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समाचार पत्रों से चयित अंश Newspapers Clippings

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

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CONTENTS

| S. No. | TITLE | Page No. |
|---|--|--------------|
| DRDO News | | 1-11 |
| DRDO Technology News | | 1-11 |
| 1. | रक्षा अधिग्रहण परिषद ने 13,700 करोड़ रुपये के प्रस्तावों को मंजूरी प्रदान की | 1 |
| 2. | DAC approves proposals worth Rs 13,700 crore | 2 |
| 3. | Army to get 118 Arjun Mark 1-A tanks as defence ministry clears proposal for 'Hunter Killers' | 2 |
| 4. | Indian Army gets 118-tank boost: Defence Ministry clears acquisition of Arjun Mark 1A tanks | 4 |
| 5. | MoD clears defence buys worth ₹13,700 cr, including 118 Arjun Mk-1A tanks | 5 |
| 6. | Why Indian Army could be concerned with indigenous Arjun Tanks amid 'Make In India' Drive? | 7 |
| 7. | DRDO hands over the licensing agreement for Transfer of Technology (LAToT) to Godrej & Boyce for the production of Mechanical Mine Layer – Self Propelled (MML SP), at Aero India 2021 | 9 |
| 8. | To counter China, India's DSA begins scouting for star wars technology | 10 |
| Defence News | | 11-17 |
| Defence Strategic National/International | | 11-17 |
| 9. | Rear Adm Tarun Sobti takes over as Flag Officer Commanding Eastern Fleet | 11 |
| 10. | 'Make in India' gets big push with 64% of defence modernisation budget kept for Indian players | 12 |
| 11. | Cochin Shipyard lowest bidder for Rs 10,000-crore contract to build missile vessels for Indian Navy | 14 |
| 12. | Army places emergency procurement order for Kalyani M4 armoured vehicles tested in Ladakh | 15 |
| 13. | बढ़ेगी भारतीय सेना की ताकत: 'कल्याणी एम-4' बख्तरबंद गाड़ियों के आगे बम भी हो जाएगा बेअसर, जार्ने इसकी खूबियां | 16 |
| Science & Technology News | | 18-24 |
| 14. | Scientist from IIT Kanpur develops washable adhesive and related products | 18 |
| 15. | Ion-optics-based quantum microscope can image individual atoms | 19 |
| 16. | The magic angle of twisted graphene | 20 |
| 17. | New sensor paves way to low-cost sensitive methane measurements | 21 |
| COVID-19 Research News | | 23-24 |
| 18. | Rheumatoid arthritis drug shows promise in fighting Covid-19 | 23 |



पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Tue, 23 Feb 2021 5:03PM

रक्षा अधिग्रहण परिषद ने 13,700 करोड़ रुपये के प्रस्तावों को मंजूरी प्रदान की

रक्षा मंत्री श्री राजनाथ सिंह की अध्यक्षता में रक्षा अधिग्रहण परिषद (डीएसी) ने दिनांक 23 फरवरी, 2021 को नई दिल्ली में भारतीय सेना, भारतीय नौसेना और भारतीय वायु सेना के लिए आवश्यक विभिन्न हथियारों/प्लेटफार्मों/उपकरणों/आवश्यक प्रणालियों के पूंजी अधिग्रहण प्रस्तावों को मंजूरी दे दी है। 13,700 करोड़ रुपये की कुल लागत के लिए तीन एओएन को स्वीकृति प्रदान की गई। ये सभी एओएन रक्षा अधिग्रहण की सर्वोच्च प्राथमिकता श्रेणी में हैं अर्थात 'बाय [इंडियन-आईडीडीएम (स्वदेशी रूप से डिजाइन, विकसित एवं निर्मित किया गया)]।

इन सभी अधिग्रहण प्रस्तावों को स्वदेश में डिजाइन, विकसित और निर्मित किया जाएगा। इनमें अन्य उपकरणों के साथ साथ रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) द्वारा डिजाइन और विकसित किए गए प्लेटफॉर्म और सिस्टम शामिल होंगे।

समयबद्ध रक्षा खरीद प्रक्रिया और तेजी से निर्णय लेने और पूंजी अधिग्रहण के लिए लिए गए समय को कम करने की दिशा में योजनाबद्ध तरीके से काम करने के लिए सरकार के आत्मनिर्भर भारत के लक्ष्यों को पूरा करने के लिए रक्षा अधिग्रहण परिषद (डीएसी) ने यह भी मंजूरी दी कि डीएंडडी मामलों के अलावा सभी पूंजी अधिग्रहण अनुबंध (प्रत्यायोजित और गैर-प्रत्यायोजित) दो वर्षों में समाप्त किए जाएंगे। रक्षा मंत्रालय सेना के तीनों अंगों और सभी हितधारकों के परामर्श से इसे प्राप्त करने के लिए विस्तृत कार्ययोजना तैयार करेगा।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1700283>



DAC approves proposals worth Rs 13,700 crore

Defence Acquisition Council (DAC), under the chairmanship of Raksha Mantri Shri Rajnath Singh, has approved capital acquisition proposals of various weapons/platforms/equipment/systems required by the Indian Army, Indian Navy and Indian Air Force, in New Delhi on February 23, 2021. Three Acceptance of Necessities (AoNs) for an overall cost of Rs 13,700 crore were accorded. All these AoNs are in the highest priority category of Defence Acquisition viz 'Buy [Indian-IDDMM (Indigenously Designed, Developed and Manufactured)].

All these acquisition proposals will be indigenously designed, developed and manufactured. These will include inter-alia platforms and systems designed and developed by Defence Research and Development Organisation (DRDO).

To meet the Atmanirbhar Bharat goals of the Government on time-bound defence procurement process and faster decision making and to systematically work towards reducing the time taken for capital acquisition, the DAC also approved that all capital acquisition contracts (delegated and non-delegated) other than D&D cases shall be concluded in two years. The Ministry, in consultation with the Services and all stakeholders, will come up with detailed plan of action for achieving the same.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1700215>

ThePrint

Wed, 24 Feb 2021

Army to get 118 Arjun Mark 1-A tanks as defence ministry clears proposal for 'Hunter Killers'

Order for the two regiments of the Arjun Mark 1-A tank will take at least a year from now and would be the last for this system because the Army is looking at lighter tanks for the future

By Snehes Alex Philip

New Delhi: The defence ministry Tuesday granted approval to the Army's proposal to procure 118 indigenously manufactured Arjun Mark 1-A 'Hunter Killers', the second biggest 'Make in India' project in the armed forces this year after the Tejas aircraft deal earlier this month.

The Rs 8,380-crore project was given the Acceptance of Necessity (AON) by the Defence Acquisition Council (DAC), which is led by Defence Minister Rajnath Singh.

Sources told ThePrint the Army will now issue the Request for Proposal (RFP) to the Defence Research and Development Organisation (DRDO), and the whole process till the final contract could take at least one year.



Prime Minister Narendra Modi and Army officials in front of a Arjun Mark 1-A tank on 14 February 2021 | PTI

“Three Acceptance of Necessities (AoNs) for an overall cost of Rs 13,700 crore were accorded,” a statement by the defence ministry noted, and according to sources, the Arjun tank project was one of them. The others were related to the Army’s Rs 5,300-crore project for protection and countermeasures for armoured fighting vehicles.

Known as the ‘Hunter Killers’, the new version of the indigenous tanks have all-weather capability, and better fire power and stability than the Arjun main battle tank (MBT).

The Mark 1-A weighs 68 tonnes and is equipped with a 120mm main gun, and will be the most potent tank to be inducted in the Army.

According to the contract, the first tank will be rolled out from the factory within 30 months once the formal contract is done.

At present, the Army currently operates two regiments of the MBT that are based in Rajasthan.

According to sources in the defence and security establishment, the present order of Mark 1-A for the two regiments will be the last for this system. This is because the Army is looking to induct lighter tanks, weighing 50 tonnes at most and a minimum of 30 tonnes.

Currently, India operates with Russian-designed T-90 tanks, which weigh around 46 tonnes, besides the T-72 tanks.

Major improvements

The Mark 1-A comes with 14 major improvements that the Army had sought, which are part of a total 71 new features.

