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DRDO News

DRDO Technology News

Press Information Bureau
Government of India

Ministry of Defence

Wed, 04 Aug 2021 4:56PM

Various R&D projects taken up by DRDO

Defence Research & Development Organisation (DRDO) undertakes various R&D projects. The lab-wise details of projects sanctioned during last three years (1 Jul 2018 – 30 Jun 2021) are as follows:-

Sl. No.	Lab	No of Project
1	ADA	4
2	ADE	5
3	ADRDE	2
4	ARDE	12
5	ASL	6
6	CABS	5
7	CAIR	10
8	CFEES	6
9	CHESS	2
10	CVRDE	15
11	DEAL	7
12	DEBEL	3
13	DGRE	11
14	DIPAS	2
15	DLJ	7
16	DLRL	7
17	DMRL	9
18	DMSRDE	1

19	DRDE	3
20	DRDL	14
21	DRLT	1
22	DYSL-AI	1
23	DYSL-AT	1
24	DYSL-CT	2
25	DYSL-QT	1
26	DYSL-SM	1
27	GTRE	6
28	HEMRL	7
29	INMAS	1
30	IRDE	8
31	ISSA	3
32	ITR	1
33	JCB	1
34	LRDE	8
35	NMRL	4
36	NPOL	6
37	NSTL	4
38	R&D(E)	17
39	RCI	22
40	SAG	2
41	SSPL	4
42	TBRL	5
43	VRDE	2
Total		**239**

The above list does not include projects in strategic and classified domain.

Some of the major projects undertaken are in the areas of:

- Missile Systems
- Airborne Early Warning & Control System
- Fighter Aircrafts
- Armoured Fighting Vehicles

- Bridging and Mining Systems
- Guided Munitions
- Artillery Guns & Rockets
- Small Arms & Ammunitions
- Advanced Torpedoes & Advanced Sonar Suite
- Electronic Warfare
- Long Range Radars
- Artificial Intelligence based Systems
- Sonar & Torpedo
- Autonomous System
- EW System etc.

A list of technologies developed by DRDO in last three years is as follows:-

S No.	Lab/Centre	Technology Developed
1	**ADE**	· Unmanned Aerial Vehicles · Cruise missiles · Flight simulator · Flying test bed · Mission Computer for fighter aircraft
2	**ADRDE**	· Parachutes, Brake parachutes and heavy drop systems for various Aero, navy and space
3	**ASL**	· Development of technology for Stealth Structures with Load Bearing Capability. · Design of Composite Shims based Flex Seals. · Developed High temperature Anti-Corrosive low friction Graphene base coating. · Developed Thermal Protection System for High Temperatures (@ 18000C). · 4D C-SiC Hot Gas valve Nozzles proven for 120 seconds duration. · Developed Indigenous Brake Discs for Mirage -2000 & ALH. · Ship based S/Ka dual band telemetry ground receiving stations developed and installed on DRDO Ships.
4	**ARDE**	· Advanced warhead Technology · KE Rod Technology · Multi Point Initiation Technology · Deep Penetration Warhead · Low L/D Shaped Charge Warhead · Ferroelectric Pulse Power Technology For Initiation Of Warheads
5	**CAIR**	· Technologies related to Artificial Intelligence and robotics in Maritime Situational Awareness, Geographical Information System, Multi Agent Robotics, Secure Handset/Mobile, Secure OS, Quantum Communication.

6	**CHESS**	· Multidisciplinary technology consisting of 1. Optical Channel for combination of High Power Fibre laser 2. High precision Opto mechanical Technology · Laser based target Neutralization Technique · Spatial Beam Combination technology · Sensible Heat Storage based Thermal Management
7	**CASDIC**	· Mission Computer for Su 30
8	**CABS**	· Airborne Early warning and control systems and associated technologies.
9	**CFEES**	· Environmental & Explosive Safety Technology
10	**CVRDE**	· Technologies for Next Generation Main Battle Tank (Multiple). · Engine Technologies for AFVs (multiple). · Automatic Transmission Technologies for AFVs (Multiple). · Suspension and Running Gear Technologies for AFVs. · Repair and Recovery Technologies for AFVs. · Tele-operated and Autonomous Technologies for AFVs. · Indigenous Landing Gear Technologies for UAVs. · Indigenous Technologies for Aircraft quality Bearings. · Technologies for Brushless DC Generator.
11	**DEAL**	· Bandwidth efficient (low BT modulation/demodulation lossless text compression • High code rate LDPC (Low density Parity check)
12	**DLRL**	· GPS & GLONASS Satellite Navigational Receiver · Jamming and Spoofing in L Band · Detection, Location Fixing and Monitoring & Jamming of Communication Signals in HF & V/UHF Bands • Digital Receivers, Digital Exciters & Wideband High Power Amplifiers
13	**DRDL**	· Two pulse Rocket propulsion system · Solid Fuel Ducted Rocket Ramjet technology · Liquid Propellant based Ramjet System · End game system based on Laser Proximity Fuse · Control guidance algorithms for various class of missiles • Development of on the move Communication system, on the move tracking system, on the move command control system.
14	**DRDE**	· NBC Haversack Mk II · Chemical Agent Monitor (CAM) · Automatic Chemical Agent Detector & Alarm

		(ACADA) · Three Colour Chemical Detector Paper Mk II · Personal Decontamination Kit Mk II · NBC Canister Mk II · First Aid Kit Type A (Mk II) · First Aid Kit Type B (Mk II)
15	**DMRL**	• Sm2Co17 magnets in large sizes (1-2 kg brick) with energy product of 28-30 MGOe and iHc of 12 – 20 kOe • Developed temperature compensated Sm2Co17 magnets with near zero (10-25 ppm) temperature coefficient of remanence and energy product of 14-18 MGOe. • Sm2Co17 magnets capable of working at 550oC with energy product of 6-10 MGOe and iHc of 5-8 kOe at 550oC (BLDC in extreme environments). • Nd-Fe-B magnets with energy product of 40-45 MGOe and IHc of 10 – 15 kOe in operating temperature range of ~150oC. • Microwave lossy materials (absorbers, buttons, terminations and severs ets.) for S & G band frequencies were developed. • High conductivity AlN substrate materials bonded with copper single/both sides for electronic devices developed. • Ferroelectric materials for electron emission cathode developed. • Developed materials, coatings and related processes for applications involving extreme thermal, mechanical and oxidising environments as experienced in hypersonic cruise vehicles. • C-SiC composite, ZrB2-SiC composite, high purity Nb and Nb alloy Cb752, metallic thermal protection system incorporating metallic honeycomb sandwiches and ceramic insulations, Ni base superalloy foam, and functionally graded material based on Ni base superalloy and yttria stabilised zirconia (YSZ) were developed. • Developed oxidation resistant silicide coatings for Nb alloy, thermal barrier coatings for Ni base superalloy, oxidation resistant ZrB2-SiC coatings for C-SiC and high emissive coatings for Ni base superalloys. • Revised Total Technical Life (TTL) of transport aircraft engine from the present 7000 to 8000 hours based on Damage Tolerance concepts • Developed tungsten heavy alloy penetrator rods of size 26 mm D., 600 mm L with mechanical properties as follows: • Ultimate tensile strength :1600 MPa (min.) • % plastic elongation to failure: 8-10% (min.) • Charpy impact energy on : 100 J/cm2 (average) unnotched specimen • Demonstrated the ability to fabricate segmented/jacketed

