

Oct
2020

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

खंड : 45

अंक : 249

24-26 अक्टूबर 2020

Volume: 45

Issue: 249

24-26 October 2020



रक्षा विज्ञान पुस्तकालय

Defence Science Library

रक्षा वैज्ञानिक सूचना एवं प्रलेखन केंद्र

Defence Scientific Information & Documentation Centre

मेटकॉफ हाउस, दिल्ली - 110 054

Metcalfe House, Delhi - 110 054

CONTENT

S. No.	TITLE	Page No.
DRDO News		1-11
DRDO Technology News		1-11
1.	DRDO lauds Air Force for supporting its weapon trials, anti-COVID-19 measures	1
2.	DRDO चीफ ने वायुसेना को कहा थैंक्यू, बोले-IAF के बिना हथियारों का परीक्षण नामुमकिन	2
3.	चीनी सेना मारी जाएगी: बैलेस्टिक मिसाइल से होगा हमला, नहीं बचेगा दुश्मन देश	3
4.	Not LCA Tejas, This was India's 1st indigenous fighter jet that terrorized Pak air force without even a single loss	4
5.	Four scientists and engineers selected for annual IISc. awards	5
6.	From DRDO Scientist to IIT Director – meet IISc alumni award winners	6
7.	MDL will deliver all 6 scorpene submarine to Indian Navy by 2023: CMD Vice Admiral Narayan Prasad	7
Defence News		12-17
Defence Strategic National/International		12-17
8.	India wants tensions to end, but won't cede an inch of territory, says Rajnath Singh	12
9.	Rajnath reviews LAC situation in eastern sector at Army's Trishakti Corps in Sukna	13
10.	Army commanders to review situation in Ladakh at 4-day conference from tomorrow	14
11.	Army Chief General Manoj Naravane to visit Nepal from November 4-6	15
12.	Navy demonstrates combat readiness; missile sinks target in practice drill	16
Science & Technology News		18-30
13.	Near Collision of Rocket Part, Satellite in Orbit Stirs up Space Junk Worries	18
14.	ISRO's Mars mission discovers how dust storms expand the red planet's atmosphere	20
15.	Quantum cascade lasers (QCLs) exhibit extreme pulses	21
16.	Time crystals lead researchers to future computational work	23
17.	Scientists manage to improve metallic glasses	24
18.	Turning a common plastic Into high-value molecules	25
19.	Researchers use neutrons to study weld-induced stress relief in renewable energy infrastructure	26
20.	Pump down the volume: Study finds noise-cancelling formula	28
COVID-19 Research News		29-30
21.	The other vaccine	29
22.	Plasma therapy for Covid-19 has no benefit, finds ICMR study	30

DRDO lauds Air Force for supporting its weapon trials, anti-COVID-19 measures

In the last six months, the Indian Air Force has flown more than 160 hours for supporting the missions of Defence Research and Development Organisation for COVID-19 relief and weapon trials

Without the support of the Indian Air Force, it would not have been possible for DRDO to carry out many of its weapon trials at short notice and transport material for its anti-Covid-19 equipment, DRDO Chairman Dr G Satheesh Reddy said.

"The Indian Air Force has given us active support for our trials and anti-COVID-19 measures. Without their active support, it would not have been possible to carry out many of our weapon trials at short notice as well as transportation of men and material to fight against COVID-19," Reddy told ANI when asked about the role of Air Force in supporting DRDO in recent times.



Photo: ANI

In last six to seven weeks, the DRDO has carried out more than a dozen successful trials of different weapon systems including the Shaurya strategic missile, Nag anti-tank guided missile, BrahMos Extended Range missile system, Hypersonic Missile Technology Demonstration Vehicle and the Rudram-1 anti-radiation missile system.

In the last six months, the Indian Air Force has flown more than 160 hours for supporting the missions of Defence Research and Development Organisation for COVID-19 relief and weapon trials.

The coordination has been done between the Directorate General of Air Operations in the Air Force and the Programme Office-I of the DRDO for facilitating these air movements.

Of the 160 hours flown by the Air Force in support of DRDO using its different transport aircraft and choppers, close to 100 hours have been exclusively for ferrying material for the COVID-19 missions.

The DRDO has also been provided with 15 different aircraft for its trial teams. The Wheeled Armoured Platform of the DRDO was also ferried using an Air Force aircraft to the operational areas in Ladakh. (ANI)

<https://www.dnaindia.com/india/report-drdo-praises-air-force-for-supporting-its-weapon-trials-anti-covid-19-measures-2851783>

DRDO चीफ ने वायुसेना को कहा थैंक्यू, बोले- IAF के बिना हथियारों का परीक्षण नामुमकिन

By Richa Bajpal

नई दिल्ली: रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) के मुखिया जी सतीश रेड्डी ने हथियारों के परीक्षण में मदद करने के लिए भारतीय वायुसेना (आईएएफ) का शुक्रिया अदा किया है। उन्होंने कहा कि कम समय में भी आईएएफ हमेशा रेडी थी और इस वजह से कई अहम हथियारों का परीक्षण हो सका। साथ ही डीआरडीओ चेयरमैन ने एंटी-कोविड-19 उपकरणों को एक जगह से दूसरी जगह पर ले जाने के लिए भी वायुसेना का आभार जताया है।

हर समय मौजूद थी वायुसेना

डीआरडीओ चीफ जी सतीश रेड्डी ने कहा, 'भारतीय वायुसेना ने हमें हमारे ट्रायल्स के लिए सक्रिय तौर पर मदद दी और एंटी-कोविड-19 उपकरणों में भी वायुसेना की मदद मिली। उनकी मदद के बिना यह संभव नहीं था कि हम कई हथियारों का ट्रायल कर पाते और अपने कर्मियों को कोविड-19 से लड़ने के लिए उपकरण मुहैया करा पाते।' रेड्डी ने न्यूज एजेंसी एएनआई से यह बात उस समय कही जब उनसे हाल के समय में वायुसेना की तरफ से डीआरडीओ को मिलने वाली मदद से जुड़ा सवाल पूछा गया था। पिछले छह से सात हफ्तों के अंदर डीआरडीओ ने एक दर्जन से ज्यादा हथियार प्रणालियों का परीक्षण किया है जिसमें शौर्य स्ट्रैटेजिक मिसाइल, नाग एंटी-टैंक गाइडेड मिसाइल, ब्रह्मोस सुपरसोनिक क्रूज मिसाइल, हाइपरसोनिक मिसाइल टेक्नोलॉजी डेमॉन्स्ट्रेशन व्हीकल और रुद्रम-1 एंटी-रेडिएशन मिसाइल सिस्टम का सफल परीक्षण शामिल है। वहीं डीआरडीओ की मदद के लिए एयरफोर्स ने 160 घंटे की उड़ान को अलग-अलग ट्रांसपोर्ट एयरक्राफ्ट और हेलीकॉप्टर के जरिए अंजाम दिया। वहीं कोविड-19 की राहत सामग्री को मुहैया कराने के लिए करीब 100 घंटे की उड़ान को अंजाम दिया गया।



<https://hindi.oneindia.com/news/india/drdo-chief-praises-indian-air-force-for-supporting-its-weapon-trials-585835.html>

चीनी सेना मारी जाएगी: बैलेस्टिक मिसाइल से होगा हमला, नहीं बचेगा दुश्मन देश

भारत की तरफ से दुश्मनों को धूल चटाने में शौर्य मिसाइल के नए संस्करण का सफल परीक्षण है। शौर्य मिसाइल परमाणु क्षमता रखने वाली मिसाइल है। सबमरीन लॉन्चड बैलेस्टिक मिसाइल होती है। इसे रक्षा रिसर्च और विकास संस्थान(DRDO) ने विकसित किया।

By Vidushi Mishra

नई दिल्ली: वैसे तो इन दिनों चीन की कई देशों से तनातनी चल रही है। लेकिन भारत से बीते 8 महीनों से चीन के साथ रिश्ते खराब होने के साथ-साथ पाकिस्तान भी उसी की चाल चलने लगा है। ऐसे में हालातों को देखते हुए भारत का नई मिसाइलों का सफल परीक्षण करना अहम हो जाता है। इन्हीं के चलते 3 अक्टूबर को भारत ने शौर्य मिसाइल के नए संस्करण का सफल परीक्षण किया था। जिसके बाद से ये मिसाइल फैमिली की हिस्सा है। चलिए आपको बताते हैं क्या है इस मिसाइल की महत्वपूर्ण बातें।

सबमरीन लॉन्चड बैलेस्टिक मिसाइल

भारत की तरफ से दुश्मनों को धूल चटाने में शौर्य मिसाइल के नए संस्करण का सफल परीक्षण है। शौर्य मिसाइल परमाणु क्षमता रखने वाली मिसाइल है। सबमरीन लॉन्चड बैलेस्टिक मिसाइल होती है। इसे रक्षा रिसर्च और विकास संस्थान(DRDO) ने विकसित किया।

इसका नाम पूर्व राष्ट्रपति और मिसाइलमैन के नाम पर नाम रखा गया। बता दें, इस मिसाइल के विकास का कार्यक्रम 1990 के दशक में शुरू हुआ था। नए संस्करण वाली मिसाइल की रेंज 6,000 किमी तक है।

युद्ध के मोर्चे पर

भारत पहले कई बार के-4 मिसाइलों का सफल परीक्षण कर चुका है, जिनकी रेंज 3,500 किमी तक रही है। साथ ही के-5 और के-6 कोडनेम वाली मिसाइलें विकसित की जा रही हैं, उनकी रेंज 5,000-6,000 किमी तक होगी।

बीते कई दिनों से पाकिस्तान और चीन दोनों ही पड़ोसी और दुश्मनी पर उतारू देशों के साथ भारत समुद्र में भी युद्ध के मोर्चे पर है। ऐसे में एक तरफ चीन परमाणु क्षमता वाली कई सबमरीन विकसित कर चुका है, इसलिए भारत के लिए जवाबी कार्रवाई के लिए के-फैमिली की मिसाइलों का सफल परीक्षण करना बहुत जरूरी और अहम हो जाता है।

हालाकि ये मिसाइलें सबमरीन पनडुब्बियों से भी लॉन्च की जा सकती है। ये मिसाइलें हल्की, छोटी और पकड़ में ना आने वाली मिसाइल हैं। लेकिन के-फैमिली की अधिकतर मिसाइलें सबमरीन लॉन्च ही हैं।

<https://newstrack.com/india/shaurya-missile-successful-test-nuclear-capability-submarines-launched-ballistic-developed-drdo-698956.html>



Not LCA Tejas, This was India's 1st indigenous fighter jet that terrorized Pak air force without even a single loss

By Aakriti Sharma

Aatmanirbhar Bharat or self-reliant India is the new slogan introduced by the current BJP government, but the importance of building an indigenous fighter aircraft for Indian armed forces was realised long back in the 1960s.

