

Dec
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 : 290

19-21 दिसंबर 2020

Vol.: 45

Issue : 290

19-21 December 2020



रक्षा विज्ञान पुस्तकालय

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**Press Information Bureau
Government of India**

Ministry of Defence

Fri, 18 Dec 2020 5:02PM

Raksha Mantri Shri Rajnath Singh hands over DRDO systems to Armed Forces Chiefs

Raksha Mantri Shri Rajnath Singh today handed over three indigenously developed Defence Research and Development Organisation (DRDO) systems to Army, Navy and Air Force at a function held in DRDO Bhawan.

Shri Rajnath Singh handed over the Indian Maritime Situational Awareness System (IMSAS) to the Chief of Naval Staff Admiral Karambir Singh, ASTRA Mk-I Missile to Air Chief Marshal Rakesh Kumar Singh Bhadauria and Border Surveillance System (BOSS) to the Chief of Army Staff General MM Naravane. The handing over of these products was done in the presence of Raksha Rajya Mantri Shri Shripad Yesso Naik, the Guest of Honour and Chief of Defence Staff General Bipin Rawat.

Raksha Mantri Shri Rajnath Singh also gave away awards to DRDO scientists for outstanding contributions in various categories during the function.

The awards include DRDO Lifetime Achievement Award – 2018 to Shri N V Kadam for his contributions for developing control and guidance schemes for missiles. Excellence awards were given to academia and industry for technology absorption. Besides, individual awards, team awards, technology spin-off awards, techno managerial awards and awards in other categories were also given.

Complimenting the DRDO scientists for their outstanding work in developing defence systems, Raksha Mantri said that DRDO has been developing high level technologies for defence systems for increasing the capacity and capability of armed forces.

Shri Rajnath Singh lauded the role of DRDO scientists in combating COVID-19 pandemic. He congratulated all the scientists who received the awards and wished them the very best for their future endeavours.

Speaking on the occasion, Raksha Rajya Mantri Shri Shripad Naik said that DRDO is playing an important role in self-reliance of Defence. He appreciated the efforts of DRDO towards development of technologies and products for combating COVID-19.

Chief of Defence Staff General Bipin Rawat in his address congratulated the scientific fraternity for their achievements and emphasised on the need of working at the fast pace so that the country will have most of the indigenous systems.

The development of these high technology systems has led to higher self-reliance in Defence technologies. These three systems which have completed the design and development cycles and are being deployed were handed over to the services.

Among the systems handed over was BOSS. An all-weather electronic surveillance system successfully designed and developed by Instruments Research & Development Establishment

(IRDE), Dehradun. The system has been deployed at Ladakh border area for day and night surveillance. The system facilitates monitoring and surveillance by automatically detecting the intrusions in harsh high-altitude sub-zero temperature areas with remote operation capability. The system is being produced by Bharat Electronics Limited (BEL), Machlipatnam.

The IMSAS is state-of-the-art, fully indigenous, high performance intelligent software system that provide Global Maritime Situational Picture, Marine planning tools and Analytical capabilities to Indian Navy. The system provides Maritime Operational Picture from Naval HQ to each individual ship in sea to enable Naval Command and control (C2). Centre for Artificial Intelligence & Robotics (CAIR), Bengaluru and Indian Navy has jointly conceptualised and developed the product and the BEL, Bengaluru has implemented it.

The ASTRA Mk-I is the indigenously developed first Beyond Visual Range (BVR) Missile, which can be launched from Sukhoi-30, Light Combat Aircraft (LCA), Mig-29 and Mig-29K. Globally, very few countries have expertise and capabilities to design and produce this class of weapon system. Successful development of ASTRA weapon system by Defence Research & Development Laboratory (DRDL) Hyderabad & production by Bharat Dynamics Limited (BDL), Hyderabad is a major contribution towards 'Atmanirbhar Bharat'.

Secretary, DDR&D & Chairman DRDO Dr G Satheesh Reddy stated that DRDO is committed to the development of advanced systems and technologies for Defence. He added that DRDO strives to create robust ecosystem of Defense design, development and production along with academia, industry and armed forces.

Several senior functionaries from Ministry of Defence and Government of India were present at the function.

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पत्र सूचना कार्यालय

भारत सरकार

रक्षा मंत्रालय

Fri, 18 Dec 2020 5:02PM

रक्षा मंत्री श्री राजनाथ सिंह ने सशस्त्र बलों के प्रमुखों को डीआरडीओ की प्रणालियां सौंपी

रक्षा मंत्री श्री राजनाथ सिंह ने आज रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) भवन में आयोजित एक कार्यक्रम में थल सेना, नौसेना और वायु सेना को स्वदेशी रूप से विकसित डीआरडीओ की तीन प्रणालियां सौंपी।

श्री राजनाथ सिंह ने नौसेना प्रमुख एडमिरल करमबीर सिंह को इंडियन मेरिटाइम सिचुएशनल अवेयरनेस सिस्टम (आईएमएसएस) सौंपी। इसके अलावा एयर चीफ मार्शल राकेश कुमार सिंह भदौरिया को अस्त्र एमके-1 मिसाइल और थल सेना अध्यक्ष जनरल एमएम नरवाने को बॉर्डर सर्विलांस सिस्टम (बीओएसएस) सौंपी। इन उत्पादों को सौंपने का काम गेस्ट ऑफ ऑनर रक्षा राज्य मंत्री श्री श्रीपद येसो नाइक और चीफ ऑफ डिफेंस स्टाफ जनरल बिपिन रावत की उपस्थिति में किया गया।

इस समारोह के दौरान रक्षा मंत्री श्री राजनाथ सिंह ने विभिन्न श्रेणियों में उत्कृष्ट योगदान के लिए डीआरडीओ के वैज्ञानिकों को पुरस्कार प्रदान किए।

इन पुरस्कारों में डीआरडीओ लाइफटाइम अचीवमेंट पुरस्कार-2018 भी शामिल है। यह पुरस्कार श्री एनवी कदम को मिसाइलों से संबंधित नियंत्रण और मार्गदर्शन योजनाओं को विकसित करने में योगदान करने के लिए दिया गया। इसके अलावा प्रौद्योगिकी समावेशन के लिए अकादमिक और उद्योग को उत्कृष्टता पुरस्कार भी दिए गए। वहीं व्यक्तिगत पुरस्कार, समूह पुरस्कार, टेक्नोलॉजी स्पिन-ऑफ अवार्ड्स और टेक्नो मैनिजिरीअल अवार्ड्स सहित अन्य श्रेणियों में भी पुरस्कार दिए गए।

रक्षा प्रणालियों को विकसित करने में उत्कृष्ट कार्य के लिए डीआरडीओ के वैज्ञानिकों की सराहना करते हुए रक्षा मंत्री ने कहा कि डीआरडीओ सशस्त्र बलों की क्षमता और सामर्थ्य को बढ़ाने को लेकर रक्षा प्रणालियों के लिए उच्च-स्तरीय तकनीकों का विकास कर रहा है।

श्री राजनाथ सिंह ने कोविड-19 महामारी का सामना करने में डीआरडीओ वैज्ञानिकों की भूमिका की सराहना की। उन्होंने पुरस्कार प्राप्त करने वाले सभी वैज्ञानिकों को बधाई दी और उनके भविष्य के प्रयासों के लिए उन्हें शुभकामनाएं भी दीं।

इस अवसर पर रक्षा राज्य मंत्री श्री श्रीपद येसो नाइक ने कहा कि रक्षा क्षेत्र की आत्मनिर्भरता में डीआरडीओ एक महत्वपूर्ण भूमिका निभा रहा है। उन्होंने कोविड-19 का सामना करने के लिए तकनीकों और उत्पादों के विकास की दिशा में डीआरडीओ के प्रयासों की सराहना की।

चीफ ऑफ डिफेंस स्टाफ जनरल बिपिन रावत ने अपने संबोधन में वैज्ञानिकों को उनकी उपलब्धियों के लिए बधाई दी और तेज गति से काम करने जोर दिया, जिससे देश में अधिकांश प्रणालियां स्वदेशी हों।

उन्होंने आगे कहा कि इन उच्च प्रौद्योगिकी प्रणालियों के विकास से रक्षा तकनीकों में उच्च आत्मनिर्भरता आई है। ये तीन प्रणालियां जिनकी बनावट और विकास चक्रों को पूरा किया जा चुका है, उन्हें सेवाओं के लिए सौंप दिया गया है।

आज जिन प्रणालियों को सशस्त्र बलों को सौंपा गया है, उनमें एक बॉर्डर सर्विलांस सिस्टम (बीओएसएस) भी है। यह एक सभी मौसमों में काम करने वाला इलेक्ट्रॉनिक सर्विलांस सिस्टम है, जिसे इंस्ट्रूमेंट्स रिसर्च एंड डेवलपमेंट इस्टैब्लिशमेंट (आईआरडीई), देहरादून द्वारा सफलतापूर्वक डिजाइन और विकसित किया गया है। इस प्रणाली को दिन और रात की निगरानी के लिए लद्दाख सीमा क्षेत्र में तैनात किया गया है। यह प्रणाली सुदूर संचालन क्षमता के साथ कठोर अधिक ऊंचाई वाले और उप-शून्य तापमान वाले क्षेत्रों में घुसपैठ का स्वतः पता लगाकर जांच और निगरानी की सुविधा देती है। इस प्रणाली का उत्पादन भारत इलेक्ट्रॉनिक्स लिमिटेड (बीईएल), मछलीपटनम द्वारा किया गया।

आईएमएसएसएस एक अत्याधुनिक, पूरी तरह से स्वदेशी, उच्च प्रदर्शन वाला इंटेलिजेंट सॉफ्टवेयर सिस्टम है, जो भारतीय नौसेना को ग्लोबल मेरिटाइम सिचुएशनल पिक्चर, मैरिन प्लानिंग टूल्स और विश्लेषणात्मक क्षमता प्रदान करती है। यह प्रणाली नौसेना कमान और नियंत्रण (सी2) को सक्षम करने के लिए समुद्र में प्रत्येक जहाज को नौसेना मुख्यालय से मेरिटाइम ऑपरेशनल पिक्चर उपलब्ध कराती है। सेंटर फॉर आर्टिफिशियल इंटेलिजेंस एंड रोबोटिक्स (सीएआईआर), बेंगलुरु और भारतीय नौसेना ने संयुक्त रूप से इस उत्पाद की अवधारणा और विकास किया है। वहीं बीईएल, बेंगलुरु ने इसे लागू किया।

अस्त्र एमके-1 स्वदेशी रूप से विकसित पहली बियाँन्ड विजुअल रेंज (बीवीआर) मिसाइल है, जिसे सुखोई-30, लाइट कॉम्बैट एयरक्राफ्ट (एलसीए), मिग-29 और मिग-29के से प्रक्षेपित किया जा सकता है। वैश्विक स्तर पर कुछ देशों के पास ही इस तरह की हथियार प्रणाली को डिजाइन और उत्पादन करने की विशेषज्ञता

और क्षमता है। रक्षा अनुसंधान एवं विकास प्रयोगशाला (डीआरडीएल), हैदराबाद द्वारा सफलतापूर्वक विकसित और भारत डायनामिक्स लिमिटेड (बीडीएल), हैदराबाद द्वारा उत्पादित अस्त्र हथियार प्रणाली 'आत्मनिर्भर भारत' के लिए एक बड़ा योगदान है।

रक्षा अनुसंधान एवं विकास विभाग (डीडीआर एंड डी) के सचिव और डीआरडीओ के अध्यक्ष डॉ. जी सतीश रेड्डी ने कहा कि डीआरडीओ रक्षा संबंधित उन्नत प्रणालियों और प्रौद्योगिकियों के विकास के लिए प्रतिबद्ध है। उन्होंने आगे कहा कि डीआरडीओ अकादमिक, उद्योग और सशस्त्र बलों के साथ रक्षा डिजाइन, विकास और उत्पादन का मजबूत पारिस्थितिकी तंत्र बनाने का प्रयास करता है।

इस समारोह में भारत सरकार और रक्षा मंत्रालय के कई वरिष्ठ अधिकारी उपस्थित थे।

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**Press Information Bureau
Government of India**

రక్షణ మంత్రిత్వ శాఖ

Fri, 18 Dec 2020 5:02PM

డి.ఆర్.డి.ఓ. వ్యవస్థలను సాయుధ దళాల అధిపతులకు అందజేసిన -

రక్షణ శాఖ మంత్రి శ్రీ రాజ్ నాథ్ సింగ్

రక్షణ పరిశోధన మరియు అభివృద్ధి సంస్థ (డి.ఆర్.డి.ఓ), దేశీయంగా అభివృద్ధి చేసిన, మూడు వ్యవస్థలను, రక్షణ మంత్రి శ్రీ రాజనాథ్ సింగ్, ఈ రోజు, సైనిక, నావికా, వైమానిక దళాలకు, డి.ఆర్.డి.ఓ. భవన్‌లో జరిగిన ఒక కార్యక్రమంలో అందజేశారు.

ఈ కార్యక్రమంలో శ్రీ రాజ్ నాథ్ సింగ్ - భారత సముద్ర పరిస్థితుల అవగాహనా వ్యవస్థ (ఐ.ఎమ్.ఎస్.ఎ.ఎస్) ను నావికా దళాధిపతి అడ్మిరల్ కరంబీర్ సింగ్ కు అందజేశారు. అదేవిధంగా, అస్త్రా ఎం.కె-1 ఓపిని ని ఎయిర్ చీఫ్ మార్షల్ రాకేశ్ కుమార్ సింగ్ భదోరి కి మరియు సరిహద్దు నిఘా వ్యవస్థ (బి.ఓ.ఎస్.ఎస్) ని సైనిక దళాధిపతి జనరల్ ఎమ్.ఎమ్. నరవణి కి అందజేశారు. రక్షణ శాఖ సహాయ మంత్రి శ్రీ శ్రీపాద యెస్సో నాయక్ మరియు రక్షణ సిబ్బంది అధిపతి జనరల్ బిపిన్ రావత్ సమక్షంలో ఈ ఉత్పత్తులను అప్పగించారు.

వివిధ విభాగాలలో విశేష కృషి చేసిన డి.ఆర్.డి.ఓ. శాస్త్రవేత్తలకు ఈ సందర్భంగా రక్షణ మంత్రి శ్రీ రాజనాథ్ సింగ్, అవార్డులు ప్రధానం చేశారు.

ఈ అవార్డులలో - ఓపిని నియంత్రణ మరియు మార్గదర్శక పథకాలను అభివృద్ధి చేసినందుకు చేసిన కృషికి శ్రీ ఎన్.వి. కదమ్ కు ప్రధానం చేసిన "డి.ఆర్.డి.ఓ. జీవన సాఫల్య పురస్కారం - 2018", సాంకేతిక పరిజ్ఞానం అమలు కోసం విద్యా, పరిశ్రమల రంగాలలో ఉత్తమ కృషి చేసినవారికి ప్రధానం చేసిన "ఎక్సలెన్స్ అవార్డులు" మొదలైనవి ఉన్నాయి. వీటితో పాటు, వ్యక్తిగత అవార్డులు, బృందాలకు అవార్డులు, టెక్నాలజీ స్పిన్-ఆఫ్ అవార్డులు, టెక్నో మేనేజర్ అవార్డులు, ఇతర విభాగాలలో అవార్డులను కూడా ఈ సందర్భంగా ప్రధానం చేశారు.

రక్షణ వ్యవస్థలను అభివృద్ధి చేయడంలో, డి.ఆర్.డి.ఓ. శాస్త్రవేత్తలు చేసిన కృషికి రక్షణ మంత్రి అభినందనలు తెలియజేస్తూ, సాయుధ దళాల శక్తి, సామర్థ్యాలను పెంపొందించే వ్యవస్థల కోసం డి.ఆర్.డి.ఓ. ఉన్నత స్థాయి సాంకేతిక పరిజ్ఞానాన్ని అభివృద్ధి చేస్తోందని, పేర్కొన్నారు.

కోవిడ్-19 మహమ్మారిని ఎదుర్కోవడంలో డి.ఆర్.డి.ఓ. శాస్త్రవేత్తలు పోషించిన పాత్రను శ్రీ రాజనాథ్ సింగ్ ఈ సందర్భంగా ప్రశంసించారు. అవార్డులు అందుకున్న శాస్త్రవేత్తలందరినీ ఆయన అభినందించారు, వారి భవిష్యత్ ప్రయత్నాలకు శుభాకాంక్షలు తెలియజేశారు.

రక్షణ శాఖ సహాయ మంత్రి శ్రీ శ్రీపాద నాయక్, ఈ సందర్భంగా మాట్లాడుతూ, రక్షణ రంగం స్వావలంబనలో డి.ఆర్.డి.ఓ. ముఖ్యమైన పాత్ర పోషిస్తోందని, పేర్కొన్నారు. కోవిడ్-19 ని ఎదుర్కోవటానికి అవసరమైన సాంకేతిక పరిజ్ఞానాన్నీ, ఉత్పత్తులనూ అభివృద్ధి చేయడానికి డి.ఆర్.డి.ఓ. చేసిన కృషిని ఆయన ప్రశంసించారు.

రక్షణ సిబ్బంది అధిపతి జనరల్ బిపిన్ రావత్ మాట్లాడుతూ, శాస్త్ర, సాంకేతిక బృందం సాధించిన విజయాలను అభినందించారు. అదే విధంగా దేశంలోని చాలా స్వదేశీ వ్యవస్థలు ఉండేలా వేగంగా పని చేయవలసిన అవసరాన్ని ఆయన నొక్కి చెప్పారు.

ఈ అత్యాధునిక సాంకేతిక వ్యవస్థల అభివృద్ధి రక్షణ సాంకేతిక పరిజ్ఞానాలలో అధిక స్వావలంబనకు దారితీసింది. రూపకల్పన, అభివృద్ధి దశలను పూర్తి చేసుకుని, వినియోగానికి సిద్ధంగా ఉన్న ఈ మూడు వ్యవస్థలను సంబంధిత రక్షణ దళాలకు అప్పగించడం జరిగింది.

