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समाचार पत्रों से चयित अंश Newspapers Clippings

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DRDO Technology News

**Press Information Bureau
Government of India**

Ministry of Defence

Tue, 17 Nov 2020 6:15PM

Second Successful Flight Test of QRSAM System

In yet another flight test, the Quick Reaction Surface to Air Missile (QRSAM) System tracked the target accurately and successfully neutralised the airborne target. The flight test, second in the series was conducted today at around 1542 hrs from the Integrated Test Range, Chandipur, off the coast of Odisha. The test was carried out once again, against the high performance Jet Unmanned Aerial Target called Banshee, which simulates an aircraft.

The Radars acquired the target from a long range and tracked it till the mission computer automatically launched the missile. Continuous guidance was provided through Radar data link. Missile entered the terminal active homing guidance and reached the target close enough for proximity operation of warhead activation.

The flight test was conducted in the deployment configuration of the weapon system comprising of Launcher, fully Automated Command and Control System, Surveillance System and Multi Function Radars. The QRSAM weapon system, which can operate on the move, consists of all indigenously developed subsystems. All objectives of the test were fully met. The launch was carried out in the presence of the users from Indian Army.

A number of range instruments like Radar, Telemetry and Electro Optical Sensors were deployed which captured the complete flight data and verified the performance of the missile.

Teams from ARDE and R&DE(E) from Pune, LRDE Bengaluru, and IRDE Dehradun in addition to the Missile Complex Laboratories from Hyderabad and Balasore participated in the test.

The first in the series test of QRSAM took place on 13th Nov 2020 achieving the milestone of a direct hit. Second test proved the performance parameters of warhead.

Raksha Mantri Shri Rajnath Singh congratulated DRDO scientists on the successful flight test of QRSAM. Secretary DDR&D & Chairman DRDO Dr G Satheesh Reddy congratulated all the teams who worked on the QRSAM project, on the second continuous successful flight test.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1673489>





Tue, 17 Nov 2020 6:15PM

రెండోసారి విజయవంతంగా క్యూఆర్ఎస్ఎఎమ్ వ్యవస్థ విమాన పరీక్ష

'క్విక్ రియాక్షన్ సర్వీస్ టు ఎయిర్ మిస్సైల్' (క్యూఆర్ఎస్ఎఎమ్) వ్యవస్థ నిర్దేశిత లక్ష్యాన్ని కచ్చితంగా ట్రాక్ చేసి, వాయుమార్గాలో లక్ష్యాన్ని విజయవంతంగా ఛేదించింది. ఈ సిరీస్లో రెండోదైన విమాన పరీక్షను ఈ రోజు ఒడిశా తీరంలో ఛాందీపూర్లోని ఇంటిగ్రేటెడ్ టెస్ట్ రేంజ్ నుండి 1542 గంటలకు నిర్వహించారు. బాస్ట్ అని పిలువబడే అత్యుత్తమమైన పనితీరు గల మానవరహిత జెట్ వైమానాన్ని లక్ష్యంగా చేసుకొని మరోసారి ఈ పరీక్ష నిర్వహించడం జరిగింది.

రాడార్లు లక్ష్యాన్ని సుదూర శ్రేణి నుండి పొంది మిషన్ కంప్యూటర్ స్వయంచాలకంగా క్షిపణిని ప్రయోగించే వరకు మొత్తం పని తీరును ట్రాక్ చేసింది. ఈ పరీక్షలకు రాడార్ డేటా లింక్ ద్వారా నిరంతర మార్గదర్శకత్వం అందించబడింది. క్షిపణి టెర్మినల్ యాక్టివ్ హోమింగ్ మార్గదర్శకత్వంలో ప్రవేశించి వార్హెడ్ యాక్టివేషన్ యొక్క సామీప్య ఆపరేషన్ కోసం లక్ష్యాన్ని చేరుకుంది. లాంచర్ పూర్తిగా ఆటోమేటెడ్ కమాండ్ అండ్ కంట్రోల్ సిస్టమ్, నిఘా వ్యవస్థ మరియు మల్టీ ఫంక్షన్ రాడార్లతో కూడిన ఆయుధ వ్యవస్థ యొక్క విస్తరణ ఆకృతీకరణలో ఈ విమాన పరీక్ష జరిగింది.

క్యూఆర్ఎస్ఎఎమ్ ఆయుధ వ్యవస్థ చలన స్థితిలోనూ పనిచేయగలదు. ఇది దేశీయంగా అభివృద్ధి చెందిన ఉపవ్యవస్థలను కలిగి ఉంటుంది. ఈ పరీక్షతో వ్యవస్థ యొక్క అన్ని లక్ష్యాలు పూర్తిగా నెరవేరినట్టయింది. ఈ వ్యవస్థను వినియోగిస్తున్న భారత సైన్యం సమక్షంలో ఈ క్షిపణి ప్రయోగం జరిగింది. ఈ పరీక్షకు రాడార్, టెలిమెట్రీ మరియు ఎలక్ట్రో ఆప్టికల్ సెన్సార్ల వంటి అనేక శ్రేణి పరికరాలను మోహరించారు. ఇవి పూర్తి విమాన డేటాను సంగ్రహించి మిస్సైల్ పనితీరును ధ్రువీకరించాయి. హైదరాబాద్, బాలసోర్కు చెందిన క్షిపణి కాంప్లెక్స్ లాబోరేటరీలతో పాటుగా పూణెకు చెందిన ఏఆర్డీఈ మరియు ఆర్ అండ్ డీఈ(ఈ), బెంగళూరు మహానగరానికి చెందిన ఎల్ఆర్డీఈ, డెహ్రాడూన్కు చెందిన ఐఆర్డీఈలకు చెందిన పలు జట్లు ఈ మిస్సైల్ పరీక్షలో పాల్గొన్నాయి.



క్యూఆర్ఎస్ఎఎమ్ సిరీస్ పరీక్షలో మొదటిది ఈనెల 13న ప్రత్యక్ష తాకిడి యొక్క మైలురాయిని సాధించింది. రెండో పరీక్ష వార్హెడ్ యొక్క పనితీరు పారామితులను సంగ్రహంగా నిరూపించింది. క్యూఆర్ఎస్ఎఎమ్ పరీక్ష రెండోసారి విజయవంతంగా నిర్వహించినందుకు రక్షణ మంత్రి శ్రీ రాజనాథ్ సింగ్ డీఆర్డీఓ శాస్త్రవేత్తలను అభినందించారు. ఈ పరీక్ష విజయవంతం అయిన సందర్భంగా క్యూఆర్ఎస్ఎఎమ్ ప్రాజెక్టులో పనిచేసిన అన్ని జట్లను డీడీఆర్ అండ్ డీ కార్యదర్శి, చైర్మన్ డాక్టర్ జీ సతీష్ రెడ్డి అభినందించారు.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1673558>

India successfully test-fires quick reaction surface-to-air missile with live warhead

Developed by DRDO, the missile was test-fired using a live warhead for the first time against the high performance unmanned aerial target Banshee that mimicked an enemy aircraft

By Hemant KumarRout

Bhubaneswar: India on Tuesday conducted a crucial developmental trial of indigenously built Quick Reaction Surface to Air Missile (QRSAM) with a live warhead from a defence facility off Odisha coast fast-tracking the induction of the weapon system in the armed forces.

Developed by DRDO, the missile was test-fired using a live warhead for the first time against the high performance unmanned aerial target Banshee that mimicked an enemy aircraft. The weapon destroyed the expendable target with precision.

A defence official said the radars located the target from a long range and tracked it till the mission computer automatically launched the missile. Continuous guidance was provided through radar data link. The missile entered the terminal active homing guidance and reached the target close enough for proximity operation of warhead activation, he said.

This was the second trial of the missile from the Integrated Test Range (ITR) in the last five days. On November 13, the missile travelling at a high speed had hit pilotless target aircraft Banshee mid air at medium range and medium altitude. The launch was carried out in the presence of Indian Army officials.



Second phase of flight test of Quick Reaction Surface to Air Missile (QRSAM) from the Integrated Test Range in Chandipur. (Photo | PTI)

Defence Minister Rajnath Singh congratulated DRDO for two back to back successful trials of QRSAM. “First test proved the radar and missile capabilities with direct hit. The missile demonstrated the warhead performance on proximity detection during the second test,” he said.

The missile was fired with full configuration in deployment mode. The entire event was monitored by ground telemetry systems, range radar systems and electro-optical tracking system, which verified the performance of the missile.

The QRSAM weapon system, which operates on the move, comprises of fully automated command and control system, active array battery surveillance radar, active array battery multifunction radar and launcher.

Both radars are four-walled having 360-degree coverage with search on move and track on move capability. The single stage solid propelled missile has midcourse inertial navigation system with two-way data link and terminal active seeker.

With a strike range of 30 km, the weapon system was fired from a canister mounted on a rotatable truck-based launch platform parked at the ITR launching complex at about 3.42 pm. Considered to be a unique system in its class, the missile is expected to supplement medium range surface-to-air missile Akash.

DRDO Chairman Dr G Satheesh Reddy congratulated all the stakeholders who worked on the QRSAM project for the second successful flight test. The weapon system is expected to be inducted early next year.

<https://www.newindianexpress.com/nation/2020/nov/17/india-successfully-test-fires-quick-reaction-surface-to-air-missile-with-live-warhead-2224576.html>

DRDO surface-to-air missile shoots down aerial target in latest test

This was the second test of the QRSAM system in five days. The QRSAM test on November 13 achieved a direct hit while the second one on Tuesday proved the performance parameters of the warhead

New Delhi: The Defence Research and Development Organisation's (DRDO) quick-reaction surface-to-air missile (QRSAM) system on Tuesday shot down an aerial target from the Integrated Test Range at Chandipur off the Odisha coast, the defence ministry said in a statement.

This was the second test of the QRSAM system in five days. The QRSAM test on November 13 achieved a direct hit while the second one on Tuesday proved the performance parameters of the warhead, the statement said. Both tests were carried out against the Banshee target drone that simulates an aircraft.