The then Prime Minister Jawaharlal Nehru had got German engineer Kurt Tank to design India's first indigenously researched and developed fighter jet HF-24 Marut.

A significant achievement for Hindustan Aircraft Limited at the time, the HF-24 Marut was an absolute beauty with its sleek, pencil-slim contours, an elegant, swept-wing and tail configuration attached to a perfect area-ruled fuselage.



HAL Tejas

On 1 April 1967, Marut (which meant "Spirit of the Tempest" in Sanskrit), was delivered to the Indian Air Force.

Due to the lack of an appropriate power plant, Marut could not fulfil its role as an intercepting, supersonic jet. However, in spite of its drawbacks, the fighter jet participated in the 1971 Indo-Pak War, making it a battle-proven machine.

Developed to commence air-to-ground attack as a base role, the aircraft was also capable of self-defence.

In the combat, Marut did not participate in as many dogfights but its performance was impressive because not even a single jet was shot down, in fact, it managed to strike Pakistan's much-advanced Sabre.

After missing the target at first during December 6 mission, led by Sqn. Ldr. KK Bakshi, while crossing Naya Chor, (situated in Sindh, Pakistan) on a strike mission, Marut hit the Engine of Sabre and tore the airframe (probably the tail section) apart. This was marked as the first-ever kill made by Marut, proving its combat capability.

Marut displayed a maximum performance of 1112 kph (Mach 0.91) at sea level and 1086 kph (Mach 1.02) at high altitudes. It was capable of maintaining moderate landing speeds and low-altitude stability due to its very thin and large wings.

A total of 147 Maruts were manufactured. But these were all retired in the early 1980s, some pretty much sent from the factory to junk stores. After the incidents of pilot deaths due to ejection malfunction, it was clear that Marut could not fulfil its role as an interceptor.

Defence Research and Development Organisation (DRDO) and Hindustan Aeronautics Limited (HAL) have spent more than three decades working on another indigenous fighter jet called Light Combat Aircraft – Tejas. The Indian Air Force has planned for 324 Tejas aircraft in several variants.

The indigenous fighters have been designed and developed by the Aircraft Development Agency (ADA) and are set to become the backbone of the Indian Air Force. The all-weather aircraft has been designated for air superiority and ground attack as its primary role and has reconnaissance and anti-shipping strikes capability as its secondary role.

As the HAL is currently manufacturing advanced series of the LCA, Mk1A will be equipped with beyond-visual-range (BVR) missiles such as Derby missile. Indigenously developed BVR missile ASTRA Mk1 has been identified to be integrated on Mk1A as the IAF's choice.

The versatile weapon, which will serve as a force multiplier and immensely add to the strike capability of the aircraft, will give Tejas an edge over its contemporaries in BVR warfare.

Aeronautical Development Agency (ADA) and Hindustan Aeronautics Limited (HAL) are also working on Advanced Medium Combat Aircraft (AMCA), which is an Indian programme of a fifth-generation fighter aircraft. A single-seat, twin-engine, stealth supermaneuverable all-weather multirole fighter aircraft is likely to take its first flight in 2023-2024.

The AMCA, a multirole combat aircraft designed for the air superiority, ground attack, bombing, intercepting and strike, will be adding to the depleting fleet of IAF. From HAL HF-24 Marut, India's aviation industry has come a long way as it is undertaking several fighter jet designing and manufacturing projects indigenously.

<https://eurasianimes.com/not-lca-tejas-this-was-indias-1st-indigenous-fighter-jet-that-terrorized-pak-air-force-without-even-a-single-loss/>



Mon, 26 Oct 2020

Four Scientists and Engineers selected for annual IISc. awards

It is in recognition of the contribution made by them in their fields

Bengaluru: Four people, including scientists and engineers, have been selected for the Distinguished Alumnus/Alumna Awards of the Indian Institute of Science (IISc.) for 2020. This year's awardees are: K. Rajalakshmi Menon, B.S. Murty, Sethuraman Panchanathan, and Keshab Panda.

This is an annual award that recognises exceptional contributions made by IISc. alumni to their profession, institute and society as a whole, said IISc. in a press release. Govindan Rangarajan, Director, IISc., said that the awardees are highly accomplished individuals who had made exceptional contributions to their fields of study.

One of the awardees, Dr. Menon, Scientist and Program Director at Defence Research and Development Organisation (DRDO), said: "We are honoured to confer this award upon them in recognition of their achievements."

The awardees

According to a release by IISc., Dr. Menon has made pioneering contributions to the design, development, testing, deployment and operationalisation of the indigenous Airborne Early Warning and Control system, which have been inducted into the Indian Air Force (IAF).

Another awardee, Prof. Murty, Director, Indian Institute of Technology, Hyderabad, has been recognised for his contributions in the fields of high entropy alloys, non-equilibrium processing of materials by mechanical alloying among others.

Prof. Panchanathan, Director of the National Science Foundation (NSF), U.S., has been recognised for his contributions to research on human-centred computing solutions benefiting individuals with disabilities.



Karnataka Bengaluru
23/10/2020 Prof . B S Murthy
winner of IISc. Distinguished
Alumnus/Alumna Awards
announced for 2020 Photo
Credit: [Handout E Mail](#)

Mr. Panchanathan had been appointed to the U.S. National Science Board and the National Advisory Council on Innovation and Entrepreneurship, said the release.

Dr. Panda, currently serving as CEO & MD of L&T Technology Services Ltd., has been selected for the awarded for his contributions to engineering R&D, in particular for steering the growth of engineering services businesses such as Satyam and L&T.

<https://www.thehindu.com/news/national/karnataka/four-scientists-and-engineers-selected-for-annual-iisc-awards/article32938310.ece>



Sun, 25 Oct 2020

From DRDO Scientist to IIT Director – meet IISc alumni award winners

These annual awards recognise contributions made by IISc alumni to their profession, society, and the Institute. The nominations received are evaluated by a committee appointed by the Director, IISc.

Four scientists and engineers have been selected to receive the distinguished alumnus/alumna award of the [Indian Institute of Science \(IISc\)](#). This year's awardees are K Rajalakshmi Menon, BS Murty, Sethuraman Panchanathan, and Dr Keshab Panda.

These annual awards recognise contributions made by IISc alumni to their profession, society, and the institute. The nominations received are evaluated by a committee appointed by the Director, IISc.

Rajalakshmi Menon is currently a Scientist and Program Director of the Intelligence, Surveillance, Targeting, and Reconnaissance (ISTAR) programme of the Defence Research and Development Organisation (DRDO). She has made pioneering contributions to the design, development, testing, deployment, and operationalisation of the indigenous Airborne Early Warning and control system inducted into the Indian Air Force, as well as several other flagship programmes at DRDO. She graduated from IISc with MSc (Engg) and PhD degrees in Aerospace Engineering in 1994 and 2002 respectively.

BS Murty is currently the Director of the Indian Institute of Technology (IIT), Hyderabad. Murty has been recognised for his contributions to the fields of high entropy alloys, non-equilibrium processing of materials by mechanical alloying, and bulk metallic glasses. He has also established several key facilities, collaborations, and conferences in metallurgy. He graduated from IISc with ME and PhD degrees in Metallurgy in 1988 and 1992, respectively.

Sethuraman Panchanathan is currently the Director of the National Science Foundation (NSF), USA. He has made contributions to research on human-centred computing solutions benefiting individuals with disabilities. He is also an innovator, entrepreneur and institution builder, and has been appointed earlier to the US National Science Board and the National Advisory Council on Innovation and Entrepreneurship. Prof Panchanathan graduated from IISc with a BE degree in Electronics and Communication Engineering in 1984.

Keshab Panda is currently the CEO and MD of L&T Technology Services Limited. He has been recognised for his contributions to engineering R&D, in particular for steering the growth of engineering services businesses such as Satyam and L&T. He has also been closely associated with leading industry bodies such as NASSCOM, CII and the Indo American Chamber of Commerce. Dr Panda graduated from IISc with an ME degree in Aerospace Engineering in 1985.

<https://indianexpress.com/article/education/from-drdo-scientist-to-iit-director-meet-iisc-alumni-award-winners-iisc-ac-in-6867412/>

MDL will deliver all 6 scorpene submarine to Indian Navy by 2023: CMD Vice Admiral Narayan Prasad

On the Keel laying of India's stealth Frigates Project 17 Alpha at MDL, BW Businessworld's Manish Kumar Jha spoke with MDL's Chairman & Managing Director, Vice Admiral, Narayan Prasad. MDL's IPO has seen the record subscription, receiving bids worth Rs 70000 cr. CMD talks about Indian navy's next generation submarines Project 75 I, collaboration and its core AIP system development stage

By Manish Kumar Jha

MDL's IPO has seen record overall subscription. How will it boost MDL?

It is world's unique shipyard with such diverse set of products. It proves that people have immense faith in us. We are constantly working on our leadership position in defence ships and submarines.

For IPOs that have happened till now in FY21, MDL has set the following records:

- Highest overall Subscription; Rs 444 crore public offer of Mazagon Dock subscribed 157 times- a record by public sector
- Highest Non-Institutional Subscription
- 2nd highest in overall subscription in terms of amount.

Often referred as the "Ship Builder to the Nation", Mazagon Dock Shipbuilders (MDL) has crucial role in building maritime muscle of India. Could you talk about such vision and how MDL gears up for future challenges?

MDL has a rich legacy of building front line warships submarines, offshore platforms and a wide range of commercial vessels. MDL has played a very crucial role in contributing to the blue water capability of the Indian Navy since we embarked on the first indigenously built warship INS Nilgiri. Warship building in India has been the forte of state owned enterprises. The nuances of warship building is different from that of merchant shipbuilding.

With the continued support of indigenous shipbuilding industry, the Indian Navy has already transformed into a 'Makers Navy' from a 'Buyer's Navy'. R&D initiatives, adoption of industry best practices, benchmarking of our key processes against global standards, improvement in productivity should be the key drivers that can help achieve the goal.

For a country that is predominantly peninsular in nature with a coastline of approximately 7500 kms, requires a vibrant and strong shipbuilding industry for economic as well as strategic reasons. India's shipbuilding capabilities need to keep pace with its macro economic development, market demand and the enormous human resource potential that we have.

MDL's mission statement 'Build Quality Ships on Time' reflects our aspiration as a shipyard for continual holistic improvement in all spheres of the company's activities. We are taking several steps to remain as a centre of excellence in ship and submarine building. I will mention just four of the key initiatives viz Human resources, best practices, procurement and infrastructure:

- Human resources with the requisite complex skill sets are our main asset. It is our focus.