ఈ రోజు అప్పగించిన రక్షణ వ్యవస్థలలో బి.ఓ.ఎస్.ఎస్. (బాస్) కూడా ఉంది. అన్ని వాతావరణ పరిస్థితుల్లో పనిచేసే, ఎలక్ట్రానిక్ నిఘా వ్యవస్థను, డెప్రోడూస్ లోని పరికరాల పరిశోధన మరియు అభివృద్ధి సంస్థ (ఐ.ఆర్.డి.ఈ) విజయవంతంగా రూపొందించి, అభివృద్ధిచేసింది. ఈ వ్యవస్థను లడఖ్ సరిహద్దు ప్రాంతంలో పగలు, రాత్రి నిఘా కోసం మోహరించారు. రిమోట్ ఆపరేషన్ సామర్థ్యంతో, అధిక-ఎత్తులో, సున్నా కన్నా తక్కువ ఉష్ణోగ్రతగల కఠినమైన ప్రాంతాలలో చొరబాట్లను స్వయంచాలకంగా గుర్తించడం ద్వారా ఈ వ్యవస్థ పర్యవేక్షణ మరియు నిఘాను సులభతరం చేస్తుంది. ఈ వ్యవస్థను, మచిలీపట్నం లోని భారత్ ఎలక్ట్రానిక్స్ లిమిటెడ్ (బెల్) నిర్మిస్తోంది.

ఐ.ఎమ్.ఎస్.ఎ.ఎస్. అనేది అత్యాధునికమైన, పూర్తిగా స్వదేశీ పరిజ్ఞానంతో, అధిక పనితీరు గల తెలివైన సాఫ్ట్వేర్ వ్యవస్థ, ఇది గ్లోబల్ మారిటైమ్ సిట్యుయేషనల్ పిక్చర్, మెరైన్ ప్లానింగ్ టూల్స్ మరియు విశ్లేషణాత్మక సామర్థ్యాలను భారత నావికాదళానికి అందజేస్తుంది. నావల్ కమాండ్ అండ్ కంట్రోల్ (సి-2) ను ప్రారంభించడానికి ఈ వ్యవస్థ సముద్రంలో ఉన్న ప్రతి ఓడకు నావికాదళ ప్రధాన కార్యాలయం నుండి మారిటైమ్ ఆపరేషనల్ పిక్చర్ను అందిస్తుంది. బెంగళూరులోని, సెంటర్ ఫర్ ఆర్టిఫిషియల్ ఇంటెలిజెన్స్ మరియు రోబోటిక్స్ (సివి.ఐ.ఆర్) తో పాటు భారత నావికాదళం సంయుక్తంగా ఈ ఉత్పత్తిని రూపొందించి, అభివృద్ధి చేశాయి. కాగా, బెంగళూరు లోని బి.ఈ.ఎల్. సంస్థ, దీనిని అమలు చేసింది.

ఆస్ట్రా ఎమ్.కె-1, దేశీయంగా అభివృద్ధి చేసిన మొదటి బియాండ్ విజువల్ రేంజ్ (బి.వి.ఆర్) క్షిపణి. దీనిని సుఖోయ్-30, లైట్ కంబాట్ ఎయిర్ క్రాఫ్ట్ (ఎల్.సి.ఎ), మిగ్-29 తో పాటు మిగ్-29 కె నుండి ప్రయోగించవచ్చు. 'అత్మ నిర్భార భారత్' లో భాగంగా, అస్ట్రా ఆయుధ వ్యవస్థను, హైదరాబాద్ లోని రక్షణ పరిశోధన మరియు అభివృద్ధి ప్రయోగశాల (డి.ఆర్.డి.ఎల్) విజయవంతంగా అభివృద్ధి చేసింది. కాగా, హైదరాబాద్ లోని భారత్ డైనమిక్స్ లిమిటెడ్ (బి.డి.ఎల్) ఉత్పత్తి చేసింది.

రక్షణ రంగానికి అవసరమైన అధునాతన వ్యవస్థలు, సాంకేతిక పరిజ్ఞానాల అభివృద్ధికి, డి.ఆర్.డి.ఓ. కట్టుబడి ఉందని, డి.డి.ఆర్ & డి, కార్యదర్శి మరియు డి.ఆర్.డి.ఓ., చైర్మన్, డాక్టర్ జి. సతీష్ రెడ్డి పేర్కొన్నారు. విద్యా, పరిశ్రమ, సాయుధ దళాలతో పాటు రక్షణ రూపకల్పన, అభివృద్ధి, ఉత్పత్తి యొక్క బలమైన పర్యావరణ వ్యవస్థను రూపొందించడానికి డి.ఆర్.డి.ఓ. కృషి చేస్తోందని, ఆయన తెలియజేశారు.

రక్షణ మంత్రిత్వ శాఖలో పాటు, భారత ప్రభుత్వానికి చెందిన అనేక మంది ఉన్నతోద్యోగులు ఈ కార్యక్రమంలో పాల్గొన్నారు.

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Sat, 19 Dec 2020 9:55PM

Inauguration of Hypersonic Wind Tunnel at DRDO Hyderabad

Raksha Mantri Shri Rajnath Singh visited DRDO's Dr APJ Abdul Kalam Missile Complex during his visit to Hyderabad on 19th Dec 2020. Hon'ble Union Minister of State for Home Affairs Shri G Kishan Reddy and Dr G Satheesh Reddy, Secretary, Department of Defence R&D and Chairman, DRDO accompanied him during the visit. Cluster DGs, Lab Directors and Programme Directors briefed the dignitaries about the ongoing projects and technological developments. On this occasion, Hyderabad based DRDO labs showcased various indigenously developed systems and technologies in wide ranging areas including missiles, avionics systems, advanced materials, electronic warfare, quantum key distribution technology, directed energy weapons, Gallium Arsenide and Gallium Nitride technology capabilities.

During his visit, two anti-drone technologies were demonstrated by DRDO labs to Raksha Mantri. DRDO Young Scientists' Laboratory - Asymmetric Technologies (DYSL-AT) and RCI demonstrated drone and innovative anti-drone technologies. It has multiple capabilities including neutralizing ground targets and anti-drone applications to counter stationery as well as high-speed moving targets. Key features of the weapon system include secure communication link, effective recoil management system, high firing angular resolution and vision-based target detection and tracking.

On this occasion, Raksha Mantri inaugurated the advanced Hypersonic Wind Tunnel (HWT) test facility. The state-of-the-art HWT Test facility is pressure vacuum driven enclosed free jet facility having nozzle exit diameter of 1 meter and will simulate Mach No 5 to 12 (Mach represents the multiplication factor to the speed of sound). After USA and Russia, India is the third country to have such a large facility in terms of size and operating capability. It is an indigenous development and an outcome of synergistic partnership with Indian industries. The facility has the capability to simulate hypersonic flow over a wide spectrum and will play a major role in the realization of highly complex futuristic aerospace and defence systems.

During the exhibition of a range of missile systems, various avionic systems and other technologies, scientists explained all the systems and technologies in detail and Hon'ble Raksha Mantri showed keen interest in the technical explanations and demonstrations.

Shri Kishan Reddy laid the foundation stone of Explosive Test Facility for Propellant and Explosive Systems. This facility will be used for design validation and evaluation of missile sub-systems under different environmental conditions. He appreciated the efforts of DRDO for

developing such a large number of systems. He said that he is happy that so much of high technology work is happening in the Hyderabad region, the region where he belongs.

Raksha Mantri addressed the DRDO fraternity and applauded the phenomenal technological achievements and recent series of successful missions and technological achievements by various clusters of DRDO including Hypersonic Technology Demonstration Vehicle (HSTDV), Anti-Radiation Missile (RUDRAM), Quick Reaction Surface to Air Missile (QRSAM), Supersonic Missile Assisted Release Torpedo (SMART) and Quantum Key Distribution (QKD) technology during last six months. He lauded DRDO's contributions, despite COVID pandemic conditions, towards strengthening Atmanirbhar Bharat and for leading the indigenous development of state-of-the-art technology products and innovative solutions. He congratulated Dr G Satheesh Reddy for DRDO's contribution to the development of technologies and products for combatting COVID-19 Pandemic. Also he acknowledged the tremendous efforts in establishment of COVID-19 hospitals at Delhi and Bihar, development of indigenous ventilators, PPE kits and other protective equipment in short span of time.

Shri Rajnath Singh appreciated the endeavors of contributions of DRDO Young Scientist Labs and said DRDO needs to focus on next generation needs including cyber security, space and artificial intelligence and evolve roadmaps. The immense potential available in DRDO has been a catalyst for the development of industries and defence manufacturing sector. RM urged DRDO scientists to make India a Super Military Power thereby making India a Super Power.

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पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Sat, 19 Dec 2020 9:55PM

डीआरडीओ हैदराबाद में हाइपरसोनिक विंड टनल का उद्घाटन

रक्षा मंत्री श्री राजनाथ सिंह ने 19 दिसंबर, 2020 को अपनी हैदराबाद यात्रा के दौरान डीआरडीओ के डॉ. एपीजे अब्दुल कलाम मिसाइल कॉम्प्लेक्स का दौरा किया। इस यात्रा के दौरान उनके साथ माननीय केंद्रीय गृह राज्यमंत्री श्री जी किशन रेड्डी और रक्षा अनुसंधान एवं विकास विभाग के सचिव डॉ. जी. सतीश रेड्डी भी उपस्थित थे। विभागों के महानिदेशकों, प्रयोगशाला निदेशकों और कार्यक्रम निदेशकों ने गणमान्य व्यक्तियों को वर्तमान में जारी परियोजनाओं और तकनीकी विकास के बारे में जानकारी दी। इस अवसर पर, हैदराबाद स्थित डीआरडीओ प्रयोगशालाओं ने मिसाइल, एवियोनिक्स सिस्टम, एंडवांस्ड मैटेरियल, इलेक्ट्रॉनिक वॉरफेयर, प्रमुख वितरण प्रौद्योगिकी, निर्देशित ऊर्जा हथियार, गैलियम आर्सेनाइड और गैलियम नाइट्राइड प्रौद्योगिकी क्षमताओं सहित अन्य क्षेत्रों में व्यापक रूप से विकसित विभिन्न स्वदेशी प्रणालियों और प्रौद्योगिकियों का प्रदर्शन किया।

रक्षा मंत्री की यात्रा के दौरान डीआरडीओ प्रयोगशालाओं द्वारा दो ड्रोन विरोधी तकनीकों का भी प्रदर्शन किया गया। डीआरडीओ युवा वैज्ञानिकों की प्रयोगशाला-असममित प्रौद्योगिकी (डीवाईएसएल-एटी) और आरसीआई ने ड्रोन और नवीन एंटी-ड्रोन प्रौद्योगिकियों का प्रदर्शन किया। इसमें मुकाबला करने के लिए ग्राउंड टारगेट और एंटी-ड्रोन एप्लिकेशन को बेअसर करने के साथ-साथ हाई-स्पीड मूविंग टारगेट सहित कई क्षमताएं शामिल हैं। हथियार प्रणाली की प्रमुख विशेषताओं में सुरक्षित संचार लिंक, प्रभावी पुनरावृत्ति प्रबंधन प्रणाली, उच्च फायरिंग कोणीय संकल्प और दृष्टि-आधारित लक्ष्य पहचान और ट्रैकिंग शामिल हैं।

इस अवसर पर, रक्षा मंत्री ने उन्नत हाइपरसोनिक विंड टनल (एचडब्ल्यूटी) परीक्षण सुविधा का उद्घाटन किया। यह प्रेशर वैक्यूम संचालित एक अत्याधुनिक एचडब्ल्यूटी टेस्ट सुविधा है जिसमें 1 मीटर का नोजल एग्जिट

व्यास है और यह मैक नंबर 5 से 12 का अनुकरण करते हुए (मैक साउंड की गति के गुणन कारक का प्रतिनिधित्व करता है)। अमेरिका और रूस के बाद, भारत तीसरा देश है जहां आकार और परिचालन क्षमता के मामले में इतनी बड़ी सुविधा है। यह सुविधा स्वदेशी रूप से विकसित और भारतीय उद्योगों के साथ की गई साझेदारी का एक परिणाम है। इस सुविधा में व्यापक स्पेक्ट्रम पर हाइपरसोनिक प्रवाह को अनुकरण करने की क्षमता है और यह अत्यधिक जटिल फ्यूचररिस्टिक एयरोस्पेस और रक्षा प्रणालियों के कार्यान्वयन में प्रमुख भूमिका निभाएगा।

मिसाइल प्रणालियों, विभिन्न एवियोनिक प्रणालियों और अन्य प्रौद्योगिकियों की एक श्रृंखला की प्रदर्शनी के दौरान, वैज्ञानिकों ने सभी प्रणालियों और तकनीकों के बारे में विस्तार से जानकारी दी और माननीय रक्षा मंत्री ने इनके तकनीकी स्पष्टीकरण और प्रदर्शनों में गहरी रुचि दिखाई।

श्री किशन रेड्डी ने प्रणोदक और विस्फोटक प्रणालियों के लिए विस्फोटक परीक्षण सुविधा की आधारशिला रखी। इस सुविधा का उपयोग विभिन्न पर्यावरणीय परिस्थितियों में मिसाइल उप-प्रणालियों के डिजाइन सत्यापन और मूल्यांकन के लिए किया जाएगा। उन्होंने इतनी बड़ी संख्या में सिस्टम विकसित करने के लिए डीआरडीओ के प्रयासों की सराहना की। उन्होंने कहा कि उन्हें प्रसन्नता है कि हैदराबाद क्षेत्र में उच्च प्रौद्योगिकी पर अत्यधिक कार्य किया जा रहा है।

रक्षा मंत्री ने डीआरडीओ के कार्मिकों को संबोधित करते हुए डीआरडीओ के विभिन्न समूहों की अभूतपूर्व तकनीकी उपलब्धियों और हाल ही में संचालित किए गए सफल मिशनों की श्रृंखला के लिए उनकी सराहना की, जिसमें पिछले छह महीनों के दौरान हाइपरसोनिक टेक्नोलॉजी डिमॉन्स्ट्रेशन व्हीकल (एचएसटीडीवी), एंटी-रेडिक मिसाइल (आरयूडीआरएएम), क्विक रिएक्शन सरफेस टू एयर मिसाइल (क्यूआरएसएएम), सुपरसोनिक मिसाइल असिस्टेड रिलीज़ टारपीडो (एसएमएआरटी) और क्वांटम की डिस्ट्रीब्यूशन (क्यूकेडी) तकनीक शामिल हैं। उन्होंने कोविड महामारी की परिस्थितियों के बावजूद, आत्मनिर्भर भारत की दिशा में मजबूती से आगे बढ़ने और अत्याधुनिक प्रौद्योगिकी उत्पादों के स्वदेशी विकास का नेतृत्व करने और अभिनव समाधानों में डीआरडीओ के योगदान की सराहना की। रक्षा मंत्री ने कोविड-19 महामारी से निपटने के लिए प्रौद्योगिकियों और उत्पादों के विकास में डीआरडीओ के योगदान हेतु डॉ. जी. सतीश रेड्डी को बधाई दी। इसके अलावा उन्होंने दिल्ली और बिहार में कोविड-19 अस्पतालों की स्थापना, स्वदेशी वेंटिलेटर, पीपीई किट और अन्य सुरक्षात्मक उपकरणों के विकास को बहुत कम समय में पूरा करने की कोशिशों के लिए भी डीआरडीओ का आभार जताया।

श्री राजनाथ सिंह ने डीआरडीओ युवा वैज्ञानिक प्रयोगशाला के प्रयासों की सराहना करते हुए कहा कि डीआरडीओ को साइबर सुरक्षा, अंतरिक्ष और कृत्रिम बुद्धिमत्ता सहित अगली पीढ़ी की जरूरतों पर ध्यान देने और इस संदर्भ में एक प्रारूप तैयार करने की आवश्यकता है। उन्होंने कहा कि डीआरडीओ में उपलब्ध अपार संभावनाएं उद्योगों और रक्षा विनिर्माण क्षेत्र के विकास के लिए उत्प्रेरणा रही हैं। रक्षामंत्री ने डीआरडीओ के वैज्ञानिकों से भारत को सर्वाधिक शक्ति संपन्न बनाने के लिए एक सर्वाधिक सैन्य संपन्न राष्ट्र बनाने का आग्रह किया।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1682150>

Rajnath Singh hands over three important DRDO developed systems to Army, Navy and Air Force

Rajnath Singh also gave away awards to Defence Research and Development Organisation scientists for outstanding contributions in various categories during the function

By Mayank Singh

New Delhi: Defence Minister Rajnath Singh handed over three indigenously developed systems to Army, Navy and Air Force at a function held in Defence Research and Development Organisation (DRDO) Bhawan.

One of them, Border Surveillance System, has already been deployed in Ladakh against the Chinese troops.

Rajnath Singh handed over the Indian Maritime Situational Awareness System (IMSAS) to the Chief of Naval Staff Admiral Karambir Singh, ASTRA Mk-I Missile to Air Chief Marshal Rakesh Kumar Singh Bhadauria and Border Surveillance System (BOSS) to the Chief of Army Staff General M M Naravane.



Defence Minister Rajnath Singh. (Photo| Twitter)

An all-weather electronic surveillance system successfully designed and developed by Instruments Research & Development Establishment (IRDE), Dehradun. The system has been deployed at Ladakh border area for day and night surveillance.

The system facilitates monitoring and surveillance by automatically detecting the intrusions in harsh high-altitude sub-zero temperature areas with remote operation capability. The system is being produced by Bharat Electronics Limited (BEL), Machlipatnam.

The IMSAS is state-of-the-art, fully indigenous, high performance intelligent software system that provide Global Maritime Situational Picture, Marine planning tools and Analytical capabilities to Indian Navy. The system provides Maritime Operational Picture from Naval HQ to each individual ship in sea to enable Naval Command and control (C2).

Centre for Artificial Intelligence & Robotics (CAIR), Bengaluru and Indian Navy has jointly conceptualised and developed the product and with the BEL, Bengaluru carrying out its implementation.

The ASTRA Mk-I is the indigenously developed first Beyond Visual Range (BVR) Missile, which can be launched from Sukhoi-30, Light Combat Aircraft (LCA), Mig-29 and Mig-29K.