		penetrators with tungsten heavy alloy as the core and steel as the jacket
16	**DEBEL**	· Medical Oxygen Plant · Individual Underwater Breathing (IUWBA) · Physical Efficiency Test Monitor · Air Sterilization Unit
17	**DIPAS**	· Space Heating Device (Bukahari) · Oxygenated Solar Shelter · Ergonomically Designed Backpack (90 Ltrs) · Cognobar and Quercetin Bar
18	**DFRL**	· Terrain and Weapon Platform specific MREs for Army and Navy · Frozen/Chilled Mutton/Chicken Test Kit
19	**DIPR**	· Night Vision Human Performance Attributes (NVHPAs) · Manuals and ComBAT Active App on Stress Management · Crowd Behaviour Analysis Software (CBAS) for crowd management
20	**DRL**	· Snake Repellent
21	**DGRE**	· Development of Landslide forecasting model for a particular site. · Terrain Contour mapping · Weak Zone Susceptibility Mapping · Trafficability evaluation by developing a suitable DSS · Development of Operational Avalanche Forecast Models · Design of Avalanche Control Structures · Development of Snow Cover Model for different Snow Climatic Zones
22	**DMSRDE**	· Bullet Proof Jacket as per GSQR 1438 · Boot Antimine Infantry (BAMI) · Anti-Personal Mine Blast Protective Suit (APMBPS) · DMS HOTS Oil – I · DMS HIDEN Fuel · PEGCOL-113 · ECW Protective Goggles · NBC Gloves · NBC Overboot · Gloves ECW · Mounting and Support Equipment for Multi Spectral Camouflage Net · Filtration Cartridge and Prefilters using nano-enabled technologies

		· Thermally Conducting Light Weight nano-composite based structures for damping applications (BLDC Motor) · Development of Anti COVID-19 Personal Protective Equipment (PPE) Coverall · Sanitizing Fluid "DefSen-2020"
23	**DLJ**	· Indigenization of Microwave Chaff Cartridge 118/I for IAF · Radiation Contamination Monitoring Systems for Indian Navy · Thermal Targets for Strategic Weapon Systems · Network of Radiation Monitoring Sensors for Strategic Locations · CBRN Water Purification System · Indigenization of Microwave Chaff Payload for Indian Navy · Artificial Engineered Materials (AEM) and Radar Absorbing Structures (RAS) · Radiation Detection Measurement & Control Unit (RADMAC-A) · High Altitude Water Purification System (HAWPS) · Flexi Life Saver Water Bottle · SIGMA 3.0 Software
24	**GTRE**	· Development of gas turbines for aero engines, cruise missiles and associated technologies
25	**HEMRL**	· High Performance Solid Rocket Propellant (Specific Impulse ~250s) to increase payload and range of Rockets & Missiles. · High performance Gun Propellant for improved armour penetration capabilities. · Thermobaric composition for warhead to enhance lethality and performance · Less Sensitive Explosive compositions for IM compliant munition. · Tank protection technologies: Anti Thermal Anti Laser Smoke Grenades and Next Generation ERA(NGERA) · Aircraft protection technologies: IR Flars (MTV Based) and Chaff cartridges · Explosive Detection technologies: OPX Revilator for trace/micro detection.
26	**IRDE**	· Raman spectroscopy based Explosive identification technique · Digitised Libraries of Explosive Agents for quick identification · Laser based Dazzling technique for non-invasive countermeasures · Low power Laser based invisible deterrence technology · Video based Remote controlled Day /Night Capability

		with Alarm · laser based advanced surveillance device capable detection and location of Optical targets viz., NVD, CCD, LRF, Sniper Sight, Binoculars, etc. · Retro reflector based optical assembly based on CATS Eye effect · Sighting technology based on holography · Sighting technology with Day/Night capability and Laser based target Designation for Tanks · Visual Tracking based Laser Target neutralization Technology · Sighting System for small rifles, Shoulder Fired Missiles · Test jig for guided weapon performance evaluation before the firing of the missile. · optical surveillance technologies for detection of Targets • Target engagement technology for the terminal phase of missile.
27	**INMAS**	· Bike Ambulance
28	**ISSA**	· Systems Analysis Software Tool · Mission Planning Software for HEAUV · Air Direction Training Simulation System
29	**LRDE**	· Rotating 4D phased Array Radar with Solid State T/r Modules · Digital beamforming Technique · Advanced Electronic counter counter measure features (ECCM) · Modern generation coherent solid state Radar designed for 24 x 7 operation · First Ground based radar with Dual Frequency of operation for operation in inclement weather conditions · Detection algorithms for small RCS targets (boats & dingies) in presence heavy sea clutters · Ultra wide Band antenna technology · Step Frequency Continuous wave form technology · Low power signal and data processing Techniques · Clutter and data processing techniques for identification of buried objects · Ultra wide Band antenna technology · Step Frequency Continuous wave form technology • Micro Doppler based processing for identifying object behind wall
30	**NSTL**	• Advanced Light Weight Torpedoes • Ship Launched • Air Launched • - Advanced Heavy Weight Torpedo (with Fibre Optic

		Communication) • MIGM (Multi Influence Ground Mine) • Subsurface Platforms - WFCS • Air platforms – AFCS • Submarine -Submarine Fired Decoy –SFD (MOHINI) • TORPBUSTER (MOHANASTRA) • Autonomous Underwater Vehicles • High Power Li-ion Battery Technology • SMART: Supersonic Missile Assisted Release of Torpedo
31	**NPOL**	• DIFAR Sonobuoy • Portable diver detection system • Near field acoustic calibration system • Expendable bathy thermograph • Fiber optic intrusion detection system • Underwater acoustic nodes • Underwater acoustic targets • Flank Array, Conformal Array & Towed Array Sonars for Submarines • High Frequency imaging Sonar
32	**NMRL**	• NMR-Indium free Aluminium Sacrificial Anode (NMR-IFASA) • NMR -Aluminium Anode for ship propeller (NMR-AASP) • NMR - Zinc sacrificial anode for fast moving Crafts and Jet propulsion system (NMR - ZSA) • NMR-IPR 1074 and NMR-IPR 1075 Rubber Roll • Porous Carbon Paper (NMR-PCP) • NMR-Mastic (Damping of Structural Vibrations) • NMR- Anticorrosive and Antifouling Under Water Paint for application under Immersed Condition (NMR-AAUWP) • NMR- Corrosion resistant fuel cell catalyst for acid Fuel cells (NMR-CrCAT-FC) • Self Cleaning Coating (NMR-SCC) • Rubber lining system for submarine battery pit compartments and its application technology (NMR-RLSBP) • Hydrophobic Potting material (NMR-HPM)
		• Besafe' Technology for accelerated bioremediation of marine oil spill (NMR-Besafe) • NMR-Radar Absorbing Paint (NMR-RAP) • Fuel Cell based Air Independent Propulsion Technology for Naval Submarines