The tank has undergone four upgrades to the firepower of the tank, besides new transmission systems. It includes an improved gunner’s main sight, integrated with automatic target tracking. This would enable the tank crew to track moving targets automatically and engage them even when Arjun is on the move.

The Mark-1A’s gun is controlled by a computerised integrated fire control system, giving the tank a high first round kill capability. The gun’s day-and-night stabilised sights, coupled with automatic target tracker, guarantee accurate engagement even in dynamic conditions.

Other than the conventional fin stabilised armour piercing discarding sabot and high explosive squash head ammunition, the Mark 1-A comes with thermo baric and penetration-cum-blast ammunition.

Last week, during a function, Prime Minister Narendra Modi had also handed over a model of the tank to the Army

“A tank made in Tamil Nadu will be used in our northern border to keep our nation safe. This showcases India’s united spirit–Bharat’s ekta darshan,” Modi had said.

<https://theprint.in/defence/army-to-get-118-arjun-mark-1-a-tanks-as-defence-ministry-clears-proposal-for-hunter-killers/610117/>

Indian Army gets 118-tank boost: Defence Ministry clears acquisition of Arjun Mark 1A tanks

The Defence Acquisition Council today also okayed proposals for the acquisition of indigenously-developed Nag anti-tank guided missile and Arudhra medium power radar

Key Highlights

- **DAC clears acquisition of 118 Arjun Mark 1A tanks for the Army**
- **Acquisition of indigenously-developed Nag anti-tank guided missile also approved**
- **The proposal on acquisition of Arudhra medium power radar also cleared**

New Delhi: In a big boost to the Indian Army, the Ministry of Defence on Tuesday granted approval for the acquisition of 118 Arjun Mark 1A tanks for the ground force. The acquisition cost has been pegged at over Rs 6,000 crores.

Defence officials were quoted as saying that the 58-tonne weight DRDO-developed tanks would be ready for delivery within 30 months of the contract being signed.

At a meeting of the Defence Acquisition Council today, the MoD also cleared proposals for the acquisition of indigenously-developed Nag anti-tank guided missile and Arudhra medium power radar.

In a release, the government said the DAC today met under the chairmanship of Defence Minister Rajnath Singh and cleared capital acquisition proposals of various weapons/platforms/equipment/systems which are needed by the three arms of the armed forces - the Indian Army, Indian Navy and Indian Air Force.

“Three Acceptance of Necessities (AoNs) for an overall cost of Rs 13,700 crore were accorded. All these AoNs are in the highest priority category of Defence Acquisition viz 'Buy' [Indian-IDDMM (Indigenously Designed, Developed and Manufactured)].

“All these acquisition proposals will be indigenously designed, developed and manufactured. These will include inter-alia platforms and systems designed and developed by Defence Research and Development Organisation (DRDO),” the release said.

“To meet the Atmanirbhar Bharat goals of the government on time-bound defence procurement process and faster decision-making and to systematically work towards reducing the time taken for capital acquisition, the DAC also approved that all capital acquisition contracts (delegated and non-delegated) other than D&D cases shall be concluded in two years. The Ministry, in consultation with the Services and all stakeholders, will come up with detailed plan of action for achieving the same,” it added.

<https://www.timesnownews.com/india/article/indian-army-gets-118-tank-boost-defence-ministry-clears-acquisition-of-arjun-mark-1a-tanks/724063>



Arjun Mark 1A tanks | Photo Credit: ANI

MoD clears defence buys worth ₹13,700 cr, including 118 Arjun Mk-1A tanks

The order for the tanks could be placed with the Ordnance Factory Board (OFB) this year, with five tanks to be delivered within 30 months of the signing of the contract.

By Rahul Singh

New Delhi: The defence ministry on Tuesday cleared domestic military purchases worth ₹13,700 crore, including the army's proposals to buy 118 Arjun Mk-1A main battle tanks and equipping armoured fighting vehicles (AFVs) with modern protection and countermeasure systems, officials familiar with the developments said.

While the new tanks will cost ₹8,380 crore, the protection systems for the army's fleet of more than 3,000 AFVs (tanks and infantry combat vehicles) will cost ₹5,300 crore, the officials said. The order for the tanks could be placed with the Ordnance Factory Board (OFB) this year, with five tanks to be delivered within 30 months of the signing of the contract, Hindustan Times has learnt. This will be followed by 30 tanks being delivered every year.



The Arjun Mk-1A main battle tank.(Photo by Special Arrangement)

The Defence Acquisition Council (DAC) - India's apex procurement body – on Tuesday accorded its acceptance of necessity (AoN) for buying the tanks and the AFV protection systems to provide a push to the government's Atmanirbhar Bharat Abhiyan (self-reliant India campaign). Defence minister Rajnath Singh chaired the DAC meeting.

“Three AoNs for an overall cost of ₹13,700 crore were accorded. All these AoNs are in the highest priority category of defence acquisition...These (systems) will be indigenously designed, developed and manufactured,” the ministry said in a statement, without naming the proposals approved.

The proposals cleared by the DAC include 293 Nag anti-tank missiles developed by DRDO, 13 modified ICVs (called the Nag missile carrier or Namica), eight medium power radars called Arudra and practice ammunition for T-90 and T-72 tanks, officials said.

The Arjun Mk-1A is an upgraded version of the Arjun Mk-1 currently in army service. The new tank will come with 71 upgrades over the existing variant including 14 major improvements, said one of the officials cited above. The upgrades significantly improve the tank's lethality, mobility and survivability, he said.

The improvements on the new tank include better firepower, auto target tracker, remote-controlled weapon system, explosive reactive armour, advanced laser warning and countermeasure systems, containerized ammunition bin, advanced land navigation systems and improved night vision capabilities.

“The precise target tracking of the tank ensures accurate engagement during day and night in both static and dynamic conditions,” the official said.

The Defence Research and Development Organisation's Chennai-based Combat Vehicles Research and Development Establishment (CVRDE) has designed and developed the tank. The tanks will be manufactured at the OFB's Heavy Vehicles Factory at Avadi, outside Chennai.

Prime Minister Narendra Modi handed over a prototype of the Arjun Mk-1A tank to army chief General Manoj Mukund Naravane in Chennai on February 14, in a clear indication that the order for the 118 tanks was in the pipeline. The prototype was tested for more than 6,000 km across the country's western sector, followed by another 1,500 km of rigorous testing, HT has learnt.

More than 200 companies will be involved in the project, which is expected to generate around 8,000 jobs, said a second official. The army's existing tank fleet consists of T-90, T-72 and the Arjun Mk-1 tanks.

Protection and countermeasure systems for its AFVs have been a long-standing demand of the army. The systems will enhance the survivability of AFVs by equipping them with the capability to overcome threats from missiles, rocket-propelled grenades and tank ammunition, said a third official.

Experts said the new tanks and AFV upgrades would boost the fighting potential of the army.

"It's a big leap forward and has been pending for a long time. It will improve the strike capability of the army's armoured formations. I also see it as a very potent step in the direction of achieving self-reliance in the defence sector," said former Northern Army commander Lieutenant General BS Jaswal (retd).

But some experts flagged concerns about the bulky tank, saying its weight (68 tonnes) would limit the army's deployment options.

The defence ministry said that the DAC was of the view that capital acquisition contracts - other than design and development cases - should be concluded in two years. "The ministry, in consultation with the services and all stakeholders, will come up with a detailed plan of action for achieving the same," the statement said.

Defence minister Rajnath Singh on Monday said the ministry would try to conclude contracts in two years as against the current average period of up to four years.

Meanwhile, Bharat Forge on Tuesday announced that it received a ₹178-crore order from the army for its M4 vehicles under the emergency procurement route. The highly mobile vehicles, which provide protection against mines and improvised explosive devices, underwent trials in the Ladakh sector recently.

<https://www.hindustantimes.com/india-news/mod-clears-defence-buys-worth-rs-13-700-cr-including-118-arjun-mk-1a-tanks-101614091988608.html>

Why Indian Army could be concerned with indigenous Arjun Tanks amid 'Make In India' Drive?

This question assumes relevance, with the Ministry of Defence (MoD) approving recently the induction of 118 Arjun Mark 1A Main Battle Tanks (MBTs) into the Indian Army at a cost of Rs 8,400 crore.