Globally, very few countries have expertise and capabilities to design and produce this class of weapon system.

ASTRA weapon system has been developed by Defence Research & Development Laboratory (DRDL) and production by Bharat Dynamics Limited (BDL) Hyderabad.

These high technology systems have completed the design and development cycles.

Rajnath Singh also gave away awards to DRDO scientists for outstanding contributions in various categories during the function.

DRDO developed the systems handed over to the chiefs of all three armed forces. It is the Research and Development wing of Ministry of Defence, Government of India.

The handing over of these products was done in the presence of Raksha Rajya Mantri Shri Shripad Yesso Naik, the Guest of Honour, Chief of Defence Staff General Bipin Rawat and Secretary, DDR&D & Chairman DRDO Dr G Satheesh Reddy.

<https://www.newindianexpress.com/nation/2020/dec/19/rajnath-singh-hands-over-three-important-drdo-developed-systems-to-army-navy-andair-force-2238383.html>

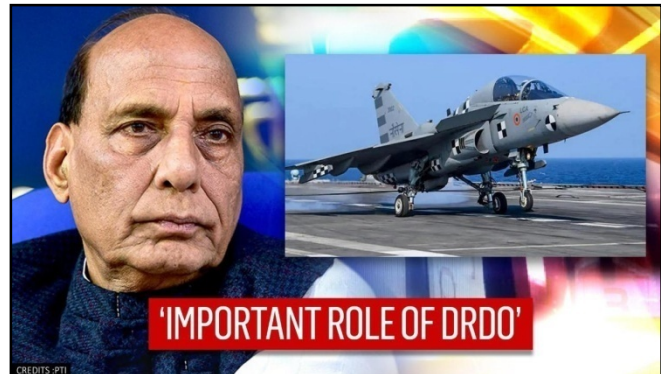
DRDO can play significant role in making India superpower: Defence Minister Rajnath Singh

Defence Minister Rajnath Singh stated that the Defence Research and Development Organisation (DRDO) can play a significant role in making India a superpower

Defence Minister Rajnath Singh on Friday stated that the Defence Research and Development Organisation (DRDO) can play a significant role in making India a superpower.

"We want to make India a superpower and you (scientists) can play an important role in this," said the Defence Minister while addressing the DRDO officials.

The defence minister lauded the premier defence research agency for successfully developing and testing a variety of defence systems including the multirole fighter aircraft Tejas and ballistic missile systems which has significantly boosted the capabilities of the Indian Armed Forces. The defence minister felicitated 45 scientists of DRDO for their exceptional contribution.



Chief of Defence Staff General Bipin Rawat, who was present at the event, stated that DRDO helped the armed forces in becoming self-reliant to facing the evolving challenges and the country would win the future wars with indigenously developed weapon technology.

General Rawat said, "For the past few years, DRDO has helped the armed forces to become self-reliant to face the emerging challenges ahead of the country. Currently, we are facing several challenges at the northern and western borders. The way in which we are heading towards self-reliance, it is pertinent for DRDO to keep working ardently in that direction."

Hand over of DRDO developed systems to Armed Forces

On the occasion, the Defence Minister presented the Indian Maritime Situational Awareness System to Navy Chief Admiral Karambir Singh, ASTRA MK - missile to the Air Force Chief RKS Bhadauria and Border Surveillance System (BOSS) to the Army chief General MM Naravane. The defence systems and equipment were developed by DRDO.

Moreover, sources stated on Thursday that the Centre will soon assign a project to DRDO a project to develop six new Airborne Early Warning and Control planes. The AEW&C will be built on aircraft from Air India which will improve the Indian Air Force's surveillance capabilities along borders with China and Pakistan.

The Indian Air Force earlier used three PHALCON AWACS systems which had the Israeli and Russian technology - the Israeli Radar with Russian Ilyushin-76 transport aircraft. Moreover, the two Netra aircraft provided by the DRDO have also been deployed extensively during the recent conflicts to keep a watch over the activities of the adversaries. The new AEW&C project is said to cost around Rs 10,500 crore and the defence systems will be mounted on Air India fleet keeping the Atmanirbhar Bharat and Make in India initiative in mind, as against the previous plan of procuring six new Airbus 330 and getting the defence systems mounted from them.

(With ANI inputs)

<https://www.republicworld.com/amp/india-news/general-news/drdo-can-play-significant-role-in-making-india-superpower-defence-minister-rajnath-singh.html>

सीडीएस रावत बोले- भविष्य में जंग होने पर हम स्वदेशी हथियारों से चटाएंगे दुश्मनों को धूल

नई दिल्ली: चीन और पाकिस्तान के साथ सीमा पर जारी तनाव के बीच चीफ ऑफ डिफेंस स्टॉफ (सीडीएस) जनरल बिपिन रावत ने बड़ा बयान देते हुए कहा है कि भविष्य में होने वाली जंग को भारत स्वदेशी हथियारों से लड़ेगा और दुश्मनों को हराएगा। वहीं, रक्षा मंत्री राजनाथ सिंह ने कहा, भारत को सुपरपावर (महाशक्ति) बनाने में डीआरडीओ वैज्ञानिकों की महत्वपूर्ण भूमिका होगी।

रक्षा अनुसंधान व विकास संगठन यानी डीआरडीओ के एक कार्यक्रम को संबोधित करते हुए सीडीएस रावत ने कहा, हम देख रहे हैं कि रक्षा क्षेत्र को लेकर हमारा निजी उद्योग भी प्रेरित है, उन्हें समर्थन की जरूरत है। मुझे लगता है कि भविष्य में होने वाले युद्ध को हम स्वदेशी हथियारों के माध्यम से जीतेंगे।



सीडीएस बिपिन रावत - फोटो : ANI

सीडीएस बिपिन रावत ने कहा, वर्तमान समय में हमारा देश उत्तरी और पश्चिमी सीमाओं पर कई चुनौतियों का सामना कर रहा है। देश जिस रफ्तार से आत्मनिर्भरता की तरफ कदम बढ़ा रहा है। ये बेहद जरूरी है कि डीआरडीओ पूरी लगन के साथ काम करता रहे।

रक्षा मंत्री ने 'अस्त्र एमके-1 बीवीआर' और 'समुद्री स्थिति संबंधी जागरूकता प्रणाली' सौंपी

डीआरडीओ के इस कार्यक्रम में रक्षा मंत्री राजनाथ सिंह ने हवा से हवा में मार करने वाले 'अस्त्र एमके-1 बीवीआर' के एक मॉडल को वायुसेना प्रमुख आरकेएस भदौरिया को सौंपा। रक्षा मंत्री ने कहा कि हम भारत को महाशक्ति बनाना चाहते हैं और आप (वैज्ञानिक) इसमें महत्वपूर्ण भूमिका निभा सकते हैं।

बता दें कि अस्त्र स्वदेशी रूप से विकसित पहली बीवीआर (बियॉन्ड विजुअल रेंज) हवा से हवा में मार करने वाली मिसाइल है। इसे सुखोई-30, एलसीए और मिग-29 से लॉन्च किया जा सकता है। वहीं, राजनाथ ने डीआरडीओ द्वारा तैयार भारतीय 'समुद्री स्थिति संबंधी जागरूकता प्रणाली' नौसेना प्रमुख और सीमा निगरानी प्रणाली (बॉस) सेना प्रमुख को सौंपी।

<https://www.amarujala.com/india-news/cds-general-bipin-rawat-at-drdo-in-case-of-war-we-will-win-it-through-indigenous-weapons>

Defence Minister Rajnath Singh felicitates Eminent Scientists at DRDO award function

Defence Minister Rajnath Singh felicitated 45 eminent scientists at DRDO award function for their extraordinary research work and contribution on December 18: By Shivani Sharma

Defence Minister Rajnath Singh felicitated 45 scientists at DRDO award function for their extraordinary research work. On the occasion, Rajnath Singh said, "India is moving ahead in its endeavour to be an economic and military superpower, and our scientists are contributing to the progress of the nation". MoS Defence Sripad Yesho Naik, CDS General Bipin Rawat, Chiefs of Army, Navy, Airforce were also present on the occasion. The DRDO handed over the newly developed technologies to the chiefs of the three services on the occasion.



Indian Maritime situational awareness system (IMSAS)

Indian maritime situational awareness system is a state of artfully indigenous high-performance intelligent software system that provides a global maritime situational picture, marine planning tools and analytical capabilities to Indian Navy. It also provides Global Maritime operational picture from Naval headquarter to each individual ship in the sea to enable Naval command and control. IMSAS is deployed on more than 200 Naval units with more than 1000 operational nodes emphasis extensively used in Naval exercises and operations. IMSAS has put Indian Navy at par with quad partners in command and control software during recently concluded Malabar exercise.

Astra MK-I BVR Air to Air Missile

Astra is the first indigenously developed beyond visual range BVR air to air missile which can be launched from Su 30, LCA, MIG 29 with range hundred plus kilometres. Globally very few countries have expertise and capabilities to design and produce this class of weapons system. The entire supply-chain along with test facilities have been developed in India. The successful development of Astra weapon system is a major contributor towards Atmanirbhar Bharat.

Border Surveillance System (BOSS)

Border surveillance system Boss provides all-weather surveillance for day-night monitoring of border areas BOSS has been successfully developed at Ladakh border area for day and night surveillance it facilitates monitoring and surveillance by automatically detecting the intrusion thereby easing men patrolling in Harsh hi all scheduled sub-zero temperature areas boss is the first of its kind surveillance system developed for unmanned locations of high altitude border area it consists of Battlefield surveillance radar BFS are XR electro-optical sensors Day and Night cameras, eye-safe LRF and geolocation sensors mounted on the pan-tilt platforms powered with hybrid energy source equipment transmits the video and data over wireless.

CDS General Bipin Rawat said that because of DRDO our armed forces have become so empowered that If we have to go in a war then we will come victorious with indigenously prepared warfare. He added that we are facing many challenges on the eastern and western borders but DRDO is helping us in overcoming these challenges. Defence minister reiterated how Indian Forces are moving ahead in becoming self-reliant with indigenous weapon systems. Rajnath Singh also said whatever our forces have done in the recent times is miraculous and it happened with the support of our scientists.

<https://m.republicworld.com/india-news/general-news/defence-minister-rajnath-singh-felicitates-eminent-scientists-at-drdo-award-function.html>

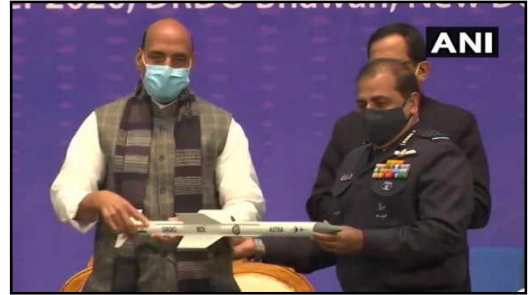
DRDO के अवार्ड समारोह में बोले रक्षामंत्री, स्वदेशी के विकास के साथ बड़ी आर्म्ड फोर्सज की ताकत

By Vivek Singh

नई दिल्ली: रक्षामंत्री राजनाथ सिंह ने डीआरडीओ के अवार्ड समारोह में हिस्सा लिया। इस दौरान द्वारा रक्षा क्षेत्र में किए गए विकास कार्यों के लिए डीआरडीओ के वैज्ञानिकों और संगठन से जुड़े व्यक्तियों की तकनीक, आत्मनिर्भरता, एकेडमिक और परफॉर्मंस एक्सीलेंस के क्षेत्र में पुरस्कार दिए गए। समारोह में रक्षा मंत्री ने कहा कि डीआरडीओ ने लगातार उच्च तकनीकी सहयोग देकर भारतीय आर्म्ड फोर्सज को मजबूती प्रदान की है।

सेना को सौंपे DRDO में विकसित हथियार

डीआरडीओ के अवार्ड समारोह में पहुंचे रक्षामंत्री राजनाथ सिंह ने इंडियन एयर फोर्स के प्रमुख आरके भदौरिया को Astra MK-1 BVR एयर टू एयर मिसाइल का मॉडल सौंपा। एस्ट्रा पूर्ण रूप से देश में विकसित की गई पहली बीवीआर (Beyond Visual Range) मिसाइल है जिसे एसयू-30, एलसीए और मिग-29K एयरक्राफ्ट से 100 किमी की दूरी से लॉंच किया जा सकता है। इस दौरान रक्षा मंत्री ने नेवी चीफ को डीआरडीओ द्वारा विकसित सामुद्रिक स्थिति जागरूकता प्रणाली (Maritime Situational Awareness System) सौंपा। साथ ही आर्मी चीफ नरवणे को डीआरडीओ के द्वारा ही बनाया गया बॉर्डर सर्विलांस सिस्टम (BOSS) सौंपा।



ऊंची उड़ान भरने की जरूरत- राजनाथ सिंह

डीआरडीओ के अवार्ड समारोह में बोलते हुए रक्षा मंत्री ने कहा कि इस संगठन ने अपने सफल प्रयोगों के माध्यम से देश के रक्षा बलों की क्षमता बढ़ाने में मदद की है। चाहे वह मल्टीरोल फाइटर एयरक्राफ्ट तेजस (Multirole Fighter Aircraft Tejas) हो या फिर बैलिस्टिक मिसाइल सिस्टम (Ballistic Missile System) और फिर रडार सिस्टम हो। उन्होंने कहा कि DRDO ने यंग साइंटिस्ट लैब जैसे कार्यक्रम चलाए जिनके माध्यम से वह वर्तमान के साथ ही भविष्य की जरूरतों के लिए भी काम कर रहा है। डीआरडीओ ने कई स्वदेशी तकनीक का विकास कर आत्मनिर्भरता में मदद की है।

इसके साथ ही राजनाथ सिंह ने कोरोना काल में डीआरडीओ के कामों की प्रशंसा भी की। उन्होंने कहा कि कोरोना काल की शुरुआत में ही डीआरडीओ ने वेंटिलेटर, पीपीई किट्स, मास्क और सैनेटाइजर्स जैसी जरूरी चीजों का निर्माण शुरू कर दिया था जिससे कोरोना के खिलाफ जंग में लगे लोगों को बहुत मदद मिली। डीआरडीओ की चुनौतियों का जिक्र करते हुए रक्षामंत्री ने 200 प्रतिशत की क्षमता से काम करने की अपील की। उन्होंने कहा कि बदली हुए परिस्थितियों में जिस तरह के रक्षा समीकरण बन रहे हैं हमें और ऊंची उड़ान भरने की जरूरत है।

'संघर्ष इतना बढ़ गया जिसकी कल्पना नहीं की गई थी'

वहीं आज ही रक्षामंत्री ने मिलिट्री लिटरेचर फेस्टिवल में भी हिस्सा लिया। पहली बार आयोजित हुए इस फेस्टिवल को वीडियो कॉन्फ्रेंसिंग से संबोधित करते हुए रक्षा मंत्री ने आयोजन की शुरुआत को ही इसकी सफलता बताया। उन्होंने कहा कि 'हमारे यहां लिटरेरी फेस्टिवल और फिल्म फेस्टिवल तो होते रहे हैं लेकिन मिलिट्री लिटरेचर फेस्टिवल एक नई शुरुआत है।'

उन्होंने कहा कि 'यह आयोजन इसलिए भी महत्वपूर्ण है कि बदलते समय में युद्ध के खतरे और इसका चरित्र भी बदला है। भविष्य में सुरक्षा से जुड़े और भी मुद्दे हमारे सामने आ सकते हैं। धीरे-धीरे संघर्ष का दायरा इतना बढ़ गया है जिसकी पहले कल्पना भी नहीं की गई थी।'

रक्षा मंत्री ने कहा कि मिलिट्री साहित्य को आम लोगों से जोड़ने को लेकर उनकी खुद की भी रुचि रही है। "मैं चाहता हूँ कि हमारी आने वाली पीढ़ियां हमारे देश के इतिहास को, खास तौर पर सीमा क्षेत्र के इतिहास को अच्छी तरह से जानें। इसके लिए रक्षा मंत्री बनने के बाद ही मैंने एक कमेटी का गठन किया। यह हमारे सीमाई इतिहास और इससे जुड़े युद्धों को आसान शब्दों में लोगों तक पहुंचने के लिए काम कर रही है।"

<https://hindi.oneindia.com/news/india/defence-minister-rajnath-singh-at-drdo-award-ceremony/articlecontent-pf326513-594520.html>



Sun, 20 Dec 2020

NPOL scientists in Kochi win awards

Kochi: The Kochi-based Naval Physical and Oceanographic Laboratory (NPOL) bagged two prestigious awards at the national DRDO Awards ceremony held in New Delhi on December 18.

The awards for the year 2018 were given away by Defence Minister Rajnath Singh in the presence of the Union Minister of State for Defence, Shripad Yesso Naik, and Chief of Defence Staff, General Bipin Rawat, along with Chairman of DRDO, Dr. G. Satheesh Reddy.

“Agni Award for Excellence in Self Reliance-2018” was won by Dr. K. Ajith Kumar, Scientist-G, Associate Director, Project Director, Mareech Systems. His team bagged the award for its outstanding contributions in the design, development and production of Mareech Advanced Torpedo Defence Systems, which was inducted by the Indian Navy.



“Best Techno Managerial Services / Popular Science Communications Award – 2018” was won by Sameer Abdul Azeez, Scientist-F, and Group Director (Technology Management). His team was given the award in recognition of the valuable contributions made towards successfully completing the first export of a defence system - HMS-X sonar, to Myanmar, and for providing technical consultancy to establish test facilities in Vietnam through synergized partnership with industry, and also for garnering interests of multiple other nations in DRDO-developed products.

<https://www.thehindu.com/news/cities/Kochi/npol-scientists-in-kochi-win-awards/article33374559.ece>

DIHAR conferred Defence Technology Spin-off Award for helping increase farm productivity in Ladakh

The institute is engaged in research to enhance the agro-animal productivity

Chandigarh: Defence Institute of High Altitude Research (DIHAR), Leh, has been conferred the Defence Technology Spin-off Award for the successful development of low-cost agro-animal technologies for Ladakh sector and translation of its research at the grassroots level.

