBL: hole blocking layer, EML: emissive layer, EBL: electron blocking layer, HTL: hole transport layer, HIL: hole-injection layer, EIL: electron injection layer. GAP: space between the cathode and silver nanocubes. Credit: Nature, doi: 10.1038/s41586-020-2684-z

modeled for external quantum efficiency were promising, they were still considerably lower than those observed in previous work. The team therefore aim to redesign the nanocube architecture to enhance the out-coupling efficiency of the device in future studies.

In this way, Michael A. Fusella and colleagues showed enhanced organic light-emitting device (OLED) stability by improving the decay rate through surface plasmon coupling. Typically, this strategy is detrimental to the overall performance of the device, but in this instance, the setup improved the stability of the device architecture to establish parallel paths of OLED development. The fully optimized device geometries will allow external quantum efficiencies greater than 40 percent with greater stability. The work presents a new paradigm for OLED design, paving the way for low-cost lighting panel applications and ultrafast and high luminance applications.

More information: Michael A. Fusella et al. Plasmonic enhancement of stability and brightness in organic light-emitting devices, *Nature* (2020). [DOI: 10.1038/s41586-020-2684-z](https://doi.org/10.1038/s41586-020-2684-z)

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[DOI: 10.1126/science.1198258](https://doi.org/10.1126/science.1198258)

Journal information: [Nature](#) , [Nature Photonics](#) , [Science](#)

<https://phys.org/news/2020-09-plasmonic-stability-brightness-light-emitting-devices.html>



Tue, 29 Sept 2020

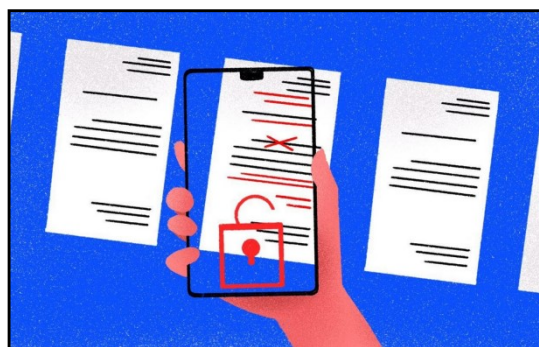
Researchers develop unique printing technology for 'invisible' images

Researchers from ITMO University's ChemBio Cluster have developed an inkjet printing technology that makes it possible to produce images that can only be seen in polarized light—such as when using a smartphone screen. The new technology will help manufacturers protect their products from forgery. An article concerning the technology was published in *ACS Applied Material Interfaces*.

In order to achieve these results, the researchers have spent five years working on a way to use solution chemistry methods to apply high-resolution organized nanostructures. In large part, the ability to produce images invisible to the naked eye is due to the creation of special colloidal ink based on nanoscale cellulose particles capable of orienting themselves on a surface in a special manner.

"The market for printing materials that can protect products from forgery and counterfeiting is growing at a geometric rate. To that end, manufacturers use various QR codes and data signals, but it would be preferable to have methods that are more accessible and don't require major investments. Using inkjet printing can make the process of launching the production of packaging material significantly simpler, but it calls for serious multi-year research into the chemical composition of the ink," explains Alexander Vinogradov, head of ITMO University's ChemBio Cluster.

While the distribution of nanoparticles is chaotic under regular conditions, the use of this special inkjet printing method results in a nanoarchitecture in which particles are strictly parallel in relation to each other. The thickness of such coatings, which forms as ink settles, is chosen so as to allow for certain optical phenomena observed under polarized light. Thus, the colorful



Credit: Dmitry Lisovsky, ITMO

optical response from the printed image can be easily observed through any LCD screen, including that of a smartphone.

"This effect is achieved by programming the nanoparticles contained within the solution; we imbue them with certain qualities in advance, knowing their charge and ionic force, the properties of the solution and keeping in mind what these parameters need to be during printing," says Alexander Vinogradov. "With all that in mind, we pick the right concentration of ink and modify it so that the dynamics of the nanoparticles and their mutual attraction and repulsion wouldn't allow them to distribute chaotically, assembling them parallel to each other instead."

Any full-color transparent image can be printed in this manner—a number, letter or a logo. These watermarks could potentially be used for added security of products, banknotes, tickets, and similar items.