In fact, during his visit to Chennai on February 14, Prime Minister Narendra Modi handed over the indigenously-developed Arjun (Mark 1A) tank to Army Chief General MM Naravane at Ordnance Factory Board's Heavy Vehicles Factory Avadi.

Now that this symbolic handover is complete, a formal contract will be signed, and accordingly, the delivery of the first Arjun Mark 1A will start within 30 months with all 118 units to be delivered within four to five years.



PM Narendra Modi after handing over the Arjun Mk1A tank to the Indian Army in Chennai.

Is the Indian Army happy with this contract? Technically speaking, it has no reason to be unhappy as its senior officers had given the tank a clearance more than a year ago after the MBT had undergone numerous trials. And what is more important, the tank comes with some features that the Army itself had sought.

So much so that according to V. Balamurugan, Director of the Combat Vehicles Research and Development Establishment (CVRDE), "The tank comes with 14 major improvements that the Army has sought, which will make it the most potent and self-protective tank in the Army's inventory."

It is said that compared to its earlier version Arjun 1, the Mark 1-A boasts an improved gunner sight (a 120mm main gun), fitted with automated target tracking capabilities. This allows the tank's crew to locate and track mobile targets automatically, enabling attack even when the MBT is moving.

It also incorporates day-and-night stabilized sights. Besides, it is integrated with thermobaric and penetration-cum-blast ammunition, in addition to the conventional fin-stabilized armor-piercing discarding sabot and high explosive squash head ammunition.

It has been reported that the Arjun Mark 1A can run at a maximum road speed of 58 km/h and 40 km/h in cross country with a maximum cruising range of 500 km. It can negotiate a gradient of 30% and a vertical step of 910 mm. It can cross natural or man-made trenches 2,430 mm wide. The tank can cross a water obstacle of 1.4 m depth without preparation and 2.15 m with a kit.

However, if the Army is really happy with Arjun Mark 1A, then why is it being said that "this is the end of the Arjun series and that DRDO officials believe this order of 118 tanks will be the last orders for the 68-ton Arjun"?

Secondly, if the Arjun Mark-1A, which is widely regarded as India's response to the Russian-made T-90S 'Bhishma' tanks that currently form the bulk of India's armored vehicle regiments, is so potent, why is it that the Army has placed a Rs 20,000 crore order for the manufacture of 464 T-90S tanks to add to the 1,191 Bhishma tanks already inducted?

The above two are troubling questions, given the not-so-rosy history of Arjun, which has seen numerous changes in design and been over-budget and long-delayed. It was planned in 1972 and

the DRDO started the work on it in 1974. It was to be a 40-ton vehicle, small enough to be strategically mobile and capable of being shuttled on internal lines (roads and railroads) to the borders.

But when in 2009, 35 years after it was originally conceived, Arjun was “ready” for production, its weight turned out to be 62 tons. It had other shortcomings too, which the Army did point out.

And yet, the Army was persuaded (pressured?) to buy 124 of them, with the last batch being procured in 2013. However, by mid-2015, two years after the purchase was complete, nearly 75 percent of the Arjun force was inoperable due to technical problems.

A 2016 report from the Comptroller and Auditor General of India noted that most of the tanks had not been in operation since 2013 due to a lack of spare parts. And the DRDO, in 2017, informed that it had imported spare parts to repair any faults that had sidelined 75 percent of the Arjun tanks

Side by side, all these years (after 2010), the DRDO declared that it would work for Arjun 2 where many shortcomings of the Arjun 1 would be rectified with additional features. In 2014, the Union Cabinet decided to procure 118 of these, but the proposal was formally cleared by the DAC (Defence Acquisition Council) only in 2018, with Arjun 2 being rechristened now Arjun Mark 1.

PM Narendra Modi after handing over the Arjun Mk1A tank to the Indian Army, in Chennai.

But the Army said that even this version did not meet all its requirements like the ability to fire a missile from its main gun and battlefield management system. Besides, the Army, which had found problems with the 62-ton weight of version 1, had to cope with the 68-ton weight with the latest version of 1A. It was only in 2020 that the Army gave its final “clearance”.

In 2018, this author had a detailed discussion with the then DRDO Chairman Dr. S Christopher. On asked about the weight problem, he had counter-questioned why was it that people were not enquiring as to what our bridges are not good enough to withstand the passage of 70-ton tanks.

He had also taken great pains to explain that people often question the DRDO when things went wrong without realizing that the DRDO’s job is only designing whereas the manufacturing was done by the OFBs, which were not under his control as these do not belong to the DRDO and operate under the domain of the Secretary, Defence Production. He also had said that for qualitative improvement, there should be joint productions with the private sector as the government ones are not worried about the losses and delays.

However, Dr. Christopher was proud that in many field trials, the Arjun had fared better than even the T-90s and that the indigenous products had the greatest advantage in the sense that one could do product improvement on the system and follow what is called spiral methods of development.

His point was that unless you get bulk orders from your armed forces, there will be lesser chances of quality-improvement. And this is something that China does well. It goes for large quantities of arms that are the high-volume, low-cost version(s) of the foreign products.

Here, the idea is that even if inferior in quality and performance to the foreign products, these low-cost lower-tech versions can be used by the Chinese forces in “high volume” to neutralize the qualitative gap. And in the process, you will learn lessons to improve your product.

Viewed thus, the Modi government’s procurement of Arjun Mark 1 A is understandable, but what remains confusing are the widely shared apprehensions that it is the “last order” for the Arjun series.

<https://eurasianimes.com/make-in-india-push-there-is-concern-over-arjun-main-battle-tanks/>

DRDO hands over the licensing agreement for Transfer of Technology (LAToT) to Godrej & Boyce for the production of Mechanical Mine Layer – Self Propelled (MML SP), at Aero India 2021

Mumbai: Godrej & Boyce, the flagship company of the Godrej Group announced that its business, Godrej Precision Engineering received the coveted Licensing Agreement for Transfer of Technology (LAToT) for the Mechanical Mine Layer, Self Propelled (MML – SP) from the Ministry of Defence’s DRDO Laboratories at the ‘Bandhan’ ceremony at Aero India 2021. Raksha Mantri Shri Rajnath Singh, Chief of Defence Staff General Bipin Rawat, three Services Chiefs, Secretary Department of Defence R&D and Chairman DRDO Dr G Satheesh Reddy and Secretary (Defence Production) Shri Raj Kumar along with other senior officials from Ministry of Defence and Karnataka Government and industrialists from the entire country were present.

The MML-SP has been designed for laying Anti-tank Bar Mines in varying soil conditions, camouflaging and recording their position accurately. It would play a crucial role in the defence and protection of India’s borders. Godrej Precision Engineering’s state of the art production facilities, stringent quality control and testing systems, coupled with decades of experience in building several ‘first-in-India’ products for defence applications will enable quicker roll out and induction of this product.

Raksha Mantri Shri Rajnath Singh in his address to the public said that Bandhan exemplifies the spirit of ‘public-private partnership’. He added that the fountain head of any capability emerges from its foundation and the foundation of our vision rests on three pillars namely, research and development, public and private defence production and defence export. He mentioned that with an aim of encouraging the manufacture of defence related items in India, our endeavour will remain to bring down the defence imports by at least two billion dollars by 2022. He highlighted that the negative list of items for import is also meant to provide opportunity to the domestic manufacturing sector to strengthen their base and contribute to Atmanirbhar Bharat.



Dr. Mayank Dwivedi, Scientist G and Director DIITM, DRDO HQrs added, “Godrej has been an important industry partner in various programs/projects of DRDO. DRDO values its contribution in various projects/programs. DRDO is confident that this LAToT will not only greatly strengthen the home-grown defense manufacturing capability of our country, but also will strengthen this partnership spanning a few decades.”

Kaustubh Shukla, Chief Operating Officer, Industrial Products Group, Godrej & Boyce, said, “We are proud to have partnered with the DRDO for more than three decades, and are deeply honoured by their confidence in us for manufacturing such a critical system. We have always considered it our foremost and sacred duty to contribute towards the defence of our Nation using our state-of-the-art technology coupled with our decades of expertise in this area. This LAToT for the Mechanical Mine Layer – Self Propelled will further strengthen our partnership with them, and we remain committed to achieving an Atmanirbhar Bharat.”