		(NMR-FCAIP)
33	**RCI**	· Imaging Infrared (IIR) seeker · Ku-band RF Seeker · Ship Inertial Navigation Systems (INS-SA) · Land INS (LNAV) · Miniature High Dynamics Global Navigation Satellite System (GNSS) · On Board Computers (OBC) · Integrated Avionics Modules · Electro Mechanical Actuators · Electro Pneumatic Actuators · Electro Hydraulic Actuators · On board batteries (PSS) · Launcher Interface units · Missile Interface Units · Seeker Processing Modules · Data link systems (Tx & Rx) · Telemetry, Transponders and Tele Command Systems · MEMS Pressure Sensors · High Accuracy Quartz Accelerometers · Ring Laser Gyros (RLG) · Fiber Optic Gyros (FOG) · Radio Proximity Fuze (RPF) · Radio Altimeters · Ceramic /Composite Radomes · Antennas for Seekers / GPS / Altimeters/ Telemetry etc. · Environmental Test Facilities (ENTEST) · Hardware in Loop Simulation (HILS) · EMI /EMC test facility · Open Range RCS measurement Facility · Antenna Test Facility · Seeker test Facilities · System Integration (Mech. & Electrical)
34	**R&DE(E)**	· CompositeSonarDome · LargeSpanInflatableHangar · MobileShelter-NBC · UnexplodedOrdnanceHandlingRobot · SurveillanceRemotelyOperatedVehicle(SROV) · ConfinedSpaceRemotelyOperatedVehicle(CSROV)
		· 46mMLC-70ModularBridge · BarMineLayer · MountainFootBridge

		· MineFieldMarkingEquipmentMk-II · TrawlAssemblyforT-72fr-90Tanks · QRSAMMobileLauncherVehicleandCanister · MRSAM MobileLauncherSystem
35	**SAG**	· Technologies for ensuring Communication Security and assuring trust in security products
36	**SSPL, Delhi**	• Technologies related to GaAS/GaN MMIC, IR Detectors, Semiconductor Laser Diodes, MEMS Devices, Acoustic Emission Sensor, SiC Crystal Growth etc
37	**TBRL**	• Ultra-fine β-HMX and Fine RDX< 6 mm (surface mean) • Electronic Fuze for 81mm Mortar Bomb • Post Impact Delay Fuze for Air Delivered Bomb • Multi-Mode hand grenade • Bund Blasting Device (BBD) Mk-II
38	**VRDE**	· 65HP Rotary Engine for conventional Take- off and Lading UAV · Development of Technologies for Autonomous Unmanned Ground Vehicle: DeTA-UGV · 70Ton Tank Transporter for MBT Arjun MK-II
39	**DYSL-QT**	· Quantum Technology
40	**DYSL-AI**	· Artificial Engineering

DRDO in collaboration with FICCI initiated a DRDO FICCI ATAC (Accelerated Technology Assessment Commercialization) program for Commercialization of DRDO technologies. During this period, 91 ToT agreements were fructified with industries and ToT fee of Rs 11.98 crores was realized.

Following Committees have reviewed DRDO:-

- Kelkar Committee (2004)
- Rama Rao Committee (2007)
- Kota Harinarayana Committee (2013)
- Shekatkar Committee (2016)
- Expert Committee constituted in August, 2019 under the chairmanship of Shri BP Sharma, Chairman RAC and former Secretary, DoP&T to work out roadmap for labs of Life Science (LS) cluster
- Expert Committee constituted in August, 2020 with Director IIT Delhi as Chairman and reps of ISRO and IAF to review charter of labs
- Expert Committee under the chairmanship of Shri BP Sharma, Former Secretary, DoP&T as Chairman and members from DoP&T and DSIR constituted in September 2020 for reviewing Re-organisation of Manpower by Cadre Restructure.

This information was given by Raksha Rajya Mantri Shri Ajay Bhatt in a written reply to Shri Vinod Kumar Sonkar and others in Lok Sabha today.

https://pib.gov.in/PressReleasePage.aspx?PRID=1742329

MANOHAR PARRIKAR INSTITUTE FOR DEFENCE STUDIES AND ANALYSES
मनोहर पर्रिकर रक्षा अध्ययन एवं विश्लेषण संस्थान

Thu, 05 Aug 2021

Self-Reliance in Defence Sector

By Richa Tokas

In the defence sector, India has long sought self-reliance, but efforts have yielded few results. India built up its domestic defence production capacity with assistance from countries like the Soviet Union and the United Kingdom in the 1960s and 1970s, mostly through assembly under licence.

While India imported platforms and equipment, it did embark on indigenously developing key equipment like missile systems. The Defence Research and Development Organisation (DRDO) in 1982-83 started the development of indigenous missile systems under the leadership of Dr APJ Abdul Kalam. These included the short-range surface-to-air missiles like the 'Prithvi', 'Akash' and the anti-tank guided missiles like 'Nag'.[1] The Prithvi missile system was inducted in 1994 while the Akash missile system was inducted in 2014 in the Indian Air Force and in the Indian Army the following year.[2] The user trial of the third-generation Nag was carried out in October 2020 and the system is in the final stages of induction.

Apart from making efforts to develop indigenous missile systems, India also entered into an agreement with Russia in 1998 to develop a supersonic cruise missile system, the 'Brahmos'. This is the fastest supersonic cruise missile in the world, which can be launched from submarines, ships, or aircraft. Brahmos was successfully inducted in 2006.

In the light of the economy hit by the pandemic, Prime Minister Narendra Modi on 12 May 2020, launched the *Aatmanirbhar Bharat Abhiyaan*. The phrase can be translated as self-reliance and self-sufficiency, and it highlights the importance of reducing external dependence in the economic sector. The term 'Vocal for Local' was also introduced to encourage the purchase of indigenous products so that the local industry can flourish. The *Aatmanirbhar Bharat* as an umbrella concept aims to achieve a technology-driven economy, build cutting-edge infrastructure and utilise the strength of the country's demographic profile to generate economic growth.

The defence sector was recognised as an important area in which there is a lot of scope for being *Aatmanirbhar* or self-reliant. The defence sector is one of the strategic sectors of the Indian economy that has the potential for tremendous growth because of the large talented pool of skill sets in terms of human resources and large-scale modernisation requirements of the armed forces. The sector will help in strengthening the economy by creating employment opportunities and reducing the import burden.

India's arms import during 2015-19, for instance, accounted for nearly 10 per cent of the world's total. India's arms import though decreased by 33 per cent between 2011–15 and 2016–20.[3] Self-reliance in defence and security needs is critical to reducing India's dependence on other countries for urgent procurement in times of exigency.