More information: Elena Eremeeva et al. Printing of Colorful Cellulose Nanocrystalline Patterns Visible in Linearly Polarized Light, *ACS Applied Materials & Interfaces* (2020). [DOI: 10.1021/acsami.0c11846](https://doi.org/10.1021/acsami.0c11846)

Journal information: [ACS Applied Materials and Interfaces](https://phys.org/news/2020-09-unique-technology-invisible-images.html)
<https://phys.org/news/2020-09-unique-technology-invisible-images.html>

COVID-19 Research News



Tue, 29 Sept 2020

Covid-19 vaccine portal launched, all data linked to research, clinical trial on it, says Harsh Vardhan

The web portal will have data on research development, clinical trials on potential Covid-19 vaccine in India, its launch date and other information, health minister Dr Harsh Vardhan said

Edited By Niyati Singh

New Delhi: The Union health ministry on Monday launched an online portal about Covid-19 with all the latest information on the coronavirus disease.

The web portal will have data on research development, clinical trials on potential Covid-19 vaccine in India, its launch date and other information, health minister Dr Harsh Vardhan said.

"An online portal about Covid-19 vaccine has been launched. Everyone will be able to go online to that portal and look up all contemporary research-development and clinical trials related information. It will also provide information about other vaccinations provided in the country," Dr Vardhan was quoted by news agency ANI as saying.

The health ministry also said that the first vaccine in India will most likely be available by the first quarter of 2021.

"Research to develop a vaccine is being done expeditiously. There are at least 3 viable such vaccine candidates that are in the phase of clinical trials right now in the country. We're hopeful that within 1st quarter of 2021 it will be available," Dr Vardhan added.

The health ministry also released the 100-year timeline history of the Indian Council of Medical Research (ICMR).

“Today’s a historic day for ICMR. It’s an honour for me to release the 100-year timeline of the history of ICMR within its premises today. The contribution of scientists associated with it is commemorated and serves as an inspiration to upcoming scientists,” he added.

India’s Covid-19 tally on Monday crossed 60-lakh mark after the country reported a spike of 82,170 new virus cases, according to Union Health and Family Welfare Ministry data. India’s case tally now stands at 60,74,703, with 95,542 deaths due to coronavirus.

<https://www.hindustantimes.com/india-news/online-portal-about-covid-19-vaccine-launched-all-r-d-clinical-trial-data-on-it-says-health-ministry/story-rJR5EEGavMjkjulRAB4nIP.html>



Tue, 29 Sept 2020

IIT Delhi research finds more effective drug in treating COVID -19 virus; Check details

Clinically approved drug "Teicoplanin" is a potential therapeutic option against COVID-19 and can be ten times more effective than several drugs being currently used, a research by Indian Institute of Technology (IIT), Delhi has found

Clinically approved drug “Teicoplanin” is a potential therapeutic option against COVID-19 and can be ten times more effective than several drugs being currently used, a research by Indian Institute of Technology (IIT), Delhi has found. The research by the institute’s Kusuma School of Biological Science screened an assemblage of 23 approved drugs, which have shown leads towards being therapeutic options for coronavirus.

“While the effect of Teicoplanin was compared with other important drugs in use, Teicoplanin was found to be 10-20 fold more effective than the chief drugs being used against SARS-CoV-2, such as Lopinavir and Hydroxychloroquine in our laboratory conditions,” said Ashok Patel, Professor at IIT Delhi. Patel, who led the research was also assisted by Dr Pradeep Sharma from AIIMS. The research has also been published in the International Journal of Biological Macromolecules.

Teicoplanin is an FDA-approved glycopeptide antibiotic, which is regularly used for treating Gram-positive bacterial infections with low toxicity profile in humans. “Recently, there has been a clinical study carried out with Teicoplanin at Sapienza University in Rome. However, a more detailed clinical investigation is required on a large cohort, in different stages mild, moderate and critically ill patients to conclude the definite role of Teicoplanin against COVID-19,” Patel said.

Globally, over 3.2 crore people have been infected with COVID-19, and the total number of deaths from the deadly virus now stands at over 9.80 lakh. India’s coronavirus tally galloped past 60 lakh on Monday with 82,170 new cases, while the number of recoveries surged to 50.17 lakh after 74,893 more people recuperated, the Health Ministry said. The death toll from the pathogen climbed to 95,542 with 1,039 more deaths. There are 9,62,640 active cases of the coronavirus disease (COVID-19), comprising 15.85 per cent of the caseload, according to the ministry data.

<https://www.financialexpress.com/lifestyle/health/iit-delhi-research-finds-more-effective-drug-in-treating-covid-19-virus-check-details/2093263/>



The research by the institute's Kusuma School of Biological Science screened an assemblage of 23 approved drugs, which have shown leads towards being therapeutic options for coronavirus. (Reuters Photo)