Congratulating the DRDO for the back-to-back successful tests, defence minister Rajnath Singh tweeted, "First launch test on 13th Nov proved the Radar and Missile capabilities with direct hit. Today's test demonstrated the warhead performance on proximity detection."

The DRDO has carried out a series of weapons tests during the last three months at a time when India and China are locked in a border row in the Ladakh sector.

"The radars acquired the target from long range and tracked it till the mission computer automatically launched the missile. Continuous guidance was provided through radar data link. Missile entered the terminal active homing guidance and reached the target close enough for proximity operation of warhead activation," the statement said.

A variety of equipment was deployed to capture the flight data and verify the performance of the missile, officials said. The equipment included radars and telemetry and electro-optical sensors.

The test was conducted in the deployment configuration of the weapon system consisting of the launcher, fully automated command and control system, surveillance system and multi-function radars. "The QRSAM weapon system, which can operate on the move, consists of all indigenously-developed subsystems. All objectives of the test were fully met. The launch was carried out in the presence of the users from Indian Army," the defence ministry said.

The key tests recently conducted by India include the supersonic missile-assisted release of torpedo (SMART) to target submarines at long ranges, a new version of the nuclear-capable hypersonic Shaurya missile with a range of 750 km and the anti-radiation missile launch to take down enemy radars and surveillance systems.

India is also developing a new class of ultra-modern weapons that can travel six times faster than the speed of sound (Mach 6) and penetrate any missile defence. In early September, the DRDO carried out a successful flight test of the hypersonic technology demonstrator vehicle (HSTDV) for the first time from a launch facility off the Odisha coast.

Only the United States, Russia and China have developed technologies to field fast-maneuvering hypersonic missiles that fly at lower altitudes and are extremely hard to track and intercept.

<https://www.hindustantimes.com/india-news/drdo-surface-to-air-missile-shoots-down-aerial-target-in-latest-test/story-XjnHy1ISCLkMO7hZ724eHL.html>



The Quick Reaction Surface to Air Missile (QRSAM) system developed by Defence Research and Development Organisation (DRDO) during a test at the Integrated Test Range at Chandipur off the Odisha coast. (PTI FILE PHOTO)

Rajnath Singh congratulates DRDO for 2 successful test trials of Quick Reaction Surface to Air Missile

India has successfully testfired the Quick Reaction Surface to Air Missile air defence system. The Missile system secured a direct hit on its target during the trial

Edited By Susmita Pakrasi

New Delhi: Defence minister Rajnath Singh on Tuesday congratulated the Defence Research and Development Organisation (DRDO) for two successful test trials of Quick Reaction Surface to Air Missile.

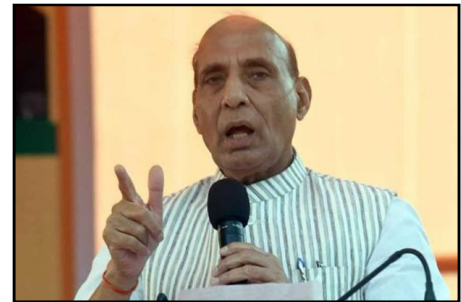
“Congratulations to @DRDO_India for two back to back successful test trials of Quick Reaction Surface to Air Missile. First launch test on 13th Nov proved the Radar and Missile capabilities with direct hit. Today’s test demonstrated the warhead performance on proximity detection,” Singh tweeted.

India has successfully testfired the Quick Reaction Surface to Air Missile air defence system. The missile system secured a direct hit on its target during the trial.

Earlier on November 13, Quick Reaction Surface to Air Missile (QRSAM) System achieved a major milestone by a direct hit on to a Banshee Pilotless target aircraft at medium range and medium altitude.

The missile has been developed as part of air defence system of the Indian Army.

<https://www.hindustantimes.com/india-news/rajnath-singh-congratulates-drdo-for-2-successful-test-trials-of-quick-reaction-surface-to-air-missile/story-R41yt6nb28nfzRU81Q6KP.html>



The missile has been developed as part of air defence system of the Indian Army.(ANI)

तुरंत जवाबी कार्रवाई करने वाली मिसाइल का चार दिन में दूसरी बार सफल परीक्षण, लक्ष्य पर लगाया सटीक निशाना

नई दिल्ली: भारत ने चार दिन के भीतर दूसरी बार मंगलवार को त्वरित प्रतिक्रिया वाली सतह से हवा में मार करने वाली मिसाइल (क्यूआरएसएएम) प्रणाली का सफल परीक्षण किया जिसने हवाई लक्ष्य पर सटीक निशाना साधकर इसे नष्ट कर दिया। रक्षा सूत्रों ने बताया कि परीक्षण ओडिशा के चांदीपुर स्थित एकीकृत परीक्षण केंद्र (आईटीआर) से अपराह्न लगभग 3.42 बजे किया गया।

उन्होंने कहा कि परीक्षण में मानवरहित हवाई लक्ष्य पर निशाना साधा गया। आईटीआर के एक बयान में कहा गया कि रडारों ने लक्ष्य का काफी दूर से पता लगा लिया और मिशन कंप्यूटर द्वारा स्वचालित ढंग से मिसाइल दागे जाने तक इसपर नजर रखी। रडार डेटा लिंक के माध्यम से निरंतर निर्देशन उपलब्ध कराया गया।



बयान में कहा गया कि क्यूआरएसएएम प्रणाली में स्वदेश में विकसित उपप्रणालियों का इस्तेमाल हुआ है। परीक्षण के सभी मानक पूरी तरह प्राप्त कर लिए गए और यह सैन्य अधिकारियों की मौजूदगी में किया गया। पहली क्यूआरएसएएम प्रणाली का परीक्षण 13 नवंबर को किया गया था।

रक्षा मंत्री राजनाथ सिंह ने क्यूआरएसएएम के सफल परीक्षण पर रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) के वैज्ञानिकों को बधाई दी। डीआरडीओ के अध्यक्ष जी सतीश रेड्डी ने दूसरे सफल परीक्षण के लिए क्यूआरएसएएम परियोजना पर काम करने वाली पूरी टीम को बधाई दी।

<https://www.livehindustan.com/national/story-drdo-surface-to-air-quick-reaction-missile-shoots-down-aerial-target-in-latest-test-3633221.html>

Why are India's own 'Hunter Killer' main battle tanks missing from action in Ladakh?

By Younis Dar

Indian PM Narendra Modi's jaunty swagger as he rode atop an indigenously built Arjun tank on the occasion of Diwali made global headlines. Donning a military uniform, his seemingly stern gesture had the overtones of his hawkish ambitions towards the country's growing list of adversaries, according to his critics.

He was on a trip to the Longewala Post in the Jaisalmer sector of Rajasthan to celebrate Diwali with the soldiers. Longewala is a town situated near India's border with Pakistan in the western state of Rajasthan.

Many of the nation's indigenously-built Arjun tanks are in service in the Jaisalmer desert, which is a battle-prone region, with its close proximity to neighboring Pakistan.

The Arjun Mark 1-A 'Hunter Killer' tank, built indigenously by the country's Defence Research and Development Organisation (DRDO) is a 68-tonne monster and features a 120mm main gun.

Modi's ride aboard the made-in-India tank was construed as his commitment to promote indigenous military equipment or his campaign call for 'vocal for local' push. DRDO seemed euphoric over this gesture and hoped the army would place a long-pending order for the 118 Arjun Mark 1-A tanks.

Currently, the Indian Army's Armoured Regiments are equipped with T-72, T-90 and Arjun tanks, with the mechanized infantry battalions equipped with the BMP-2, which is a second-generation, amphibious infantry fighting vehicle.

When India's conflict with China on the Ladakh border intensified, with heavy military build-up on both sides of the border, the Indian Air Force, using its heavy-lift aircraft, airlifted dozens of additional tanks and armored personnel carriers to the Himalayan heights to beef up its firepower.

The Indian infantry forces faced the war-ready Chinese troop formations with anti-tank guided missiles, rockets and other weapons. India deployed its own missile-armed T-90 tanks in addition to upgraded T-72M1 tanks in high-altitude areas in the region.

However, India's own Killer Hunter tank, Arjun Mk-2, the upgraded version of the original Arjun tank, was missing from action. Arjun, which has been in development for over three decades has failed to impress the army due to a number of reasons.

Despite a series of upgrades since 2010, the tank remains unviable for battle operations due to its extremely bulky structure.

According to the army, Arjun is too heavy to be deployed across the border with Pakistan. The tank has been unable to traverse difficult terrain in various war theatres and areas where it needs to cross rivers and canals.

It has, therefore, been difficult for the army to deploy it in war-prone regions such as Rajasthan, Punjab and the mountainous terrain of the J&K sector.

Consequently, it will be even more difficult to deploy Arjun in Ladakh where every military equipment needs to be airlifted at extremely high altitudes. The tank is unviable to be part of the Indian Army's strike corps formations since there is a high chance it will lag behind in unfamiliar terrain.



PM Modi on Arjun Tank – Wikipedia

Its presence can hugely impact armored formations, designed for mobile offensive operations, engaged in a battle deep inside enemy territory.

The main challenge comes from the inability of the IAF aircraft such as the IL-76 and C-130 J to airlift such bulky tanks to high altitudes, while on the other hand, they can easily lift the T-series of tanks, which are comparatively lighter.

Even India's recently inducted C-17 Globemasters have a maximum payload capacity of only 75 tonnes, and it will be difficult for the aircraft to airlift the 67 tonnes Arjun Mk-2 with attendant support equipment.

Nonetheless, the Arjun MBT has significantly outperformed the Russian T-90s employed by the Indian Army during previous trials conducted in 2010. However, the tank's excess weight, problems with certain parts, and availability of spare parts have severely impacted its performance in trials.

After the feedback from the Army, the tank had undergone almost 80 improvements, which included 15 major ones, but that exercise increased the weight of the bulky machine further, complicating its race to win the army's confidence even further.