- We have completed a process of benchmarking our key processes with international shipyards. With this we expect international best practices to be adopted in the yard for both ongoing and future programs.
- We have already implemented Enterprises Resource planning and also gone for e-tendering for high value purchases to ensure transparency and probity in our procurements.
- With our modernized infrastructure MDL is capable of implementing integrated construction methodology that is at par with global standards. To complement this upgradation, we are collaborating with an international shipyard for imparting the requisite soft skills, reengineering of process. With this effort an upgradation of technology levels and also enhancement of capabilities are expected.

What is the overall order book of Mazagon Dock Shipbuilders (MDL) now?

Currently we have an order book comprising of four in number project 15 B destroyers, four in number stealth frigates and six submarines of P75, we have delivered two of them and we're now building remaining four. In addition, we're also doing another vertical which is the refit and repairs of ships and submarines and that also is a very promising line. So together right now the order book constitute about Rs. 54,000 crores.

MDL & Naval group joint development of Scorpene class submarines are delayed and stretched. While the 4th Submarine "Vela" was launched in May 2019, what will the time line for the rest?

Two boats have already been delivered and as regarding the third one, we're planning to deliver in all earnestness by 31st December this year. At the most, it might spill over to early January or maybe early February next year. And subsequent boats are all being delivered at an interval of about a year. So by what I would say that by mid-24' or end of 23' we would've delivered all the boats with regard to Residual 4 boats.

At this particular point of time, we're at a very advanced stage in the construction and trials of all the 4 boats. The boat number 3 that we're talking about, has already been to the sea, a few times, has operated, and has performed extremely well. It has come for certain maintenance and repair work which has to be undertaken. On completion we will be putting her back to sea and we're very sure the cardinal dates we should be able to adhere to.

MDL with L&T for P751 is scouting for foreign partner under SP Model. What is the technological assimilation MDL is looking for? How will the partnership with L&T will unfold? When is it expected to take off?

At the moment both L&T and MDL are the two key strategic partners of MoD which have been identified by the government severally to undertake this program of P75 I, not together.

Further, there are five foreign OEMs who are potential technology collaborators. The strategic partners will have to identify their collaborator based on techno-commercial merits.

Right now I don't foresee collaboration between MDL and L&T as we have to submit competitive bids to MoD independently. Having said that we are very hopeful because of one reason - we have the current experience of building six Scorpene submarines and past experience of building two SSK class submarines. L&T on the other hand hasn't built a conventional submarine at all.

Nevertheless, L&T has been a very proud engineering establishment for this country and we are all very proud to have L&T with us, developing and trying to get as many number of indigenous products with significant contribution in our journey to self-reliance.

The original plan of P75 Scorpene submarine to have an air independent propulsion system (AIP), has not materialized so far. We are still struggling with AIP technology for our future project- P75 I. Why could we not get an AIP system for the Scorpene submarine?

As far as the air independent propulsion system is concerned, now these are very niche technologies very rarely available in today's combat market. I'd just like to share with you, we have an R&D lab with DRDO called NSTL Visakhapatnam and way back in 2002 they started

having a tryst with an air-independent propulsion package and they developed a closed-cycle diesel engines which is one of the apes but this is one of the very, very basic model.

In today's scenario a couple of navies are claiming to have developed an air-independent propulsion system, largely based on fuel cells. However, they may not be willing to share those technologies with us.

In P75I the AIP is introduced with an aim to enhance the submerged endurance of the boat. AIP will increase the submerged endurance by may be about 10 to 15 days vis-à-vis what is being achieved traditionally. It is envisaged that the foreign partner in the P75I will provide the AIP know-how to the Indian side.

So, P75 I is one of the niche technologies which has to come out with that it has to be a conventional submarine with an air independent propulsion system for enhanced submerged endurance. And in terms of technologies which are available in the world, certainly Germany claims to have all the commissioned boats with an air package largely again on the fuel cell. We're also hearing about Navantia from Spain that they are very soon going to commission a boat with another additional package, Daewoo in South Korea claims with one of the boats what they've already produced. Similarly, even Rosoboronexport, an Amur-class of submarine which they're trying to offer to us is also one of the boats in which the land trials of air-independent propulsion system is presently in progress, and they're hopeful to offer a product of that kind.

We're also putting a huge amount of effort in our indigenous programme of the air independent propulsion system, but the complete details right now are not available in the open public domain. But I can only suffice to say that this will take a little more while.

So, the Air Independent Propulsion (AIP) System will be the core of P75I. Where is DRDO now in terms of developing this technology because it might delay this program? Could you share an update on this – and if it is being developed indigenously?

I'd only share with you that the indigenous programme is at a very advanced stage but exact stage is not known to me because it's not fully available in the public domain. They're also putting up a huge amount of impetus to develop because it's to be integrated with the P75 I for which a RFP is already expected somewhere in the end of October or maybe mid of November this year itself. Now a vagueness cannot be retained there.

If, it [DRDO] is to incorporate an indigenous air independent propulsion system whenever the boats are going to be commencing their production, they should be ready and usable by the time they reach that level of construction or it has to go for a foreign developed air independent propulsion package.

So there's a huge amount of hastening up that happening in the DRDO sector which is happening around there but as I've told you, it is always good particularly in a niche technology like this one that we fit our own ones because once we start sailing these boats what kind of a problem that we are going to envisage is not known. What kind of a maintenance problem will come out here, and submarines by and large is a very technology intensive platform and if it has to remain underwater that is what the combat efficiency of the platform and its punch delivery capacity will talk about that she should not come out once she dive.

Once the position of the submarine is revealed, it becomes very vulnerable. So, its strength lies in remaining in deep water for a very long time undetected. So she should not come out at any point of time. So with such technology getting proven we do not have very neat and clean and open forum data available. So we will have to have a very concerted kind of a look and this RFP is taking a little amount of time because we have to be very, very clear that if the development programme from the Indian side is going to get delayed, shall we delay the programme or else try to look for a foreign option.

But India will always look, in case they can incorporate the one which is indigenous development which will be the best one.

MDL's Nhava Yard is all set for futuristic project which will have a far reaching capacity, probably making MDL the busiest dock. Apart from the P75I project, what are the projects earmarked?

Right now, the order book is about 54,500 crores, and we're also saying that out of the total capacity that we have for 11 submarines, we have only about 4 in number right now and which also we will deliver in 2.5 to 3 years from today. Similarly the ship's programme that we have 8 against the 10 capacity and these all will get delivered in 5 to 7 years from now. Having talked about that, we've also bid for certain programs. The case-in-point is new generation missile vessels. They're roughly about 6 in number. We've already submitted our bids and the navy will take its own course of time to identify certain competitive bidding and we'll get to understand.

With depleting Naval Budget -reduced from 18% to 13% of the Defence outlay- how does it affect the modernization as far the MDL is concerned?

Creation of a modernized infrastructure at MDL was undertaken in the 1990s as a partly customer funded asset. MDL has already completed the modernization and this infrastructure is already in place and is being utilized. The modernization program was conceived as an infrastructure upgrade to enable implementation of the 'Integrated Construction' methodology of shipbuilding practiced by advanced shipbuilding nations.

Apart from enabling assembling and handling grand blocks, the facility will facilitate enormous amount of pre-outfitting which will pave way for a substantial reduction in build periods. A 300 T goliath crane that straddles across the slipways, a modular workshop where grand blocks could be assembled and lifted, an impounded wet basin that can hold two destroyer sized warships and two submarines simultaneously, a cradle assembly shop for assembling the sections of the conventional submarines, electronic stores etc were the major components of the modernization program. Therefore, the reduction in Naval Budget is not envisaged to adversely affect MDL's modernization program.

What is the export outlook for MDL? And what are the plans for scaling up defence export?

In terms of export of this particular shipyard, we enjoy a very enviable past. We've exported 243 vessels in the past which includes countries like Mexico, France, UK, Singapore, Yemen, Iran, Mozambique, but they all are small sized utility vessels like multi-purpose support vessels to Mexico, some drizzle to France, some general cargo vessels to UK, bulk carrier to Singapore, and likewise water-tankers, cargo barges, lighters, ponton. Now these all are where our verticals at certain point of time when we didn't have so much of order book.

Having migrated into the current order position right now and since we have a capacity, we've an export segment which is available because we've been researching these markets and we've visited these markets.

Africa, we've engaged with Ghana, Nigeria, Sierra Leone, Cameroon, they have a requirement for floating docks, fishing trawlers, offshore patrol vessels, fast interceptor crafts and anchor handling vessels. Middle east, Egypt and Saudi Arabia have a requirement for anchor handling decks, Europe-Portugal require maritime electrical equipment, Asia-Bangladesh have large patrol vessels and floating dock, South America-Peru they need offshore patrol vessels FIC's. We've also engaged with Brazil very recently. So all these potentials are available and we've about 14 to 15 agents distributed all across who give us the lead to identify what are the requirements and how do we go about doing it. So there is a huge potential. Actually we've submitted some of our bids also but just when the whole thing was shaping up, we've this Covid19.

Whatever we have given to ourselves, we should be able to place if not realise place-in order for about 70 to about 90 crores this year but over a periods of about 5 to 7 years it is to be taken to about 1000 to 1500 crores but what we're looking at, unfortunately this we don't have a big marker for capital warships like destroyer frigates and submarines.

The countries that we have in our vicinity or geographical area out here, they don't have their frigates and destroyers. And as they're all financially very intensive platforms costing 5000 crores

to about 7500 crores they don't want to buy these. So, identifying a market for these vessels is going to be a tough one, I won't say no, because if Bangladesh is there, and Sri Lanka is there and if they're also migrating to acquire frigates, you can build for them.

Will MDL be keen to go to the overseas market and acquire some of the existing ship-building companies, positioning as a global player. Is this idea possible as far as MDL is concerned in the near future down the line?

We will have to slightly wait and watch what is going to be the emerging government policy.

Right now, as far as the Department of Defence Production is concerned, we have not migrated to go - I mean that mandate has not been given to us to migrate and put a foothold out there and do a merger or acquisition of the - any shipyard. But should there be any such opportunity which the government mandates us to do this work, we have the capacity and we have the capability to do it.

In the leadership position on India's leading DPSU, you also have a greater responsibility to hand-holding private players to be the part of ecosystem which will lead to greater innovation & efficiency?

I've talked about what is the vision of MDL. Mission and the vision I have spelt out right in my opening statement here but I can tell you what we're doing is we're not only trying to execute with the quality and timely delivery of our projects, we're also trying to share technologies and we're trying to bolster all defence PSU shipyards. Like today, the project 17 Alpha programme, the complete designing details are being developed out here. Though 3 ships are being built by GRSE but the detailed designs are all being done. The complete provisioning action of major equipment, their price negotiation which happens with all the vendors for the economy of scale and a better kind of a rebate is all being undertaken and led by MDL. Also, their reps are also present here. So that's a huge amount of collaborative effort with GRSE and certainly they are getting bolstered to produce such kind of stealth frigates in their premise.