Recent border tensions with China highlighted the reality of procurement done on short notice, to enhance combative effectiveness. During the stand-off, reports flagged that the Indian Army lacked terrain-specific weapons like combat vehicles, among others. To overcome these gaps in weaponry pertaining to high-altitude warfare, the Indian armed forces were provided with emergency financial powers for capital and revenue procurements.[4] Such procurement, though, will be invariably expensive.

Even as this dependence on importing defence products needs to be reduced, indigenous defence procurement needs to be encouraged. It is noteworthy that under the provisions of the emergency

procurement, the Indian Army also placed orders for indigenous products like the M4 armoured vehicles from the Pune-based defence company, Bharat Forge of the Kalyani Group.[5]

The Ministry of Defence (MoD) has taken other important steps to boost the 'Make in India' policy in defence manufacturing. The limits on foreign direct investment (FDI) in the defence sector have been raised to 74 per cent, from the earlier limits of 49 per cent (in May 2020). Out of the total capital acquisition budget for the year 2021-22, over 60 per cent has been earmarked for domestic capital procurement. Defence capital outlay has been increased by 18.75 per cent in the budget of 2021–22. The Defence Procurement Procedure (DPP) 2016 has been revised as the Defence Acquisition Procedure (DAP) 2020, with stress on achieving self-reliance in the defence sector.[6]

To enable the domestic industry to manufacture high-technology weapons and equipment, the government is aggressively promoting the role of the private sector in defence acquisition.[7] The Innovations for Defence Excellence (iDEX) awards, instituted by the MoD in April 2018, are an essential step towards creating an ecosystem to foster innovation, research and technology development. iDEX has provided opportunities to MSMEs (micro, small and medium enterprises), start-ups, research and academic institutions as well as individuals to provide innovative solutions to pressing problem areas of the armed forces.[8]

Further, the MoD has undertaken important steps to facilitate and encourage exports. The Export Promotion Cell (EPC) in the Department of Defence Production (DDP) has been created for the purpose. India has achieved considerable growth in exporting defence equipment. During 2015-20, India's defence exports grew from around Rs 2,000 crore to Rs 9,000 crore.[9] Exports of globally competitive Indian defence products will no doubt help achieve economies of scale and spur qualitative improvements in indigenous defence production.

SRIJAN, the indigenisation portal, was launched in August 2020 for the benefit of defence public sector units (DPSUs) and ordnance factories to provide development support to MSMEs/start-ups/industry for import substitution. A 'positive indigenisation list' consisting of more than 200 items that will be manufactured within India is a huge opportunity to add volumes to the domestic defence industry using their own design and development capabilities.

These steps cumulatively are expected to make use of the large, available skill pool to introduce fresh energy in the defence sector by developing innovative, niche, and cutting-edge technologies for the military. A robust domestic defence manufacturing sector can transform India's military capabilities and help achieve self-reliance in its defence requirements.

Ms Richa Tokas is an Intern in Defence Economics and Industry Centre at Manohar Parrikar IDSA, New Delhi

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https://www.idsa.in/idsacomments/self-reliance-in-defence-sector-040821

THE TIMES OF INDIA

Thu, 05 Aug 2021

Midhani supplies titanium alloy for medium combat jets' airframe

By Ch Sushil Rao

Hyderabad: As India works to further strengthen its armed forces by equipping them with the advanced medium combat aircraft (AMCA), Hyderabad-based defence PSU, Midhani, has begun supplying the titanium alloy material needed to make the airframe for the aircraft. "The airframe is an important part of AMCA which is being developed for the first time in India. Other structures come up on airframe and to make it, we have provided a strategic titanium alloy. Some of the requirements have already been met," Midhani CMD Suresh Kumar Jha told TOI.

It was decided that the needed material would be developed indigenously under the Atmanirbhar Bharat programme, the technology for it was developed at Midhani. While five slabs have been supplied so far, another seven will be supplied in due course for the work that has begun on the AMCA.

Midhani has used a similar technology that it used to provide a specialised titanium alloy used in the making of the crew escape system of ISRO's Gaganyaan programme. When the advance fighter jet becomes a reality, it will be a crucial arrow in the quiver of the Indian Air Force. With AMCA, India will be joining an elite club of countries which have a fifth generation combat aircraft.

The plan is to have 120 stealth fighters to give muscle to the IAF and also the Indian Navy. The aircraft design is by Aeronautical Development Agency (ADA) under the ministry of defence with DRDO and HAL working on the project.

Going by what Indian Air Force chief RKS Bhaduaria said last year, the DRDO has set a target to roll out the AMCA by 2027. In the second phase of the production, sixth generation technologies will be included in the stealth fighter. Also by 2032, the IAF will have at least 18 squadrons of fighter jets if plans were to materialise.

https://timesofindia.indiatimes.com/city/hyderabad/midhani-supplies-titanium-alloy-for-medium-combat-jets-airframe/articleshow/85054821.cms

THE TIMES OF INDIA

Thu, 05 Aug 2021

IAF Chief RKS Bhadauria on a four-day visit to Israel

By Rajat Pandit

New Delhi: Air Chief Marshal R K S Bhadauria is now on a four-day visit to Israel to discuss measures to further bolster the already expansive bilateral defence cooperation between the two countries.

"As strategic partners, India and Israel enjoy strong, multi-dimensional ties, an important pillar of which is defence cooperation and military level exchanges. ACM Bhadauria arrived in Israel on Tuesday on an invitation by Major General Amikam Norkin, commander of the Israel Air Force," said an officer.

Interestingly, the IAF chief has travelled to Israel after a visit to the UAE, where he held discussions with his counterpart Major General Ibrahim Nasser M Al Alawi, among others. The UAE has taken the lead among the Gulf countries in "normalizing" ties with Israel. India has close strategic-military ties with both the countries.

Israel has been among the top four arms suppliers (along with US, Russia and France) to India for almost two decades now, with military sales worth around $1 billion every year.

The Indian armed forces have inducted a wide array of Israeli weapon systems, ranging from Phalcon AWACS (airborne warning and control systems) and Heron, Searcher-II and Harop drones to Barak anti-missile defence systems and Spyder quick-reaction anti-aircraft missile systems.

The acquisitions also include Israeli missiles and precision-guided munitions, from Python and Derby air-to-air missiles to Crystal Maze and Spice-2000 bombs. The Spice-2000 penetration bombs, in fact, were used by Indian Mirage-2000s fighters to bomb the JeM facility at Balakot in Pakistan in February last year.

The armed forces are also now inducting the next-generation Barak-8 surface-to-air missile systems under three joint DRDO-Israeli Aerospace Industries (IAI) projects worth over Rs 30,000 crore.