It has also contributed significantly in increasing farm productivity, crop diversification and improving socio-economic condition of the tribal farmers in the trans-Himalayan Ladakh region.

Dr OP Chaurasia, Director, DIHAR received the award from the Minister of Defence, Rajnath Singh during the DRDO Awards function at New Delhi.

The institute is engaged in research to enhance the agro-animal productivity and develop greenhouse technologies for high altitude for the availability of fresh food to troops in Ladakh, besides screening and identifying medicinal and aromatic plants to exploit them for use for defence purposes.

<https://www.tribuneindia.com/news/nation/dihar-conferred-defence-technology-spin-off-award-for-helping-increase-farm-productivity-in-ladakh-186637>



Business Standard

Sun, 20 Dec 2020

Rajnath Singh inaugurates India's first hypersonic wind tunnel in Hyderabad

After America and Russia, India is the third country to have such a large facility in terms of size and operating capability

Hyderabad: Defence Minister Rajnath Singh on Saturday inaugurated the advanced Hypersonic Wind Tunnel (HWT) test facility here, making India the third country after the US and Russia to have such a facility.

The state-of-the-art HWT Test facility is "pressure vacuum driven enclosed free jet facility having nozzle exit diameter of 1 metre and will simulate Mach No 5 to 12 (Mach represents the multiplication factor to the speed of sound)", a defence release said.

After America and Russia, India is the third country to have such a large facility in terms of size and operating capability, it said.

It is an indigenous development and an outcome of synergistic partnership with Indian industries.

The facility has the capability to "simulate hypersonic flow over a wide spectrum and will play a major role in the realization of highly complex futuristic aerospace and defence systems," the release said.

Singh, who visited the Defence Research and Development Organisation's Dr APJ Abdul Kalam Missile Complex here during his two-day visit to the city, urged the DRDO's scientists to make India a "Super Military Power", thereby making India a Super Power, a defence release said.

He appreciated the contributions of DRDO Young Scientist Labs and said the DRDO needs to focus on next generation needs, including cyber security, space and artificial intelligence and evolve roadmaps.

"The immense potential available in DRDO has been a catalyst for the development of industries and defence manufacturing sector.

RM (Raksha Mantri) urged DRDO scientists to make India a Super Military Power thereby making India a Super Power," it said.

Union Minister of State for Home G Kishan Reddy and DRDO Chairman G Satheesh Reddy accompanied Singh during the visit.

The release said Lab Directors, Cluster DGs and Programme Directors briefed the dignitaries about the ongoing projects and technological developments.

Hyderabad-based DRDO labs showcased various indigenously developed systems and technologies in wide ranging areas including missiles, avionics systems, advanced materials, electronic warfare, quantum key distribution technology, directed energy weapons, Gallium Arsenide and Gallium Nitride technology capabilities.

Two anti-drone technologies were demonstrated by DRDO labs to Singh, it said.

The Defence Minister, who addressed the DRDO fraternity, applauded the recent series of successful missions and technological achievements by various clusters of the organisation.

This included the Hypersonic Technology Demonstration Vehicle (HSTDV), Anti-Radiation Missile (RUDRAM), Quick Reaction Surface to Air Missile (QRSAM), Supersonic Missile Assisted Release Torpedo (SMART) and Quantum Key Distribution (QKD) technology during the last six months, it said.

(Only the headline and picture of this report may have been reworked by the Business Standard staff; the rest of the content is auto-generated from a syndicated feed.)

https://www.business-standard.com/article/current-affairs/rajnath-singh-inaugurates-india-s-first-hypersonic-wind-tunnel-in-hyderabad-120121901079_1.html



Photo: @rajnathsingh (Twitter)

Defence Minister Rajnath Singh inaugurates country's first hypersonic wind tunnel facility

After Russia and US, India has become the third country to have such a large facility in terms of operating capability and size

By Shailaja Tripathi

The Union Defence Minister Rajnath Singh on December 19, 2020 inaugurated India's first advanced Hypersonic Wind Tunnel Facility. It makes India the third country after Russia and the United States to have such a facility.

According to an official release by Defence Ministry, after Russia and US, India has become the third country to have such a large facility in terms of operating capability and size. It added that the facility is an indigenous development as well as an outcome of synergistic partnership with the industries of India.

The Defence Minister also visited Dr. Abdul Kalam Missile Complex of DRDO. During his visit, he urged the scientists of DRDO to make India a 'super military power' which also means making India a super power.



About Hypersonic Wind Tunnel Facility:

The defence release explained that the state-of-the-art hypersonic wind tunnel facility is a pressure vacuum driven enclosed free jet facility which has nozzle exit diameter of 1 meter. It will simulate Mach No 5 to 12. Mach represents the multiplication factor to the speed of the sound.

The Hypersonic Wind Tunnel Facility has the capability of simulating hypersonic flow over a wide spectrum. It will also play a significant role in the realization of high complex futuristic aerospace and defence systems.

Defence Minister visits DRDO facility:

The Defence Minister applauded the contributions of the DRDO young scientist labs. He also added that the organisation now needs to focus on the next generations needs. It includes artificial intelligence, cybersecurity, space and evolve roadmaps.

Rajnath Singh also noted that the immense potential that is available in DRDO has always been a catalyst for the development of defence manufacturing sector and industries.

He applauded the recent technological achievements and successful missions by the various clusters of the DRDO. These missions included:

- Hypersonic Technology Demonstration Vehicle
- Quick Reaction Surface to Air Missile
- Anti-Radiation Missile
- Quantum Key Distribution Technology
- Supersonic Missile Assisted Release Torpedo

DRDO showcased various systems and technologies:

- The dignitaries were briefed about the ongoing projects as well as technological developments.

- They showcased various indigenously developed technologies and systems which included advanced materials, missiles, avionics systems, quantum key distribution technology, electronic warfare, directed energy weapons.
- Two anti-drone technologies were also demonstrated.

<https://www.jagranjosh.com/current-affairs/defence-minister-rajnath-singh-inaugurates-countrys-first-hypersonic-wind-tunnel-facility-1608455667-1>



Sun, 20 Dec 2020

ATAGS howitzer best in world, no need for imported artillery guns: DRDO

By Ajit K Dubey

Balalore: Maintaining that the ATAGS howitzer is the best gun in the world with the capability to strike targets at the longest range of 48 kilometers, a top DRDO Scientist said, the indigenous gun can meet Indian Army's full requirement of 1800 artillery guns systems and there was no need for imports in this field.

Interacting with ANI during the field trials of the ATAGS which has already fired over 2,000 rounds in places like Sikkim near the China border and Pokharan near the Pakistan border, ATAGS project director and senior Defence Research and Development Organisation (DRDO) scientist Shailendra V Gade said the gun system is far better than the legendary Bofors in the Indian Army along with any other artillery gun in the world including the ATHOS gun offered by Israel.

The Advanced Towed Artillery Gun System (ATAGS) has been developed by the DRDO and produced by two firms Bharat Forge and Tata Advanced Systems Limited.

"The Indian Army's requirement is for 1580 towed artillery guns and apart from that, they need 150 ATAGS and another 114 Dhanush guns. So, there is a requirement of a total of 1,800 guns. The way the ATAGS is performing and come up, I am sure that this entire requirement of 1,800 guns can be met by this gun only," Gade told ANI.

Explaining the edge which the Indian Army would get to vet adversaries like China in a war scenario, Gade said the DRDO-developed gun is the longest firing howitzer in the world with 48 km and this will help it to be safe during a strike against the enemy.

"The enemy won't be able to counter you as they would not be able to reach you but you can reach them at 48 kilometers. You can be eight kilometers behind their strike range but still hit them," he said.

Asked if the ATAGS was better than the guns available with China and Pakistan, Gade said, "in fact, this is the best gun in the world because no other country has been able to such a system built on this high-technology with a high rate of firing capability."

Comparing the advancement of the ATAGS over the legendary Bofors and the rest of the guns in the world, Gade said the ATAGs can fire five rounds in a minute whereas the others can fire only three. "The range is also very high at 48 kilometers whereas the Bofors can fire at 32kms



ATAGS howitzer undergoing trials in Balalore (Photo/ANI)

using the same type of round. The mobility is also very high. The gun will be very reliable, maintenance-free and robust," he said.

The Indian Army is looking at the acquisition of around 1600 artillery guns and was looking at Israeli guns ATHOS as an option for quick induction of 400 pieces.

On being asked to compare the ATAGS with the ATHOS and French Nexter guns, Gade said, "If you look at the qualitative requirements of the ATHOS and Nexter guns, the requirements of the ATAGS are very stringent. So, definitely, the guns systems are not very contemporary. If we look at the future as 2027-2030, the ATAGS is the answer for those times for the Indian Army."

On being asked whether there was a need for India to import any howitzer from abroad in view of the presence of howitzer, Gade said, "not at all. I feel India as a country, we have developed the core competence and technology is there to meet the country's requirements for world-class guns."

<https://www.aninews.in/news/national/general-news/atags-howitzer-best-in-world-no-need-for-imported-artillery-guns-drdo20201219102044/>



Sun, 20 Dec 2020

DRDO says ATAGS howitzer 'best in world' | A look at its specifications, features and how well it competes with the legendary Bofors

The DRDO, which has developed the ATAGS howitzers along with Bharat Forge Limited and Tata Advanced Systems Limited, believes that it could solve the Army's requirement of 1800 artillery guns systems

New Delhi: In what could boost Modi government's plan to make India self-reliant in the crucial defence sector, the Defence Research and Development Organisation (DRDO) has successfully conducted the field trials of Advanced Towed Artillery Gun System (ATAGS) howitzers.

The DRDO, which has developed the ATAGS howitzers along with Bharat Forge Limited and Tata Advanced Systems Limited, believes that it could solve the Army's requirement of 1800 artillery guns systems, claiming that it is the "best gun in the world".

"The Indian Army's requirement is for 1580 towed artillery guns and apart from that, they need 150 ATAGS and another 114 Dhanush guns. So, there is a requirement of a total of 1,800 guns. The way the ATAGS is performing and come up, I am sure that this entire requirement of 1,800 guns can be met by this gun only," DRDO scientist Shailendra V Gade said while speaking to news agency ANI.

What are the features of the ATAGS howitzer?

The DRDO says that ATAGS howitzer -- which has been indigenously developed -- is the "longest firing gun in the world" and has the capability to strike targets at a range of 48 kilometers. It believes that the gun can also hit targets that are "eight kilometers behind their strike range".

Talking about the specifications, the ATAGS howitzer is a 155 mm calibre gun which has a weight of 18 tonnes and 6,975 mm barrel length. The howitzer requires a crew of 6 to 8 personnel.



(pic credits: ANI)

The howitzer is equipped with advance features like auxiliary power mode, automatic command and control system, advanced communication system and night vision system. The DRDO says that it can fire three rounds in 15 seconds in burst mode while in sustained mode, it has a rate of fire of 60 rounds in 60 minutes.

How does the ATAGS howitzer fare against the legendary Bofors gun?

The DRDO says that the ATAGS howitzer is "far better" than the legendary Bofors gun used by the Indian Army in the 1999 Kargil War and can also compete with the ATHOS guns, noting that "no other country has been able to such a system built on this high-technology with a high rate of firing capability".

Here it is noteworthy to mention that the Indian Army was thinking to purchase the Israeli guns ATHOS.

"The range is also very high at 48 kilometers whereas the Bofors can fire at 32kms using the same type of round. The mobility is also very high. The gun will be very reliable, maintenance-free and robust," Gade told ANI.

"If you look at the qualitative requirements of the ATHOS and Nexter guns, the requirements of the ATAGS are very stringent. So, definitely, the gun's systems are not very contemporary. If we look at the future as 2027-2030, the ATAGS is the answer for those times for the Indian Army," he added.

Can ATAGS howitzer help India in a two-front war against China and Pakistan?

The field trials were recently conducted and it fired over 2,000 rounds in places like Sikkim near the China border and Pokharan near the Pakistan border. The DRDO believes that it would give an edge to the Indian Army over China and Pakistan in a war scenario.

It also says that ATAGS will fulfil the Indian Army's full requirement of 1800 artillery guns systems and there was no need for imports in this field.

"Not at all. I feel India as a country, we have developed the core competence and technology is there to meet the country's requirements for world-class guns," Gade told ANI when asked whether there was a need for India to import any howitzer from abroad in view of the presence of howitzer.

<https://english.jagran.com/india/drdo-says-atags-howitzer-best-in-world-a-look-at-its-specifications-features-and-how-well-does-it-compete-against-the-legendary-bofors-10021339>



Mon, 21 Dec 2020

CM Naveen Patnaik congratulates DRDO on successful test firing of ATAGS howitzer

Bhubaneswar: Chief Minister Naveen Patnaik congratulated the Defence Research and Development Organisation (DRDO) Sunday afternoon for the successful test-fire of the Advanced Towed Artillery Gun System (ATAGS) Howitzer at Chandipur Integrated Test Range (ITR) in Balasore district.

Taking to Twitter the CM said, "Congratulate @DRDO_India on the successful test firing of Advanced Towed Artillery Gun System (ATAGS) Howitzer at Baleswar test firing range".

Notably, India conducted a series of trials of a fresh batch of the state-of-the-art ATAGS off Odisha coast Saturday. The venture paved the way for its early induction into the Indian armed forces.



However, the user specific trials of the gun system are considered to be the best in its class in the world. The trials were conducted from the Proof and Experimental Establishment (PXE) – a DRDO test range to validate the fire power of the advanced howitzer.

<https://www.orissapost.com/cm-naveen-patnaik-congratulates-drdo-on-successful-test-firing-of-atags-howitzer/amp/>

TIMESNOWNEWS.COM

Sun, 20 Dec 2020

'Best in the world': Indian-made ATAGS howitzer set to give artillery edge to defence forces

The indigenous gun ATAGS howitzer was test-fired at a facility in Odisha's Balasore

Key Highlights

- *It is the best gun in the world, no other country has been able to develop such a gun system: ATAGS Project Director*
- *We are hoping India will have the biggest achievement in the class of artillery gun system: Anil Morgaokar, DRDO*

Balasore: Indian-made ATAGS howitzer can meet Indian Army's full requirement of 1800 artillery guns systems and there is no need to procure foreign items in this field, said a top DRDO scientist on Saturday. The indigenous gun was test-fired at a facility in Odisha's Balasore.

While speaking to media, Advanced Towed Artillery Gun System (ATAGS) project director and senior Defence Research and Development Organisation (DRDO) scientist Shailendra V Gade said the gun system is far better than the legendary Bofors in the Indian Army along with any other artillery gun in the world including ATHOS gun of Israel.

The Advanced Towed Artillery Gun System (ATAGS) has been developed by the DRDO and produced by two firms Bharat Forge and Tata Advanced Systems Limited. It has already fired over 2,000 rounds in places like Sikkim near the China border and Pokharan near the Pakistan border.

"The Indian Army's requirement is for 1580 towed artillery guns and apart from that, they need 150 ATAGS and another 114 Dhanush guns. So, there is a requirement of a total of 1,800 guns. The way the ATAGS is performing and come up, I am sure that this entire requirement of 1,800 guns can be met by this gun only," said Gade.

Stressing on the remarkable range of the gun, Gade said the DRDO-developed gun is the longest firing howitzer in the world with 48 km and this will help it to be safe during a strike against the enemy.

"The enemy won't be able to counter you as they would not be able to reach you but you can reach them at 48 kilometers. You can be eight kilometers behind their strike range but still hit them," he said.

Asked if the ATAGS was better than the guns available with China and Pakistan, Gade said, "in fact, this is the best gun in the world because no other country has been able to such a system built on this high-technology with a high rate of firing capability."

The Indian Army is looking at the acquisition of around 1600 artillery guns and was looking at Israeli guns ATHOS as an option for quick induction of 400 pieces.

<https://www.timesnownews.com/india/article/best-in-the-world-indian-made-atags-howitzer-set-to-give-artillery-edge-to-defence-forces/696516>



ATAGS Howitzer undergoing trial at Balasore | Photo Credit: ANI

Army to test indigenous artillery system with 48-km strike range

By Rajat Pandit

New Delhi: The Army will soon begin testing an indigenously-developed artillery system, which the DRDO contends is the best in its class in the world with a record-breaking strike range of 48-km. If the big gun passes muster, it can fulfil the Army's requirement for 1,580 such guns worth over Rs 25,000 crore.

The 155mm/52 caliber advanced towed artillery gun system (ATAGS) is set to undergo "winter user trials" by the Army in Sikkim in January-February, which will be followed by the "mobility trials" and then the "summer trials" in May-June.

With the development of ATAGS, which has Bharat Forge (Kalyani Group) and Tata Advanced Systems as the production partners, DRDO officials contend the Army has no need to import such guns from Israel or other countries.



But the Army says the indigenous guns will have to first prove their worth in the forthcoming user trials. The force has a parallel project stuck in the final stages to procure 400 Athos towed gun systems for Rs 5,147 crore from Israeli firm Elbit Systems, which was originally supposed to be followed by the domestic production of another 1,180 guns in collaboration with the Ordnance Factory Board. The Israeli gun had emerged as L-1 a year ago to beat the French one from Nexter Systems after trials.

Amidst this wrangling, the user-trials of the indigenous ATAGS also got somewhat delayed after the barrel of one of the guns burst during test-firing at the Pokhran field firing range in Rajasthan, which injured four personnel, in September.

"It was most probably due to defective ammunition. There was no issue with the barrel. Over 2,000 rounds have already been successfully test-fired from the ATAGS during high-altitude trials in Sikkim and then in Pokhran," a senior DRDO official said.

"Further tests are currently underway at the Proof and Experimental Establishment range at Balasore. Why should the Army import such guns if a much better indigenous option with a longer 48-km range is available? Other contemporary guns have a 40 to 45-km range," he added.