Over the years, Godrej & Boyce has successfully partnered with DRDO for various projects. Godrej Precision Engineering has successfully executed orders for defence land systems like Brahmos Missile Launchers, Missile carriers and Naval systems like Diving and Surfacing Mechanism, Hull Equipment, Life Raft Container Ejection Systems, Steering Gear and so forth.

Godrej Aerospace, another business of Godrej & Boyce works closely with DRDO for developing mission critical systems. The business has the rare honour of having received the Defence Technology Absorption Award twice, first for developing BrahMos Airframes and the second time for Power Take Off (PTO) shafts for LCA.

The association with DRDO is beyond just defence equipment. During the pandemic, Godrej developed and delivered Proportional Solenoid Valves — a critical component for making ventilators.

<https://www.punekarnews.in/drdo-hands-over-the-licensing-agreement-for-transfer-of-technology-latot-to-godrej-boyce-for-the-production-of-mechanical-mine-layer-self-propelled-mml-sp-at-aero-india-2021/>

THE TIMES OF INDIA

Wed, 24 Feb 2021

To counter China, India's DSA begins scouting for star wars technology

By Chethan Kumar

Bengaluru: Nearly two years after India demonstrated its anti-satellite (ASAT) technology through 'Mission Shakti', the newly formed Defence Space Agency (DSA), a quiet dedicated organisation established to drive India's counter-space activities has officially begun scouting for technologies to augment its capabilities to deal with threats in, and from space.

TOI has learnt reliably that the agency has requested proposals from multiple companies for technologies that provide complete SSA (space situational awareness) solutions which can detect, identify and track enemy assets while also warning about any impending attacks.

The DSA, the nod to form which under the Ministry of Defence (MoD) was granted in mid-2019, is a tri-services agency headed by air vice Marshal SP Dharkar. Sources in the know told TOI that the agency had been talking with multiple space technology companies as early as last year, but it officially issued an RFI — to select companies — sometime in January 2021.

“Companies have time till the first week of March to respond to the RFI,” a source said, adding that the DSA is looking for a complete solution that can be enhanced to play an offensive role in the future.

The DSA is also looking for a system that can fuse space surveillance data available from various sources into a common operating picture (COP) so as to better evaluate threats and to maximise the effectiveness of Indian operations in space, land, sea and air domains.

From neighbourhood watch screenings to analysis and prediction of threats — from ASAT, space debris, DE (direct energy) weapons and RF (radio frequency) interference, the DSA's requirements are specific. It is also looking to catalog space objects, acquire analysis tools for predictive assessment.



The move assumes importance given that China, notwithstanding its public stance, has been strengthening its military space capabilities by continuing to develop and acquire a variety of space capabilities designed to limit or prevent an adversary's use of space-based assets during crisis or conflict.

As reported by TOI in September 2020, the PLA continues to acquire and develop technologies including kinetic-kill missiles, ground-based lasers, and orbiting space robots, as well as expanding space surveillance capabilities, which can monitor objects in space within their field of view and enable actions.

According to a 200-page annual report to the US Congress prepared by the Department of Defence fnds, China is developing electronic warfare capabilities such as satellite jammers, offensive cyber capabilities and directed-energy weapons.

<https://timesofindia.indiatimes.com/india/india-begins-scouting-for-star-wars-technology/articleshow/81163698.cms>

Defence News

Defence Strategic: National/International



Press Information Bureau
Government of India

Ministry of Defence

Tue, 23 Feb 2021 3:19PM

Rear Adm Tarun Sobti takes over as Flag Officer Commanding Eastern Fleet

Rear Admiral Tarun Sobti, VSM took over the Command of the Eastern Fleet, the Sword Arm of the Eastern Naval Command, from Rear Admiral Sanjay Vatsayan, AVSM, NM today. The change of guard took place at an impressive ceremony held on 23 February 2021 in Naval Base, Visakhapatnam.

Rear Admiral Tarun Sobti was commissioned into the Indian Navy on 01 July 1988 and is a specialist in Navigation and Direction. The Flag Officer is an alumnus of the National Defence Academy, Khadakwasla, Collège Interarmées de Défense, Paris, France and College of Naval Warfare, Mumbai.

During his illustrious career spanning 32 years, he served as Navigating Officer of INS Kirpan, commissioning Navigating Officer of INS Mysore, Direction Officer on INS Viraat and Executive Officer of missile destroyer INS Delhi. His sea commands include those of missile vessel INS Nishank, missile corvette INS Kora and missile destroyer INS Kolkata of which he was the commissioning Commanding Officer.

His prestigious staff and operational appointments include those as Joint Director of Staff Requirements and Joint Director of Personnel at Naval Headquarters and Captain Work-Up at



Local Work-Up Team (East). He also served as the Naval Attaché at Embassy of India, Moscow. Prior assuming command of the Eastern Fleet, the Flag Officer was Deputy Commandant and Chief Instructor of Indian Navy's premier officer training establishment Indian Naval Academy at Ezhimala.

Over the past 12 months, the Eastern Fleet under the command of Rear Admiral Sanjay Vatsayan has maintained high level of combat readiness and undertaken various operational missions including Operation Samudra Setu towards repatriation of Indian citizens, Mission SAGAR providing Humanitarian Assistance to friendly foreign countries and Malabar 20. His tenure also saw the commissioning of INS Kavaratti, the indigenously built P28 class ASW corvette. He would be taking over as the Deputy Commandant of the prestigious tri-services institution National Defence Academy at Khadakvasla, Pune shortly.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1700179>

ThePrint

Wed, 24 Feb 2021

‘Make in India’ gets big push with 64% of defence modernisation budget kept for Indian players

The 64% allocation under capital acquisition budget amounts to about Rs 70,000 crore and is to be used for purchases from domestic sector. Experts say it will help boost the sector at large

By Amrita Nayak Dutta

New Delhi: The Union Defence Ministry has decided to earmark around 64 per cent of its modernisation funds under the capital acquisition budget for 2021-22 — a sum of over Rs 70,000 crore — for purchases from the domestic sector.

This marks an increase from 2020-21, when a capital budget allocation for domestic vendors was first made. At 58 per cent, this came to an amount of Rs 52,000 crore.

The announcement for 2021-22 was made Monday by Union Defence Minister Rajnath Singh at a seminar on defence budget organised by the Society of Indian Defence Manufacturers (SIDM), an association representing domestic industry players. It is part of the Modi government's larger push to make India — currently the world's second biggest arms importer — self-reliant in the field of defence.

In his address, Singh also spoke about widening the ‘negative import list’, which lists items that India seeks to stop buying from other countries. In 2020, the government listed 101 items — including weapons systems and assault rifles — and specified an indicative date by which the import embargo will kick in for each of them.

Singh said discussions are underway on including certain spares in the list.

Announcing the increase in allocation for purchases from domestic defence vendors, Singh said “it will have a positive impact on enhanced domestic procurement, having a multiplier effect on our industries including MSMEs and start-ups ... and also increase employment in the defence sector”.

Experts in the field say the decision is a welcome step towards encouraging Atmanirbhar Bharat (self-reliant India) and ‘Make in India’ — the Modi government's mission to boost local manufacturing. However, they add, its success is something that will only be known with time.



Representational image | Indian Army tanks at the Republic Day parade | Suraj Singh Bisht | ThePrint File Photo

A Make-in-India push

Under the Atmanirbhar Bharat campaign, the defence sector has been identified as one of the core areas to boost 'Make in India'.

Big-ticket defence projects currently being pursued under Make in India include the Light Combat Aircraft Tejas (83 of which have been ordered), transport aircraft C-295 (to be manufactured by Tata-Airbus, deal with the government in final stages), and the AK-203 rifles (to be made in India as part of a joint venture between the Ordnance Factory Board, Kalashnikov Concern, and Rosoboronexport, the Russian state agency for military exports.).

In 2021-22, the Army has been allocated a capital outlay — for acquisitions, repair, etc — of Rs 36,000 crore, the Navy Rs 33,000 crore, and the IAF Rs 58,000 crore.