India is also now finalizing `Project Cheetah' to arm the Heron drones with laser-guided bombs, air-to-ground anti-tank missiles and other precision-guided munitions as well as advanced reconnaissance capabilities with Israel's help for around Rs 3,500-crore, as was reported by TOI.

https://timesofindia.indiatimes.com/india/iaf-chief-rks-bhadauria-on-a-four-day-visit-to-israel/articleshow/85040091.cms

COVID 19: DRDO's Contribution

दैनिक भास्कर

Thu, 05 Aug 2021

कलेक्टर श्री गुप्ता ने निर्माणाधीन ऑक्सीजन प्लांट देखा कार्य को शीघ्रता से पूर्ण कराने के दिए निर्देश

डिजिटल डेस्क | हरदा कलेक्टर श्री संजय गुप्ता ने मंगलवार को जिला अस्पताल के आयुष विंग के सामने निर्माणाधीन ऑक्सीजन प्लांट के निर्माण कार्य का निरीक्षण किया। उल्लेखनीय है कि इस प्लांट की क्षमता 500 ली. प्रति मिनट ऑक्सीजन प्रदाय करने की है। इसका निर्माण डिफेन्स रिसर्च एण्ड डेवलपमेन्ट ऑर्गेनाइजेशन (डीआरडीओ) द्वारा पीएम केयर फण्ड के तहत उपलब्ध राशि से कराया जा रहा है।

इसका सिविल कंस्ट्रक्शन संबंधी कार्य नेशनल हाईवे अथॉरिटी ऑफ इंडिया (एनएचएआई) द्वारा कराया जा रहा है। इस दौरान डॉ. शिरीष रघुवंशी के अलावा एनएचएआई और विद्युत वितरण कम्पनी के अधिकारी भी मौजूद थे। कलेक्टर श्री गुप्ता ने इस दौरान निर्माण एजेन्सी के अधिकारियों को अगले दो-तीन दिनों निर्माण कार्य शीघ्रता से पूर्ण करने के निर्देश दिये।

कलेक्टर श्री गुप्ता ने जिला अस्पताल की छत मरम्मत कराने के निर्देश दिये कलेक्टर श्री गुप्ता को जिला अस्पताल के भ्रमण के दौरान सिविल सर्जन डॉ. रघुवंशी ने बताया कि अस्पताल की छत से पानी टपकता है, जिस पर श्री गुप्ता ने छत पर जाकर स्थिति देखी और छत की साफ-सफाई कर छत मरम्मत कराने के निर्देश पीडब्ल्यूडी के अधिकारियों को दिये। उन्होने निर्माणाधीन आईसीयू वार्ड का भी निरीक्षण किया और उसका निर्माण कार्य गुणवत्ता के साथ समय सीमा में पूर्ण कराने के निर्देश दिये।

https://www.bhaskarhindi.com/city/news/collector-mr-gupta-saw-the-under-construction-oxygen-plant-and-gave-instructions-to-complete-the-work-expeditiously-279203

जागरण

Thu, 05 Aug 2021

अस्पताल में लग रहा है 2000 एलपीएम क्षमता वाले आक्सीजन प्लांट

पूर्णिया: दूसरी लहर में आक्सीजन संकट से सभी छोटे-बड़े अस्पतालों को गुजरना पड़ा। इस कारण से कोरोना संक्रमित की परेशानी काफी बढ़ गई। महामारी तो जानलेवा है ही अगर व्यवस्थागत कमियां से लोगों की सांसें थमने लगे तो स्थिति भयाभव हो जाती है। तीसरी लहर में इसके लिए जिला स्तर व्यापक तैयारी की जा रही है। इसके लिए सदर अस्पताल में 2000 एलपीएम क्षमता वाला दो -दो आक्सीजन प्लांट लगाया जा रहा है। इसमें एक पाथ एनजीओ की तरफ से और दूसरा डीआरडीओ की तरफ से लगाया जा रहा है। 2000 एलपीएम आक्सीजन प्लांट से 24 घंटे में 200 जंबो सिलेंडर भरने की क्षमता लगेगी। परिसर में पीएसए प्लांट (प्रेशर स्विग एडसोरेप्शन प्लांट) लगाया जा रहा है। प्लांट का बेस तैयार हो चुका है। एक और आक्सीजन प्लांट पाइप लाइन में सदर अस्पताल में दो आक्सीजन प्लांट का निर्माण अंतिम चरण में है। दो का बेस तैयार किया जा रहा है।

एक पाथ एनजीओ की तरफ से प्रदान किया जा रहा है और दूसरा डीआरडीओ मशीन की आपूर्ति कर रहा है। प्लांट में एनएचआई सिविल वर्क करेगा। इससे अस्पताल के सभी वार्डों में आक्सीजन की आपूर्ति की जाएगी। एक बीएमजीपी सिविल निर्माण और पाथ फाइनांस मशीन आपूर्ति करेगा। जिसका निर्माण ट्रामा सेंटर के बगल में हो रहा है। जमीन की व्यवस्था अस्पताल प्रशासन ने की है। विद्युत और पानी आपूर्ति की व्यवस्था सदर अस्पताल प्रशासन करेगा।

2000 एलपीएम क्षमता का लगेगा प्लांट पीसीए आक्सीजन प्लांट की आपूर्ति स्थापना डीआरडीओ कर रही है। जमीन सदर अस्पताल ने मुहैय्या कराया है। विद्युत और पानी की आपूर्ति सदर प्रशासन करेगा। इसके लिए 200 केवीए का एक ट्रांसफार्मर लगाना होगा। इसके सुरक्षा और आग से बचाने की जिम्मेदारी अस्पताल प्रशासन की होगी। प्लांट से अस्पताल तक आक्सीजन पाइप लाइन बिछाया गया है। 24 घंटा आक्सीजन आपूर्ति की जाएगी। 24 घंटा में 200 जंबो सिलेंडर भरा जा सकेगा। इस तरह से दो प्लांट अगर काम करेगा तो 24 घंटे में चार सौ जंबो सिलेंडर भरने की क्षमता हो जाएगी।

आक्सीजन आपूर्ति के लिए अनुमंडल स्तर पर भी तैयारी आक्सीजन आपूर्ति के जिले दो अनुमंडल अस्पताल धमदाहा और बनमनखी में आक्सीजन की आपूर्ति प्लांट लगाने की योजना है। तत्काल वहां पर दस -दस आक्सीजन कंसेंट्रेटर और 13 पीएचसी में पांच -पांच आक्सीजन कंसेंट्रेटर लगाए जाएंगे।

https://www.jagran.com/bihar/purnea-oxygen-plant-with-2000-lpm-capacity-is-being-set-up-in-the-hospital-21896397.html

राष्ट्रीय हिन्दी दैनिक
तरुणमित्र

Thu, 05 Aug 2021

15 अगस्त तक डीएमसीएच व बेनीपुर अनुमंडल अस्पताल में ऑक्सीजन प्लांट चालू करने का निर्देश