The latest version, Mark 1-A, has improved features, including potent firepower, besides other developments including new transmission systems. The other improvements include the deployment of a gunner's main sight, integrated with automatic target tracking. The feature will help the tank crew to track mobile targets automatically, and engage them even when the tank is on the move.

After a plethora of upgrades, DRDO is finally hopeful the tank's latest version will impress the army. Even the Arjun's 120 mm gun has been upgraded with a computerized integrated fire control system, which ensures that the Mark-1A has a high first-round-kill capability.

Besides, the inclusion of day-and-night stabilized sights with its automatic target tracker enhances the combat edge of the tank.

The renowned Indian strategic affairs analyst Ajai Shukla writes in his blog, "Army insiders say there is an ingrained belief that Russian tanks are better than Indian ones. However, it was officially stated that the 62.5-tonne Arjun was too heavy for roads and bridges along the Pakistan border, and too wide to be transported by train."

He further observes that the army had been under pressure from the defense ministry to place the order of 118 tanks from DRDO. The Indian Army's dilly-dallying also pushed the timeline of Arjun's induction, and only in December 2018 did it recommend inducting the tank into service.

Interestingly, it has been almost two years since, and the army is yet to place an indent for the 118 Arjun Mark 1A. The army again raised many issues which included the issues with ammunition availability, non-availability of spares and low indigenous content – to successfully avoid placing an order, Shukla writes.

However, with the defense ministry pushing for more indigenization, there is a chance that Arjun MBTs will get lucrative offers from the Indian Army. DRDO is keeping its hopes high on Narendra Modi's commitment to 'vocal for local', and it is yet to be seen if the Army goes ahead with ordering the MBT Arjun.

<https://eurasianimes.com/why-are-indias-own-hunter-killer-main-battle-tanks-missing-from-action-in-ladakh/>

India's enhanced strategic nuclear triad: Implications for South Asian strategic stability – OpEd

By Haris Bilal Malik

Since the last few years, India has embarked on an extensive augmentation of its strategic nuclear capabilities. This is primarily inspired by its long-held desire to dominate the escalation ladder of the South Asian region and extend its strategic outreach.

The massive buildup of strategic nuclear capabilities is also part of India's grand strategy that is intended towards achieving the status of global power. In pursuit of this, it has carried out an overwhelming enhancement of its nuclear capabilities aimed at completing a strategic nuclear triad. Furthermore, India has been maintaining an offensive nuclear force posture along with the provision of advanced delivery systems and platforms that are capable of firing nuclear missiles. In this regard, a very robust three-pronged nuclear force structure which includes land-based, air-launched, and submarine-launched nuclear missiles form the very basis of the Indian nuclear triad.



Indian army's BrahMos Mobile Autonomous Launchers, February 7, 2014 (Courtesy Anirvan Shukla)

Specifically, this has become more significant given the Indian induction of sophisticated platforms to strengthen its existing nuclear triad. This is further aimed at both initiating the first strike option and ensuring a second-strike capability. India's attempt to dominate the regional deterrence equilibrium by enhancing its nuclear triad would adversely affect the strategic stability of the South Asian region.

In simplistic terms, the nuclear triad is the ability to launch a nuclear offensive from various platforms and delivery systems at air, land, and undersea. This is aimed at ensuring a three-prong offensive nuclear force posture. Air platforms are a major source of delivering nuclear warheads. In this regard, initially, India had relied on its Jaguar and Mirage 2000 jets with the provision to deliver the air-launched nuclear missiles.

Later on, the Russian Sukhoi Su-30 jets were acquired by India which is also capable of delivering nuclear missiles. India has also reportedly modified 40 of these jets to carry the BrahMos supersonic cruise missiles, one of the fastest supersonic missiles currently available in the world. This has significantly enhanced India's air-based nuclear capability. Since then, these jets have been projected as the backbone of the air component of the Indian nuclear triad.

Most recently, India has received the first five of its total 36 Rafale jets from France. It is widely believed that the Indian Rafales would likely be modified to play the nuclear role. Since, along with its other advanced strikes capabilities, Rafale is well known to be capable of delivering a nuclear payload. Especially against the backdrop of the humiliation which India has faced in recent crises, the addition of Rafale in the Indian Air Force (IAF's) inventory would further complement the air-based component of the Indian nuclear triad.

In the same vein, India's land-based component of the nuclear triad consists of offensive missile systems capable of delivering nuclear warheads at various ranges. In this regard, most notably, the Agni and Prithvi missiles are India's fully operational land-based nuclear-capable ballistic missiles. Especially the Agni missiles are believed to be the backbone of the Indian land-based nuclear capability. The Agni-V and Agni-VI variants of this series are reportedly Inter-Continental Ballistic Missile (ICBMs). The Agni-V of 5000 km range is in service, whereas the Agni-VI of 10000 km range is under development. This shows Indian eagerness to complete an ICBM ranged land-based component of its nuclear triad.

In addition to these, there has been much hype regarding the land launched version of the BrahMos supersonic cruise missile which India has developed in collaboration with Russia. The BrahMos missile is also capable of delivering nuclear warheads with its incredible speed. India also aspires to have hypersonic nuclear-capable cruise missiles as part of its land-based nuclear capability. In this regard, the recent tests of the Shaurya ballistic missile and Hypersonic Technology Demonstrator Vehicle (HSTDV) for future cruise missiles are considerably important.

Furthermore, there are also reports which suggest that India and Russia are jointly working on the BrahMos-II a hypersonic variant of this cruise missile. Though the practicality of this might remain questionable, such developments indicate that India wants to further enhance the land-based component of its nuclear triad.

It is worth mentioning here that the provision of nuclear first-strike and assurance of second-strike capability undersea is the most credible component for the completion of a nuclear triad. The naval based component appears to be the Indian priority as well. This is evident from the Indian enhancements of its naval based nuclear deterrent capabilities with the provision of nuclear-powered and ballistic missile-carrying submarines (SSBNs) and submarine-launched ballistic missiles (SLBMs).

In this regard, the presence of the INS Arihant SSBN and the K-series SLBMs in the Indian naval inventory are worth considering. Especially, the K-series has tremendous significance for India's sea-based nuclear capability aimed at completing the nuclear triad. These include; the K-15 missile (the land-based version of Sagarika missile) with a range of 700 km and the K-4 missile of 3500 km range. The long-range K-5 and K-6 missiles of 5000 and 6000 km are also under development.

Along with these, the INS Arighat, India's second SSBN as reported is set to be deployed by the end of 2020. It is also believed to be capable of carrying more nuclear-capable missiles as compared to the INS Arihant. These platforms have considerably enhanced India's naval based second-strike capability and further ensured the completion of a strategic nuclear triad.

Hence at the present, India seeks to maintain a credible and reliable strategic nuclear triad in pursuit of its hegemonic designs and great power aspiration. India's nuclear triad is in large part ensured by its offensive enhancement of air, land, and undersea nuclear capabilities. Such an Indian attempt to dominate the regional deterrence equation would likely further increase the risk of instability in the region. These factors combined would have long-lasting implications for the overall regional deterrence equilibrium that is primarily ensured by Pakistan's nuclear capability. Though, Pakistan still holds a very calculated and principled minimum credible deterrence approach, Indian eagerness to expand its nuclear triad would likely challenge the nuclear threshold of Pakistan. This would ultimately undermine the strategic and deterrence equilibrium in South Asia.

(The writer currently works as a Research Associate at the Strategic Vision Institute (SVI) in Islamabad, Pakistan.)

<https://www.eurasiareview.com/17112020-indias-enhanced-strategic-nuclear-triad-implications-for-south-asian-strategic-stability-oped/>

Smooth run for Covishield so far, second dose soon

By Sulogna Mehta

Visakhapatnam: In good news, clinical trial of the Covishield vaccine is going on successfully at King George Hospital-Andhra Medical College (KGH-AMC) in Visakhapatnam.

The second dose of the vaccine will be administered among volunteers by November-end, 29 days after the first dose. No adverse reactions have been reported yet.

Speaking to TOI, special officer for Covid-19 (north-coastal AP) Dr PV Sudhakar said, “After administering the second dose at the end of this month, we will follow the volunteers for six months in case there are any adverse reactions. We are conducting the trial on 60 volunteers who met the criteria. So far, no one has developed fever, allergy or any other complication after the first dose.”

“We are conducting the safety profile trial of the vaccine at KGH-AMC. Starting from day zero, volunteers would be called in for health check-ups on day 29, 57, 90 and 180 along with regular follow-ups on health conditions. Some other institutes will be working on vaccine efficiency in preventing Covid-19, where blood samples will be collected to check for antibodies,” said Dr Sudhakar, who is also Principal of AMC.

KGH-AMC commenced trial for the Oxford-Astra Zeneca Covishield vaccine in October. Being conducted by Serum Institute of India (SII) at 17 sites across the country, the third phase of the human clinical trial of the vaccine will go on for six months.

Meanwhile, KGH-AMC has also submitted the drug trial report for the 2-Deoxy-D-Glucose (C₆H₁₂O₅) or 2-DG molecule and blood samples of subjects to Defence Research and Development Organisation (DRDO). DRDO, which developed the drug, is yet to announce a report on whether the drug has proved effective in the treatment of Covid-19.

According to doctors, the 2-DG molecule has been used successfully to treat certain types of cancer by inhibiting glucose supply to cells. Doctors believe viruses such as SARS-CoV-2 will not be able to live and multiply if glucose supply to cells is disrupted.

Volunteers will be followed for six months after the second dose to check for adverse reactions. The trial at KGH-AMC is being conducted on 60 volunteers.

<https://timesofindia.indiatimes.com/city/visakhapatnam/smooth-run-for-covishield-so-far-second-dose-soon/articleshow/79268844.cms>

Wed, 18 Nov 2020

Rosoboronexport: Outlook for Arms sales to India

On the occasion of 20 years of Russian arms export agency, Rosoboronexport, DefenseWorld.net discussed its market outlook - especially in relation to India - with Konstantin Makienko, deputy director of the Centre for Analysis of Strategies and Technologies (CAST), an independent Russian think tank. Key comments: "Rafale and Super Hornet too heavy for Indian Aircraft Carriers.... "Su-57 and Armata MBT have future in India." Konstantin Makienko.