As you are aware, we have 42% of equity stake in GSL and Goa Shipyard Ltd, today they are also producing in collaboration with a Russian partner, 2 in number, Talwar-class stealth frigates. We already have 6 in number of such platforms, 4 more acquisitions where 2 are being built in GSL and 2 in Yentania Zavrot. Since we are located here, and we have a knowhow of building frigates and all, whatever assistance is being required by our sister shipyard which is Goa shipyard, we are very keen to work with them.

Now coming to share our entire efforts even with a private partner, we're giving impetus to 2 shipyards, who are also building different blocks of our running programs. We have Chouglay shipyard in Goa and we also have a private shipyard - Shoft shipyard in Bharuch. They are building certain blocks and it is a very nice hand holding. It is a very nice offloading, as it lessens my routine mundane kind of a job, at the same time they have also got fully entrenched with building such kind of complicated platforms so that's a very good thing to happen.

Like we gave an order for five in number naval OPV vessels to Pipavav, 3 in number cadet training vessels to ABG shipyard. Similarly there's a Gujarat PSU called Alcock Ashdown, we've given 6 in number vessels to them.

Maritime is important for the country's security and also for the economy. Having said that you are in a very unique position, as having served as decorated Vice admiral in Indian Navy and now as the CMD of a leading shipyard of the country. You see what is happening in the South China Sea. How can we fix such budgetary decline?

I can only share with you that the demonstration of the power of the country is only largely through the maritime power of the country. So if that is the keyword, whether what is the budgetary allocations, I am very sure, at every point of time the government has maintained that whilst you have a Covid19 like situation and the GDP has plummeted down, we would always meet all your critical requirements. So as far as we're concerned you can see a growth in maritime requirements.

<http://www.businessworld.in/article/MDL-Will-Deliver-All-6-Scorpene-Submarine-To-Indian-Navy-By-2023-CMD-Vice-Admiral-Narayan-Prasad/25-10-2020-335366/>

India wants tensions to end, but won't cede an inch of territory, says Rajnath Singh

"I can say with confidence that the courage and deeds of Indian soldiers will be written in golden letters by the historians," the Defence Minister said

By Dinakar Peri

New Delhi: India wants an end to the ongoing standoff with China in Eastern Ladakh, but Indian soldiers will not allow even an inch of the country to be taken away by anyone, Defence Minister Rajnath Singh said on Sunday.

"India wants an end to the ongoing border tension with China and restoration of peace. This is our objective. But at times, some nefarious incidents keep happening. I am very confident that our soldiers will never allow even an inch of our land to be taken away by anyone," Mr. Singh said after performing 'Shastra Puja' on the occasion of Dussehra at Sukna, headquarters of the Army's 33 Corps in West Bengal.

"I can say with confidence and on the basis of concrete information that the courage and deeds of Indian soldiers during whatever has happened at the India-China border in Ladakh recently will be written in golden letters by historians," Mr. Singh said.

Mr. Singh was accompanied on the visit by Army Chief Gen Manoj Naravane and after the puja, he inaugurated a road in Sikkim built by the Border Roads Organisation (BRO) through video-conference. The 19.85 Km alternate alignment of the National Highway 310 was necessitated due to the previous alignment having seen extensive damages due to sinking and other natural hazards, Defence Ministry said in a statement.

Since the standoff along the disputed boundary in Ladakh in May, the Army has been on high alert along the entire LAC. On June 15, 20 Indian soldiers were killed in a violent clash in Galwan valley in which China suffered an unknown number of casualties. A government official said China, through diplomatic channels, has accepted five personnel killed including a Commanding Officer.

Tensions flared up again on the South of Pangong Tso on August 29 and 30 after Indian Army occupied some dominating heights in the area on Indian side of LAC thwarting provocative moves by Chinese troops and later also on the ridgelines of Finger 4 on the North Bank. Several rounds of military and diplomatic talks have remained inconclusive in finding a way for disengagement and dep-escalation.



Defence Minister made the remarks after performing "Shastra Puja" — the customary worship of weapons — at the Sukna-based headquarters of the Indian Army's 33 Corps in Darjeeling district of West Bengal on the occasion of Dussehra. | Photo Credit: PTI

Mr. Singh was earlier scheduled to perform the puja at the high-altitude area of Sherathang, near the Line of Actual Control (LAC) in Sikkim, but that was dropped due to inclement weather, officials stated. *(With inputs from PTI)*

<https://www.thehindu.com/news/national/india-wants-an-end-to-border-tension-but-not-at-the-cost-of-ceding-land-says-rajnath-singh/article32940152.ece>

THE TIMES OF INDIA

Sun, 25 Oct 2020

Rajnath reviews LAC situation in eastern sector at Army's Trishakti Corps in Sukna

New Delhi: Defence minister Rajnath Singh on Saturday reviewed the combat preparedness of the Indian Army at the Sukna-based headquarters of its 33 Corps which is responsible for guarding the Line of Actual Control (LAC) with China in the Sikkim sector, officials said. The defence minister arrived at the key military base, popularly known as 'Trishakti' Corps, in Darjeeling district in late afternoon as part of his two-day visit to West Bengal and Sikkim to review the military preparedness in view of the border row with China in eastern Ladakh as well as to celebrate Dussehra with soldiers.

Singh is accompanied by Chief of the Army Staff General Manoj Mukund Naravane. The Army has significantly bolstered deployment of troops and weaponry along the nearly 3,500 km-long LAC including in the Sikkim and Arunachal Pradesh sectors.



The officials said top commanders of the 33 Corps gave detailed briefing to the defence minister and Gen Naravane on the situation along the LAC in Sikkim sector as well as about deployment of troops and weapons.

In an interaction with a group of Army personnel, the defence minister conveyed his wishes to them on the occasion of Vijayadashami and hailed their dedication in securing the nation's borders. "Due to brave soldiers like you, the borders of this country are protected. The whole country is proud of you," he said.

The defence minister also talked about the rich history of the Trishakti Corps. "The Trishakti Corps has a great golden history. Especially in 1962, 1967, 1971 and 1975, this Corps demonstrated examples of valour. It has been excellent," he said.

"I extend my best wishes to all of you and your family for the festival of Vijayadashami," the defence minister's office tweeted quoting him as saying.

Officials said Singh will perform 'Shastra puja'(worship of weapons) at Sherathang area in Sikkim on Sunday morning on the occasion of Dussehra.

The defence minister had performed 'Shastra Puja' in the French port city of Bordeaux during Dussehra last year as he was on a bilateral visit to the country then.

Singh has been performing 'Shastra Puja' during Dussehra for the last several years including during his tenure as the Union Home Minister in the previous NDA government.

Almost all formations of the Indian Army along the LAC are on a very high-level of alert in view of the border row with China in eastern Ladakh

India and China are locked in an over five-month-long bitter border standoff in eastern Ladakh that has significantly strained their ties.

Both sides held a series of diplomatic and military talks to resolve the row. However, no breakthrough has been achieved to end the standoff.

<https://timesofindia.indiatimes.com/india/rajnath-reviews-lac-situation-in-eastern-sector-at-armys-trishakti-corps-in-sukna/articleshow/78850255.cms>



Mon, 26 Oct 2020

Army commanders to review situation in Ladakh at 4-day conference from tomorrow

By Elizabeth Roche

- *The biannual commanders' conference will also deliberate on a slew of long-pending reform measures including reducing ceremonial practices and non-military activities to ensure optimum utilization of resources, a person familiar with the matter said*

New Delhi: Top officers of the Indian Army are expected to review India's combat readiness in eastern Ladakh as well as other sensitive areas along the Line of Actual Control border with China at a four-day brainstorming session beginning Monday.

The biannual commanders' conference will also deliberate on a slew of long-pending reform measures including reducing ceremonial practices and non-military activities to ensure optimum utilization of resources, a person familiar with the matter said.

Indian Army Chief, Manoj Mukund Naravane will chair the Army Commanders' Conference (ACC) that will end on Thursday.

It comes as India is faced with the possibility of simultaneously dealing with China and Pakistan along its western and northern borders.

Defence Minister Rajnath Singh, chief of Defence Staff Bipin Rawat, chief of Naval Staff Karambir Singh and Indian Air Force chief Rakesh Kumar Singh Bhadauria will address the commanders on Tuesday.

"The Army Commanders will carry out a comprehensive review of the security challenges facing the nation including the situation in eastern Ladakh and Jammu and Kashmir," the person cited above said.

The situation in eastern Ladakh remains tense as both Indian and Chinese armies deployed over 50,000 troops each along the Line of Actual Control (LAC) following the escalation of a military standoff that began in early May.

Subjects on the discussion table include human resource management, the person cited above said. The status of various infrastructure projects undertaken by the Border Roads Organisation especially along India's periphery is also expected to be discussed.

Besides a review of security challenges facing the country, the Army commanders will look at reform measures recommended by internal committees in the utilisation of resources while giving priority to the sharpening of operational capability of the 1.3-million strong army, the person said. A proposal being looked at is asking various military units to cut down the costs of celebrating Raising Days and Battle Honour Days.

<https://www.livemint.com/news/india/army-commanders-to-review-situation-in-ladakh-at-4-day-conference-from-tomorrow-11603639276210.html>

Army Chief General Manoj Naravane to visit Nepal from November 4-6

India is in the process of repairing ties with Nepal, which took a hit earlier in the year after Nepal published a new political map in May

Army Chief General MM Naravane's three-day crucial visit to Nepal beginning on November 4 is expected to have a significant diplomatic overtone with India looking at resetting relations with the Himalayan nation after the ties came under severe strain following a bitter border row, officials said on Sunday.

The Chief of Army Staff is scheduled to hold extensive talks with the top civilian and military brass of Nepal including his counterpart General Purna Chandra Thapa on a range of key issues such as further boosting the management of the nearly 1,800 km-long border between the two countries. "The Chief of Army Staff is scheduled to visit Nepal from November 4 to 6 with an aim to strengthen overall ties including in areas of defence and security," a highly placed government source told PTI.



Chief of Army Staff Gen M M Naravane

In continuation of an age-old tradition that started in 1950, General Naravane will be conferred with the honorary rank of "General of the Nepal Army" by Nepalese President Bidya Devi Bhandari at an event in Kathmandu. India also confers the honorary rank of "General of Indian Army" to the Nepal Army Chief.

It will be the first high-level visit from India to Kathmandu since the ties between the two neighbours came under strain after the Himalayan nation came up with a new political map in May claiming several areas in Uttarakhand to be part of its territory.

India's decision to send the Army Chief to Nepal to reset the ties is seen as part of a larger exercise by New Delhi to rejuvenate relations with Myanmar, the Maldives, Bangladesh, Sri Lanka, Bhutan and Afghanistan in the wake of greater efforts by China to expand its influence in the region.