The 64 per cent allocation for domestic vendors in 2021-22 means the import legroom has shrunk to 36 per cent. According to government sources, the three defence services were asked to arrive at a ratio of planned procurements from the domestic and global sectors before finalising this figure.

Rajnath Singh Monday said that the defence ministry also plans to channelise about Rs 1,000 crore in 2021-22 for procurement from iDEX, a defence ministry initiative to encourage start-ups.

The government's push to promote indigenous defence equipment is evident in the Defence Acquisition Procedure 2020, which prioritises capital acquisitions from domestic players over foreign ones.

Earlier this month, the 15th finance commission advised the government to devise a road map to reduce India's dependence on defence imports while enhancing indigenous production at a faster rate.

On Monday, PM Modi said the government has taken several initiatives like de-licensing, de-regulation, export promotion, and foreign investment liberalisation, to give the defence manufacturing sector a boost.

India, he added, should look at achieving defence-related exports to the tune of Rs 35,000 crore to become a net exporter of defence equipment in the next five years.

How decision is likely to pan out

Talking to ThePrint, a senior services officer said the decision to increase fund allocation for domestic procurement is a good move to boost the Indian defence sector.

"However, the actual expenditure on domestic procurements from the capital budget set aside for the purpose would be clear only when the expenditure estimates come at the end of the financial year," the officer said. "That would determine the success of the move."

Another officer said the way forward would mean targeted earmarking of funds for the domestic sector. "Expenditure and utilisation will also depend on the absorption capacity of the domestic defence industry," the officer added. The move, the officer said, "will also enhance investment sentiments in the domestic defence industry".

Brigadier Ashis Bhattachayya (retd), a senior adviser at SIDM, said the benefits of a high capital allocation for the domestic defence sector are "colossal" because the entire "industrial base gets a chance to mature".

"This is most important for an Atmanirbhar Bharat ... to develop the ecosystem. We were behind schedule on that front," he said.

"Earlier, it was 70 per cent for foreign sellers, which went down to 65 per cent. It is indeed a big boost to the defence industry when you turn the figure around," he added. "That is because the entire ecosystem gets a chance to service this demand placed on platform makers," he said.

<https://theprint.in/defence/make-in-india-gets-big-push-with-64-of-defence-modernisation-budget-kept-for-indian-players/609818/>

Cochin Shipyard lowest bidder for Rs 10,000-crore contract to build missile vessels for Indian Navy

Incorporated in 1972, CSL can build ships up to 1,10,000 dead weight tonnage and repair ships up to 1,25,000 DWT

New Delhi: Cochin Shipyard on Tuesday said it has emerged as the lowest bidder for a Rs 10,000-crore contract by the Indian Navy, to build Next Generation Missile Vessels.

The state-owned company has emerged as a forerunner in the Indian shipbuilding and ship repair industry that can build and repair the largest vessels in India.

"At the meeting held today (February 23) at the Ministry of Defence, New Delhi, Cochin Shipyard Ltd (CSL) has been declared as L1 (the lowest bidder) in the tender floated by the Indian Navy for construction of six...Next Generation Missile Vessels (NGMV)," CSL said in a regulatory filing to the BSE.

The estimated order value is around Rs 10,000 crore, the company said.

It said the final announcement of the contract will be subject to the satisfactory completion of necessary formalities in this regard, which will be updated in due course.

Incorporated in 1972, CSL can build ships up to 1,10,000 dead weight tonnage (DWT) and repair ships up to 1,25,000 DWT.

The yard has delivered two of India's largest double hull Aframax tankers each of 95,000 DWT.

CSL has secured shipbuilding orders from internationally renowned companies from Europe and Middle East and is nominated to build the country's first indigenous air defence ship.

<https://www.newindianexpress.com/business/2021/feb/23/cochin-shipyard-lowest-bidder-for-rs-10000-crore-contract-to-build-missile-vessels-for-indian-navy-2267888.html>



Cochin Shipyard (Photo | EPS)

Army places emergency procurement order for Kalyani M4 armoured vehicles tested in Ladakh

The M4 armoured vehicles were ordered from Pune-based Bharat Forge and had undergone trials in Ladakh, along with its competitors, in August 2020

By Snehash Alex Philip

New Delhi: The Army has ordered an emergency procurement of M4 armoured vehicles, which were tested in Ladakh during the standoff with China, from the Pune-based defence company Bharat Forge of the Kalyani group.

In a statement released Tuesday, the company said it had “received an order worth Rs 177.95 crores from the Indian Ministry of Defence for supply of Kalyani M4 vehicles”.

According to sources in the defence and security establishment, the emergency procurement is for a small number but they are looking to further increase the number of armoured vehicles in the Army’s inventory.

The sources added that the Army is in need of wheeled armoured vehicles that can transport troops faster and capable of operating in high altitude regions.

They noted that the Kalyani M4 comes with certain extra features than the regular vehicles, but refused to elaborate further on the details.

The vehicle had undergone trials in Ladakh, along with its competitors, in August 2020.

The contract was announced a day after Prime Minister Narendra Modi stressed on the importance of private sector participation to develop India’s defence manufacturing base.

Features of Kalyani M4

The Kalyani M4, which will be built at the company’s Pune plant, is a multi-role platform, designed to meet the requirements of the armed forces for quick mobility in rough terrain and in areas affected by mine and IED threats.

It has ballistic and blast protection from up to 50 kg TNT side blast, or IED or roadside bombs due to its design that is built on a flat-floor monocoque hull. With a thrust speed of 140 km per hour, the vehicle has a payload of 2.3 tonnes and an operating range of about 800 km.

The M4 is an original product of the South African arms firm Paramount Group but has been fine-tuned for Indian conditions by Bharat Forge.

The two firms have also signed a deal to join their technologies, capabilities and expertise to manufacture armoured vehicles in India.

In a statement Monday, the Paramount Group said it wanted to position the M4 as the “future of protection” in all markets across the world.

<https://theprint.in/defence/army-places-emergency-procurement-order-for-kalyani-m4-armoured-vehicles-tested-in-ladakh/610278/>



An M4 armoured vehicle | www.paramountgroup.com

बढ़ेगी भारतीय सेना की ताकत: 'कल्याणी एम-4' बख्तरबंद गाड़ियों के आगे बम भी हो जाएगा बेअसर, जानें इसकी खूबियां

भारत-फोर्ज ने इस बख्तरबंद गाड़ी को दक्षिण अफ्रीका की पैरामाउंट कंपनी के साथ मिलकर तैयार की है, और ये सीबीआरएन यानि कैमिकल बायोलॉजिकल, रेडियोलॉजिकल और न्युक्लियर अटैक को सहन कर सकती है

By नीरज राजपूत

नई दिल्ली: एलएसी से डिसइंगेजमेंट के तुरंत बाद रक्षा मंत्रालय ने भारतीय सेना के लिए 820 बख्तरबंद गाड़ियों का आर्डर दिया है। आपको बता दें कि एलएसी पर टकराव के दौरान चीनी सैनिक इसी तरह की बख्तरबंद गाड़ियों से मूवमेंट करते हैं। इसके अलावा इमरजेंसी प्रोक्योरमेंट के तहत रक्षा मंत्रालय ने सेना के लिए स्वदेशी प्राइवेट कंपनी भारत-फोर्ज से भी इसी तरह की एम-4 आर्मर्ड गाड़ियों की खरीददारी के लिए हरी झंडी दे दी है। रक्षा मंत्रालय के मुताबिक, मंगलवार को रक्षा मंत्री राजनाथ सिंह के नेतृत्व वाली रक्षा खरीद परिषद (डिफेंस एक्युजेशन कॉउंसिल--डीएसी) की बैठक हुई जिसमें सीडीएस जनरल बिपिन रावत और तीनों सेनाओं के प्रमुख सहित रक्षा सचिव भी मौजूद थे। इस बैठक में 13,700 करोड़ रुपये के रक्षा सौदों की मंजूरी दी गई। इनमें थलसेना के लिए 820 बख्तरबंद गाड़ियों सहित 118 स्वदेशी अर्जुन मैन बैटल टैंक भी शामिल हैं।