DW: Please tell us about the Rosoboronexport's role today in the Russian system of military and technical cooperation with foreign countries, especially, in relation to India?

Konstantin Makienko: Rosoboronexport that was established 20 years ago pays great attention to the implementation of industrial projects, especially in relations with such large industrial countries as India. The very first large projects in the field of Soviet-Indian military-technical cooperation provided for a license to India and for the manufacture MiG-21FL fighter jets in the sixties. In the eighties, licensed production of MiG-27ML fighter-bombers was performed. And of course, one should mention the Su-30MKI heavy multipurpose fighter jet, which today has become the crucial element of the Indian Air Force's combat fleet. In the domain of the ground forces, the production of the T-72S and T-90S main battle tanks, as well as the BMP-2 infantry fighting vehicles, was launched in India. Of the most recent examples, we can also note the contract for the construction of Project 11356 Talwar-class frigates in Goa (Shipyard).

DW: Have you created equipment from scratch especially developed to suit Indian requirements?

Konstantin Makienko: Indian partners often seek to acquire equipment, modified or entirely developed according to their own specifications. For example, the USSR created the An-32 military transport aircraft especially for India as optimized for operation in hot climates and at high-altitude airfields. The Project 61ME destroyers were designed according to specification of the Indian Navy. It is curious, that finally the Indian project turned out to be more effective than the Soviet ships of Project 61, on the basis of which the Indian version was developed. The Indian Navy received a multipurpose ship, while the Soviet version was an anti-submarine ship. It is worth noting that the 61ME Project destroyers are still in service with the Indian Navy, which clearly indicates the success of this design. If we talk about the post-Soviet period, then again it is necessary to return to the Su-30MKI project. When developing a technical appearance of this fighter jet, the Indian military set a very high technological standard, which was at the limit of the then capabilities of the Russian aero industry. Moreover, subsystems of third countries, mainly



KA-226T helicopter

France and Israel, as well as Indian equipment, including the mission computer, were integrated into the onboard equipment suit. Thus, Rosboronexport has much experience in creating military products according to Indian requirements.

DW: Given that the S-400 Triumf ADMS contract has become the biggest military-technical cooperation project between Russia and India, what can be said about the current Russian market offer in the domain of air defense systems?

Konstantin Makienko: The USSR and Russia have always possessed a very capable industry for developing and producing the air defense systems. The peculiarity of the Russian market proposals is that Rosboronexport can supply its partners with the entire range of air defense systems - from portable anti-aircraft missile systems to long-range anti-aircraft missile systems like S-400. It can be said that the Russian Federation offers to the global market virtually on a turnkey basis a complete set of solutions for air defense, including the recently proposed systems to combat small-sized UAVs, i.e. complete air defense network.

DW: What is the current state of the Russia-India military cooperation, given the Indian policy of arms procurement diversification?

Konstantin Makienko: Despite India's diversification of weapons sources and the development of its own defense industry, it is Russian weapons that dominate all branches of the Indian Armed Forces. This applies to the Air Force, the Navy, and the Ground Forces. Two major features of Russia as a partner of India can be highlighted. Firstly, Russia is ready to transfer practically any conventional weapons technology to India. At the same time, the license depth is not limited by anything - as in the Su-30MKI case – India is assembling AL-31FP turbofan engines. In general, there are only a handful of countries in the world capable of producing such complex systems as the AL-31FP engine. India is one of these states. Russian and Indian military-political interests are so compatible, so harmonious that Rosboronexport has no deterrent motives for technology transfer. And secondly, Russia has transferred, and is ready to transfer in the future extremely powerful systems that no one else in the world trades in. For example, we are talking about an aircraft carrier. For India, Russia remains the only source of such technologies.

DW: What is your personal assessment of the Su-30MKI Modernization program?

Konstantin Makienko: The technical appearance of the fighter jet was formed over twenty years ago. Of course, the deep upgrade is needed. Ideally, a new radar with an active phased array and new weapons should be integrated. The specific technical appearance of modernized aircraft should be determined only by the Indian Air Force in accordance with its needs and financial capabilities. I can only say, that the Su-30 platform itself and the open architecture of the avionics provide the most significant and flexible capabilities, up to the integration of such heavy aircraft weapons as the BrahMos-A weighing 2.5 tons. No other multi-role fighter of the Indian Air Force can provide such an opportunity. The early modernization is also needed because the Su-30MKI remains, despite the Rafale purchase, the most utilized IAF's fighter jet, and constitutes its mainstay. It provides the IAF with a tactical, operational and even a operational-strategic tool.

DW: India wants to replace the MiG-29K carrier borne jets with Boeing F/A-18 or Rafale. Any thoughts on this?

Konstantin Makienko: The F/A-18 fighter jet is too heavy for the existing Vikramaditya aircraft carrier, and this is even more so for the lighter Vikrant carrier that is under construction. Rafale can theoretically be integrated on both of these ships, but the entire take-off and landing system, the entire system of aviation technical equipment was originally developed for the use of Russian aircraft. As far as I understand, this also applies to Vikrant. Rebuilding ships for the CATOBAR system will be so laborious and expensive that it is easier to lay down a new ship and build it from the very beginning to make suitable for catapult takeoff. In the meantime, for the next 10-15 years (at least), I do not see any alternative to the MiG-29K fighter jet. Here we return to the issue of joint projects. This is a great opportunity for the Indian Navy and the Russian Navy to jointly develop unified requirements for the modernization of this fighter jet and to jointly purchase a batch in the interests of the two countries, or at the same time modernize the existing fleet if the

purchase of new carrier-based aircraft seems excessive. The project to build the aircraft carrier Vikramaditya for the Indian Navy is a prime example of the special relationship between Russia and India in the field of military-technical cooperation. By having received this ship and MiG-29K carrier aircraft for horizontal take-off, the Indian fleet significantly levelled up its capabilities. The ship rebuilding project itself is an engineering miracle. During the modernization works the radio-electronic equipment and the power plant were completely replaced, the type of aircraft weapons was changed.

DW: The media have reported about the Indian interest toward the Sprut-SDM1 light amphibious tank. What are the major advantages of this tank?

Konstantin Makienko: The most significant feature of Sprut-SDM1 is that while being a light tank it possesses the firepower of the main battle tank – the 125 mm gun, which can also fire guided missiles. Its major competitors on the global market, the light tanks from China (Type 15) and Turkey (Kaplan), are armed only with a 105 mm gun. Unlike them, Sprut-SDM1 has good amphibious capabilities and can even use its main armament while swimming. The new Russian tank also is a genuine light tank in terms of weight – the Chinese and Turkish tanks are heavier. The light weight gives Sprut-SDM1 a unique cross-country ability in the mountains and in swampy areas. We should also point out, that Russia currently proposes at the global market not only the armoured vehicles, but also the specially designed digital simulating systems, which ensure 100% real-life simulation of the vehicle's combat action without wasting ammunition, fuel etc. A product line of such systems was showcased at the ARMY-2020 expo this August by the Training Systems, the major developer in this field.

DW: What is left wanting in the Russia, India military-technical cooperation?

Konstantin Makienko: I think, that we should more actively develop joint projects in the interests of the armed forces of both states. Moreover, our countries have such a high level of compatibility and complementarity of military-political interests that it is possible and necessary to build the elements of a common military-industrial space.

DW: Are you happy with the progress in the KA-226T project? When can we expect a firm contract on this?

Konstantin Makienko: Ka-226T is absolutely indispensable for the Indian military given its capabilities in the mountains and the need to replace the ageing fleet of Chetak helicopters, constructively belonging to the early 1960-s helicopter era. The Ka-226T project is also a unique chance for India to master a number of crucial helicopter engineering technologies, including the unique coaxial rotors scheme. But despite the obvious interest of the military in Ka-226T, the implementation of the project (i.e. signing the contract) for its production in India has been in a standby mode for several years due to, probably, judging by previous experience, overestimated requirements for the level of localization. The planned level, reported by the Indian media this year, in fact is already very high for any aerospace product. Ka-226T is not a handgun, as all aerospace products it is a complex, high-tech system. 100% localization is just not possible to be achieved at once. The global practice of concluding and fulfilling contracts for the localization of such military equipment indicates a gradual increase in the level of localization based on the capabilities of the local industry. In case of Ka-226T one could be sure, that the proposed level of localization of the Russian components meets the requirements of Make in India program and does not require additional certification procedures from the outside (thus saving financial and time resources). I would also add an interesting historical link: Ulan-Ude Aviation Plant (UUAZ), which is going to manufacture the helicopters in Russia and participate in organizing the licensed production in India, earlier was the producer of MiG-27 combat aircraft, and in the 1980s played a major role in the transfer of technology for the license production of MiG-27 Bahadur jets by HAL in India. Another major program, that is also waiting to get started, is AK203 assault rifle joint production project. It envisages unique 100% localization level and options for exporting the rifles to the third countries. Thus potentially, aside from being a regional economic growth driver, it could seriously propel India's ambitions as an arms exporter. The project is based on the

intergovernmental agreement concluded on the highest level. Although the manufacturing facility was officially opened more than 1.5 years ago, there is no production because there is no contract.

DW: The head of ROE has spoken about the Su-57 and Armata as potential international bestsellers, do you see a future for these equipment in India?