Earlier this month, General Naravane travelled to Myanmar along with Foreign Secretary Harsh Vardhan Shringla on a very crucial visit during which India decided to supply an attack submarine to the Myanmar Navy besides agreeing to further deepen military and defence ties.

Nepal is important for India in the context of its overall strategic interests in the region, and leaders of the two countries have often noted the age-old "Roti-Beti" relationship. Land-locked Nepal relies heavily on India for the transportation of goods and services. Nepal's access to sea is through India, and it imports a predominant proportion of its requirements from and through India.

According to official data, Nepal's imports from India in 2017 were worth USD 6.52 billion while its exports to the country were pegged at USD 420.18 million. The figure for China, which was second on the list of countries from which Nepal imported its requirements, was five times lower than that of India.

With regards to security, India's strategic thinkers are concerned over reports of China grabbing Nepalese territories in a number of locations along the border between the two countries, though Kathmandu has claimed that there were no such encroachments.

India-Nepal ties came under strain after Defence Minister Rajnath Singh inaugurated an 80-km-long strategically crucial road connecting the Lipulekh pass with Dharchula in Uttarakhand on May

8. Nepal protested the inauguration of the road claiming that it passed through its territory. Days later, Nepal released a new map showing Lipulekh, Kalapani and Limpiyadhura as its territories.

In the midst of the row, General Naravane said that there were reasons to believe that Nepal objected to the road at the behest of "someone else", in an apparent reference to China. The comments triggered angry reactions from Nepal.

India too had published a new map in November 2019 showing the abovementioned areas as its territories. After Nepal released the map, India reacted sharply, calling it a "unilateral act" and cautioned Kathmandu that such "artificial enlargement" of territorial claims will not be acceptable to it. In June, Nepal's Parliament approved the new political map of the country featuring areas which India maintains belong to it. In response, India said Nepal's action violates an understanding reached between the two countries to resolve the boundary issues through talks.

Nepalese Prime Minister K P Sharma Oli has been asserting that Lipulekh, Kalapani and Limpiyadhura belong to Nepal and vowed to "reclaim" them from India.

The Lipulekh pass is a far western point near Kalapani, a disputed border area between Nepal and India. Both India and Nepal claim Kalapani as an integral part of their territory - India as part of Uttarakhand's Pithoragarh district and Nepal as part of Dharchula district.

<https://www.outlookindia.com/website/story/india-news-army-chief-general-manoj-naravane-to-visit-nepal-from-november-4-6/362969>



Sat, 24 Oct 2020

Navy demonstrates combat readiness; missile sinks target in practice drill

In a demonstration of its combat readiness in strategic sea lanes around India, the Indian Navy on Friday released a video of an anti-ship missile destroying a sinking ship with "deadly accuracy" somewhere in the Arabian Sea

New Delhi: In a demonstration of its combat readiness in strategic sea lanes around India, the Indian Navy on Friday released a video of an anti-ship missile destroying a sinking ship with "deadly accuracy" somewhere in the Arabian Sea.

The missile was fired by frontline corvette INS Prabal as part of a mega naval drill involving aircraft carrier INS Vikramaditya and a number of warships, attack helicopters, aircraft and other assets of the Navy.

An Indian Navy Spokesperson tweeted that the missile homed in on its target, an old ship, hitting with deadly accuracy at its maximum range.

"#AShM launched by #IndianNavy Missile Corvette #INSPrabal, homes on with deadly accuracy at max range, sinking target ship," he said.

Chief of Naval Staff Admiral Karambir Singh on Thursday reviewed the operational preparedness of his force at various shore-based locations as well as at sea.

He also addressed a select group of combatants of the Navy's Carrier Battle Group over a broadcast from the INS Vikramaditya, India's only aircraft carrier, and reviewed the force's overall combat readiness, officials said.

In his remarks, Admiral Singh complimented his force for continuously maintaining "peak combat-readiness" and "high tempo" of operations over the past few months, they said.

The Indian Navy has significantly increased its deployment in the Indian Ocean Region, in an attempt to send across a message to China in the wake of escalation in tension between the two countries.

Giving an overview of the prevailing security situation, the Chief of Naval Staff stated that the Navy would continue to maintain a high-tempo of operations in coming months.

“He also complimented the Carrier Battle Group and its combatants for accurate and effective weapon firings, which left no doubt about the Navy’s readiness to meet any emergent contingencies,” the Navy said in a statement on Thursday.

A carrier battle group is a mega naval fleet comprising an aircraft carrier, accompanied by a large number destroyers, frigates and other ships.

“Indian Navy continues to maintain a high tempo of operations and combat-readiness despite the Covid-19 pandemic by adhering to stringent protocols onboard warships, submarines and aircraft squadrons and bases, and is fully prepared to tackle challenges in the maritime domain,” the Navy said.

<https://www.hindustantimes.com/india-news/watch-india-navy-demonstrates-combat-readiness-ins-prabal-fires-missile-in-practice-drill/story-bW9NhAifq6cBVGpvcFmZjN.html>



The missile was fired by frontline corvette INS Prabal as part of a mega naval drill involving aircraft carrier INS Vikramaditya and a number of warships, attack helicopters, aircraft and other assets of the Navy. (File photo)

Near Collision of Rocket Part, Satellite in Orbit Stirs up Space Junk Worries

By Raunak Gupta

In 1989, the Soviet Union launched a navigation satellite called Kosmos 2004 from one of its northern cosmodromes. Twenty years later, in an unrelated event, China launched a rocket called CZ-4C, to put a military reconnaissance satellite in space. Other than their military utilities, these two space-bound objects had nothing in common. But unbeknownst to anyone, their destinies were going to intersect.

On October 13 this year, LeoLabs Inc., a Silicon Valley company, alerted the world to a dangerous collision event. The company employs a collection of ground-based radars that allow it to track and identify objects of various sizes in low-Earth orbit – which is any orbit above 100 km and below 2,000 from Earth’s surface.

In a tweet, the company identified two objects that were on a collision course – Kosmos 2004 and a part of the CZ-4C rocket. According to its pre-collision analysis, the now defunct Cold Soviet-era satellite and a discarded stage of the Chinese rocket had a 1% to 20% chance of colliding in space, some 991 km above Antarctica, on October 16.

The next day, LeoLabs updated its probability calculation to greater than 10%. The combined mass of the two objects approximated to be 2,800 kg, and they were approaching each other at a relative speed of 14.7 km/s. This scenario represented a large amount of potential collision energy in the event of a crash, even if it posed no threat to anything on the ground. More importantly, the intensity of the collision would likely produce small debris that would burn off when it reentered Earth’s atmosphere. So why bother?

It is bothersome because such collisions typically generate debris that, while it would burn up on reentry, actually tends to hang around in orbit for a long time first. In an interview with *ScienceAlert*, Alice Gorman, a space archaeologist in Australia, called this event “one of the potentially worst accidental collisions that we’ve seen for a while.”

Apart from the intensity of the crash itself, a collision between two large objects like Kosmos and CZ-4C is also likely to produce lots of small pieces, and could single-handedly increase the amount of space debris occupies in low-Earth orbit by a few percentage points. The high potential energy also means the pieces are flung out into space, and without any drag, they whiz around in orbit at those high speeds. They’re practically bullets to satellites and space-walking astronauts.

As space gets more crowded this way, we get closer to a tipping point, called the Kessler syndrome. NASA scientists Donald Kessler and Burton Cour-Palais posited in 1978 that if the debris cloud surrounding Earth becomes dense enough, one collision event could lead to a cascade of subsequent collisions, like a domino effect, that produce even more debris. Eventually, sections of Earth orbit could be rendered entirely unusable.

In the 1970s, Kessler’s and Cour-Palais’s thesis was more in the realm of informed foresight backed by technical rigour. But today the Kessler syndrome is a very real possibility. Every time there is an accidental collision in orbit, orbital debris is one of the major concerns of every stakeholder, but especially spaceflight agencies like NASA and the Indian Space Research Organisation (ISRO).

In May 1963, the Massachusetts Institute of Technology placed 480 million tiny copper needles, each about 1.7-cm long, in orbit to create an ‘artificial ionosphere’ that would help the US military’s radio communications. This isn’t considered to be a debris-generating event, but the needles as such considerably cluttered space and are obsolete today thanks to advances in communication technology.

A second significant event took place in 2007, when China launched an anti-satellite missile to blow up a test satellite. The event generated many thousands of pieces of debris that also dispersed around the satellite’s orbit as well as spread up and down to other orbits. A 2007 analysis estimated that only 6% of the debris will burn up in Earth’s atmosphere in 10 years, and only 21% in 100 years.

Only two years later, there was another significant collision event — between Russia’s commercial Iridium 33 satellite and military Kosmos 2251 satellite. According to the US Space Surveillance Network, the event had been responsible for more than 2,000 debris fragments in orbit by July 2011. As of January 2016, *SpaceNews* reported that 1,505 pieces were still in orbit and hadn’t yet reentered the atmosphere. This was the first instance of two satellites colliding, instead of one satellite and some debris.

A decade later, in March 2019, India’s Defence Research and Development Organisation (DRDO) emulated China, launching an anti-satellite missile to shoot down a purpose-built satellite that ISRO had placed in low-Earth orbit. DRDO Chief G. Sateesh Reddy had said all the debris would burn up in the atmosphere by May. But six months later, at least 30 fragments were still found to be in orbit, plus how many ever smaller fragments that ground-based systems couldn’t track.

As for the potential Kosmos and CZ-4C collision: 10 minutes after the time of closest approach, LeoLabs tweeted that CZ-4C had passed over its radar station in New Zealand as a single object without debris. The company followed it up with an estimate of the miss distance – about 11 metres.

Even though other experts have come up with more conservative estimates, there is no denying that this was a near-hit. We avoided disaster this time but there is no avoiding the potential for such collisions in future. Space junk is not going anywhere. The European Space Agency combines observations with statistical models to list the number and sizes of objects that make up this junk. The data unequivocally suggests that we are only generating more debris with time.

Some spaceflight agencies today require new missions to include de-orbiting manoeuvres that will ensure a satellite that has reached the end of its life doesn’t hang around in orbit, and falls back down to get burnt. SpaceX’s planned fleet of 12,000 Starlink satellites, to facilitate internet access around the planet, is one example. While these measures are good, they’re not enough. We need to pollute space less but we also need to clean up what’s already there. Many space missions shed multiple stages in the course of their journeys, and each stage is a potential piece of debris and/or the source of more pieces. The CZ-4C object is an example.

Researchers have already begun to develop some tools and techniques that could help. For example, Surrey Satellite Technologies has developed a net to capture and remove debris from orbit. The European Space Agency has developed e.Deorbit – a ‘debris grabber’ – that is planning to launch in 2025.