<https://timesofindia.indiatimes.com/india/army-to-test-indigenous-artillery-system-with-48-km-strike-range/articleshow/79831376.cms>

There will be no compromise: General Bipin Rawat

In his first detailed interview after taking over as Chief of Defence Staff on January 1, General Bipin Rawat tells Executive Editor Sandeep Unnithan about what his Department of Military Affairs (DMA) has achieved, the border standoff with China, his plans to transform the armed forces, the road ahead and the resistance to change

By Sandeep Unnithan

Q. Looking back at the past year, what has been your biggest achievement as Chief of Defence Staff (CDS)?

A. We've been able to get all the services on board on the issue of integration. It has dawned on everyone that, to be combat-effective, unless we operate together, we won't be able to apply our combat power the way we should. It's good to have individually strong services, but it shouldn't lead to lopsided development of one service. Finally, we have to realise that each service has to operate in a synergistic, coordinated manner with the other services. Wars are fought for ensuring territorial integrity, hence the Army is supported by other Services to ensure victory on land



Photo by Bandeep Singh

Q. Within four months of taking charge, you faced a crisis on the border with China. How did the office of the CDS help in this situation?

A. Earlier, there was hesitation on sharing information between the services or it was unduly delayed. With the CDS coming into the picture, the three services always kept everyone abreast of what was happening from the start.

Q. Did the fact that the Indian Air Force (IAF) was in theatre almost immediately have something to do with this information-sharing?

A. Yes. Not just that, even the navy was raring to go and ready for any task. We were able to coordinate the action and make sure everybody knew what the other service is doing. To that extent, we were able to bring about unity in effort.

Q. And this would not have been possible without the office of the CDS?

A. The Integrated Defence Staff (IDS) that existed earlier wasn't really empowered. If the army was doing something, whether they should even share that with, say, the navy was left entirely to them. If the air force was doing something, whether the army or the navy should be informed was completely left to them. That's not the case now. The office of the CDS has brought coordination amongst the three services.

Q. How hopeful are you of a resolution to the Ladakh standoff?

A. There is hope of a resolution, but at the same time we must prepare for the worst case scenario. Everybody is hopeful, everybody wants a resolution, but at the same time we must not lower our guard and must be prepared for things not working out the way we want them to. It has been spelt out very clearly that there will be no compromise. So if we are not looking at a compromise, then there's going to be a hardening (of positions). Everybody has been saying that both sides should return to April 2020 positions, status quo ante. That's the bottom line we've spelt out.

Q. Is there a deadline? How long are you prepared to wait?

A. Both sides are preparing and consolidating. Finally, we don't want a permanently defensive line to be drawn. Of course, negotiations will happen at the political level, it is already happening at the military and diplomatic levels. Some resolution will be found because you don't remain in eyeball to eyeball confrontation for years to come. Everybody talks of Sumdorong Chu (an Indian Army-PLA standoff in Arunachal Pradesh in 1987) lasting seven years. That's not the way we want to go this time. The climatic conditions in Sumdorong Chu and Ladakh are very different. One has to look at these issues.

Q. Nine months into the standoff, have you been able to figure out why the Chinese did what they did?

A. Many theories are going around. I don't think it's worth guessing. The fact is this (Chinese incursion) has been going on over the years. Only that [in this case], the number of face-off points have increased. Yes, they must have come with some intention, which we have analysed, but it would be incorrect to come to a specific conclusion as to why this was done.

Q. Do you believe the topmost Chinese leadership was aware of this?

A. The Chinese would not have done anything of this nature and magnitude without their leadership's knowledge.

Q. 2020 is perhaps the first year the army has lost lives on both fronts, LoC and LAC. Is the two-front war you have spoken of finally a reality?

A. We were always tasked for defending our borders. And when you have unsettled borders on your north and west, you don't know which side the battle will commence and where it will end. So you should be prepared on both fronts. How you want to deal with the fronts is [something] the leadership will have to decide, but to say you will not be prepared, we shouldn't look at this (two-front war) as something new.

Q. Are you looking at greater collusive action between both fronts?

A. We worked out our methods to say how collusive [action] could happen and not happen, how much and how far one nation can go against another. How they would support we've worked out our contingencies, but yes, some kind of collusive [action] should be anticipated.

Q. Would it be greater than in the past? Has Xi Jinping altered the situation greatly?

A. I don't think so. It's the same.

Q. The economy has been severely impacted in 2020. As CDS, would you ask for a hike in the defence budget?

A. We have sought additional funds, especially for emergency purchases that the services are making now. The government has said funds will be made available. The emergency purchases are not happening overnight. The funds flow is spread over years.

Q. How much additional funds have you asked for?

We've given them (government) a ballpark figure, but I won't like to comment on it. We've been promised [that funds] are coming they are being released based on our expenditure.

Q. What has been the most significant achievement of the DMA?

A. The most important part is looking at integrating procedures of the three services. We are trying to see commonality of purpose. Communication systems, and large part of our training are being streamlined. Gradually, we are moving to joint training, not only at the officer level but the

level of men (soldiers). We've integrated in certain places. In Delhi, systems are talking to each other. When the Network for Spectrum (NFS) comes through, each service will have a common system. We have, as a test bed, created three joint logistic nodes in Chennai, Mumbai and Guwahati, where common logistics are being done. Each service has its own promotion boards and HR policies. We are in the process of bringing about commonality amongst the services

Q. What about synergy of the three services?

A. Getting the three services to agree on integration has been the biggest achievement. Synergising activities, whether it's training, logistics or maintenance, and even foreign cooperation, are being looked at in an integrated manner. We are developing an Integrated Capability Development Plan (ICDP) to equip the armed forces and manage procurements. The ICDP will be unveiled soon. We are working on a Defence Capital Acquisition Plan (DCAP). ICDP is going to be the process on how we do capability development. The DCAP will look at acquisitions over the next five years.

Q. Are you on course to establishing theatre commands by 2022?

A. By 2022, we will have the structures in place and the rollout will start. I expect air defence to roll out faster. The maritime command will follow next, by 2021, and by 2022, we will at least start the rollout of land-based theatre commands. It will take time to stabilise, but we are confident the process will begin.

Q. You don't see any difficulty in carrying out reforms while the army is guarding unsettled borders?

A. If we don't integrate, there will be a problem. Today, you are looking at a northern theatre and a western theatre. The northern theatre commander has to be very sure as to what is available to him, and how he is going to be resourced, and how he's going to fight if war is thrust upon us. The western theatre commander must be very clear on how he is going to fight the war. He must know how the army, air force and navy will support him. For example, navy assets are now also being used on land, which we never did earlier.

Q. There's been a lot of controversy around your proposals to reduce pensions and increase terms of service. Are those still on the table?

A. We are not looking at reducing pensions; we are looking at age extension. The proposal will go to the government soon and will have to be approved by the CCS. We are hoping to get it by the next financial year. This is only to extend the service for officers. There is some other scheme coming in for the men, referred to as Tour of Duty. The army chief has been talking about that, to allow our citizens to serve in the army and then they will be facilitated to find employment elsewhere.

Q. What are the savings through all these measures?

A. If we extend the retirement age, the government will have funds to support the defence services, to help us move faster with the creation of infrastructure.

Q. When we met in February, you had objections regarding the navy's proposal for a third aircraft carrier. Do those objections still stand given the altered threat perception?

A. Andaman and Nicobar and Lakshadweep, these are unsinkable aircraft carriers. Today, there is so much visibility on the battlefield, there is absolute transparency, whether you use satellites or drones or UAVs or any system. Anything which moves on the surface, even on land, is dead. Anything at sea will get picked up. And today you've got fairly accurate systems to bring down anything on land or at sea. So aircraft carriers are going to be vulnerable. One might say they keep moving, but so does the chap have the capability to keep you under observation. Adversaries have systems that will target you based on where you are next. Therefore we need to carry out an in-depth assessment of requirement of aircraft carriers, grey hull ships, submarines and above all our ability to maintain all round surveillance and to target the adversary's sea going vessels and aircraft.

Q. 2020 is perhaps the first year the Indian Army has lost lives on both fronts, LoC and LAC. Do you believe the two-front war that you have spoken of is finally a reality?

A. We were always tasked for defending our borders. And when you have unsettled borders on your north and your west, you don't know which side the battle will commence and where it will end. So you should be prepared on both fronts. How you want to deal with the fronts is [something] the leadership will have to decide, but to say that you will not be prepared, I don't think we should look at this (two-front war) as something new.

Q. Are you looking at greater collusive action between both fronts?

A. We worked out our methods to say how collusive [action] could happen and not happen, how much and how far one nation can go against another. How they would support we've worked out our contingencies, but yes, some kind of collusive [action] should be anticipated.

Q. Can you afford this deployment on the northern and eastern borders, where troops have been amassed at high altitudes?

A. You have to change your thought process. You've got threats on your northern and western sides. I don't think sitting on the border is the best way to defend it. We should be using surveillance, cameras, UAVs and unmanned systems, and keeping a ready force in the rear areas, where it continues to train. You've got to balance your requirements and, therefore, the technology and boots on ground need to be balanced. The next thing I want to look at is, today, you've got to start empowering your soldier with technology to be able to detect, identify and neutralise the threat at longer ranges than seek combat at close ranges. In our context, we have peculiarity of terrain, which necessitates acclimatisation to weather and altitude, and, hence, some forward presence of reserves becomes imperative. If you are able to empower the soldier with technology, the number of people with boots on the ground will reduce.

Q. Despite Pakistan's economic worries, there doesn't seem to be any let-up in infiltration from across the border. They are flying weapon shipments in drones.

A. They're changing tactics. They've realised that tiered deployments have made the LoC almost impregnable. Secondly, technology infusion, electronic warfare and surveillance systems, has happened on our side. You can practically see an infiltrating column come in. But importantly, there has been a lot of synergy between all government agencies. With everybody getting incorporated, information does reach as to where infiltration is being anticipated. So they have realised there's a problem, so how do they continue with the infiltration? They find the biggest problem is sending weapons. They have now developed drones that can carry a rifle or two rifles. The people (terrorists) are sent in through Rajasthan and Punjab or through tunnels.

Q. Are you on course to establishing theatre commands by 2022?

A. By 2022, we will have the structures in place and the rollout will start. I expect air defence to roll out faster. The maritime command will follow next, by 2021, and by 2022, we will at least start the rollout of land-based theatre commands. It will take time to stabilise, but we are confident the process will begin.

Q. Ultimately who will command these theatres?

A. There will be a role reversal. As of now, you cannot take away the responsibility of operations from the service chiefs. How they will get integrated will be [taken care of] by a theatre commander. But the operational guidelines will come from the respective service chiefs depending on the theatre. In a land theatre, the chief of the army staff will be responsible for conduct of operations. The air force chief will be responsible for air space management. As we integrate and start having a better understanding of the service, role reversal will happen. The office of the CDS will take over the operational responsibility while equipping, arming, training and logistics support will become the responsibility of the services.

Q. What is the time frame for this role reversal?

A. I don't see it happening before 7-8 years. There's a reason for it. Today, we don't understand each other's service. You have to have a fairly comprehensive understanding of the capability of the services, which will take time as we start integrating. In the one year as CDS, I have imbibed a

lot about the navy and the air force through regular briefings from them. But if this starts happening at the lower level, at the corps level, the leadership that will emerge will certainly be better aware (on jointmanship).

Q. Do you foresee an upgrade in the CDS's rank over the next eight years?

A. I think it is better to keep him at this rank only (four star). Today, there is acceptability within the service, there is a CDS, he is equal to you, but he's first among equals. If you start putting him above others, it will disrupt the bonhomie we share. If you make the CDS so strong that he can dictate terms to the services, then problems will start emerging. The CDS must be strong enough not by giving him power, but in decision-making. The decision he takes must be implementable.

Q. You don't want technically qualified people to leave?

A. Technically qualified for a field for which I want. Some people are technically qualified in a field for which I have numbers. Maybe I can do without them. But today, I am looking at people getting trained in cyber, AI There's going to be quantum computing. These people we are not willing to release. Why should I leave my doctors or those who maintain our aircraft and helicopters, our radars, vehicles and communication systems? Why should we release them early?

Q. Does that mean you are freezing recruitments?

A. Let me tell you the other advantage of that. You have held back the money coming out of the exchequer for the next two-three years. Which I am saying is only delaying the money that the government is giving. But I visualise the government going through some crisis over the next two-three years because of Covid. Indirectly, in a small way, we are helping overcome that small crisis by cutting down on the pension budget for some time. Now comes the issue of intake (recruitments). I will continue with my intake. As my intake continues, if nobody retires for three years, I have a deficiency in officers, which everybody talks about. I will make up 50 per cent of my deficiency. (The defence ministry said the army is short of 7,399 officers.)

Q. There have been objections that the CDS does not have the mandate to do all of this?

A. There are a lot of things that are not on the CDS's mandate. It is a plan you are going to give to the government with a complete roadmap, and it will go to the CCS for approval. Age extension requires cabinet approval. I've been asked to do theatre commands. It's my task, but even that has to go to the cabinet.

Q. You're wearing three hats, bureaucrat, military adviser and chairman of the Chiefs of Staff Committee. Who do you see when you look in the mirror?

A. As of now the secretary and the CDS, both roles are being performed by one person and that is taxing. As secretary, I have a lot of work. It is literally a bureaucrat's work. It is files and files and files. At the same time you have to focus on CDS. If somebody tells you that you have to take up operational responsibility, you can take that on if you don't have secretarial responsibility. At some stage, you will have to see who will look after the secretary's work and who will do the CDS's work.

Q. You've made a lot of friends and enemies in the past one year.

A. Friends to sabhi ban jaate hain lekin dushman humko satark rahane ki chetawani bhejate hain (Friends are easily made, but enemies keep us alert). I have always felt that people don't like change. When I became army chief, I looked at all the studies done over the past 20 years. There were 13 studies on change and restructuring in the Perspective Plans Directorate. The first study was done by General Krishna Rao in 1984. The next major study was by General Sundarji in 1987. I picked up these 13 studies and read them. The last study, which I now studied, which I am now talking about, IBG is not my idea. IBG is General V.K. Singh's idea done by General A.K. Singh as DG-PP. He conceptualised IBG-isation. He called it 'integration of forces for better combat management', I called it IBGs.

What happened is that with every study, you could not reach consensus and you shelved it. All I've said is that 'we won't shut this down'. The restructuring of army headquarters is not my study. It is General V.P. Malik's study. When General Malik said he would cut down 50,000 soldiers [at a

time] the strength of the army was 900,000 (it is now 1.3 million), people raised a furore and it was shut down.

Q. What is the ideal strength of the army? Also, are the reforms you had spoken of as army chief on course?

A. We should be at a million when we finish our IBG-isation. We have to look at how effective our cyber [capabilities] will become. How effective we will become in space. We have become very heavy on logistics. We are now cutting down on a lot of our logistics support. When we became independent and started raising our army, we raised our army around divisions. Divisions had been created by the British for out-of-area contingencies, like fighting in Burma and North Africa. Hence, they carried all their logistics. But we are going to fight across the border, the logistic support will come from here (within the country).

<https://www.indiatoday.in/magazine/interview/story/20201228-there-will-be-no-compromise-1750669-2020-12-18>

INDIA
TODAY

Sun, 20 Dec 2020

United colours of armed forces

The Chief of Defence Staff and the Department of Military Affairs complete a year in one of the most challenging times. Will India get the integrated military structure it needs?

By Sandeep Unnithan

New Delhi: A row of Indian Air Force (IAF) C-17s, Indian Army tanks in the Himalayas and a naval landing ship tank in the Andamans. Three large photo frames hang on one wall of General Bipin Rawat's spartan office in South Block, a daily reminder of his task at hand. As India's first Chief of Defence Staff (CDS), General Rawat has to get the army, air force and navy, the world's second, fourth and seventh largest, respectively, to work together as one unit.

"Some years ago, we used to ask, 'Why do we need a CDS?'" says General Rawat, with a smile. "Now, there is acceptance and acceptability all around and structures are being created for integration." (See accompanying interview.)

The idea of creating the post of CDS, a single-point military advisor to the government, was always a political one. It was first proposed in 2001 by the Group of Ministers appointed after the 1999 Kargil War, reiterated by an MoD (ministry of defence)-appointed committee of experts in 2016 and finally announced by Prime Minister Narendra Modi from the ramparts of the Red Fort on August 15 last year. The armed forces were



LEADING FROM THE FRONT: Chief of Defence Staff Gen. Bipin Rawat with the three service chiefs, Gen. Manoj M. Naravane, Admiral Karambir Singh and Air Chief Marshal R.K.S. Bhaduria in New Delhi

opposed to it for reasons of inter-service rivalry. The post of CDS is independent India's single-biggest military reform, one that will over the years change how the armed forces are structured.

Apart from being the CDS and the single-point military advisor to the government, General Rawat wears two more hats. As the permanent Chairman of the Chiefs of Staff Committee, he is first among equals on a panel that includes the three service chiefs. And as Secretary, Department of Military Affairs (DMA), he's a file-pushing military bureaucrat heading a fifth department in the MoD. All these responsibilities converge at a low-roofed, windowless 300 sq. ft office on the ground floor of South Block. For an office that wields enormous power and responsibility, it has a remarkably modest setting. The room is smaller than the lounge where General Rawat met visitors when he was the army chief. The potted plants in brass containers and the red foot-mat outside,

government code for an important office, break the monotony of a long corridor. Officers from the three services hurry past with files to be perused by the CDS's one-star military advisor. This is the beating heart of a one-year-old military-bureaucratic machine set up to make the armed forces future-ready.

Even General Rawat's worst critics will agree that the tasks before the CDS and DMA are humongous. A one-year review would hence only list what will largely be work in progress. "The office of the CDS is like a one-year-old child who is still taking baby steps. It will take time to stabilise," says Lt General D.B. Shekatkar, who headed the 2016 MoD committee that, among other things, recommended the post of CDS.

Over the next few days, General Rawat is to prepare for defence minister Rajnath Singh a report on 'annual achievements in jointness during the year'. This, in all probability, will list some of his office's most significant accomplishments over the year. These include kicking off three studies that will create the first of two integrated theatre commands, the National Air Defence Command (NADC), followed by the Maritime Theatre Command (MTC), by 2021. Next is a plan to harmonise the Rs 1 lakh crore worth of military hardware purchased by the armed forces every year. And finally, a drastic proposal to increase the retirement age of armed forces officers to save pensions and give the government a brief budgetary respite.