Konstantin Makienko: I am sure, that both products have future in India. Su-57 is an aircraft, combining the ground attack and interception capabilities, created with the use of the most up-to-date technologies, which can be offered by the Russian aerospace industry. Concealed operating due to the low radar signature, high level of EW capabilities, data fusing and networking with Command & Control (C2) systems, supersonic maneuverability, high intelligence in combat use, omnidirectional and multichannel use of weapons – all this is Su-57. Su-57 is unique compared to other 5th generation aircraft in terms of the size, weight and type of missiles & munitions fitted in its internal bays. The same can be said about T-14 Armata main battle tank. It is the first tank in the world with an uninhabited tower. It can be considered the most advanced tank in the world.

https://www.defenseworld.net/interview/108/Rosoboronexport_Outlook_for_Arms_sales_to_India#.X7SoHR9czcc

THE TIMES OF INDIA

Wed, 18 Nov 2020

Making sense of the military's Rawat conundrum

By Deepak Sinha

Not many of us will be familiar with Hanlon's Razor, a principle or rule of thumb akin to Murphy's Law, which states "never attribute to malice that which is adequately explained by stupidity." Its application can go a long way in helping eliminate the more devious motives we tend to attribute for much of human behaviour.

Over the years General Bipin Rawat, former Army Chief and the present Chief of Defence Staff, has been in the middle of numerous controversies for his apparently off the cuff attempts to control burgeoning defense expenditure. While many disparate motives have been imputed to him, to be fair, he is probably as keen as most to improve the capabilities of our Armed Forces.

Sadly, other than an overwhelming desire for achieving immediate results, neither the ability to think through the implications of his initiatives, especially their impact on the organization or personnel, nor any genuine attempt at taking others along, have been the hallmark of his efforts.

Take his latest proposal in which he has attempted to sort out the broader issue of retention of personnel, especially those technically qualified, while also simultaneously attempting to control the rising expenditure on pensions. Incidentally, matters pertaining to pensions are not within his ambit of responsibilities as laid down in the Government's Rules of Business for the Department of Military Affairs which he also heads. What his proposal has managed to do is create fears within the serving community that it may be an attempt at replacing the existing pension system, while some veterans believe it is an attempt to undermine OROP, which this Government has only partially fulfilled.

Retention of skilled personnel is not just a concern for the military but also in all fields of endeavor, as we all know, especially more so when an individual has highly marketable skills, such as a pilot or surgeon or even an Operational Theatre Nurse, for example. Therefore, forcing them to retire at an early age after having trained them, as the military does, based on the rank they reach, is clearly not the optimum utilization of their expertise.

Undoubtedly, increasing their retirement ages, as has been proposed, makes eminent sense, though there will be limitations that must be taken into account because many of these specializations will be required in combat zones where age is an extremely important factor. For example, expecting a 57-year-old surgeon to be posted in a medical unit located at high altitude is neither desirable nor practicable for understandable reasons.

Therefore, across the board increase in retirement ages for all technically qualified personnel makes little sense because as they get older their utility in combat support roles, their primary task, will be increasingly questionable and they will become a liability.

Moreover, the rationale put forward that by retaining them in service will lower pension costs is misleading, it may do so initially, but as even a back of the envelope calculation of long- term impact on CTC will clearly show they will cost the exchequer more.

However, what is really irksome is the proposal to curtail pensionary benefits to those requesting to leave prematurely in an attempt to incentivize retention.

Firstly, applying such measures only to uniformed personnel while others in the Central Government are not impacted is not only legally untenable but also foolish as it only disincentivizes people from joining, especially since the military is already short of its authorized strength. Most importantly, the military of necessity, needs personnel who are motivated and willing to go beyond the call of duty, if we expect them to win us wars. How forcing anyone to stay on compulsorily can ever be a battle winning factor truly boggles the mind.

Undoubtedly, the increasingly high expenditures incurred in meeting pensions for those who are paid from Defence Estimates, including civilians, is a cause for serious concern. Not only does it put a strain on the Central government's financial resources, which could be used elsewhere, but also impacts the amount available for capital expenses that go towards modernization and the procurement of new weapon systems.

The truth is defense pensions needs to be looked at through the lens of a much larger prism. Firstly, the defence budget is wholly dependent on the National Security Strategy we wish to pursue and the military capabilities we wish to build. Since Prime Minister Modi's ascent to power we have seen a gradual decline in the defense budget, as a percentage of the GDP, to levels not seen since 1962. Obviously, threat assessments made in the past few years were grossly wrong, for which we are now paying the price, being forced to undertake emergency procurements, at huge cost, in an effort to counter Chinese actions in Ladakh. A defense budget of less than 3% of GDP is unrealistic, given the security challenges we face.

Moreover, our defense pensions are grossly skewed as more than a third of the military pension budget is disbursed to civilians paid out of Defence Estimates, though they account for around a fifth of all pensioners. More importantly, a question that the Government refuses to face is why does a military of 1.3 million uniformed soldiers require a support staff of half a million civilians? For example, as Mr. Bhartendu Kumar Singh, of the Indian Defence Accounts Service, in an article in the Eurasia Review pointed out "the Accounts Branch of the Indian Air Force, for example, has 492 commissioned officers and 7,000 men catering to the pay matters of 1,60,000 officers and men in the Air Force. On a competitive note, the same can be provided by 300 people on the civilian side very easily."

The Government clearly has its task cut out, if it is keen to reduce the pension bill, not by adopting the rather ill thought measures suggested by the CDS but by cutting down on the civilian establishment within the Ministry of Defence, which is in many ways much like the tail wagging the dog. As regards retention, there is a need to adopt more innovative methods to achieve our requirements.

The United States Navy, for example, in its efforts to retain some of its Special Forces personnel is contemplating the introduction of sizeable bonuses for those who volunteer to stay on, much in the manner that business corporations function.

Finally, the General would be well advised to remember that change for the sake of change is not necessarily progress. As this columnist has time and again pointed out this Government has, over the years, behaved atrociously with the military. For reasons best known to itself it has indulged in deliberate actions to hurt their self-esteem and stature. It is also common perception, within the Services community at least, that General Rawat owes his career growth to the present dispensation and has therefore spared no effort to further the government's intentions. All of this

may well be true, but a simpler more likely explanation could be the one that Robert J Hanlon of Scranton Pennsylvania came up with!

(Disclaimer: Views expressed above are the author's own.)

<https://timesofindia.indiatimes.com/blogs/para-phrase/making-sense-of-the-militarys-rawat-conundrum/>

ThePrint

Wed, 18 Nov 2020

Hit by budget crunch, Indian Navy now plans to buy 2 Landing Platform Docks instead of 4

Navy is working on a fresh request for proposal with new specs, two months after the defence ministry cancelled the 2013 RFP to buy 4 Landing Platform Docks

By Amrita Nayak Dutta

New Delhi: A budget crunch could force the Indian Navy's hand to cut down the number of Landing Platform Docks (LPDs) it is seeking to buy, ThePrint has learnt. The Navy is now looking at two LPDs, also known as amphibious transport docks, instead of four.

Defence sources told ThePrint that the Navy is working on drafting a fresh 'Request for Proposal' (RFP) with new specifications for the LPDs, and discussions are on to reduce the number to two. However, a senior defence official told ThePrint that the Navy can float another tender in the future to buy the other two LPDs, depending on its priorities.

The defence ministry in September withdrew the earlier RFP for procuring four LPDs. The Navy had, in November 2013, invited proposals from private shipyards to build these four LPDs at a cost of Rs 20,000 crore. Since then, the RFP saw nine extensions and one re-submission of bids in seven years before it was withdrawn in September.

Earlier this year, the Comptroller and Auditor General, in its report tabled in Parliament, had pointed out the Navy's failure to conclude the contract to procure the LPDs, despite deciding on the acquisition in 2010.

Budget crunch

In the last Union Budget, the Indian Navy was allocated only Rs 41,259 crore, as against the projected amount of Rs 64,307 crore. The budgeted amount wasn't enough to meet its existing committed liabilities — the expenditure that the Navy is committed to pay vendors as part of earlier orders and acquisitions.

The budget cuts had forced the Navy to rethink its long-term plan to build a 200-ship fleet by 2027, as laid out in its Maritime Capability Perspective Plan (MCPP) for 2012-2027. It revised the figure to about 175 ships, up from the current strength of 150 ships and submarines.

A senior Navy officer told ThePrint that the force is prioritising its immediate requirements to optimise available resources.

"Several factors will have to be taken into account — such as the availability of troops trained in amphibious operations and the requirement of those ships during peacetime — in view of the available resources," the officer said, adding that the Indian Navy possesses five large Landing Ship Tanks (LST), two medium LSTs and eight Landing Craft Utility (LCU) boats for amphibious operations.



INS Jalashwa, an existing landing platform dock of the Indian Navy | Photo: PIB via Wikipedia

‘Dual role of LPDs’

LPDs are used for amphibious operations or expeditionary warfare missions. They can carry Army battalions, tanks and armoured carriers, and helicopters into a war zone by sea. At present, the Indian Navy has just one LPD — INS Jalashwa.

A second senior Navy officer explained that an LPD has a dual role — in peacetime and during hostilities.

“In peacetime, it can be used for humanitarian assistance and disaster relief (HADR) or noncombatant evacuation operations (NEOs). The Navy is the first responder in case of rendering HADR in Indian Ocean Region littorals (countries with coastlines connected to the Indian Ocean). During a war, it plays an important role in transporting large numbers of amphibious troops and equipment for suitable operations to influence events,” the officer said.

The officer explained that amphibious contingencies in India could mean landing a large body of troops on the enemy coast, or retaking any occupied island(s) in the Navy’s area of responsibility.

LPDs in other countries

Navies of other countries have developed advanced LPDs over the years.

For instance, China has been supplying military equipment for its base in the African country of Djibouti using its new Type 71 LPDs. These provide China’s PLAN (People’s Liberation Army Navy) with a ‘blue-water’ capability for landing forces away from its borders.

The US Navy has been building San Antonio-class LPDs since 2000, which are likely to make up two-thirds of its amphibious warfare fleet.

The vessels can function as part of a three-ship amphibious ready group, a larger joint task force and even independently.

Rear Admiral S.Y. Shrikhande (Retd), who headed India’s naval intelligence, told ThePrint that LPDs are a critical component of any nation’s expeditionary capability.