दरभंगा: आगामी 15 अगस्त तक डीएमसीएच व अनुमंडलीय अस्पताल बेनीपुर में ऑक्सीजन प्लांट की स्थापना एवं आईसीयू के सभी बेड तक ऑक्सीजन पहुंचाने के लिए बुधवार को अंबेडकर सभागार में डीएम की अध्यक्षता में हुई। बैठक में मेडिकल कॉलेज अस्पताल के प्राचार्य ने कहा कि डीएमसीएच में 3 ऑक्सीजन प्लांट स्थापित किये जा रहे हैं। 1 प्लांट क्रायोजेनिक का एवं 2 प्लांट बीएमसीआईएसएल द्वारा स्थापित किया जा रहा है।

क्रायोजेनिक प्लांट से डीएमसीएच के कोरोना वार्ड के सभी 125 बेड पर ऑक्सीजन की आपूर्ति होगी। इसके लिए सिविल वर्क व पाईप लाईन का कार्य किया जा रहा है। क्रायोजेनिक ऑक्सीजन प्लांट के पाईप लाईन एवं सिविल वर्क के लिए लिण्डे इण्डिया लिमिटेड कम्पनी को जिम्मेवारी दी गई है। पाईप लाईन लग जाने के बाद पेट्रोलियम एण्ड एक्सप्लोसिव सेफ्टी ऑर्गनाईजेशन से लाइसेंस लेना पड़ेगा। डीएम ने अधीक्षक को लाइसेंस के लिए शीघ्र ही अप्लाई कर देने का निर्देश दिया। वहीं बेनीपुर अनुमण्डलीय अस्पताल परिसर में डीआरडीओ द्वारा स्थापित किए जा रहे ऑक्सीजन प्लांट के संबंध में सिविल सर्जन डॉ. अनिल कुमार ने कहा कि अभी सिविल वर्क चल रहा है। पीलर एवं बेस बन कर तैयार हो गया है।

सिविल वर्क पूर्ण हो जाने पर डीआरडीओ द्वारा प्लांट स्थापित की जाएगी। डीएम ने सभी एजेन्सी को चेतावनी देते हुए कहा कि 15 अगस्त तक सभी ऑक्सीजन प्लांट चालू हो जाना चाहिए और बेड तक ऑक्सीजन की आपूर्ति होनी चाहिए। यदि इसमें कहीं कोई कमी पायी गई तो संबंधित एजेन्सी के विरूद्ध आपदा प्रबंधन अधिनियम के अन्तर्गत कार्रवाई की जाएगी। टीकाकरण के लिए प्रखंडवार लक्ष्य निर्धारित किये गए है। 250 से 300 लोगों पर 1 टीकाकरण केन्द्र बनाना होगा। आज होने वाले टीकाकरण के लिए दरभंगा नगर निगम क्षेत्र को 8 हजार टीका का लक्ष्य निर्धारित किया गया है।

https://tarunmitra.in/instructions-to-start-oxygen-plant-in-dmch-and-benipur-sub-division-hospital-by-august-15/394209

Defence News

Defence Strategic: National/International

Press Information Bureau
Government of India

Ministry of Defence

Wed, 04 Aug 2021 4:55PM

Boosting domestic production of defence equipment

The Government has taken several policy initiatives and brought reforms to encourage indigenous design, development and manufacture of defence equipment in the country, thereby reducing dependency on imports in coming years. These initiatives, inter-alia, include according priority to procurement of capital items from domestic sources under Defence Acquisition Procedure (DAP)-2020; Notification of two 'Positive Indigenisation Lists' of total 209 items for which there would be an embargo on the import beyond the timeline indicated against them; Simplification of Industrial licensing process with longer validity period; Liberalisation of FDI policy allowing 74% FDI under automatic route; Simplification of Make Procedure; Launch of Innovations for Defence Excellence (iDEX) scheme involving start-ups & MSMEs; Implementation of "Public Procurement (Preference to Make in India), Order 2017"; Launch of an indigenization portal namely SRIJAN to facilitate indigenisation by Indian Industry including MSMEs; Reforms in Offset policy with thrust on attracting investment and Transfer of Technology for Defence manufacturing by assigning higher multipliers; Establishment of two Defence Industrial Corridors one each in Uttar Pradesh and Tamil Nadu.

In addition, for 2021-22, the allocation for Domestic procurement has been enhanced compared to previous years and is planned to be about 64.09 % i.e. Rs. 71,438.36 Crore of the allocated amount for military modernization.

Further, year-wise annual Turnover of Ordnance Factory Board (OFB), 09 Defence Public Sector Undertakings (PSUs), 06 other PSUs & 37 private companies manufacturing defence items, indicates the impact of measures taken by the Government to make successful "Make in India". The year-wise details of annual Turnover of these units are as below:

Financial Year	Total Value in Rs crore
2016-2017	74054
2017-2018	78820
2018-2019	81121
2019-2020	78569
2020-2021	84694

The measures taken by Government for Indigenisation are likely to result in import substitution. On the basis of data received from Controller General of Defence Accounts (CGDA), the details of

procurement of defence equipment (both Capital and Revenue) by the three Services (Army, Navy and Air Force), in the last three years which indicates decrease in imports, are as follows:

(Value in Rs crore)

Year	Total expenditure on Procurement (both capital and revenue)	Expenditure on Procurement (both capital and revenue) from Domestic sources	%age of expenditure on Procurement (both capital and revenue) from Domestic sources
2018-2019	93474	50500	54.0
2019-2020	108340	63722	58.8
2020-2021	139341	88632	63.3

Further. the details of procurement of defence equipment (both Capital and Revenue) done from foreign sources by the three Services (Army ,Navy and Air Force), in the last five years are as follows:

(Value in Rs crore)

Year	Expenditure on Procurement (both capital and revenue) from Foreign sources
2016-2017	30494
2017-2018	33413
2018-2019	42974
2019-2020	44618
2020-2021	50709

Moreover, value of Export Authorization issued by Department of Defence Production to DPSUs/OFB and Private companies, during the last five years has been as under:

	2016-17	2017-18	2018-19	2019-20	2020-21
Value of Export Authorisation (Rs. in crores)	1521.91	4682.36	10745.77	9115.55	8434.84

This information was given by Raksha Rajya Mantri Shri Ajay Bhatt in a written reply to Shri Rajiv Pratap Rudy in Lok Sabha today.

https://pib.gov.in/PressReleasePage.aspx?PRID=1742324

Press Information Bureau
Government of India

Ministry of Defence

Wed, 04 Aug 2021 3:46PM

Commencement of Sea trials of Indigenous Aircraft Carrier (IAC(P71)) 'Vikrant'

Indigenous Aircraft Carrier (IAC) 'Vikrant' designed by Indian Navy's Directorate of Naval Design(DND) is being built at Cochin Shipyard Limited(CSL), a Public Sector Shipyard under Ministry of Shipping(MoS). IAC is a leading example of the nation's quest for "Atma Nirbhar Bharat" with more than 76% indigenous content. This is the maiden attempt of the Indian Navy and Cochin Shipyard to indigenously design and build an Aircraft Carrier.