इन 820 बख्तरबंद गाड़ियों की कुल कीमत करीब 5300 करोड़ है। लैंड-माइन्स से भी सैनिकों को बचाने वाली इन आर्मर्ड गाड़ियों का इस्तेमाल चीन सीमा सहित कश्मीर में एंटी-टेरेरिज्म ऑपरेशन्स में किया जाएगा। आपको बता दें कि पिछले साल जब पूर्वी लद्दाख से सटी एलएसी के फिंगर-एरिया में भारत के साथ जब चीन का टकराव हुआ था, तो चीनी सैनिक अपनी इन्हीं बख्तरबंद गाड़ियों में फ्रंटलाइन पर पहुंचे थे (5-6 मई 2020)। इन आर्मर्ड गाड़ियों को 'हम्वी' कहा जाता है।

गोलियां का कोई खास असर नहीं होता

इन गाड़ियों पर लैंडमाइन्स, बम और राइफल की गोलियां का कोई खास असर नहीं होता है। गाड़ियों के शीशे भी बुलैटप्रूफ होते हैं। भारतीय सैनिक अपनी जिप्सी से एलएसी और दूसरे बॉर्डर पर मूवमेंट करते हैं। रक्षा मंत्रालय के मुताबिक, ये सभी बख्तरबंद गाड़ियां आत्मनिर्भर प्लान के अंतर्गत आईडीडीएम कैटेगरी के तहत खरीदी जाएंगी यानि इंडिजेनस डिजाइन, डेवलपड एंड मैनुफैक्चर।

इसके अलावा डीएसी ने थलसेना के लिए 118 स्वदेशी अर्जुन मार्क-1ए टैंकों को खरीदने की मंजूरी दी। डीआरडीओ और ओएफबी यानि ऑर्डिनेंस फैक्ट्री बोर्ड ने इस स्वदेशी टैंक को तैयार किया है। हाल ही में प्रधानमंत्री नरेंद्र मोदी ने तमिलनाडु के अपने दौरे के दौरान अर्जुन टैंक को थलसेना प्रमुख जनरल एम एम

नरवणे को सौंपा था। ये मार्क-1ए टैंक पुराने अर्जुन टैंक से उन्नत और घातक हैं और इनमें पुराने अर्जुन टैंक से 71 अपग्रेड किए गए हैं।

आपको यहां पर ये भी बता दें कि सोमवार को प्रधानमंत्री मोदी ने रक्षा बजट पर आयोजित के वेबिनार में रक्षा-क्षेत्र में प्राईवेट पार्टनरशिप पर जोर दिया था। उसके अगले ही दिन रक्षा मंत्रालय ने थलसेना के लिए इमरजेंसी प्रोक्योरमेंट के तहत भारत-फोर्ज कंपनी से 'कल्याणी एम-4' आर्मर्ड व्हीकल्स खरीदने की मंजूरी दे दी है। इस सौदे की कुल कीमत 177.95 करोड़ है--कितने गाड़ियां मिलेंगी इस सौदे से उसे गुप्त रखा गया है।

कल्याणी एम-4 एक मल्टीरोल माइन प्रोटेक्टेड आर्मर पैर्सनल कैरियर व्हीकल है

इस सौदे के बाद भारत-फोर्ज कंपनी ने बयान जारी कर कहा कि कल्याणी एम-4 एक मल्टीरोल माइन प्रोटेक्टेड आर्मर पैर्सनल कैरियर व्हीकल है जिसमें 8-10 सैनिक सवार हो सकते हैं। ये गाड़ी करीब 50 किलो टीएनटी गोला-बारूद तक के हमले को झेल सकती है।

मंगलवार को रक्षा खरीद परिषद ने ये भी कहा कि हथियारों की कुछ कैटेगरी को छोड़कर कोशिश ये की जाएगी कि दो साल के भीतर सभी सौदों को पूरा कर लिया जाए अभी 5-6 साल लग जाते हैं।

इसके अलावा, मंगलवार को डीआरडीओ ने बॉर्डर पर माइन्स बिछाने वाली माइन लेयर-सेल्फ प्रोपेडलड व्हीकल के लिए गोदरेजज कंपनी को ट्रांसफर ऑफ टेक्नोलोजी (टीओटी) सौंपी है ताकि सेना के लिए इस तरह की खास गाड़ियां बनाए जो खुद ब खुद सीमावर्ती इलाकों में माइन्स बिछा सके। अभी सैनिक हाथ से माइन्स बिछाते हैं जो बेहद जोखिम भरा कार्य है।

<https://www.abplive.com/news/india/bharat-forge-to-supply-kalyani-m4-armoured-vehicles-for-indian-army-ann-1786744>



Press Information Bureau
Government of India

Ministry of Science & Technology

Tue, 23 Feb 2021 12:27PM

Scientist from IIT Kanpur develops washable adhesive and related products

Scientists have developed a sticky mat which takes away dust from a contacting surface, ensuring a clean, hygienic, healthy, and refreshing atmosphere at our home, offices, hospitals, and laboratories as also smooth functioning of many expensive equipments. The mat is a low-cost one and remains washable and usable over many cycles.

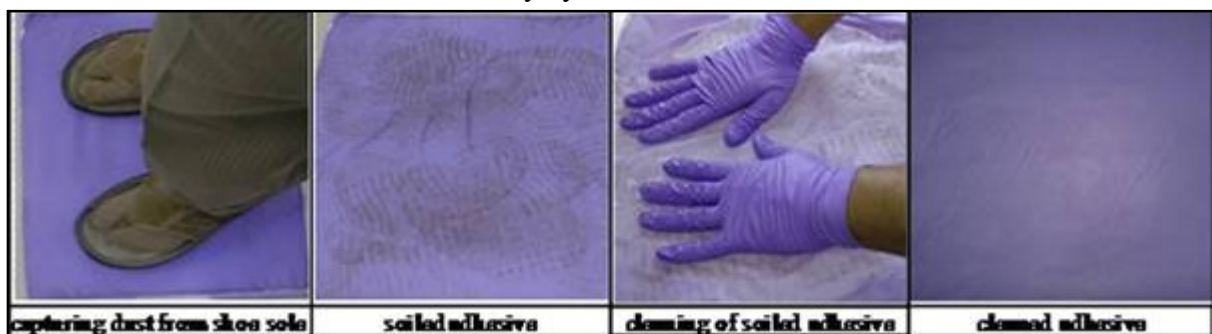


Figure 1. Example of washable adhesive

Prof Animangsu Ghatak from the Department of Chemical Engineering IIT Kanpur, who developed the mat with the support of Department of Science & Technology, Government of India under Make in India initiative, took inspiration from adhesive pad present at the feet of wall climbing animals, like house lizards.



Figure 2. Washable adhesive used for catching dust and even mosquitoes inside home.

The adhesive associated makes use of nanoscopic pyramidal bumps on its surface to attract dust particles towards it, thereby cleaning the sole of our shoes when we step on it. When the adhesive gets completely covered with particulate matter, it is washed in a way that we wash our clothes. At this, the surface gets back its ability to stick and remains usable through hundreds of such cycles.

The scientists have used a bottom-up approach of preparation of nano- to micro-patterned surface on elastomer over a large area, control of geometry of surface patterns by simple methods, washability, and reusability of the adhesive over many cycles for the development of this mat. It has been validated, and an Indian patent application has been filed for the sticky mat. It is simple to prepare, easy to wash, environmentally benign, cost-effective, and can be a replacement for materials imported for the same purpose. The closest substitute is the 3M sticky pad that is not washable or reusable.

This mat can be used in ICU of Hospitals, clean rooms, facilities housing sophisticated equipment as a component of air filters. The technology is important wherever cleanliness and

hygiene is desired. The product is in 7 – 8 level of technology readiness level and is yet to be commercialised. A pilot plant is being built to make the material in a scale larger.

[For more details, contact Animangsu Ghatak (9984365312, aghatak@iitk.ac.in)]

<https://pib.gov.in/PressReleasePage.aspx?PRID=1700124>



Wed, 24 Feb 2021

Ion-optics-based quantum microscope can image individual atoms

By Bob Yirka

A team of researchers at Universität Stuttgart has developed an ion-optics-based quantum microscope that is capable of creating images of individual atoms. In their paper published in the journal *Physical Review Letters*, the group explains how they built their microscope and how well it worked when tested.