“It concerns me that with the Navy’s declining share of the budget, force planning has come under severe resource constraints. Of course, the priorities are for the naval staff to determine. If there is a constraint, maybe naval expeditionary capacities will not be the highest priority at the moment. The priority may be to work on other capabilities,” Shrikhande said.

The retired Rear Admiral added: “In the long run, a major Indo-Pacific nation like ours, which has a strategic offensive-defensive orientation, would do well to build the correct expeditionary capabilities — both air- and sea-borne. There will always be a need for such capabilities... The technology and tactics may change, but sea and air power have needed power projection capabilities, and expeditionary instruments are part of this.”

<https://theprint.in/defence/hit-by-budget-crunch-indian-navy-now-plans-to-buy-2-landing-platform-docks-instead-of-4/546361/>

Sea trials of India's first indigenous aircraft carrier Vikrant set to begin in Jan 2021

The Indian Navy is set to begin sea trials of its new aircraft carrier named after the erstwhile INS Vikrant which was decommissioned in January 1997

By Janvi Manchanda

The Indian Navy is set to begin sea trials of its new aircraft carrier named after the erstwhile INS Vikrant which was decommissioned in January 1997. The new INS Vikrant which is yet to be commissioned will be India's first-ever Indigenous Aircraft Carrier (IAC-1) which is expected to begin sea trials in January 2021 along the coast of Karwar or Visakhapatnam as these two places are the only ones with facilities to accommodate it. The aircraft carrier is being constructed by Cochin Shipyard Limited in Kochi, Kerala.

"Jayema Sam Yudhi Sprdhah"

Earlier news reports quoting sources claimed that the sea trials of IAC-1 Vikrant are to begin from December 2020. PRO Defence informed Republic Media Network that the Harbour trials of the ship are yet to finish as it was delayed due to the COVID-19 pandemic. The PRO further informed that the sea trials are expected to begin in January 2021 provided things go as planned.



The Vikrant was initially supposed to be completed in 2010 and commissioned in 2016 but was later postponed multiple times due to several reasons ranging from construction delays to sea trial and warship trial delays to COVID-19 outbreak. In 2016 the Comptroller & Auditor General (CAG) published a project plan from 2014 from the Cochin Shipyard Limited which suggested that the completion was expected in 2023 but the Indian Navy had hopes of early delivery and planned to partially commission the ship before the expected date. In 2019, the Indian Navy had announced that IAC Vikrant would be fully operational by the end of 2022. While the media reports have suggested that the IAC-1 Vikrant is to be commissioned towards the end of 2021, no confirmation of the same was provided by the PRO.

More on IAC-1 Vikrant

The namesake Indigenous Aircraft Carrier will be commissioned under the same name and motto of INS Vikrant which is taken from Rigveda. The motto is 'Jayema Sam Yudhi Sprdhah' which roughly translates to 'I defeat those who dare fight against me' while the name 'Vikrant' means 'courageous'. IAC-1 Vikrant has a capacity to carry a total of 40 aircraft and is expected to carry MiG 29K fighter jets. The ship is also expected to carry Kamov Ka-31 or Westland Sea King helicopter.

The work on the design of the ship began in 1999 but the formal recognition of the commencement of the construction of Vikrant was laid down in February 2009. The Indigenous Aircraft Carrier was floated out of the dry dock for the first time in December 2011 and launched in August 2013. IAC-1 Vikrant is 262 metres long and 62 meters wide and displaces about 40,000 metric tons. The deck is designed with all facilities required to enable a combat aircraft like MiG 29K.

The ship has a combat management system which was developed by Tata Power Strategic Engineering Division in partnership with Weapon and Electronics System Engineering Establishment and MARS, Russia. This Combat Management System is the first one to be developed by a private company and was handed to the Indian Navy in March 2019. IAC Vikrant

is expected to have about 160 Indian Navy officers and 1,400 sailors onboard after being commissioned.

<https://www.republicworld.com/india-news/general-news/sea-trials-of-indias-first-indigenous-aircraft-carrier-vikrant-set-to-begin-in-jan-2021.html>

Science & Technology News

The Siasat Daily

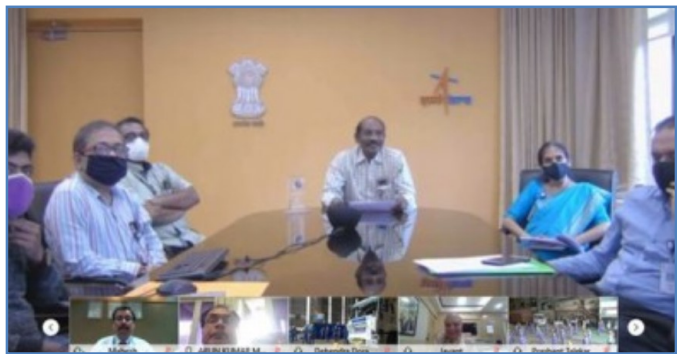
Wed, 18 Nov 2020

L&T delivers rocket booster for Indian human space flight (Ld)

Bengaluru: Infrastructure major Larsen & Toubro (L&T) has delivered the first hardware — a rocket booster for the launch vehicle of India’s maiden human space flight Gaganyaan — to the Indian Space Research Organisation (ISRO), an official said on Tuesday.

“The hardware, a booster segment, will be used in the heavy rocket for launching the country’s first manned mission Gaganyaan into the earth’s lower orbit with three Indian astronauts in 2021-22,” a company official said here.

K. Sivan, Chairman of the state-run ISRO, received the hardware, which is the middle segment of the solid propellant rocket booster (S-200).



“The booster segment was produced at our Powai Aerospace manufacturing facility in Mumbai with a diameter of 3.2 metres, 8.5 metres in length and weighing 5.5 tonnes,” said the company in a statement here.

The Mumbai-based company is playing a vital role in powering the country’s human space flight programme.

L&T has been manufacturing hardware for every mission of ISRO, including lunar (Chandrayaan) and Mars (Mangalyaan).

“L&T and ISRO teams have worked on realising the flight hardware ahead of schedule while maintaining the quality standards required for the manned mission,” Sivan said on the occasion.

The space agency will use the heavy-lift geo-synchronous satellite launch vehicle (GSLV Mark-III) for the manned mission to carry three astronauts with payloads to conduct experiments in zero gravity onboard the orbiter.

“The S-200 forms the solid propellant booster for the launch vehicle,” said L&T Director for defence and smart technologies, J.D. Patil.

Four ace Indian Air Force (IAF) pilots are undergoing intense training at the Gagarin research and test cosmonaut training centre in Moscow for the space flight around the earth’s orbit for a week.

“Of the four pilots, three will go into the space to orbit around the earth for a week and conduct experiments in micro-gravity and bio-science,” Sivan had said earlier.

The training is being conducted under a commercial contract between Glavkosmos joint stock company of the Russian state space corporation Roscosmos and the human spaceflight centre of the Indian space agency.

The Yuri A. Gagarin state scientific research-and-testing cosmonaut training centre in Moscow's Oblast trains cosmonauts for space missions.

Though Prime Minister Narendra Modi had hinted in his Independence Day address on August 15, 2018 that three Indians, including a woman, would be sent to space, Sivan clarified that the crew would be all-men as all the four selected are males.

Former IAF test pilot Wing Commander Rakesh Sharma was the first Indian to have gone into space as a cosmonaut aboard Soyuz-T from Russia on April 2, 1984.

In the run-up to the ambitious manned mission, the space agency will launch 2-3 unmanned missions in 2021 with humanoids to test the human rating of the propulsion modules, including the crew module and the escape system in the event of emergency in the spacecraft.

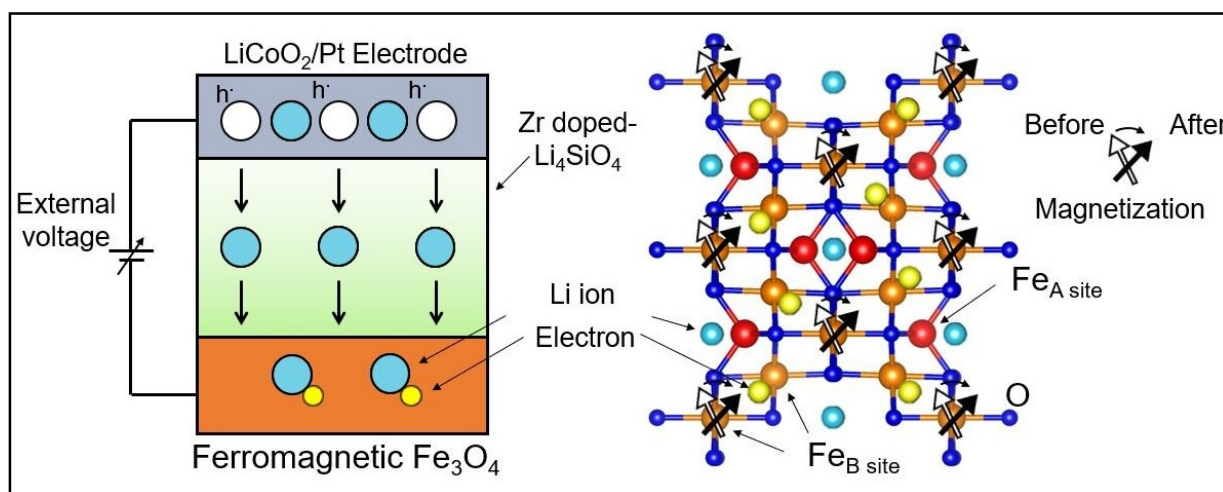
<https://www.siasat.com/it-delivers-rocket-boosters-for-indian-human-space-flight-ld-2025317/>



Wed, 18 Nov 2020

Controlling magnetization direction of magnetite at room temperature

Over the last few decades, conventional electronics has been rapidly reaching its technical limits in computing and information technology, calling for innovative devices that go beyond the mere manipulation of electron current. In this regard, spintronics, the study of devices that exploit the "spin" of electrons to perform functions, is one of the hottest areas in applied physics. But, measuring, altering, and, in general, working with this fundamental quantum property is no mean feat.