The Indigenous Aircraft Carrier is 262 m long, 62 m at the widest part and height of 59 m including the superstructure. There are 14 decks in all, including five in the superstructure. The ship has over 2,300 compartments, designed for a crew of around 1700 people, including specialised cabins to accommodate women officers. The ship has been designed with a very high degree of automation for machinery operation, ship navigation and survivability, 'Vikrant' has a top speed of around 28 knots and cruising speed of 18 knots with an endurance of about 7,500 nautical miles. The ship can accommodate an assortment of fixed wing and rotary aircraft.

Most of the ship construction activities have been completed and the ship has entered the trials phase. Readiness of ship's Propulsion and Power Generation equipment/ systems was tested in harbour as part of Basin Trials in Nov 20. Progress of construction of the Carrier was reviewed by Hon'ble Raksha Mantri during his visit to the ship on 25 Jun 21. Though the commencement of Sea Trials was delayed due to the 2nd wave of COVID, with concentrated and dedicated efforts of large number of workmen, OEMs, engineers, overseers, inspectors, designers and the ship's crew, who had put their heart and soul towards the ship's readiness for sea trials. This is a major milestone activity and historical event. Reaching this milestone is significant as they have been achieved barring the current pandemic challenges and imponderables. During the maiden sailing, ship's performance, including hull, main propulsion, PGD and auxiliary equipment would be closely watched.

With the delivery of IAC, India would join a select group of nations with the capability to indigenously design and build an Aircraft Carrier, which will be a real testimony to the 'Make in India' thrust of the Indian Government.

The Indigenous construction of Aircraft Carrier is a shining example in the Nation's quest for 'Atma Nirbhar Bharat' and 'Make in India Initiative'. This has led to growth in indignous design and construction capabilities besides development of large number of ancillary industries, with employment opportunities for 2000 CSL personnel and about 12000 employees in ancillary industries. Over 76% indigenous content towards procurement of equipment, besides work by CSL and their subcontractors is being directly invested back into the Indian economy. Around 550 Indian firms including about 100 MSMEs are registered with CSL, who are providing various services for construction of IAC.

Indian Navy's ship building programme is rightly poised to provide requisite 'Economic Stimulus', with 44 ships & submarines on order being built indigenously.

https://pib.gov.in/PressReleasePage.aspx?PRID=1742282

पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Wed, 04 Aug 2021 3:46PM

स्वदेशी विमानवाहक पोत (आईएसी (पी71) 'विक्रांत' के समुद्री परीक्षणों की शुरुआत

भारतीय नौसेना के नौसेना डिजाइन निदेशालय (डीएनडी) द्वारा डिजाइन किया गया स्वदेशी विमानवाहक (आईएसी) पोत 'विक्रांत' पत्तन, पोत परिवहन और जलमार्ग मंत्रालय (एमओएस) के तहत सार्वजनिक क्षेत्र के शिपयार्ड कोचीन शिपयार्ड लिमिटेड (सीएसएल) में बनाया जा रहा है।आईएसी 76 प्रतिशतसे अधिक स्वदेशी सामग्री के साथ "आत्मनिर्भर भारत" के लिए देश के प्रयास का एक प्रमुख उदाहरण है। यह भारतीय नौसेना और कोचीन शिपयार्ड का स्वदेशी रूप से एक विमानवाहक पोत डिजाइन करने निर्माण करने का पहला प्रयास है।

स्वदेशी विमानवाहक पोत 262 मीटर लंबा, 62 मीटर चौड़ा और 59 मीटर ऊंचा है, जिसमें सुपरस्ट्रक्चर भी शामिल है। सुपरस्ट्रक्चर में पांच डेक होने समेत पोत में कुल 14 डेक हैं। जहाज में 2,300 से अधिक कम्पार्टमेंट्स हैं, जिन्हें लगभग 1700 लोगों के क्रू के लिए डिज़ाइन किया गया है, जिसमें महिला अधिकारियों को समायोजित करने के लिए विशेष केबिन भी शामिल हैं। जहाज को मशीनरी संचालन, जहाज नेविगेशन और कठिन हालात में स्वयं को बनाए रखने के दृष्टिकोण से बहुत उच्च स्तर के ऑटोमेशन के साथ डिजाइन किया गया है, 'विक्रांत' की लगभग 28 समुद्री मील की शीर्ष गति और लगभग 7,500 समुद्री मील की एंड्योरेंस के साथ 18 समुद्री मील की परिभ्रमण गति है। जहाज फिक्स्ड विंग और रोटरी एयरक्राफ्ट के वर्गीकरण को समायोजित कर सकता है।

अधिकांश जहाज के निर्माण की गतिविधियां पूरी हो चुकी हैं और यह परीक्षण के चरण में प्रवेश कर चुका है। जहाज के प्रणोदन और बिजली उत्पादन उपकरण / प्रणालियों की तैयारी का परीक्षण दिनांक 20 नवंबर को बेसिनपरीक्षणों के अंतर्गत बंदरगाह में किया गया था। जहाज के निर्माण की प्रगति की समीक्षा माननीय रक्षा मंत्री द्वारा दिनांक 25 जून 2021 को जहाज के दौरे के दौरान की गई थी। हालांकि अपना दिल और आत्मा जहाज की तैयारी के लिए लगाने वाले बड़ी संख्या में कामगारों, ओईएम, इंजीनियरों, ओवरसियरों, निरीक्षकों, डिजाइनरों और जहाज के चालक दल के केंद्रित और समर्पित प्रयासों के साथ, कोविड-19 की दूसरी लहर के कारण समुद्री परीक्षण शुरू होने में देरी हुई। यह एक प्रमुख मील का पत्थर और ऐतिहासिक घटना है। इस मील के पत्थर तक पहुंचना महत्वपूर्ण है क्योंकि उन्हें मौजूदा महामारी चुनौतियों और अपरिहार्यताओं की बाध्यताओं के बीच हासिल किया गया है। पानी में प्रथम प्रवेश के दौरान हल समेत मुख्य प्रणोदन, पीजीडी और सहायक उपकरणों के प्रदर्शन को बारीकी से देखा जाएगा।

स्वदेशी विमानवाहक पोत की डिलीवरी के साथ भारत स्वदेशी रूप से डिजाइन और एक विमानवाहक बनाने की क्षमता वाले देशों के चुनिंदा समूह में शामिल हो जाएगा, जो भारत सरकार की 'मेक इन इंडिया' मुहिम का एक वास्तविक प्रमाण होगा।

एयरक्राफ्ट कैरियर का स्वदेशी निर्माण 'आत्मनिर्भर भारत' और 'मेक इन इंडिया' की दिशा में देश के प्रयास का एक जीवंत उदाहरण है। इससे बड़ी संख्या में सहायक उद्योगों के विकास के अलावा, 2000 सीएसएल कर्मियों और सहायक उद्योगों में लगभग12000 कर्मचारियों के लिए रोजगार के अवसरों के साथ