Scientists have been pushing the boundaries of microscopy for many years—so much so that current quantum gas microscopes are now able to see objects as small as $0.5\mu\text{m}$ in size. That is small enough to look at groups of atoms. In this new effort, the researchers have pushed the boundary even further by creating a microscope that images individual atoms.

The microscope built by the team began with the use of an electrostatic lens, a device that can be used to transport charged particles such as electrons. The researchers put three of them together and added an ion detector that was able to single out single ions. Electrostatic lenses work in ways very similar to lenses used in standard handheld cameras or smartphones. But instead of focusing light using a curved surface, an electrostatic lens directs the paths of ions in an electric field. Electrostatic lenses also differ from traditional lenses in that they are adjustable—researchers need only change the voltage applied to the electric field.

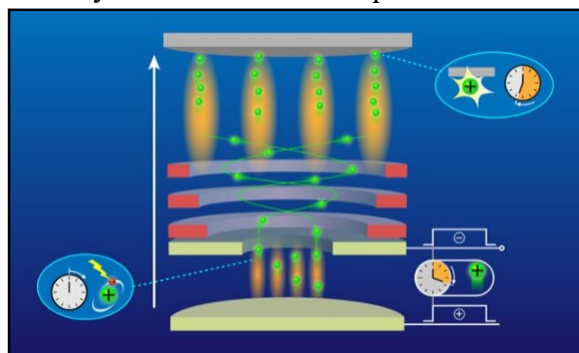
The researchers also added a means for confining material to be imaged—for testing, they added ultracold rubidium atoms and held them in a lattice in ways reminiscent of a quantum gas microscope. To create an image, the researchers fired laser pulses at the atoms, resulting in photoionization. This forced the ions to remain in place for approximately 30 nanoseconds. During their time in the lattice, the atoms interacted with each other, resulting in the buildup of many-body correlations. The ions were then released into the microscope, where images were made.

Testing of the microscope showed it capable of capturing features from $6.79\mu\text{m}$ to $0.52\mu\text{m}$ with 532 nm spacing between them—enough to allow for creating images of single individual atoms. It was also found to have a depth field of $70\mu\text{m}$ —big enough to create 3-D images.

More information: C. Veit et al. Pulsed Ion Microscope to Probe Quantum Gases, *Physical Review X* (2021). DOI: [10.1103/PhysRevX.11.011036](https://doi.org/10.1103/PhysRevX.11.011036)

Journal information: [Physical Review Letters](#) , [Physical Review X](#)

<https://phys.org/news/2021-02-ion-optics-based-quantum-microscope-image-individual.html>

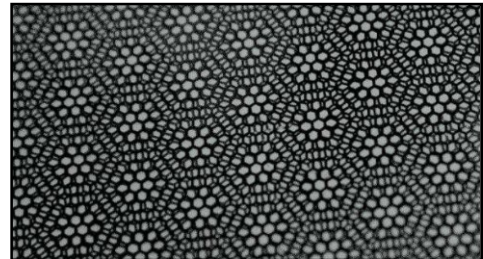


Researchers demonstrate an ion-optics-based microscope that can resolve individual charged atoms. The atoms are confined in a one-dimensional optical lattice (bottom of image) and then illuminated with a light pulse, which ionizes the atoms (green balls). After a short delay, the ionized atoms are transferred into the ion-optic system, where they are manipulated with electrostatic lenses (red rectangles) and imaged with an ion detector (top of image). The arrow indicates the direction of travel of the ions through the microscope. Credit: APS/Alan Stonebraker

The magic angle of twisted graphene

Graphene, a two-dimensional material composed exclusively of carbon, has revealed extraordinary properties, including thermal and electrical conductivity, transparency, and flexibility. When combined, these properties become particularly interesting in the age of touch screens and flexible electronics. "Unlike 3-D materials, graphene has a height reduced to the ultimate dimension of the atom. It's therefore a carbon atom plane," explains Prof. Jean-Christophe Charlier, a specialist in nanoscopic physics at the Institute of Condensed Matter and Nanosciences of UCLouvain.

In a study published in *Nature*, the scientist and his team dissected the behavior of electrons when two layers of graphene superimposed at an angle of 1.1 degrees (the so-called 'magic angle') produce a moiré effect. Well known to photographers, painters and fashion specialists, this optical effect consists of a figure composed of dark and light domains resulting from the superposition of two gratings. "When two layers of graphene are superimposed with this magic angle, they give rise to superconductivity. They therefore conduct electricity without any resistance," Prof. Charlier says.



Two layers of graphene superimposed at an angle of 1.1 degrees (the so-called 'magic angle') produce a moiré effect. Credit: JC

This property is more than useful for transporting electricity without loss of energy. "We've shown that the two graphene planes twisted in this way interact and lead to a restructuring of the atoms into domains where electrons are trapped and localized in space." However, by definition, electrons tend to move away from one other, repelled by their respective negative charges. "To limit their interactions, the electrons can organize themselves by aligning their spin, which gives them magnetic properties, or by forming an insulator, or by pairing up to produce superconductivity." It's the last that occurs in the case of bilayer graphene twisted at the magic angle. In addition, the scientists have shown that phonons, atom particles responsible for vibrations in solid materials, are also trapped in the domains formed by the twisted graphene.

The synthesis of new 2-D materials and the observation of the extraordinary properties which can be derived from them have led to a twistrionics craze driven by the idea of one day being able to create structures with the desired properties "brick by brick," or to extrapolate knowledge acquired on simple materials, such as [graphene](#), to more complex materials, allowing for better control or performance of superconducting systems in everyday life. Examples include the superconducting coils in Japanese magnetic levitation trains (Maglev), which levitate above the rails, or the superconducting magnet in magnetic resonance imaging (MRI) equipment.

More information: Andreij C. Gadelha et al, Localization of lattice dynamics in low-angle twisted bilayer graphene, *Nature* (2021). [DOI: 10.1038/s41586-021-03252-5](https://doi.org/10.1038/s41586-021-03252-5)

Journal information: [Nature](#)

<https://phys.org/news/2021-02-magic-angle-graphene.html>

New sensor paves way to low-cost sensitive methane measurements

Researchers have developed a new sensor that could allow practical and low-cost detection of low concentrations of methane gas. Measuring methane emissions and leaks is important to a variety of industries because the gas contributes to global warming and air pollution.

"Agricultural and waste industries emit significant amounts of methane," said Mark Zondlo, leader of the Princeton University research team that developed the sensor. "Detecting methane leaks is also critical to the oil and gas industry for both environmental and economic reasons because natural gas is mainly composed of methane."

In The Optical Society (OSA) journal *Optics Express*, researchers from Princeton University and the U.S. Naval Research Laboratory demonstrate their new gas sensor, which uses an interband cascade light emitting device (ICLED) to detect methane concentrations as low as 0.1 parts per million. ICLEDs are a new type of higher-power LED that emits light at mid-infrared (IR) wavelengths, which can be used to measure many chemicals.

"We hope that this research will eventually open the door to low-cost, accurate and sensitive methane measurements," said Nathan Li, first author of the paper. "These sensors could be used to better understand methane emissions from livestock and dairy farms and to enable more accurate and pervasive monitoring of the climate crisis."

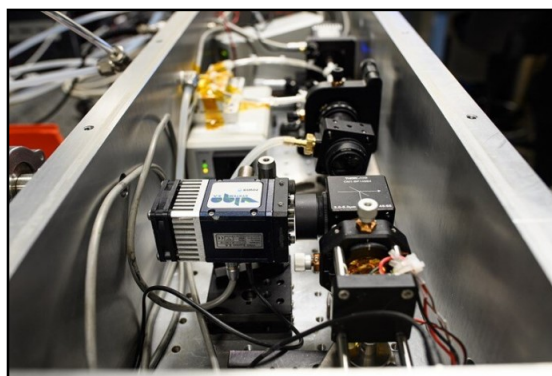
Building a less expensive sensor

Laser-based sensors are currently the gold standard for methane detection, but they cost between USD 10,000 and 100,000 each. A sensor network that detects leaks across a landfill, petrochemical facility, wastewater treatment plant or farm would be prohibitively expensive to implement using laser-based sensors.