After applying an external voltage, lithium ions flow through the reduction-oxidation transistor and reach the bottom magnetite film, altering its charge carrier concentration and modifying the orientation of Fe spins. Credit: Tohru Higuchi, Tokyo University of Science

Current spintronic devices—for example, magnetic tunnel junctions—suffer from limitations such as high-power consumption, low operating temperatures, and severe constraints in material selection. To this end, a team of scientists at Tokyo University of Science and the National Institute for Materials Science (NIMS), Japan, has recently published a study in *ACS Nano*, in which they present a surprisingly simple yet efficient strategy to manipulate the magnetization angle in magnetite (Fe_3O_4), a typical ferromagnetic material. The team fabricated an all-solid reduction-

oxidation ("redox") transistor containing a thin film of Fe_3O_4 on magnesium oxide and a lithium silicate electrolyte doped with zirconium (Fig. 1). The insertion of lithium ions in the solid electrolyte made it possible to achieve rotation of the magnetization angle at room temperature and significantly change the electron carrier density. Associate Professor Tohru Higuchi from Tokyo University of Science, one of the authors of this published paper, says "By applying a voltage to insert lithium ions in a solid electrolyte into a ferromagnet, we have developed a spintronic device that can rotate the magnetization with lower power consumption than that in magnetization rotation by spin current injection. This magnetization rotation is caused by the change of spin-orbit coupling due to electron injection into a ferromagnet."

Unlike previous attempts that relied on using strong external magnetic fields or injecting spin-tailored currents, the new approach leverages a reversible electrochemical reaction. After applying an external voltage, lithium ions migrate from the top lithium cobalt oxide electrode and through the electrolyte before reaching the magnetic Fe_3O_4 layer. These ions then insert themselves into the magnetite structure, forming $\text{Li}_x\text{Fe}_3\text{O}_4$ and causing a measurable rotation in its magnetization angle owing to an alteration in charge carriers.

This effect allowed the scientists to reversibly change the magnetization angle by approximately 10° . Although a much greater rotation of 56° was achieved by upping the external voltage further, they found that the magnetization angle could not be switched back entirely (Fig. 2). "We determined that this irreversible magnetization angle rotation was caused by a change in the crystalline structure of magnetite due to an excess of lithium ions," explains Higuchi, "If we could suppress such irreversible structural changes, we could achieve a considerably larger magnetization rotation."

The novel device developed by the scientists represents a big step in the control of magnetization for the development of spintronic devices. Moreover, the structure of the device is relatively simple and easy to fabricate. Dr. Takashi Tsuchiya, Principal Researcher at NIMS, the corresponding author of the study says, "By controlling the magnetization direction at room temperature due to the insertion of lithium ions into Fe_3O_4 , we have made it possible to operate with much lower power consumption than the magnetization rotation by spin current injection. The developed element operates with a simple structure."

Although more work remains to be done to take full advantage of this new device, the imminent rise of spintronics will certainly unlock many novel and powerful applications. "In the future, we will try to achieve a rotation of 180° in the magnetization angle," says Dr. Kazuya Terabe, Principal Investigator at the International Center for Materials Nanoarchitectonics at NIMS and a co-author of the study, "This would let us create high-density spintronic memory devices with large capacity and even neuromorphic devices that mimic biological neural systems." Some other applications of spintronics are in the highly coveted field of quantum computing.

Only time will tell what this frontier technology has in line for us!

More information: Wataru Namiki et al, Room-Temperature Manipulation of Magnetization Angle, Achieved with an All-Solid-State Redox Device, *ACS Nano* (2020). DOI: [10.1021/acsnano.0c07906](https://doi.org/10.1021/acsnano.0c07906)

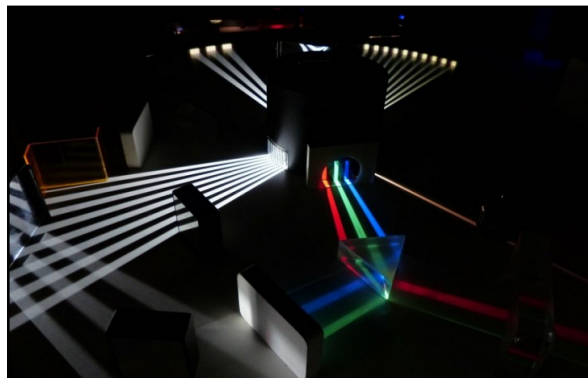
Journal information: *ACS Nano*

<https://phys.org/news/2020-11-magnetization-magnetite-room-temperature.html>

Semi-random scattering of light

What is the exact path of light inside a highly scattering material like white paint? This is a question that is impossible to answer, as the particles inside the paint are distributed randomly. This, at the same time, is a very attractive property for applying photonics in non-hackable security applications. Still, you would like to have a look inside to see what is happening. For this reason, researchers of the University of Twente (MESA+ Institute), built a light-scattering microcube that is both random and controlled. Contradictory as it seems, this is a way to know exactly what is happening inside. The research results are in *Advanced Optical Materials*.

Earlier research by UT researchers demonstrated the way light can be controlled, even when it travels through randomly scattering media like white paint. This might lead to a credit card that can't be hacked, or new medical imaging applications. In brief: Researchers know how light falls on the surfaces, and can even predict how it gets out. But the path it travels in between is unknown. Why not reverse the question, the UT scientists thought: Let's create a structure that we know precisely and that is random at the same time. In practice: let's make a tiny cube with hundreds of nanorods inside. Although they seem organized in full randomness, you know exactly where these rods are, and thus where the light is, at any given moment.



Micro-sized turkish sweet

This is done using a precision 3-D printing technology called direct laser writing, available at UT's MESA+ NanoLab. The nanorods are written using a laser and a special gel material. After hardening, the material in between is washed away. A sponge-like cube remains. The size of the cube is 15 x 15 x 15 microns, for example, with 400 to 2000 nanorods inside. The question is: What part of the incident light comes out, and in what way is this influenced by the number of rods? For a lower number of rods—less randomness—more light travels straight through the material and exits at the location you would expect. For higher numbers, light also exits at other locations, the research shows.

In their earlier publication, using a classic mathematics paradox, the UT researchers demonstrated how these rods should be organized to obtain a homogeneous distribution across the whole cube. This is a manufacturing challenge, as well: Even if the structure looks great from the outside, there may be a lump of hardened polymer at the center of the cube that fully overrides the desired effects. Images using special X-Ray microscopy, available in Grenoble, show that the entire cube consists of the expected rods.

This research gives more insight into scattering light inside randomly organized materials. It helps define the boundary conditions for applications in information security or imaging," says research leader Pepijn Pinkse of the Complex Photonic Systems group, part of UT's MESA+ Institute for Nanotechnology.

The paper, "Deterministic and Controllable Photonic Scattering Media via Direct Laser Writing," is published online in *Advanced Optical Materials*.

More information: Evangelos Marakis et al. Deterministic and Controllable Photonic Scattering Media via Direct Laser Writing, *Advanced Optical Materials* (2020). DOI: [10.1002/adom.202001438](https://doi.org/10.1002/adom.202001438)

Journal information: [Advanced Optical Materials](https://phys.org/news/2020-11-semi-random.html)
<https://phys.org/news/2020-11-semi-random.html>

Sensor experts invent supercool mini thermometer

Researchers at the National Institute of Standards and Technology (NIST) have invented a miniature thermometer with big potential applications such as monitoring the temperature of processor chips in superconductor-based quantum computers, which must stay cold to work properly.

NIST's superconducting thermometer measures temperatures below 1 Kelvin (minus 272.15 °C or minus 457.87 °F), down to 50 milliKelvin (mK) and potentially 5 mK. It is smaller, faster and more convenient than conventional cryogenic thermometers for chip-scale devices and could be mass produced. NIST researchers describe the design and operation in a new journal paper.

Just 2.5 by 1.15 millimeters in size, the new thermometer can be embedded in or stuck to another cryogenic microwave device to measure its temperature when mounted on a chip. The researchers used the thermometer to demonstrate fast, accurate measurements of the heating of a superconducting microwave amplifier.

The technology is a spinoff of NIST's custom superconducting sensors for telescope cameras, specifically microwave detectors delivered for the BLAST balloon.

"This was a fun idea that quickly grew into something very helpful," group leader Joel Ullom said. "The thermometer allows researchers to measure the temperature of a wide range of components in their test packages at very little cost and without introducing a large number of additional electrical connections. This has the potential to benefit researchers working in quantum computing or using low-temperature sensors in a wide range of fields."

The thermometer consists of a superconducting niobium resonator coated with silicon dioxide. The coating interacts with the resonator to shift the frequency at which it naturally vibrates. Scientists suspect this is due to atoms "tunneling" between two sites, a quantum-mechanical effect.

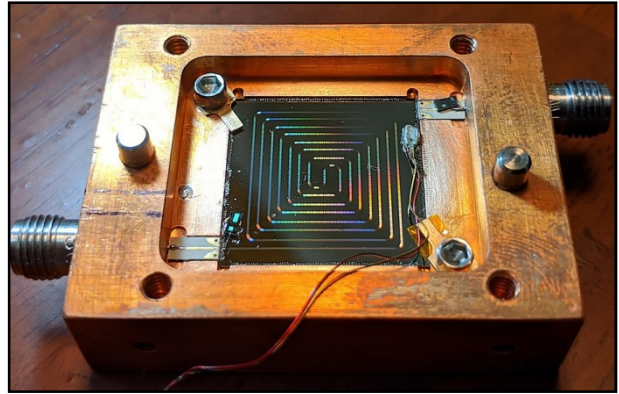
The NIST thermometer is based on a new application of the principle that the natural frequency of the resonator depends on the temperature. The thermometer maps changes in frequency, as measured by electronics, to a temperature. By contrast, conventional thermometers for sub-Kelvin temperatures are based on electrical resistance. They require wiring routed to room-temperature electronics, adding complexity and potentially causing heating and interference.