But more broadly, we don’t have any reliable way of mitigating this problem except hope that spacefaring countries listen to their better angels and that the technologies we develop hold out. This is also why, when a potential collision is impending, space scientists and engineers around the world can only wait with bated breath, and react to the best of their ability.

Tipping points are fraught with uncertainty. There is no saying when we reach one.

<https://science.thewire.in/space/kosmos-2004-cz-4c-orbital-debris-space-junk-kessler-syndrome-deorbiting/>

ISRO's Mars mission discovers how dust storms expand the red planet's atmosphere

ScientiFix, our weekly feature, offers you a summary of the top global science stories of the week

By Mohana Basu

New Delhi: Data from ISRO's Mars Orbiter Mission shows that dust storms on the Red Planet causes its upper atmosphere to undergo warming and expansion, which in turn causes some of its gases to escape into outer space.

Planets in the solar system constantly lose their atmospheres to outer space. The rate of this loss depends on the size of a planet and temperature of its upper atmosphere.

Since Mars is a relatively smaller planet compared to the Earth, it is losing its atmosphere at a faster rate. However, ISRO has now found how this loss is altered by the changes in the upper atmospheric temperature on Mars.

Characterising the Martian upper atmosphere is extremely important to understand this loss rate. This was one of the primary goals of the recent missions to Mars such as NASA's Mars Atmosphere and Volatile Evolution (MAVEN) and ISRO's Mars Orbiter Mission (MOM).

In the first week of June 2018, a dust storm started growing on Mars, engulfing the whole planet by the first week of July 2018. During this time, India's Mars orbiter observed the evening side of Mars by diving down to altitudes as low as 155 km.

By analysing the data, scientists found that the upper atmosphere was undergoing warming and expansion as the dust storm slowly engulfed Mars over a month.

The team also inferred that the heating and expansion of global dust storm leads to a part of its atmosphere to quickly reach the exobase altitude at 220 km. Exobase is the outermost region of a planet's atmosphere.

Any hot gases above the exobase altitude are more likely to move to further higher altitudes and subsequently escape to outer space. The study found that the 2018 global dust storm resulted in enhanced escape of the Martian atmosphere. .

Scientists decode effect of volcanic activity on Jupiter's moon Io

The Atacama Large Millimeter/submillimeter Array (or ALMA) has for the first time documented the direct effect of volcanic activity on the atmosphere of Jupiter's moon Io.

Io is the most volcanically active moon in our solar system, hosting over 400 active volcanoes. These volcanoes throw up sulphur gases that give Io its colours when they freeze out on its surface.

The images of Jupiter's moon Io in radio waves (made with ALMA), and optical light (made with Voyager 1 and Galileo missions) for the first time show plumes of sulphur dioxide in yellow rising up from the volcanoes on Io.

To distinguish between the different processes that give rise to Io's atmosphere, the team took snapshots of the moon when it passed in and out of Jupiter's shadow.

Based on the snapshots, they calculated that active volcanoes directly produce 30-50 per cent of Io's atmosphere.



A view of Mars captured by ISRO's Mars Orbiter | Twitter

When Io passes into Jupiter's shadow, and is out of direct sunlight, it becomes too cold for sulphur dioxide gas, which condenses onto Io's surface. During that time only volcanically-sourced sulphur dioxide is visible. This allows researchers to infer exactly how much of the atmosphere is impacted by volcanic activity.

The ALMA images also showed a third gas coming out of volcanoes: potassium chloride.

Researchers find evidence of 'lost' tectonic plate

Scientists in the US believed that they have found a long lost piece of puzzle in the Earth's tectonic plates.

The existence of a tectonic plate called Resurrection has been a topic of debate among geologists. This is because while some argue that it never existed, others say it went into the Earth's mantle somewhere in the Pacific Margin between 40 and 60 million years ago.

Using existing mantle tomography — which is similar to taking a CT scan of the Earth's interior — the team found direct evidence that the Resurrection plate existed.

The reconstructed boundaries of this ancient plate match well with the ancient volcanic belts in Washington State and Alaska.

Detailed study of tectonic plates is important because it helps geologists better predict volcanic hazards, as well as find mineral and hydrocarbon deposits.

<https://theprint.in/scientifx/isros-mars-mission-discovers-how-dust-storms-expand-the-red-planets-atmosphere/530237/>



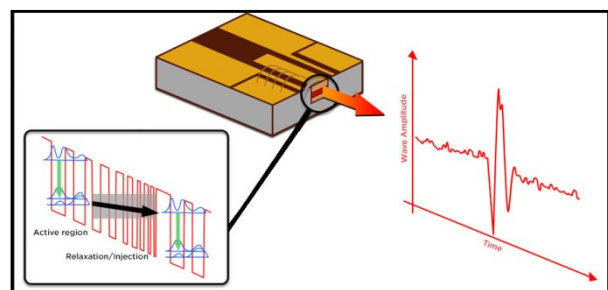
Sat, 24 Oct 2020

Quantum cascade lasers (QCLs) exhibit extreme pulses

By Renae Keep

Extreme events occur in many observable contexts. Nature is a prolific source: rogue water waves surging high above the swell, monsoon rains, wildfire, etc. From climate science to optics, physicists have classified the characteristics of extreme events, extending the notion to their respective domains of expertise. For instance, extreme events can take place in telecommunication data streams. In fiber-optic communications where a vast number of spatio-temporal fluctuations can occur in transoceanic systems, a sudden surge is an extreme event that must be suppressed, as it can potentially alter components associated with the physical layer or disrupt the transmission of private messages.

Recently, extreme events have been observed in quantum cascade lasers, as reported by researchers from Télécom Paris (France) in collaboration with UCLA (USA) and TU Darmstadt (Germany). The giant pulses that characterize these extreme events can contribute the sudden, sharp bursts necessary for communication in neuromorphic systems inspired by the brain's powerful computational abilities. Based on a quantum cascade laser (QCL) emitting mid-infrared light, the researchers developed a basic optical neuron system operating 10,000 times faster than biological neurons. Their report is published in *Advanced Photonics*.



Quantum cascade photonic device, from Spitz et al., doi 10.1117/1.AP.2.6.066001. Credit: SPIE

Giant pulses, fine tuning

Olivier Spitz, Télécom Paris research fellow and first author on the paper, notes that the giant pulses in QCLs can be triggered successfully by adding a "pulse-up excitation," a short-time small-amplitude increase of bias current. Senior author Frédéric Grillot, Professor at Télécom Paris and the University of New Mexico, explains that this triggering ability is of paramount importance for applications such as optical neuron-like systems, which require optical bursts to be triggered in response to a perturbation.

The team's optical neuron system demonstrates behaviors like those observed in biological neurons, such as thresholding, phasic spiking, and tonic spiking. Fine tuning of modulation and frequency allows control of time intervals between spikes. Grillot explains, "The neuromorphic system requires a strong, super-threshold stimulus for the system to fire a spiking response, whereas phasic and tonic spiking correspond to single or continuous spike firing following the arrival of a stimulus." To replicate the various biological neuronal responses, interruption of regular successions of bursts corresponding to neuronal activity is also required.

Quantum cascade laser

Grillot notes that the findings reported by his team demonstrate the increasingly superior potential of quantum cascade lasers compared to standard diode lasers or VCSELs, for which more complex techniques are currently required to achieve neuromorphic properties.

Experimentally demonstrated for the first time in 1994, quantum cascade lasers were originally developed for use under cryogenic temperatures. Their development has advanced rapidly, allowing use at warmer temperatures, up to room temperature. Due to the large number of wavelengths they can achieve (from 3 to 300 microns), QCLs contribute to many industrial applications such as spectroscopy, optical countermeasures, and free-space communications.

According to Grillot, the physics involved in QCLs is totally different than that in diode lasers. "The advantage of quantum cascade lasers over diode lasers comes from the sub-picosecond electronic transitions among the conduction-band states (subbands) and a carrier lifetime much shorter than the photon lifetime," says Grillot. He remarks that QCLs exhibit completely different light emission behaviors under optical feedback, including but not limited to giant pulse occurrences, laser responses to modulation, and frequency comb dynamics.

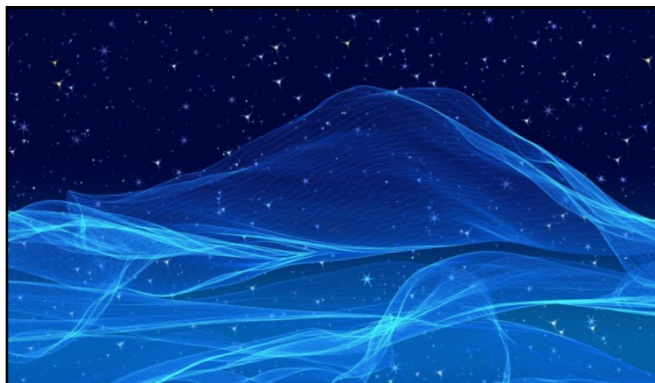
More information: Olivier Spitz et al, *Extreme events in quantum cascade lasers*, *Advanced Photonics* (2020). DOI: [10.1117/1.AP.2.6.066001](https://doi.org/10.1117/1.AP.2.6.066001)
<https://phys.org/news/2020-10-quantum-cascade-lasers-qcls-extreme.html>

Time crystals lead researchers to future computational work

Time crystals sound like something out of science fiction, but they may be the next major leap in quantum network research. A team based in Japan has proposed a method to use time crystals to simulate massive networks with very little computing power.

They published their results on October 16 *Science Advances*.

First theorized in 2012 and observed in 2017, time crystals are arrangements of matter that repeat in time. Normal crystals, such as diamonds or salt, repeat their atomic self-organization in space, but do not show any regularity in time. Time crystals self-organize and repeat their patterns in time, meaning their structure changes periodically as time progresses.



Credit: CC0 Public Domain

"The exploration of time crystals is a very active field of research and several varied experimental realizations have been achieved," said paper author Kae Nemoto, professor in the principles of informatics research division at the National Institute of Informatics. "Yet an intuitive and complete insight of the nature of time crystals and their characterization, as well as a set of proposed applications, is lacking. In this paper, we provide new tools based on graph theory and statistical mechanics to fill this gap."

Nemoto and her team specifically examined how the quantum nature of time crystals—how they shift from moment to moment in a predictable, repeating pattern—can be used to simulate large, specialized networks, such as communication systems or artificial intelligence.

"In the classical world, this would be impossible as it would require a huge amount of computing resources," said Marta Estarellas, one of the first authors of the paper from the National Institute of Informatics. "We are not only bringing a new method to represent and understand quantum processes, but also a different way to look at quantum computers."