THE ROAD TO CONVERGENCE

What the Chief of Defence Staff and the Department of Military Affairs (DMA) have achieved so far

<p>➤ Studies for theatre commands initiated. Maritime Theatre Command (MTC) completed. National Air Defence Command (NADC) and Northern, Western and Eastern Commands underway. MTC and NADC to be set up by 2022.</p>	<p>➤ Integrated Capability Development Plan (ICDP) to manage all armed forces procurements. Defence Capital Acquisition Plan (DCAP) with two- and five-year horizons.</p>	<p>➤ Measures to increase the terms of engagement of armed forces personnel to reduce immediate pension payouts and cut down defence expenditure.</p>	<p>➤ Common communication protocols for the three services in Delhi. Information sharing, joint briefings.</p>
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The Journey So Far

General Rawat took over as CDS on the first day of a year that has been a turning point in the nation's history. The Covid-19 pandemic saw a nationwide lockdown leading to an economic crisis. The sudden mobilisation of two divisions following incursions by China's PLA (People's Liberation Army) in eastern Ladakh in May completed a near-unprecedented convergence of health, economic and national security crises. General Rawat listing his biggest achievement as getting the three services "to talk to each other" might sound facetious. But it must be seen in the light of what was, until last year, a peculiarly siloed defence ministry. The military, the political leadership and the bureaucracy stood like the Ashokan Lion symbols of the Indian state, each looking in different directions and rarely speaking to each other.

General Rawat says that the first test of a new structure, where the stakeholders began to speak to each other, came during the Ladakh border crisis. IAF fighter jets and transport aircraft were flown in almost immediately to support the army while the navy stood mission-ready in the Indian Ocean. This was in stark contrast to the Kargil War when the army struggled for a month to get the air force to deploy their fighter aircraft to support the ground offensive. "We are very optimistic about the CDS and the DMA," says Navy chief Admiral Karambir Singh. "There are several instances where we have been able to take problems head on and move [forward] in terms of jointness."

"Everybody was kept on board from the very beginning," says General Rawat of the Ladakh standoff. He regularly visited the operations rooms of all three services for briefings. His office is now pushing to integrate the three secure standalone communication systems used by the armed forces. The Air Force Net, the Navy Enterprise Wide Network and the Army Data Network link up

all of a single service's command headquarters, bases and formations. But it is only in Delhi that these three networks are linked. All three services will be linked across the country once the Network for Spectrum (NFS) fiberoptic cable backbone is completed a few years hence.

The DMA overcame the service bugbear that the military was kept outside the edifice of MoD for over 70 years. It took over all military responsibilities that were earlier performed by the Department of Defence, headed by the defence secretary. Among other issues, it looks after transfers, postings and promotions of one-star officers from the three services, tasks earlier performed by the civilian bureaucracy. The DMA is a mix of civilian and military officials. The department includes five joint secretary rank officers, one from each of the three services and two from the civilian bureaucracy. (Interestingly, within the DMA, the armed forces officials are designated 'Joint Secretary Equivalent' or 'Director Equivalent'.) A senior military official says the DMA secretariat has speeded up file movement, the ultimate measure of government efficiency. "Earlier, it was almost a rule that files would come back with multiple queries; now it is no longer so," says General Rawat.

It is impossible to separate the persona of General Rawat from the post he occupies. Over the year in office, he has stoked controversy, generated antipathy and inspired WhatsApp memes. There are jointmanship jokes, such as 'all services now jointly loathe the CDS'. A former army commander, who did not want to be named, terms his record "a mixed one, mostly negative". "He has initiated a few things, meddled in a few things that were not his responsibility, earned a poor name for having become politicised and hasn't been able to take all the services along with him," says the officer.

A senior government official calls the CDS "a great idea but stuck with the wrong guy". Another officer dismisses the DMA as yet another structure within the MoD: "Earlier, we had a four-bedroom house, now we have a five-bedroom house." An armed forces official calls General Rawat "bull-headed" but also agrees that "goody-goody guys never bring change".

General Rawat shrugs off the criticism and is nonplussed about making enemies. "Dost toh sabhi ban jaate hain, lekin dushman humko satark rehne ki chetawni bhejte hain (Friends are easily made, but enemies keep us alert)," he says. The angst, he adds, comes from the love of inertia and resistance to change.

The Reforms Plan

Much of the recent furore comes from a DMA proposal to increase the retirement age of officers. General Rawat says the issue was "misread" as an attempt to cut pensions. The proposal was only aimed at raising the retirement age of officers in the ranks of colonel, brigadier and major general and their equivalent ranks, by three, two and one year, respectively. This will defer payments in the short term and make funds available for other priority areas, including infrastructure development. "I visualise the government going through a crisis over the next two-three years because of Covid. In a small way, we are helping overcome it by cutting down on the pension budget for some time," says General Rawat of the proposal, which will be sent to the cabinet committee for approval for implementation in the next financial year.

Theatre Commands will be the next big leap for the armed forces. Jointmanship, the military term for integrated military operations with a common strategy, methodology and conduct, is the cement that will go into building the military structures called theatre commands. These theatre commands, which will see the three services move out of their 17 single-service commands into just five integrated theatres, will form the edifice of the reformed structure.

The navy has just finished its study for the MTC, which aims to knit together all tri-service military assets operating out of peninsular India and having a bearing on the maritime domain. An IAF study on the NADC and an army study on the Western, Northern and Eastern Integrated Theatre Commands are underway. All of these commands will be under a future Chief of Defence Staff, but only seven or eight years hence, says General Rawat. That is because, he adds, the services don't know enough about each other's capabilities yet.

The MTC proposal puts the command under the Chiefs of Staff Committee and envisages the navy chief as responsible only for equipping, arming and training functions. General Rawat believes it is too early for that to happen. “As of now, you cannot take away the responsibility of operations from the service chiefs. How they will get integrated will be [taken care of] by a theatre commander. But the operational guidelines will come from the respective service chiefs, depending on the theatre. In a land theatre, the army chief will be responsible for conduct of operations. The air force chief will be responsible for air space management,” he says.

General Rawat speaks about his CDS post in third person, as though anxious to not sound overbearing. He is generous with his praise of the three service chief colleagues and believes that the CDS should always be a four-star officer because “a higher rank will disrupt the bonhomie we share”. “The CDS must be [made] strong enough by giving him power, but in decision-making. The decision he takes must be implementable.”

By mid-2021, General Rawat hopes to get government approval for a plan that will reassess how the armed forces buy military hardware. The Integrated Capability Development Plan (ICDP) is aimed at equipping the forces and managing procurements. So far, the system was for the three service headquarters to submit their 15-year wishlists or Long Term Integrated Perspective Plans (LTIPPs).

Importantly, LTIPPs were not linked to available budgets or urgency. Proposals were worked on a first-past-the-post system, with the acquisition case that successfully jumped through all the hoops making it to the contract-signing stage. The Defence Capital Acquisition Plan (DCAP) will review the five-year horizon and bring all services on common capability development. This could see the CDS facing opposition from the armed forces as he questions big-ticket purchases. Does the navy, for instance, need a third aircraft carrier? Does the IAF need as many squadrons as projected or there is a case for unmanned state-of-the-art aerial systems becoming game-changers in future combat?

“Any new plan to redo acquisitions needs to balance three issues, requirement of the hardware, financial capability to pay for it, and the feasibility of acquiring it,” says Lt General P. Ravi Shankar, former director-general artillery. Clearly, questions needed to have been asked for several years now.

<https://www.indiatoday.in/magazine/interview/story/20201228-united-colours-of-armed-forces-1750668-2020-12-18>

We are closely watching Chinese Navy

Interview/ Admiral Karambir Singh, Chief of the naval staff

By Pradip R Sagar

Amid worries that India's border tensions with China could spill over to the maritime front, Admiral Karambir Singh says the Indian Navy is ready to meet any challenge in the Indian Ocean Region. The admiral also talks about the Navy's modernisation plans to counter the Chinese. Excerpts from an interview:

The Indian Navy had proposed to upgrade the military facilities in the Andaman and Nicobar Islands and Lakshadweep. How far have we progressed on these?

The Andaman and Nicobar Command has matured as a tri-services command and is built on the edifice of jointmanship. The ANC will also form part of the Maritime Theatre Command. For efficient functioning of the Command, effective synergy is being maintained between the three services. Plans are afoot to strengthen the Command with appropriate maritime assets and augmentation of infrastructure to increase the overall security of Andaman and Nicobar Islands.



What are the new military platforms and other infrastructure capabilities in the ANC?

In addition to the ships available at the ANC, the Indian Navy has already based some weapon-intensive and helicopter-capable ships at the ANC. Older LCUs [landing craft utility] have been replaced with five new and more capable ships. One more ship has been delivered and is awaiting induction, and two more such ships are under construction at Garden Reach Shipbuilders and Engineers Limited. These will also be based at the ANC. In addition, the Indian Navy will further augment the force levels of ships, aircraft, helicopters and unmanned aerial vehicles at the ANC. Regarding the augmentation of infrastructure, construction of additional jetties, technical support, infrastructure and other facilities is in progress. A tri-service, ten-year infrastructure plan for the ANC has been formulated.

The India-China border skirmishes could spill over into the maritime front. How capable is the Indian Navy in taking on the Chinese navy?

All the People's Liberation Army Navy activities in the Indian Ocean Region are monitored closely. The Indian Navy as a professional force evaluates the maritime security environment in the IOR on a continuous basis. Capability and capacity in the form of force readiness and force planning of the Indian Navy are shaped to meet any challenges in the region.

What are the priorities of the Indian Navy when it comes to modernisation?

The Indian Navy's modernisation plan for the future includes induction of aircraft carriers, ships, nuclear-powered submarines and conventional submarines, revitalisation of the aviation and sub-surface assets, and the induction of certain state-of-the-art weapons, sensors and equipment. Further, the development of technical and support infrastructure for maintenance of these assets is also being progressed concurrently.



Riding the wave: the INS Kalvari, a scorpene-class submarine, during sea-trial off Mumbai | AFP

What are the ongoing acquisitions of the Indian Navy?

At present, 43 ships and submarines are under construction, of which 41 are being built in Indian shipyards. The first indigenous aircraft carrier is under construction at Cochin Shipyard, Kochi, with [expected] delivery in the latter half of 2021. Four destroyers of Project 15B are being constructed at Mazagon Dock and delivery is likely to commence from 2021. Seven frigates of Project 17A are under construction at Mazagon Dock and at Garden Reach, and their delivery will commence from 2022. Further, contracts for two diving support vessels, four survey vessels (large) and four Project 1135.6 follow-on ships were concluded in 2018. A contract for 16 ASW shallow-water craft was concluded in 2019. Besides 43 under-construction warships, 'acceptance of necessity' has also been accorded for 38 ships and six Project 75 (India) submarines.

How is the Indian Navy enhancing its maritime surveillance in the area of interest?

The P-8I long-range maritime reconnaissance aircraft is a potent platform and has proven itself on multiple occasions. The delivery of four additional P8I is scheduled by 2021. The Indian Navy has also contracted Hindustan Aeronautics Ltd to deliver 36 aircraft comprising 12 Dorniers (six delivered), 16 advanced light helicopters and eight Chetaks. Further, 'acceptance of necessity' has been accorded for the procurement of naval utility helicopters under the strategic partnership model. We are also looking to procure additional P8I aircraft and high-altitude long-endurance remotely-piloted aircraft to augment our surveillance capabilities. The Navy has just got two MQ 9B Predator drones on lease from the US and efforts are on to acquire 30 armed drones (10 each for the Air Force, the Navy and the Army) from the US through the foreign military sales route.

Compared with China, our submarine strength is very low.

The Indian Navy operates 15 conventional submarines. The nuclear-attack submarine, INS Chakra, and the indigenously built nuclear ballistic missile submarine, INS Arihant, have been inducted. With a mix of conventional and nuclear submarines, the Indian Navy's submarine arm will be capable of accomplishing a wide range of operational tasks.

Any update on the third aircraft carrier requirement?

A third aircraft carrier is in the cards. The Navy is all about reach, and we are clear of the utility of the carrier.

What are the efforts to give permanent commission to women officers?

The Indian Navy has been considering granting permanent commission for women officers, commissioned after December 3, 2008, at par with male officers, in specific branches/cadres/specialisations, viz education, law, naval constructor and naval armament inspectorate. The Navy is in the process of considering permanent commission for short service commission officers (both men and women) in certain additional branches/cadres/specialisations, in accordance with the Supreme Court judgment of March 17. Restrictions due to the Covid-19 pandemic have impacted the timelines of implementation.

<https://www.theweek.in/theweek/cover/2020/12/17/we-are-closely-watching-chinese-navy.html>

Offshore Patrol Vessels: L&T builds faster, cheaper than Goa Shipyard

Since PM Narendra Modi inaugurated GSL's indigenous shipbuilding project in November 2016, the shipyard has handed over two OPVs to the ICG and launched the other three

By Ajai Shukla

New Delhi: Goa Shipyard Ltd (GSL) on Monday launched the fifth and final Offshore Patrol Vessel (OPV) out of an order of five such vessels it is constructing for the Indian Coast Guard (ICG). The vessel has been named ICGS Saksham.

Since Prime Minister Narendra Modi inaugurated GSL's indigenous shipbuilding project on November 13, 2016, the defence public sector undertaking (DPSU) shipyard has handed over two OPVs to the ICG and launched the other three. "Launching" is a major construction landmark, in which the completed hull is put into water. It is followed by "outfitting" the vessel with its superstructure, electronics and combat weaponry.

"In spite of the ongoing COVID situation and disruptions in supply chains, it is creditable for the shipyard to complete the 100 per cent hull construction and launch the vessel within 18 months from keel laying which was in June 2019. The vessel is in advanced stage of outfitting and will be ready for delivery by October 2021, as per the contractual schedule," stated the ICG on Monday.

GSL's OPVs are 2,350-tonne vessels, armed with 30-millimetre guns and equipped with "quick response boats" to handle emergencies along the coast, piracy and anti-terrorism missions.

Speaking at the launch, GSL chief, Commodore BB Nagpal (Retired) stated that more than 70 per cent indigenisation has been achieved for these OPVs. He thanked the ministry of defence (MoD) and ICG for their confidence in GSL.

This "confidence" in DPSI shipyards causes heartburn amongst private shipyards, such as Larsen & Toubro (L&T) and Reliance Naval (RNaval), who claim they can build warships faster, cheaper and better than the public sector yards.

To test this claim, Business Standard compared GSL's performance in this five-OPV contract to a similar contract L&T won for designing and constructing seven OPVs. The contracts were awarded roughly at the same time: to L&T on March 30, 2015 and on August 26, 2016 to GSL.

GSL's contract stipulated delivery of the first vessel in 42 months, that is in February 2020 and the second OPV six months later, followed by the remaining three vessels at four-month intervals.

As it turned out GSL delivered the first two OPVs – ICGS Sachet and ICGS Sujeet – three months late. It is learnt that the remaining three OPV will breach delivery timelines even more.

Meanwhile, the L&T contract stipulated delivery of the first OPV in 36 months and subsequent vessels at six-month intervals. So far, L&T has delivered five OPVs, all of them ahead of the contracted schedule.

Another striking difference is the cost at which L&T and GSL are building their respective OPVs. L&T, which won its contract in a competitive tender, is charging the ICG Rs 185.6 crore for each OPV. In contrast, GSL, which was awarded the contract through "nomination" – the MoD's terminology for handing over contracts to DPSUs without tendering – is charging the ICG Rs 334.5 crore per OPV.



GSL on Monday launched the fifth and final Offshore Patrol Vessel out of an order of five such vessels it is constructing for the Indian Coast Guard ICG

Such a cost differential could only be justified, were GSL’s OPVs to have significantly higher combat specifications, far better performance or a much bigger size than L&T’s. In fact, both builders are delivering very similar vessels.

The main difference is that GSL supplies OPVs fitted with a 30-millimetre gun, whereas L&T’s contract requires it to supply fitting for a gun, but not the gun itself. This, however, is not a major difference, since a 30-millimetre gun costs only about Rs 2.5 crore.

The length, beam and draught (minimum depth of water in which the OPVs can operate) of both OPVs are about the same, as are their displacements: 2,147 tonnes for the L&T OPV, compared to 2,350 tonnes for the GSL vessels.

Nearly identical: L&T and GSL offshore patrol vessels

Parameter	L&T OPV	GSL CG OPV
Length	98.2 metres	105 metres
Beam (Max)	14.9 metres	13.6 metres
Draught (Max)	3.57 metres	3.65 metres
Displacement (Full Load)	2,147 tonnes	2,350 tonnes
Maximum speed	26 Knots at 100% rating	23 Knots at 92% rating
Cruising speed	12 – 14 Knots	12 – 14 Knots
Endurance	5,000 Nautical Miles at cruising speed, with 25% reserve	6,000 Nautical Miles at cruising speed, with 25% reserve
Power Generation	4 x 500 KW generators	4 x 450 KW generators
	1 x 86 KW diesel genset	1 x 80 KW diesel genset
Helicopter	Stage through: Up to 10 tonnes	Stage through: Up to 11 tonnes
	Hangar facility: Up to 6.8 tonnes	Hangar facility: Up to 6.5 tonnes
Weapons & Sensors	Fitted for 30mm gun with Fire Control System (FCS)	30mm gun with Fire Control System (FCS)
	Fitted for 2 x 12.7mm guns	Fitted for 2 x 12.7mm guns

Both vessels have nearly identical maximum and cruising speeds, while the GSL OPV can go 6,000 nautical miles, compared to the slightly lower 5,000 nautical miles endurance of the L&T OPV.

The power generating capability of the L&T OPV is slightly higher than that of the GSL vessel, which is a useful capability, given that modern warships’ combat and navigation sensors, radars and communication suites all consume significant amounts of power.