The NIST thermometer measures temperature in about 5 milliseconds (thousandths of a second), much faster than most conventional resistive thermometers at about one-tenth of a second. The NIST thermometers are also easy to fabricate in only a single process step. They can be mass produced, with more than 1,200 fitting on a 3-inch (approximately 75-millimeter) silicon wafer.

More information: J. Wheeler et al. Sub-kelvin thermometer for on-chip measurements of microwave devices utilizing two-level systems in superconducting microresonators, *Applied Physics Letters* (2020). DOI: [10.1063/5.0029351](https://doi.org/10.1063/5.0029351)

Journal information: [Applied Physics Letters](https://doi.org/10.1063/5.0029351)

<https://phys.org/news/2020-11-sensor-experts-supercool-mini-thermometer.html>



Two of NIST's superconducting thermometers for measuring cryogenic temperatures are glued to the lower left and upper right of this amplifier. The miniature thermometers, made of niobium on a layer of silicon dioxide, measure the temperature of the amplifier or other device based on a frequency signal. Credit: Wheeler/NIST

Moderna's Covid-19 vaccine: What you need to know

Even if Moderna's vaccine gets the green light from the Food and Drug Administration, it will take months to reach widespread distribution

By Carl Zimmer

On Monday, Massachusetts-based company Moderna reported promising preliminary results from its coronavirus vaccine trial. Coming just a week after similar news from Pfizer and BioNTech, the announcement immediately gave the stock market a fresh jolt. It offered more hope that there's going to be a way out of the pandemic.

Like Pfizer, however, Moderna released only early data from its trial. There's more work to be done before it'll know if the vaccine really is safe and effective. And even if Moderna's vaccine gets the green light from the Food and Drug Administration, it will take months to reach widespread distribution. In the meantime, the United States is suffering a devastating explosion of new cases of COVID-19.

Here's where things stand with the development of coronavirus vaccines.

What did these scientists find out?

The scientists randomly assigned volunteers to get either the Moderna vaccine or a placebo. The trial was blinded, meaning that neither the volunteers nor the people running the trial knew who got what.

Over time, some of the volunteers got sick with COVID-19. To get a preliminary sense of how the trial was going, an independent board of experts took a look at the first 95 participants who got sick. Ninety of them had received the placebo, and only five had been given the vaccine. Based on that data, the board estimated that the vaccine is 94.5% effective.

Do the new vaccine trial results mean the end to the pandemic?

In the short term, no. The soonest that coronavirus vaccines could possibly become widely available would be in the spring. But if effective vaccines do indeed become available — and if most people get them — the pandemic could drastically shrink. As coronavirus infections became rarer, life could gradually return to normal.

What about the vaccinated people who got sick?

COVID-19 can lead to a mild illness, or it can lead to a severe case that requires hospitalization and oxygen support. Out of the 95 people who got sick in the Moderna study, 11 experienced severe disease. None of those 11 people were vaccinated. In other words, the five vaccinated people who got sick experienced only mild symptoms, and all of the severe cases were participants from the placebo group.

“It couldn't be a more favorable split,” said Natalie Dean, a biostatistician at the University of Florida.



On November 16, 2020, US biotech company Moderna announced a vaccine against Covid-19 that is 94.5% effective. (File Photo)

The split suggests that Moderna's vaccine doesn't just block the virus in most cases, but also shields the people who do get sick from the worst outcomes of the disease. It also eases concerns that a vaccine for COVID-19 may make the disease worse, not better.

Who participated in the vaccine trial?

Moderna recruited 30,000 volunteers across the United States to participate in its trial. A quarter of the participants are 65 years or older. White people make up 63% of the volunteers; 20% are Hispanic; 10% are Black; and 4% are Asian Americans.

The 95 people who got sick with COVID-19 reflect the diversity of Moderna's volunteers: Fifteen were 65 or older. The group also included 12 Hispanic volunteers, four Black participants, three Asian Americans and one multiracial person. The efficacy and safety appeared the same in all of the subgroups, Moderna said in its announcement. But researchers will have to wait for the trial to advance further to confirm this finding.

Is Moderna in Operation Warp Speed?

Very much so. The US government provided \$1 billion in support for the design and testing of the Moderna vaccine. Researchers at the National Institutes of Health oversaw much of the research, including the clinical trials. Moderna also received an additional \$1.5 billion in exchange for 100 million doses if the vaccine proved to be safe and effective.

Although Pfizer has its own advance purchase agreement for its vaccine, it did not take Operation Warp Speed money to support its design or testing.

How do Moderna's early results compare with Pfizer's?

Pfizer provided less detail in its announcement last week than Moderna did Monday. Pfizer's outside board of experts analyzed 94 volunteers and estimated that the effectiveness of its vaccine was more than 90%. It did not specify how many people who got sick had received the vaccine or the placebo.

Nevertheless, the estimates for the two vaccines are clearly in the same ballpark. What's more, they both far exceed the FDA's requirement that coronavirus vaccines have an efficacy of more than 50%.

Pfizer did not report how many volunteers had severe COVID-19 or what fraction of those people got the vaccine. Findings like these are expected to come out in the next few weeks.

What about other vaccine candidates?

The Pfizer and Moderna vaccines are similar not only because they use mRNA but also because they coax our cells to make the same viral protein, called spike. Other vaccines that don't use mRNA also make the spike protein their target. The success of Moderna and Pfizer may bode well for them as well.

A number of teams have created vaccines based on another virus called an adenovirus, for example. The adenovirus slips into cells, delivering the gene for the spike protein. On Wednesday, a sponsor of a Russian vaccine announced that its adenovirus-based vaccine, called Sputnik V, was more than 90% effective. Outside experts wanted to see more data, however, because the announcement was based on just 20 sick volunteers — far fewer than in the Moderna and Pfizer trials.

AstraZeneca and Johnson & Johnson are also conducting Phase 3 trials on adenoviruses that carry the spike protein gene. And other companies, including Novavax and Medicigo, are running advanced trials on vaccines that deliver the spike protein itself, or pieces of it, to the body.

How long will the coronavirus vaccines last?

We don't know. Both Moderna and Pfizer started their trials July 27, and so they have been able to follow their volunteers for only a few months so far.

It's conceivable that the vaccines provide long-lasting protection or fade away in under a year and require a booster.

What do the Pfizer and Moderna reports mean together?

Pfizer and Moderna used the same basic design to build their vaccines. Both vaccines contain a genetic molecule called messenger RNA, which is wrapped in an oily bubble. The bubble can fuse to a muscle cell and deliver the RNA. Encoded in that molecule are instructions for building a single coronavirus protein called spike. When a vaccinated cell releases copies of the spike protein, the immune system learns to make antibodies against it.

While scientists have investigated mRNA vaccines for years, no vaccine has yet been licensed as safe and effective to use in people. When Moderna and other vaccine makers began designing mRNA vaccines for coronaviruses, skeptics wondered how well they would work. The two preliminary reports from both Moderna and Pfizer suggest this type of vaccine may work very well. Neither trial has uncovered serious side effects from the vaccines, although studies on their safety are continuing.

“I would expect some similarities in how they perform,” said Dean of the University of Florida. “I think I would have had a lot of questions if they got different results.”

What happens next?

Both the Moderna and Pfizer trials are continuing to gather more data from large studies. The two companies expect to apply to the FDA in the next few weeks for an emergency use authorization to begin vaccinating the public.

The FDA will review the applications and consult with its own external committee of experts before making a decision. If it authorize the vaccines — as experts think it will — a committee at the Centers for Disease Control and Prevention will then make recommendations for who should be first to receive a vaccine.

It's possible that the distribution of one or both vaccines will begin by the end of the year.

<https://indianexpress.com/article/explained/modernas-covid-vaccine-what-you-need-to-know-7055012/>



Wed, 18 Nov 2020

Mouthwash can kill coronavirus within 30 seconds: Research

Cardiff University researchers found that mouthwash emanating from the mouth contained 0.07% Cetyl Pyridinium Chloride (CPC), which showed "promising signs" of reducing COVID-19

Edited By Ravi Dubey

According to an experimental study, the mouthwash exhibited virginal properties that could kill the deadly coronavirus. Researchers say that mouthwash can reduce the oral "viral load" of SARS-CoV-2, which causes COVID-19 in people suffering from the disease. The initial result follows from a clinical trial whether the patient can reduce COVID-19 levels in saliva using over-the-counter mouthwash.

A WION report says, Cardiff University researchers found that mouthwash emanating from the mouth contained 0.07% Cetyl Pyridinium Chloride (CPC), which showed "promising signs" of reducing COVID-19.

Dentyl will be the only UK mouthwash brand used in the trial, and the findings will be published in early 2021.

Meanwhile, the worldwide coronavirus death toll has risen to 1.32 million, with 9,797 deaths reported in the previous days.

According to the Union Ministry of Health and Family Welfare's data on Tuesday, India continued to show a downward trend of daily new coronavirus cases as only 29,164 new infections were reported in the last 24 hours in the country. With this, the country's overall cases reached 88,74,291, including 4,53,401 active cases and 82,90,371 recoveries.

The cumulative death toll climbed to 1,30,519 after 449 new deaths. Maharashtra has 85,363 active coronavirus cases, the highest in the country, followed by Kerala with 71,046 and Delhi with 40,128. This was the tenth day when India reported less than 50,000 cases in a day.

The last time daily new patients crossed the 50,000-threshold was on November 7.

According to the Indian Council of Medical Research (ICMR), 8,44,382 samples for COVID-19 were tested on November 16, while a total of 12,65,42,907 samples tested so far. On Monday, the Union Health Ministry informed that the coronavirus recovery rate has improved to 93.27 percent.

India has continued the unbroken trend of the daily new recoveries outpacing the daily new additions for the 44th day, it had said.

<https://www.dnaindia.com/health/report-mouthwash-can-kill-coronavirus-within-30-seconds-cardiff-university-covid-19-research-2856924>