Quantum computers can store and manipulate multiple states of information, meaning they can process huge data sets with relatively little power and time by solving several potential outcomes at the same time, rather than one by one like classical computers.

"Can we use this network representation and its tools to understand complex quantum systems and their phenomena, as well as identify applications?" Nemoto asked. "In this work, we show the answer is yes."

The researchers plan to explore different quantum systems using time crystals after their approach is experimentally tested. With this information, their goal is to propose real applications for embedding exponentially large complex networks in a few qubits, or quantum bits.

"Using this method with several qubits, one could simulate a complex network the size of the entire worldwide internet," Nemoto said.

More information: *M. P. Estarellas et al, Simulating complex quantum networks with time crystals, Science Advances (2020). DOI: [10.1126/sciadv.aay8892](https://doi.org/10.1126/sciadv.aay8892)*

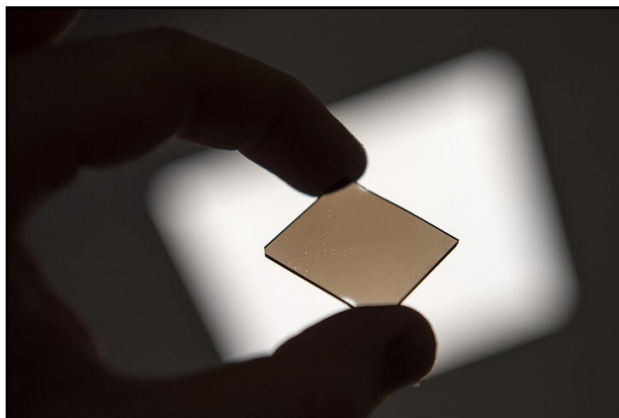
Journal information: *Science Advances*
<https://phys.org/news/2020-10-crystals-future.html>

Scientists manage to improve metallic glasses

Researchers at National University of Science and Technology MISIS (NUST MISIS) have managed to develop a unique method to process bulk metallic glasses. According to the authors of the study, they have managed to find processing conditions that significantly improve the quality of this promising material. The research results were published in *Journal of Alloys and Compounds*.

Metallic glasses (amorphous metals) are materials which, unlike crystalline forms, don't have a long range atomic order. According to the scientists, this makes the material high-strength, elastic, and corrosion resistant. Amorphous metals also have other useful properties, due to which they are in demand in instrument making, mechanical engineering, medicine and magneto-electrical engineering.

NUST MISIS scientists explained that the material's brittleness is one of the obstacles to its widespread use. The authors of the study believe that the new method to process metallic glasses will help eliminating this problem. The method was tested on an amorphous Zr-Cu-Fe-Al system alloy.



Metallic glass sample. Credit: NUST MISIS

"Annealing before and after rolling was 'prohibited' by the canons of the science of metallic glasses, since this leads to their embrittlement in the absolute majority of cases. The choice of the alloy composition and alloying system helped us bypass this problem: annealing at about 100 degrees below the glass-transition temperature allowed to achieve ductilization of bulk samples and hardening of tape samples without embrittlement," Professor Dmitry Luzgin, the research supervisor, explained.

According to the scientists, it is the way the original amorphous matrix of the alloy decomposes that affects the resulting material's characteristics. Different results are achieved depending on the samples' geometry, bulk or tape.

"For bulk samples, we've achieved an increase in tensile plasticity of up to 1.5% at room temperature by dividing a homogeneous amorphous phase into two. For ribbon samples, a 25% increase in hardness has been achieved, which is provided with the separation of secondary-amorphous-phase glassy nanoparticles of about 7 nm with retention of plasticity on bending and compression. This is an unexpected and rather significant result," Andrey Bazlov, the author of the method, an employee at the Department of Physical Metallurgy of Non-ferrous Metals of NUST MISIS, said.

NUST MISIS scientists explained that the Zr-Cu-Fe-Al system alloy cannot be used as the main structural material due to its high cost; but they believe that the proposed technology can be applied to other amorphous alloys, in particular, titanium.

The new method will simplify the process of imparting the necessary properties to metallic glasses, thereby expanding their scope of application. In the future, the research team wants to use the new technology to produce titanium and other high-quality bulk metallic glasses.

More information: A.I. Bazlov et al, *Thermo-mechanical processing of a Zr_{62.5}Cu_{22.5}Fe₅Al₁₀ glassy alloy as a way to obtain tensile ductility*, *Journal of Alloys and Compounds* (2020). DOI: [10.1016/j.jallcom.2020.157138](https://doi.org/10.1016/j.jallcom.2020.157138)

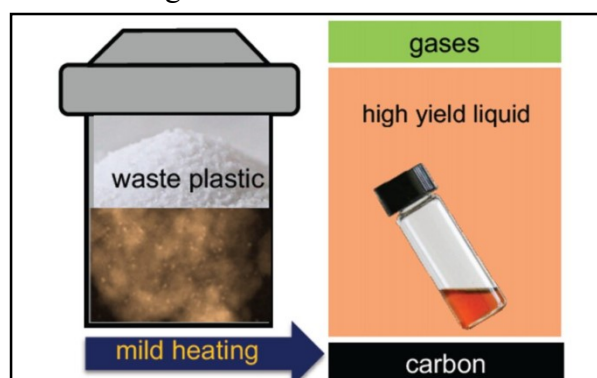
<https://phys.org/news/2020-10-scientists-metallic-glasses.html>

Turning a common plastic Into high-value molecules

By *Susannah Scott*

If you thought those flimsy disposable plastic grocery bags represented most of our plastic waste problem, think again. The volume of plastic the world throws away every year could rebuild the Ming Dynasty's Great Wall of China—about 3,700 miles long.

In the six decades that plastic has been manufactured for commercial uses, more than 8.3 billion metric tons have been produced. Plastics are light, versatile, cheap and nearly indestructible (as long as they don't get too hot). These properties make them incredibly useful in an enormous range of applications that includes sterile food packaging, energy-efficient transportation, textiles and medical protective gear. But their indestructible nature comes at a cost. Most of them decompose extremely slowly in the environment – on the order of several hundred years – where they are creating a global epidemic of plastic trash. Its consequences for human and ecosystem health are still incompletely known, but are potentially momentous.



A simple one-pot process turns polyethylene plastic waste into valuable liquids when it is exposed to a solid chemical catalyst and a little heat. Credit: Fan Zhang, UCSB, CC BY-SA

I am a chemist with experience in designing processes for making plastics, and I became interested in using plastic as a large, untapped resource for energy and materials. I wondered if we could turn plastic waste into something more valuable to keep it out of landfills and the natural environment.

A new way to use plastic waste

Plastics are made by stringing together a large number of small, carbon-based molecules in an almost infinite variety of ways to create polymer chains.

To reuse these polymers, recycling facilities could, in principle, melt and reshape them, but plastics' properties tend to deteriorate. The resulting materials are almost never suitable for their original use, although they can be used to make lower-value stuff like plastic lumber. The result is a very low effective rate of recycling.

A new approach involves breaking the long chains down into small molecules again. The challenge is how to do this in a precise way.

Since the process of making the chains in the first place releases a lot of energy, reversing it requires adding a large amount of energy back in. Generally this means heating up the material to a high temperature—but heating up plastic causes the stuff to turn into a nasty mess. It also wastes a lot of energy, meaning more greenhouse gas emissions.

My team at UC Santa Barbara, working with colleagues at the University of Illinois Urbana-Champaign and Cornell, discovered a clean way to turn polyethylene into useful smaller molecules.

Polyethylene is one of the world's most useful and most used plastic types. It is also one of the largest contributors to plastic waste. It represents a third of the nearly 400 million metric tons of plastic the world makes every year, for purposes ranging from sterile food and medical packaging, waterproof films and coatings, cable and wire insulation, construction materials and water pipes, to wear-resistant hip and knee replacements and even bulletproof vests.

How the new process works

The process we have developed does not require high temperatures, but instead depends on tiny amounts of a catalyst containing a metal that removes a little hydrogen from the polymer chain. The catalyst then uses this hydrogen to cut the bonds that hold the carbon chain together, making smaller pieces.

The key is using the hydrogen as soon as it forms so that the chain-cutting provides the energy for making more hydrogen. This process is repeated many times for each chain, turning the solid polymer into a liquid.

The chopping slows down naturally when the molecules reach a certain size, so it's easy to prevent the molecules from becoming too small. We're able to recover the valuable liquid before it turns into less useful gases.

A majority of the molecules in the recovered liquid are alkylbenzenes, which are useful as solvents and can easily be turned into detergents. The global market for this type of molecule is about US\$9 billion annually.

Turning waste plastic into valuable molecules is called upcycling. Although our study represented a small-scale demonstration, a preliminary economic analysis suggests that it could easily be adapted to become a much larger-scale process in the next few years. Keeping plastic out of the environment by reusing it in a way that makes good economic sense is a win-win.

Provided by [The Conversation](#)

<https://phys.org/news/2020-10-common-plastic-high-value-molecules.html>



Sat, 24 Oct 2020

Researchers use neutrons to study weld-induced stress relief in renewable energy infrastructure

By *Jeremy Rumsey*

Welding is an essential part of manufacturing, and the key to making crack-free welds relies on the ability to understand how the weld is put together atom by atom.

Before the COVID-19 pandemic, graduate students at the Center for Welding, Joining and Coatings Research of Colorado School of Mines, Tim Pickle and Ben Schneiderman, used neutrons at the Department of Energy's (DOE's) Oak Ridge National Laboratory (ORNL) to improve that understanding. They're part of a project supported by DOE's SunShot division and the National Renewable Energy Laboratory (NREL). The goal is to investigate the performance of welds used to build large thermal energy storage tanks at concentrating solar plants—facilities with vast networks of mirrors used to collect solar energy, some stretching several million square feet in size.



Colorado School of Mines graduate student researchers (left) Ben Schneiderman and Tim Pickle using neutrons at ORNL's High Flux Isotope Reactor to measure residual stress in welds used to make renewable energy storage tanks. Credit: ORNL/Genevieve Martin

"What we're trying to do is compare the differences in stress profiles between two manufacturing approaches, with and without post-weld heat treatment, used to create the storage tanks," said Pickle. "We're also trying to validate a finite element model that can be used by NREL and potential manufacturers to help them determine the best welding and post-weld heat treatment procedures to mitigate and find solutions to cracking problems."

Specifically, the team is studying stress relaxation cracking (SRC)—the susceptibility of welds to cracking over time due to factors such as internal stress and high temperatures. Thermal fatigue created by alternating stress between room and extremely high temperatures may also contribute to SRC. Each time the metal experiences a change in temperature during the welding process, new stress is added. Those lasting changes, or deformations, called residual stresses, can have a big impact on the performance of the weld during service.