GSL’s patrol vessel can provide “fly-through” support to a marginally larger helicopter, while the L&T OPV can provide hangar facilities to a marginally larger chopper.

https://www.business-standard.com/article/companies/offshore-patrol-vessel-go-a-shipyard-sails-ahead-of-private-peers-120121600021_1.html

India looks at integrating more countries into coastal radar network

Efforts are in advanced stages to set up coastal radar stations in Maldives, Myanmar and Bangladesh

By Dinakar Peri

New Delhi: As part of efforts to further expand the coastal radar chain network meant to enable real time monitoring of the high seas for threats as also expand India's assistance for capacity building to Indian Ocean littoral states, efforts are in advanced stages to set up coastal radar stations in Maldives, Myanmar and Bangladesh, according to defence sources.

“Mauritius, Seychelles and Sri Lanka have already been integrated into the country's coastal radar chain network. Similar plans are in the pipeline with Maldives and Myanmar and discussions are ongoing with Bangladesh and Thailand,” a defence source said. Similar proposals are being pursued with some more countries, a second source said without elaborating.



Nodal agency

Two of the coastal radar stations in Maldives were functional as of last year and work was under way on the third station and was to have been completed early this year. The Indian Navy's Information Management and Analysis Centre (IMAC) located in Gurugram which was set up after the 26/11 Mumbai terror attacks is the nodal agency for maritime data fusion.

As part of information exchange regarding traffic on the high seas, the Navy has been authorised by the government to conclude white shipping agreements with 36 countries and three multilateral constructs. So far agreements have been concluded with 22 countries and one multilateral construct. Of these, 17 agreements and the one multilateral construct have been operationalised, the second source stated.

Info fusion centre

At the Navy's Information Fusion Centre for the Indian Ocean Region (IFC-IOR) which is meant to promote Maritime Domain Awareness, three more International Liaison Officers (ILO) are expected to join soon. ILOs from France, Japan and the U.S. have already joined the centre. “The additional officers have been delayed due to COVID-19,” an official said.

Speaking to the media early this month, Navy Chief Admiral Karambir Singh said the IFC-IOR had established itself as the hub of maritime security information in the IOR through white shipping exchange agreements with 21 countries and 20 maritime security centres. ILOs from 13 countries had been invited, and three ILOs had joined the centre, with 3 more likely to join shortly, he had stated.

Under Phase-I of the coastal radar chain network, 46 coastal radar stations have been set up across the country's coastline. Under Phase-II of the project, which is currently under way, 38 static radar stations and four mobile radar stations are being set up by the Coast Guard and is in advanced stage of completion.

<https://www.thehindu.com/news/national/india-looks-at-integrating-more-countries-into-coastal-radar-network/article33379243.ece>

Chinese air force's combat experience sketchy:

Former IAF Chief BS Dhanoa

He was moderating a panel discussion on China airpower capabilities on the opening day of the fourth edition of Military Literature Festival

By Amanjeet Singh Salyal

Chandigarh: Former Air Chief Marshal BS Dhanoa said on Friday that the combat experience of China's People's Liberation Army Air Force (PLAAF) is "very sketchy", even as he raised concerns over the large resources available with the neighbouring country in case India goes to war with it.

The former Indian Air Force chief was moderating a panel discussion on China airpower capabilities on the opening day of the fourth edition of Military Literature Festival, which is being organised in virtual mode this year. Other participants included former Air Vice Marshal Arjun Subramaniam, Group Captain Ravinder Chhatwal and Dr Ming-Shih Shen from Taiwan.



Speaking amid rising tensions in eastern Ladakh, Dhanoa said China has got such a large force that whatever it loses at the battlefield can be replaced from elsewhere. The same goes for its loss of fighter aircraft.

"One of the reasons we always say that (India) needs squadron strength is because we also need deep pockets to replace our attrition," he said.

However, he also raised doubts on the combat experience of Chinese air force.

"Combat experience of the PLAAF is very very sketchy; there is one bombing mission they carried out in the Korean war... after that, there have been no offensive missions by them," said Dhanoa.

Air Vice Marshal Arjun Subramaniam (retd) said that unlike in 1962, when thousands of PLA troops swarmed down the Himalayan slopes in the eastern sectors and into Ladakh, this time around, "I think no such thing will happen as because every thrust will be met by significant friction on the ground".

"Outcomes (of the war) will likely be driven by the air power with a few disruptive technologies, like electronic warfare, cyber, unmanned aerial vehicles and space capabilities, emerging as important factors," he said.

<https://www.hindustantimes.com/chandigarh/chinese-air-force-s-combat-experience-sketchy-former-iaf-chief-bs-dhanoa/story-ibrIfPxnCu0pH3U9KdxJvN.html>

China's new road cuts travel time to Karakoram Pass, raises red flags in Delhi

Chinese infrastructure building activity has also increased in depth areas with a new logistics depot coming up at Golmud, 1,000 km from the Line of Actual Control, that will have an underground petroleum and oil storage facility

By Shishir Gupta

New Delhi: Satellite imagery and communication intercepts along the 3,488 kilometre Line of Actual Control (LAC) shows that the Chinese People's Liberation Army (PLA) is undertaking a significant road and building infrastructure upgrade across Karakoram Pass and Aksai Chin to ramp up military capacities and capability against India.

It is quite evident from the surveillance data available to conclude that despite Beijing's verbal commitments of mutual military disengagement and de-escalation from friction point on Ladakh LAC, the PLA has no intentions of troop or equipment withdrawal from the area.

While the government is tight-lipped about the developments, the number of military vehicles and troop hutments have increased along the 597-km Ladakh LAC with a number of fresh dug-outs indicating that the PLA is prepared for a long haul with Indian Army.

Indian officials said what was a matter of serious concern was that China has built an alternative 8-10 metre wide road to Karakoram Pass that would shorten the distance to the strategic gateway into Daulet Beg Oldi sector by two hours.

"Nearly all the kutchra (unmetalled) roads have been surfaced in the Aksai Chin area with the axis being widened for bigger vehicles carrying heavy equipment," said a senior military commander.

The Chinese infra building activity has also increased in depth areas with a new logistics depot that will have an underground petroleum and oil storage facility coming up at Golmud. The new depot is nearly 1,000 km from the LAC but is linked to Lhasa via Tibet Railway. It will enhance the capacity and capability of the PLA to deploy in Tibetan border with India for a long time and feed the troops in case of a worst-case scenario.

While there is continuous activity on Sikkim border, the new concern is the building of two new underground facilities at the Pang Ta air base across Arunachal Pradesh. The PLA uses underground tunnels inside mountains for housing aircraft rather than blast pens on the air bases. A similar tunnel park has been noticed at Lhasa Gonggar air base with an increase in the number of military aircraft.

The 1962 Xinjiang military command town of Kangxiwar across Karakoram Pass and on the banks of Karakash River is being revived with a direct highway connectivity to Hotan, a critical air base of PLA Air Force for dominating the restive Uighurs and a launch pad of fighter operations in case of a worst case scenario in East Ladakh. Hotan is located 320 kilometres from the Ladakh LAC.



The India China border standoff has continued for more than seven months.(ANI)

<https://www.hindustantimes.com/india-news/china-s-new-road-cuts-travel-time-to-karakoram-pass-raises-red-flags-in-delhi/story-Ye3F9fgGmLzQ1NgZLXsqeO.html>

Chinese President Xi Jinping appoints new General for PLA's Western Theatre Command amid Ladakh standoff

Chinese President Xi Jinping, who heads the Central Military Commission (CMC), the overall high-command of the two million-strong PLA, has appointed General Zhang Xudong as the Commander of the Western Theatre Command amidst the military standoff in eastern Ladakh

A new General has been appointed as the Commander of Western Theatre Command — which oversees the China-India border — of the People's Liberation Army (PLA) amidst the military standoff in eastern Ladakh.

Chinese President Xi Jinping, who heads the Central Military Commission (CMC), the overall high-command of the two million-strong PLA, has appointed General Zhang Xudong as the Commander of the Western Theatre Command, according to the official media in Beijing on Saturday.

Xi has promoted four senior Chinese military and armed police officers. Among them was General Zhang, Commander of the Western Theatre Command of the PLA, state-run Xinhua news agency reported.

The other officers who were promoted include Guo Puxiao, Political Commissar of the Logistic Support Department of the CMC; Li Wei, Political Commissar of the PLA Strategic Support Force and Wang Chunqing, Commander. The new appointments at the top of the PLA Western Command comes in the midst of the standoff between the Chinese and Indian military in eastern Ladakh since May.

Who is General Zhang Xudong?

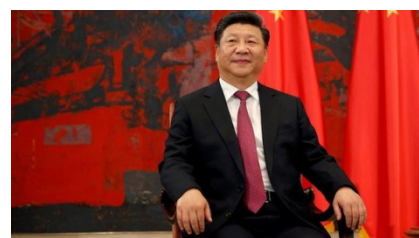
Not much is known about General Zhang, especially his association with Western Theatre Command, as he reportedly served mostly in other theatre commands of the PLA. He succeeds 65-year-old General Zhao Zongqi who headed the Western Theatre Command during the 2017 Doklam standoff where the Indian Army stood up against the PLA's plan of laying a road close to the Indian border in an area claimed by Bhutan.

The Ladakh standoff also happened under the watch of General Zhao. It began in May after China dispatched thousands of troops which were mobilised for military exercises to eastern Ladakh borders, sparking a new round of tensions with India.

India and China have held several rounds of talks at the diplomatic and military-level to resolve the prolonged standoff.

At the latest round of foreign ministry-level talks on December 18, the two sides said that they have agreed to continue work towards ensuring complete disengagement of troops in all friction points along the LAC. The meeting also decided to hold the next round of military dialogue at an early date. *(With inputs from PTI)*

<https://www.indiatoday.in/world/story/chinese-president-xi-jinping-appoints-new-general-for-pla-s-western-theatre-command-amid-ladakh-standoff-1751268-2020-12-20>



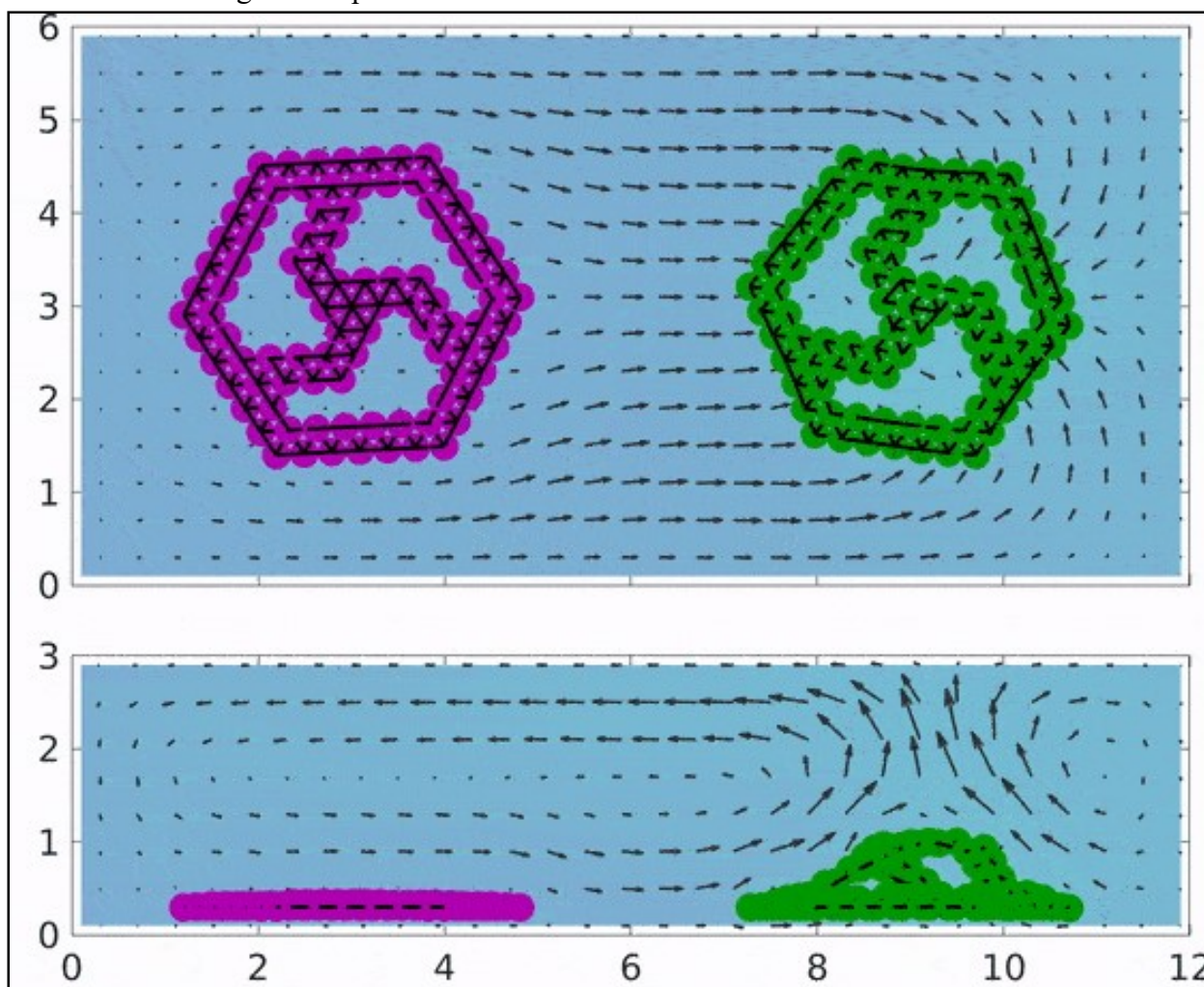
Chinese President Xi Jinping has promoted four senior Chinese military and armed police officers. (Photo: Reuters)

Sat, 19 Dec 2020

Engineers build chemically driven wheels that 'morph' into gears to perform mechanical work

By Paul Kovach

The gear is one of the oldest mechanical tools in human history and led to machines ranging from early irrigation systems and clocks, to modern engines and robotics. For the first time, researchers at the University of Pittsburgh Swanson School of Engineering have utilized a catalytic reaction that causes a two-dimensional, chemically-coated sheet to spontaneously "morph" into a three-dimensional gear that performs sustained work.



Animation from simulation demonstrating spatio-temporal control of rotors via a cascade reaction. GOx-coated rotor (magenta) lies on the left side of the chamber, while CAT-coated rotor (green) lies on the right side. Background color map indicates spatial distribution of H_2O_2 in the solution at $y = 3\text{mm}$ for side views and at $z = 0.4\text{ mm}$ for top views. Introduction of D-glucose in the solution activates the GOx-coated rotor, which morphs into a 3D structure and starts rotating spontaneously. CAT-coated rotor stays flat and stationary. H_2O_2 is produced by the first reaction, constituting the first step of the cascade reaction. In the presence of H_2O_2 , CAT-coated rotor becomes active and starts rotating, while the GOx-coated rotor becomes flat and stationary as glucose in the solution is depleted. With time, H_2O_2 in the solution is also depleted and consequently, the motion of the CAT-coated rotor stops and sheet becomes flat. Credit: A. Laskar

The findings indicate the potential to develop chemically driven machines that do not rely on external power, but simply require the addition of reactants to the surrounding solution. Published today in the Cell Press journal *Matter*, the research was developed by Anna C. Balazs, Distinguished Professor of Chemical and Petroleum Engineering and the John A. Swanson Chair of Engineering. Lead author is Abhrajit Laskar and co-author is Oleg E. Shklyaev, both post-doctoral associates.

"Gears help give machines mechanical life; however, they require some sort of external power, such as steam or electricity, to perform a task. This limits the potential of future machines operating in resource-poor or remote environments," Balazs explains. "Abhrajit's computational modeling has shown that chemo-mechanical transduction (conversion of chemical energy into motion) at active sheets presents a novel way to replicate the behavior of gears in environments without access to traditional power sources."

In the simulations, catalysts are placed at various points on a two-dimensional sheet resembling a wheel with spokes, with heavier nodes on the sheet's circumference. The flexible sheet, approximately a millimeter in length, is then placed in a fluid-filled microchamber. A reactant is added to the chamber that activates the catalysts on the flat "wheel", thereby causing the fluid to spontaneously flow. The inward fluid flow drives the lighter sections of the sheet to pop up, forming an active rotor that catches the flow and rotates.

"What is really distinctive about this research is the coupling of deformation and propulsion to modify the object's shape to create movement," Laskar says. "Deformation of the object is key; we see in nature that organisms use chemical energy to change their shape and move. For our chemical sheet to move, it also has to spontaneously morph into a new shape, which allows it to catch the fluid flow and perform its function."

Additionally, Laskar and Shklyaev found that not all the gear parts needed to be chemically active for motion to occur; in fact, asymmetry is crucial to create movement. By determining the design rules for the placement, Laskar and Shklyaev could direct the rotation to be clockwise or counterclockwise. This added "program" enabled the control of independent rotors to move sequentially or in a cascade effect, with active and passive gear systems. This more complex action is controlled by the internal structure of the spokes, and the placement within the fluid domain.

"Because a gear is a central component to any machine, you need to start with the basics, and what Abhrajit has created is like an internal combustion engine at the millimeter scale," Shklyaev says. "While this won't power your car, it does present the potential to build the basic mechanisms for driving small-scale chemical machines and soft robots."

In the future, Balazs will investigate how the relative spatial organization of multiple gears can lead to greater functionality and potentially designing a system that appears to act as if it were making decisions.

"The more remote a machine is from human control, the more you need the machine itself to provide control in order to complete a given task," Balazs said. "The chemo-mechanical nature of our devices allows that to happen without any external power source."

These self-morphing gears are the latest evolution of chemo-mechanical processes developed by Balazs, Laskar, and Shklyaev. Other advances include creating crab-like sheets that mimic feed, flight, and fight responses; and sheets resembling a "flying carpet" that wrap, flap, and creep.

More information: *Matter* (2020). DOI: [10.1016/j.matt.2020.11.04](https://doi.org/10.1016/j.matt.2020.11.04), [www.cell.com/matter/fulltext/S2590-2385\(20\)30631-7](http://www.cell.com/matter/fulltext/S2590-2385(20)30631-7)

Journal information: *Matter*
<https://phys.org/news/2020-12-chemically-driven-wheels-morph-gears.html>

New discovery brings analog spintronic devices closer

The observation of nonlinearity in electron spin-related processes in graphene makes it easier to transport, manipulate and detect spins, as well as spin-to-charge conversion. It also allows analog operations such as amplitude modulation and spin amplification. This brings spintronics to the point where regular electronics was after the introduction of the first transistors. These results by University of Groningen physicists were published in the journal *Physical Review Applied* on 17 December.