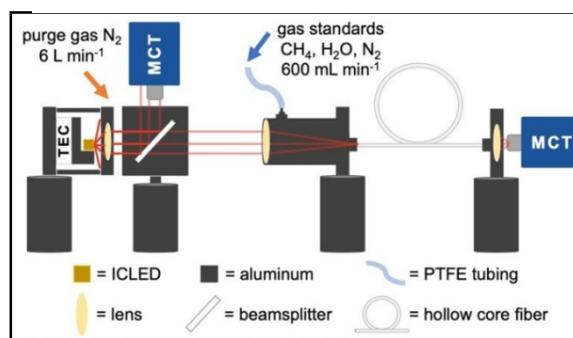
Although methane sensing has been demonstrated with mid-IR LEDs, performance has been limited by the low light intensities generated by available devices. To substantially improve the sensitivity and develop a practical system for monitoring methane, the researchers used a new ICLED developed by Jerry Meyer's team at the U.S. Naval Research Laboratory.

"The ICLEDs we developed emit roughly ten times more power than commercially available mid-IR LEDs had generated, and could potentially be mass-produced," said Meyer. "This could enable ICLED-based sensors that cost less than USD 100 per sensor."

To measure methane, the new sensor measures infrared light transmitted through clean air with no methane and compares that with transmission through air that contains methane. To boost sensitivity, the researchers sent the infrared light from the high-power ICLED through a 1-meter-



Researchers have developed a new sensor that uses an interband cascade light emitting device (ICLED) and could allow practical and low-cost detection of low concentrations of methane. Credit: Sameer Khan



To boost sensitivity, infrared light from the high-power ICLED travels through a 1-meter-long, hollow-core fiber containing an air sample. The inside of the fiber is coated with silver, which causes the light to reflect off its surfaces as it travels down the fiber to the photodetector (MCT for HgCdTe detector) at the other end. This allows the light to interact with additional molecules of methane in the air resulting in higher absorption of the light. Credit: Nathan Li, Princeton University

long hollow-core fiber containing an air sample. The inside of the fiber is coated with silver, which causes the light to reflect off its surfaces as it travels down the fiber to the photodetector at the other end. This allows the light to interact with additional molecules of methane in the air resulting in higher absorption of the light.

"Mirrors are commonly used to bounce light back and forth multiple times to increase sensor sensitivity but can be bulky and require precise alignment," said Li. "Hollow core fibers are compact, require low volumes of sample gas and are mechanically flexible."

Measuring up to laser-based sensors

To test the new sensor, the researchers flowed known concentrations of methane into the hollow core fiber and compared the infrared transmission of the samples with state-of-the-art laser-based sensors. The ICLED sensor was able to detect concentrations as low as 0.1 parts per million while showing excellent agreement with both calibrated standards and the laser-based sensor.

"This level of precision is sufficient to monitor emissions near sources of methane pollution," said Li. "An array of these sensors could be installed to measure methane emissions at large facilities, allowing operators to affordably and quickly detect leaks and mitigate them."

The researchers plan to improve the design of the sensor to make it practical for long-term field measurements by investigating ways to increase the mechanical stability of the hollow-core fiber. They will also study how extreme weather conditions and changes in ambient humidity and temperature might affect the system. Because most greenhouse gases, and many other chemicals, can be identified by using mid-IR light, the methane sensor could also be adapted to detect other important gases.

More information: Nathan Li et al. Methane detection using an interband-cascade LED coupled to a hollow-core fiber, *Optics Express* (2021). [DOI: 10.1364/OE.415724](https://doi.org/10.1364/OE.415724)

Journal information: [Optics Express](https://www.opticsjournal.net/Articles/OJ.2021.02.001)
<https://phys.org/news/2021-02-sensor-paves-low-cost-sensitive-methane.html>

Rheumatoid arthritis drug shows promise in fighting Covid-19

A new study shows an anti-inflammatory drug can help treat certain severe symptoms of Covid-19, and adds a tool for helping the sickest patients

By Joseph Walker

An anti-inflammatory drug can help reduce the risk of death in people hospitalized with Covid-19, a new clinical trial indicates, reviving hopes—and debate—about a medicine that many physicians had abandoned after earlier clinical-trial failures.

A UK study of more than 4,000 hospitalized patients showed that people who received the rheumatoid arthritis drug tocilizumab plus steroids had a 20% lower risk of death after 28 days compared with patients who received steroids and standard care only, according to preliminary results posted online this month.

The results haven't been published yet in a peer-reviewed scientific journal, but US scientists are paying attention to them because of the reputation of the University of Oxford researchers who conducted the study. In June, the same Oxford researchers were the first to prove that the cheap and widely available steroid dexamethasone significantly reduced Covid-19 deaths, a finding that led to the drug becoming a standard treatment for most hospitalized patients.

Researchers say Oxford's study may have succeeded where others failed because it included a much larger number of patients, whose average age was about 63, and included only patients with high inflammation measured in lab tests and low blood-oxygen. The data could lead to the drugs becoming more widely used, especially if they are included as suggested or recommended treatments in guidelines crafted by influential organizations such as the US National Institutes of Health.

On Monday, the Infectious Diseases Society of America updated its guidelines to suggest the use of tocilizumab in addition to steroids in severe or critically ill patients

"There have been a lot of studies before this one that suggested a possible benefit and others that seemed not quite as compelling," said Francis Collins, director of the National Institutes of Health. "I think what we were waiting for was a really large scale, well-designed study—and I think we may now have that."

Some doctors say the results show tocilizumab provides only a modest improvement over steroids alone, and that the potential side effects, such as fungal infections, are uncertain. Among patients who received steroids alone, the death rate was 33%, compared with 27% of those who also received tocilizumab.

Still, the drug could provide another option for patients who may not get better on standard therapies, doctors say.



Tocilizumab is sold under the brand name Actemra by Genentech, a unit of Roche Holding AG (REUTERS)

Tocilizumab is sold under the brand name Actemra by Genentech, a unit of Roche Holding AG, for the treatment of rheumatoid arthritis, as well as a severe inflammatory condition, sometimes called “cytokine storm,” that can result as a side effect of certain cancer treatments.

Doctors say some of the sickest Covid-19 patients suffer from an immune reaction similar to cytokine storm that can damage the lungs and lead to respiratory failure. In the spring, doctors in the US and Europe began using tocilizumab in certain hospitalized Covid-19 patients after a report by Chinese doctors indicating that the drug had helped drive dramatic turnarounds in patients infected by the virus.

In early May, nearly 16% of hospitalized patients were being treated with tocilizumab, according to an analysis of hospital admissions by electronic health records provider Epic Systems Corp. and its health research network, done at the request of The Wall Street Journal.

But when formal clinical trials were done, the results were disappointing and failed to show a definitive reduction in deaths. Use of the drug plummeted, with just 1% of Covid-19 hospital admissions receiving tocilizumab in the final week of 2020, according to the Epic data.

“After the first five or six trials [failed to reduce deaths], hardly anyone used any toci,” said Adarsh Bhimraj, an infectious disease specialist at Cleveland Clinic. “And nobody ever thought it was going to make a comeback.”

That changed after results from the new UK study, known as the Recovery trial, were posted early this month in a “preprint” article, an early version of a scientific paper before it has gone through peer review to be published in a journal. Researchers have made increasing use of preprint databases to disseminate information quickly to clinicians.

Dr. Bhimraj said the effectiveness of tocilizumab doesn’t appear overwhelming, but that it adds another tool for treating the sickest patients, particularly those who don’t appear to be getting better with dexamethasone alone.

“We don’t have anything for those patients and this is at least one thing that is available which might have a modest benefit,” Dr. Bhimraj said.

One factor that may limit use of tocilizumab is its cost, particularly for low-income countries. Dexamethasone is a cheap generic drug that most doctors are familiar with. The list price of tocilizumab is \$2,300 per dose, according to Genentech.

“Tocilizumab is currently at a price that is unaffordable for most people throughout the world and that needs to change,” said Peter Horby, joint chief investigator for the Recovery trial and professor of emerging infectious diseases at Oxford’s Nuffield Department of Medicine.

(This story has been published from a wire agency feed without modifications to the text.)

<https://www.livemint.com/science/news/rheumatoid-arthritis-drug-shows-promise-in-fighting-covid19-11614076753248.html>