The storage tanks are large structures about 100 feet wide by 30 feet tall. They're used to store molten salt material that is heated and liquified to store energy captured by solar panels. When energy is needed, the molten salt is pumped into a steam system that boils water, which then spins a turbine that generates electricity.

Essentially, a tank is made by rolling large plates of stainless steel into a cylinder. The ends are then fused together using seam welds, which require multiple layers of weld metal to fill the space in between the weld joints.

"When the welded areas of the wall joints go from room temperature to above 550 or 600 degrees Celsius, they develop stresses around the weld," said Pickle. "We want to know if we can reduce the tensile stress by using a post-weld heat treatment before the weld goes into service, to extend the lifetime of the weld and mitigate the cracking mechanism we think is happening. To do that, we need to measure the residual stresses."

Neutrons are the ideal tool for examining residual stress because they penetrate materials deeply to reveal atomic changes in the material's internal structure. Using the HIDRA instrument (formerly the Neutron Residual Stress Mapping Facility) at ORNL's High Flux Isotope Reactor, the team performed experiments on 2-inch-thick plates of 347 H stainless steel that were joined using a "40-pass" weld—a large weld consisting of 40 total individual weld beads to fuse the two ends together.

"Less sophisticated approaches to measuring stress involve drilling holes in the metal and measuring how the material deforms around the hole, as some of the residual stress is relieved by drilling. However, that would limit us to only being able to measure residual stresses in limited locations, not to mention that the thickness of the steel in this experiment would have made it even more difficult," said Schneiderman.

"To get a complete picture of the stress, we need to look at three principal strain directions from plate edge to weld centerline as a function of plate thickness, which neutrons allow us to measure. The technique has evolved to the point where using neutrons to make this sort of measurement has become more widely available to graduate student researchers like us, which really helps us carry out higher-quality investigations to inform the problem of SRC."

Provided by [Oak Ridge National Laboratory](https://phys.org/news/2020-10-neutrons-weld-induced-stress-relief-renewable.html)

<https://phys.org/news/2020-10-neutrons-weld-induced-stress-relief-renewable.html>

Pump down the volume: Study finds noise-cancelling formula

Noisy, open-plan offices full of workers hunched over desks while wearing noise canceling headphones could soon be a thing of the past, thanks to new research from The Australian National University (ANU).

The ANU researchers have developed a new formula to show how effective noise cancellation technology can be in different spaces.

Lead researcher Dr. Aimee Zhang says the ultimate goal is to achieve a noise-free environment without the use of headphones.

"Our formula allows us to calculate the best level of cancellation we can achieve in a certain area—for example, an office with a basic desk set-up, windows and doors," Dr. Zhang said.

"This is a way of creating a quieter space, without the need for everyone to keep their headphones on."

According to Dr. Zhang, the challenge is that while noise canceling headphones are generally very effective—because the ear is such a small surface area—trying to block out noise in a bigger space is much harder.

"Essentially, you have to set up multiple microphones and speakers to cancel out the original noise source," she said.

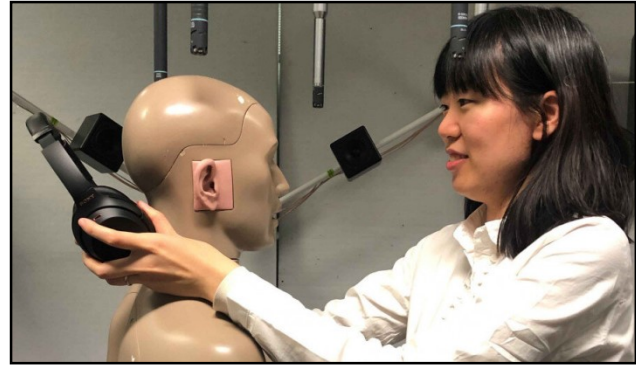
"This is not always practical. We don't always have sufficient resources to achieve an ideal level of cancellation. This study gives us a way to predict how much noise we can cancel out, and how much can't be eliminated—before implementing a complex noise cancellation system. If we develop this technology further, it could not only be incredibly useful in homes and office spaces, but even in planes and cars."

The study is part of an ongoing collaboration between the Audio and Acoustic Signal Processing group at the ANU College of Engineering and Computer Science, led by Professor Thushara Abhayapala, and technology giant Sony.

The study has been published in *The Journal of the Acoustical Society of America*.

More information: Jihui Aimee Zhang et al. Coherence-based performance analysis on noise reduction in multichannel active noise control systems, *The Journal of the Acoustical Society of America* (2020). DOI: [10.1121/10.0001938](https://doi.org/10.1121/10.0001938)

Journal information: [Journal of the Acoustical Society of America](https://phys.org/news/2020-10-volume-noise-cancelling-formula.html)
<https://phys.org/news/2020-10-volume-noise-cancelling-formula.html>



Dr Aimee Zhang. Credit: Australian National University

The other vaccine

Research suggests that a flu shot can offer a shield against severe COVID-19

By Partha Majumder

A former postdoc of mine, who is now a professor in the Calcutta University, was infected with SARS-CoV-2 a couple of months ago and had recovered from COVID-19. She asked me, “After our antibody level against the coronavirus goes down, would it be desirable to take an influenza vaccine?”

When a virus or bacteria infects someone, the body fights back. The immune system produces antibodies that are critical to fighting and clearing the virus. The antibodies are often specific. That is, an antibody produced to fight a virus may be ineffective or less effective to fight another virus.

My family and I had also tested positive for SARS-CoV-2. We are all above 65 years, my father is 98. But none of us had any major symptoms of COVID-19. We have all recovered. I have been wondering whether any past action on our part may have helped us recover without serious symptoms. When my former postdoc asked me about the flu vaccine, my answer was that I am not sure if it will protect you from being reinfected by SARS-CoV-2, but it will certainly protect you against the flu virus. I also mentioned to her that my whole family has been taking the flu vaccine annually for over 10 years. It dawned on me that this may have been the passive action that helped us smoothly tide over our COVID-19.

The influenza viruses — of the four types, A, B, C and D, only A and B can cause severe disease — and SARS-CoV-2 are all RNA viruses. That is, instead of double-stranded DNA, these viruses are made up of a single-stranded RNA genetic material. Is it then possible that the influenza vaccine can also be protective against the coronavirus? Since both are RNA viruses, is it possible that the body mounts similar immune responses?

Almost immediately after the coronavirus outbreak was declared a pandemic, many scientists and public health experts claimed that those who have received the influenza vaccine are more susceptible to infection by the coronavirus. This claim was quickly refuted by conducting focused scientific experiments — and by an analysis of data and specimens from over 10,000 residents in Canada.

Scientists have observed many interesting commonalities between immune response in patients with COVID-19 and those with influenza infection. Recently, scientists and clinicians of the Peter Doherty Institute for Infection and Immunity in Australia studied the immune responses in the blood in a COVID-19 patient. They conducted this study in the same patient at different points of time when the coronavirus was active in the patient. They found that significant changes in different cell types related to immune response in this patient compared to those without SARS-CoV-2 infection. For example, there was a large increase in numbers of antibody-secreting cells and follicular helper T-cells. They also detected immunoglobulin M (IgM) and IgG antibodies that bound the COVID-19-causing coronavirus SARS-CoV-2 in blood before symptomatic recovery. These immunological findings were similar to those that have been found earlier in patients with influenza virus infection — as well as in individuals who received a vaccine against influenza.

A large study conducted recently in Brazil comprising 92,000 COVID-19 patients has concluded that the influenza vaccine protects against getting severe COVID-19. A similar conclusion was reached in a study conducted earlier in Italy. The Brazilian study found that if a person takes a flu shot before contracting SARS-CoV-2, the chance of death from COVID-19

reduces by 20 per cent. When a person takes the shot after the onset of COVID-19, the chance of death reduces by 27 per cent.

The influenza vaccine is a cocktail of inactivated viruses, that is, dead viruses. Since the RNA of the influenza virus changes (mutates) rapidly to evolve into new strains, the cocktail also changes every year. In 2019-2020, the influenza vaccine provided globally was a quadrivalent, containing four inactivated strains of flu virus — two strains each of influenza A and B.

The jury is still out on how the flu vaccine can protect against severe COVID-19. A vaccine against a virus that is composed of one or more inactivated strains of the virus fails to produce specific immunity against the virus. Instead, it produces non-specific immunity, which refers to the immunity that a vaccine generates against a larger set of pathogens, not necessarily only against the one for which it was designed. Thus, the cocktail of inactivated strains of the flu virus confers protection not only against the influenza virus but also against other viruses. While such non-specific protection may, in some cases, be desirable, it compromises providing protection against the virus for which it was designed. It is thought that because of this non-specific immune response of the flu vaccine, recipients of the flu vaccine can recognise SARS-CoV-2 efficiently and also fight the coronavirus infection better. Hence, flu vaccine recipients infected by the coronavirus can clear away the coronavirus rapidly. Therefore, their COVID-19 clinical symptoms are less severe.

There is not yet a treatment for COVID-19 or a vaccine against SARS-CoV-2. We are having to rely on preventive measures such as wearing a face mask, hand-washing and maintaining physical distance. Every year, WHO recommends mandatory flu shots for the elderly, children and pregnant women; the subsection of any population who are at high-risk for influenza. This season, get a flu shot not only to protect yourself against influenza, but also to prevent severe COVID-19.

<https://indianexpress.com/article/opinion/flu-shot-covid-19-vaccine-human-trials-6883222/>



Sat, 24 Oct 2020

Plasma therapy for Covid-19 has no benefit, finds ICMR study

The finding of the study has been cited as one of the reasons the National Task Force is considering removing plasma therapy from the standard Covid-19 treatment protocol

By Anonna Dutt

New Delhi: The Indian Council of Medical Research (ICMR) study that found no benefits of convalescent plasma therapy for Covid-19 patients was published in the peer-reviewed British Medical Journal on Thursday. The study concluded that the therapy did not prevent progression to severe disease among Covid-19 patients. It found that the outcomes were almost the same for the two groups -- 235 who received two doses of convalescent plasma and 229 who received the standard care. The therapy involves the use of plasma of people, who have recovered from the infection, to aid the immune response of those still fighting it.

The finding of the study has been cited as one of the reasons the National Task Force is considering removing plasma therapy from the standard Covid-19 treatment protocol.

Delhi health minister Satyendra Jain has supported the therapy having received it himself. "A study done by ICMR and AIIMS [All India Institute of Medical Sciences] did not see any breakthrough maybe. But our trial is underway and it is of course being done with the permission of ICMR. We have seen benefits of the therapy, with over 2,000 people having received convalescent plasma from our bank... I have myself benefited from the therapy," Jain said this week.

<https://www.hindustantimes.com/health/plasma-therapy-for-covid-19-has-no-benefit-finds-icmr-study/story-JIzgYhkWEIRAeqGGQocvYI.html>