Spintronics is a type of electronics that uses the spin of electrons (a magnetic moment that can have the values 'up' or 'down') to transport signals. Spin transport in the 2-D carbon material graphene is excellent; however, manipulation of spins is not. This requires the addition of ferromagnets (for spin injection and detection) or heavy-atom materials with high spin-orbit coupling, which allow the manipulation of spins.

Nonlinear

Scientists from the University of Groningen have now shown that nonlinear effects that are particular to electron spin can be achieved using 2-D boron nitride. Previously, they had already shown that injecting a current through a boron nitride bilayer, to which a small DC bias current was applied, resulted in a very high spin polarization, which means that there is a large difference between the numbers of spin-up and spin-down electrons. They have now shown that the polarization increase can be attributed to nonlinear processes that influence the electron spins.

The nonlinearity means that two spin signals multiply, rather than add up (which would be a linear effect). Furthermore, in the nonlinear regime, spin signals can be measured without using ferromagnets. Earlier, all these effects were either absent or very weak in a typical graphene spintronic device. 'All because of this nonlinear effect, which increases in proportion with the bias current,' says Siddhartha Omar, a former postdoctoral researcher at the University of Groningen and first author of the paper. 'Polarization can even reach 100 per cent. Since it is nonlinear, you give less and get more during the injection when this current is applied.'

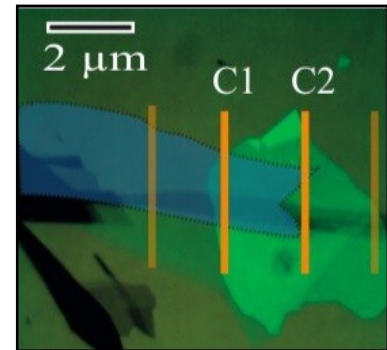
Neuromorphic

In the study, Omar and his colleagues in the Physics of Nanodevices group at the Zernike Institute for Advanced Materials, University of Groningen, show applications of the nonlinear effect for basic analog operations, such as essential elements of amplitude modulation on pure spin signals. 'We believe that this can be used to transport spin over larger distances. The larger spin signal also makes spin-charge conversion easier and that means that we no longer need ferromagnets to detect them.'

The ability to modulate a spin signal, rather than just switch it on or off, also makes it easier to construct spintronic devices. Omar: 'They could be used in spin-based neuromorphic computing, which uses switches that can have a range of values, rather than just 0 or 1.' It also seems possible to create a spin current amplifier, which produces a large spin current with a small bias voltage. 'It may be there already, but we still have to prove it,' says Omar.

Spintronics

All these effects were measured both at low temperatures and at room temperature and could be used in applications such as nonlinear circuit elements in the fields of advanced spintronics.



Graphene (light green) with boron nitride (blue) on top. Measuring points indicated in orange. Credit: EM photo Omar/UoG

'Spintronics is now at the point where regular electronics was after the introduction of the first transistors. We could now build real spintronic devices,' concludes Omar.

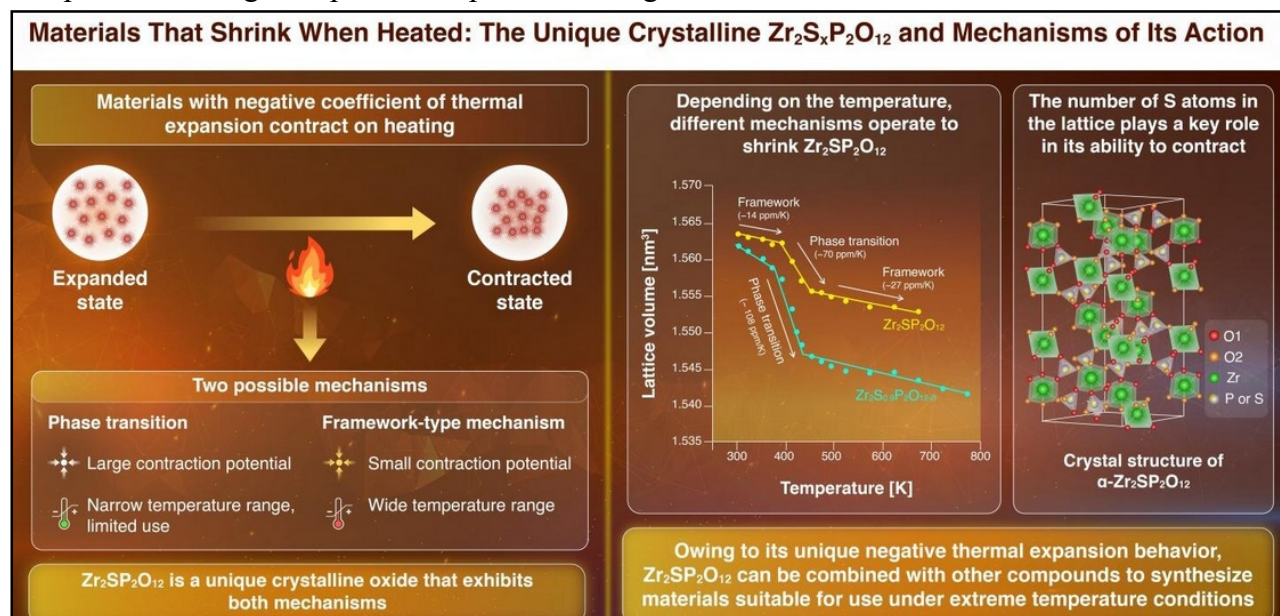
More information: S. Omar et al, Nonlinear Analog Spintronics with van der Waals Heterostructures, *Physical Review Applied* (2020). DOI: [10.1103/PhysRevApplied.14.064053](https://doi.org/10.1103/PhysRevApplied.14.064053)
<https://phys.org/news/2020-12-discovery-analog-spintronic-devices-closer.html>



Sat, 19 Dec 2020

Novel crystalline oxide may solve the problem of overheating in composite materials

Scientists at Tokyo Institute of Technology recently synthesized a novel material that displays unique thermal expansion properties. The method used by the scientists enables the production of a unique crystalline oxide containing zirconium, sulfur, and phosphorus, that exhibits two distinct mechanisms of negative thermal expansion. This is the first known material to show this property and its application may help avoid damage to composite materials, such as computer chip components, facing unexpected temperature changes.



Credit: Toshihiro Isobe, Tokyo Institute of Technology

Most materials tend to expand when heated, as the atoms move apart. The expansibility of materials under heat is measured using the coefficient of thermal expansion (CTE). Most of the current industry-grade materials have a positive CTE, making them perform poorly when subjected to more 'extreme' temperatures. However, some materials experience the opposite effect, shrinking at higher temperatures. This unusual process, known as negative thermal expansion, may help solve the problem of heat damage to composite materials.

A team of scientists at the Tokyo Institute of Technology led by Associate Prof. Toshihiro Isobe has been researching materials with negative CTE. As Dr. Isobe explains, "Negative thermal expansion behavior can be primarily attributed to two types of mechanisms, phase transition and framework-type mechanism." Both these mechanisms have found industrial application as both have pros and cons. Phase transition-type materials have large negative CTEs but narrow usable temperature ranges, which limits their operational use, particularly as fillers in composite materials. Framework-type materials, on the other hand, show thermal shrinkage over a wide temperature range, but because they have small absolute CTE values, they are required in large quantities to

achieve the desired result. For years, scientists have been searching for a suitable compromise between the two, but materials able to undergo both mechanisms of negative thermal expansion have never been reported, until now.

In their new study, published in *NPG Asia Materials*, Dr. Isobe and his team report a method to synthesize a novel crystalline oxide made of zirconium, sulfur, and phosphorus, and describe its characteristics. This crystal, the chemical formula for which is $Zr_2SP_2O_{12}$, is described by Dr. Isobe as "a negative CTE material which displays both transition- and framework-type mechanisms when heated."

The scientists found that, while $Zr_2SP_2O_{12}$ exhibits both mechanisms of negative thermal expansion mentioned earlier, one might be dominant at a given temperature. For instance, between 393K (roughly 120°C) and 453K (roughly 180°C), the material shrunk rapidly and some of the structural units were deformed, which indicates a phase transition. However, above and below this temperature range, the contraction was not as pronounced, and the researchers instead observed small changes in the length and angle of bonds between atoms, a characteristic of framework-type mechanism.

The researchers also noted an interesting phenomenon. They found that the crystals containing fewer sulfur atoms in the lattice were more easily deformed during the phase transition (120-180°C), resulting in a larger contraction of the material (higher negative CTE). This can help in producing $Zr_2SP_2O_{12}$ crystals with the desired CTE for specific applications.

This novel crystalline material and the mechanism of its production could pave the way for the synthesis of compounds with a similar dual mechanism. This way, material engineers would be able to select compounds with specific properties to tailor the performance of manufactured materials to specific operational conditions.

More information: Toshihiro Isobe et al, Negative thermal expansion in α - $Zr_2SP_2O_{12}$ based on phase transition- and framework-type mechanisms, *NPG Asia Materials* (2020). DOI: [10.1038/s41427-020-00266-9](https://doi.org/10.1038/s41427-020-00266-9)

<https://phys.org/news/2020-12-crystalline-oxide-problem-overheating-composite.html>



Sat, 19 Dec 2020

Research team develops new material system to convert and generate terahertz waves

On the electromagnetic spectrum, terahertz light is located between infrared radiation and microwaves. It holds enormous potential for tomorrow's technologies: Among other things, it might succeed 5G by enabling extremely fast mobile communications connections and wireless networks. The bottleneck in the transition from gigahertz to terahertz frequencies has been caused by insufficiently efficient sources and converters. A German-Spanish research team with the participation of the Helmholtz-Zentrum Dresden-Rossendorf (HZDR) has now developed a material system to generate terahertz pulses much more effectively than before. It is based on graphene, i.e., a super-thin carbon sheet, coated with a metallic lamellar structure. The research group presented its results in the journal *ACS Nano*.

Some time ago, a team of experts working on the HZDR accelerator ELBE were able to show that graphene can act as a frequency multiplier: When the two-dimensional carbon is irradiated with light pulses in the low terahertz frequency range, these are converted to higher frequencies. Until now, the problem has been that extremely strong input signals, which in turn could only be produced by a full-scale particle accelerator, were required to generate such terahertz pulses efficiently. "This is obviously impractical for future technical applications," explains the study's primary author Jan-Christoph Deinert of the Institute of Radiation Physics at HZDR. "So, we

looked for a material system that also works with a much less violent input, i.e., with lower field strengths."

For this purpose, HZDR scientists, together with colleagues from the Catalan Institute of Nanoscience and Nanotechnology (ICN2), the Institute of Photonic Sciences (ICFO), the University of Bielefeld, TU Berlin and the Mainz-based Max Planck Institute for Polymer Research, came up with a new idea: the frequency conversion could be enhanced enormously by coating the graphene with tiny gold lamellae, which possess a fascinating property: "They act like antennas that significantly amplify the incoming terahertz radiation in graphene," explains project coordinator Klaas-Jan Tielrooij from ICN2. "As a result, we get very strong fields where the graphene is exposed between the lamellae. This allows us to generate terahertz pulses very efficiently."

Surprisingly effective frequency multiplication

To test the idea, team members from ICN2 in Barcelona produced samples: First, they applied a single graphene layer to a glass carrier. On top, they vapor-deposited an ultra-thin insulating layer of aluminum oxide, followed by a lattice of gold strips. The samples were then taken to the TELBE terahertz facility in Dresden-Rossendorf, where they were hit with light pulses in the low terahertz range (0.3 to 0.7 THz). During this process, the experts used special detectors to analyze how effectively the graphene coated with gold lamellae can multiply the frequency of the incident radiation.

"It worked very well," Sergey Kovalev is happy to report. He is responsible for the TELBE facility at HZDR. "Compared to untreated graphene, much weaker input signals sufficed to produce a frequency-multiplied signal." Expressed in numbers, just one-tenth of the originally required field strength was enough to observe the frequency multiplication. And at technologically relevant low field strengths, the power of the converted terahertz pulses is more than a thousand times stronger thanks to the new material system. The wider the individual lamellae and the smaller the areas of graphene that are left exposed, the more pronounced the phenomenon. Initially, the experts were able to triple the incoming frequencies. Later, they attained even larger effects—fivefold, sevenfold, and even ninefold increases in the input frequency.

Compatible with chip technology

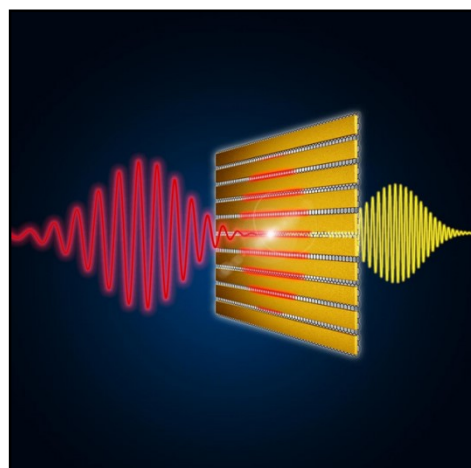
This offers a very interesting prospect, because until now, scientists have needed large, complex devices such as accelerators or large lasers to generate terahertz waves. Thanks to the new material, it might also be possible to achieve the leap from gigahertz to terahertz purely with electrical input signals, i.e., with much less effort. "Our graphene-based metamaterial would be quite compatible with current semiconductor technology," Deinert emphasizes. "In principle, it could be integrated into ordinary chips." He and his team have proven the feasibility of the new process—now implementation in specific assemblies may become possible.

The potential applications could be vast: Since terahertz waves have higher frequencies than the gigahertz mobile communications frequencies used today, they could be used to transmit significantly more wireless data—5G would become 6G. But the terahertz range is also of interest to other fields—from quality control in industry and security scanners at airports to a wide variety of scientific applications in materials research, for example.

More information: Jan-Christoph Deinert et al, Grating-Graphene Metamaterial as a Platform for Terahertz Nonlinear Photonics, *ACS Nano* (2020). DOI: [10.1021/acsnano.0c08106](https://doi.org/10.1021/acsnano.0c08106)

Journal information: [ACS Nano](https://doi.org/10.1021/acsnano.0c08106)

<https://phys.org/news/2020-12-team-material-terahertz.html>



Ultra-thin gold lamellae drastically amplify the incoming terahertz pulses (red) in the underlying graphene layer, enabling efficient frequency multiplication. Credit: HZDR/Werkstatt X

When will India get Covid-19 vaccine? Govt says 'maybe in any week of January'

Edited By Aparna Banerjea

- **Health Minister Harsh Vardhan said that the govt's first priority has always been the safety and effectiveness of vaccines**
- **Vardhan's comments comes just after India's COVID-19 case tally crossed the 1-crore mark**

On the question of when people can expect the first shots of Covid-19 vaccine in India, Union Health Minister Harsh Vardhan on Sunday said that he was hopeful of a "potential" coronavirus vaccine by "any week of January" next year.

Vardhan said that the government's first priority has always been the safety and effectiveness of vaccines. "We don't want to compromise on that. I personally feel, maybe in any week of January, we can be in a position to give first COVID vaccine shot to people of India," he said to ANI.

Vardhan's comments come just after India's COVID-19 case tally crossed the 1-crore mark.

On Saturday, the health minister had said that country's scientists and health experts have worked on the development of an indigenous vaccine and in the upcoming six to seven months, India will have the capacity to inoculate about 30 crore people.

He also said, "There have been a little over one crore cases of COVID-19 in India. Of that, 95 lakh 50 thousand cases have recovered successfully. India has one of the highest recovery rates in the world at 95.46 per cent."

Observing the fact that despite festivals in the month of October and November, no new surge of cases were observed in this period, the Union Health Minister and Chairperson of the GOM reiterated his concern and appeal to diligently maintain COVID Appropriate Behaviour even at a time when the country is at the cusp of authorizing the first set of vaccines.

According to an official release, he also expressed the need for an expeditious vaccination drive to cover all the target populations estimated to be around 30 crore.

Dr Sujeet K Singh, Director (NCDC) presented a detailed report on how the data-driven graded government policies have helped India achieve significant control over the pandemic.

Dr Singh presented a granular analysis of the trajectory of the pandemic in each state pointing out critical parameters like positivity, RAT & RT-PCR per cent breakup, the concentration of cases in particular districts and other trends like a fatality, and fatality within 48 and 72 hours of hospitalization.

Dr Vinod K Paul, Member (H) NITI Aayog apprised the GoM on three critical aspects of vaccination; the process of a pre-clinical and clinical trial of all vaccines, the details of the six vaccine candidates undergoing trial in India. Moreover, he also briefed the GoM about requests for vaccines received by the Ministry of External Affairs from 12 other countries.



File Photo: Dr. Harsh Vardhan (ANI Photo)

Union Health Secretary Rajesh Bhushan noted the importance of Health Seeking Behaviour among the population as a key driver in checking fatality.

Explaining the paradox of some States /UTs reporting very high cases but minimal fatalities while others reporting low cases but comparatively high fatalities, he said that this phenomenon results from people not coming forward for testing even if they are symptomatic in the second category of states, the release said.

Six vaccines are in various stages of clinical trials, of which four are being indigenously developed in the country.

Clinical trials by Bharat Biotech are in phase-3, while the one which is being developed by Zydus Cadila is in phase-2 clinical trial.

Vaccine candidate of Biological E is in its phase-1 clinical trials while Gennova biopharmaceuticals is in the process of getting approvals at various levels.

Serum Institute of India (SII) is also conducting phase 2 and 3 clinical trials of the Oxford-Astrazeneca vaccine.

Similarly, Dr Reddy's Laboratories is conducting phase 2 and 3 clinical trials for Russian vaccine Sputnik V. *(With agency inputs)*

<https://www.livemint.com/news/india/when-will-india-get-covid-19-vaccine-govt-says-maybe-in-any-week-of-january-11608481536007.html>