स्वदेशी डिजाइन और निर्माण क्षमताओं में वृद्धि हुई है। उपकरणों की खरीद के मामले में 76 प्रतिशत से अधिक स्वदेशी सामग्री, सीएसएल और उनके उप-ठेकेदारों द्वारा काम का फायदा सीधे भारतीय अर्थव्यवस्था को होने जा रहा है। लगभग 100 एमएसएमई सहित लगभग 550 भारतीय फर्म सीएसएल के साथ पंजीकृत हैं, जो आईएसी के निर्माण के लिए विभिन्न सेवाएं प्रदान कर रही हैं।

भारतीय नौसेना का जहाज निर्माण कार्यक्रम 44 जहाजों और पनडुब्बियों के स्वदेशी निर्माण के क्रम में अपेक्षित 'आर्थिक प्रोत्साहन' प्रदान करने के लिए सही ढंग से तैयार है।

https://pib.gov.in/PressReleasePage.aspx?PRID=1742507

Press Information Bureau
Government of India

Ministry of Defence

Wed, 04 Aug 2021 4:54PM

Cyber warfare

Government has approved establishment of Defence Cyber Agency, under the aegis of Ministry of Defence. This agency is now fully functional. To mitigate cyber threats, all the three Services have established their respective Cyber Emergency Response Teams (CERT). Furthermore, Government of India is formulating the National cyber security strategy, which is in the final stages of approval.

There have been repeated attempts by various cyber threat actors to target our various sectors. However, measures are being taken to detect and deter these threats.

Adequate safeguards have been instituted in the form of Cyber Audits, Physical Checks and Policy Guidelines to ensure a robust cyber posture of armed forces.

This information was given by Raksha Rajya Mantri Shri Ajay Bhatt in a written reply to Shri Shyam Singh Yadav in Lok Sabha today.

https://pib.gov.in/PressReleasePage.aspx?PRID=1742322

Press Information Bureau
Government of India

Ministry of Defence

Wed, 04 Aug 2021 4:58PM

Chinese threat at the coastal region

India's relations with its neighbours stand on their own and are independent of the relations of those countries with third countries. The Government has well articulated policy of 'Neighborhood first' with a focus on creating mutually beneficial, people oriented regional frameworks for stability and prosperity. Government carefully monitors any developments having a bearing on India's security and economic interests, and takes all necessary measures to safeguard them.

The Government has taken a number of measures to strengthen coastal, Off shore and maritime security. The Indian Navy, Coast Guard and State Marine Police along with other agencies such as Customs and Port Trusts patrol the Maritime Zone of India using surface and air assets to detect and check infiltration. Further, electronic surveillance of maritime zone is undertaken using radars, Automatic Identification System, open sources etc. Government has also set up Joint Operation Center, Information Management Centre and National Command, Control, Communications and Intelligent Network. Sagar Prahari Bal with Fast Intercepting Crafts and Immediate Support Vessels have been established for the security of Offshore Development Area. The Standard Operating Procedures for coordination among various agencies on coastal security issues have been formulated. Besides this, Exercises with various security agencies are conducted regularly to assess the effectiveness of existing mechanisms. Towards engaging coastal and fishing communities, Community Interaction and Awareness Programmes are being regularly conducted by Indian Navy and Coast Guard. Security of Atomic Power Plants at Kalpakkam and Kudankulam is entrusted to the Central Industrial Security Force (CSIF). In addition units of Army, Air Defence (AAD) and Air Force are placed for Air defence at Kalpakkam and Kudankulam.

This information was given by Raksha Rajya Mantri Shri Ajay Bhatt in a written reply to Shri Dr T Sumathy (A) Thamizhachi Thangapandian in Lok Sabha today.

https://pib.gov.in/PressReleasePage.aspx?PRID=1742332

R. REPUBLICWORLD.COM

Thu, 05 Aug 2021

Army Chief Gen Naravane discusses 'issues of mutual interest' with US Army Chief of Staff

US Army's Chief of Staff, General James C McConville on Aug 4 called on Indian Army Chief MM Naravane to hold talks on various key aspects of bilateral defence

By Srshti Jha

US Army's Chief of Staff, General James C McConville on August 4 called on Indian Army Chief MM Naravane to hold talks on various key aspects of bilateral defence and security cooperation between both sides.

Image Credit: Twitter- ADGPI

On July 29, Indian Army Chief MM Naravane met with Commander of US Special Operations Command General Richard D Clarke. During his three-day visit to India, the US Commander held talks on various dimensions of bilateral defence cooperation and advanced support to further deepen military ties.

India and the US deliberate on Afghanistan

Sources reported that General Naravane and General Clarke briefly deliberated on the evolving situation in war-torn Afghanistan.

Assuredly, the situation in Afghanistan remains a predicament because Taliban-infused violence is on the surge as the military organisation is constantly trying to make territorial gains in the State. This is pursuant to the withdrawal of US armed forces and NATO troops ending Washington's 18-year war with the Taliban after the 9/11 attacks. The ongoing power crisis in Afghanistan is particularly volatile given the shift of reigns as US and NATO forces prepare to exit. Currently waging war within the country, the Taliban is gaining more ground and resorting to widespread violence to expand its influence.

One of the reasons for Afghanistan and India's close ties is due to the latter's massive investment in Afghanistan. India has been a major stakeholder in the peace and stability of Afghanistan. As a close ally of Afghanistan, India has provided at least five military helicopters amid clashes. It had also invested nearly USD 3 billion in aid and reconstruction activities in the country. India has been supporting a national peace and reconciliation process which is Afghan-led, Afghan-owned and Afghan-controlled.

https://www.republicworld.com/india-news/general-news/army-chief-gen-naravane-discusses-issues-of-mutual-interest-with-us-army-chief-of-staff.html

The Indian EXPRESS

Thu, 05 Aug 2021

Explained: The importance of IAC-1, the Made-in-India aircraft carrier

The IAC-1, tomorrow's INS Vikrant, sailed out to sea for the first time on Wednesday. The indigenous aircraft carrier is a stellar achievement of defence engineering

By Krishna Kaushik,

New Delhi: The Indigenous Aircraft Carrier (IAC) 1, which will be called INS Vikrant once it enters service with the Indian Navy about a year from now, started sea trials — one of the last phases of trials — on Wednesday. What is this warship, and why is this project important for the country?

What is IAC-1, as the warship is currently codenamed?

This is the first aircraft carrier designed and built in India. An aircraft carrier is one of the most potent marine assets for a nation, which enhances a Navy's capability to travel far from its home shores to carry out air domination operations.

Many experts consider having an aircraft carrier as essential to be considered a 'blue water' navy — one that has the capacity to project a nation's strength and power across the high seas. An aircraft carrier generally leads as the capital ship of a carrier strike/battle group. As the carrier is a valuable and sometimes vulnerable target, it is usually escorted in the group by destroyers, missile cruisers, frigates, submarines, and supply ships.

IAC-1 has been designed by the Indian Navy's Directorate of Naval Design (DND), and is being built at Cochin Shipyard Limited (CSL), a public sector shipyard under the Ministry of Shipping.

Why does it matter that this is a Made-in-India warship?

Only five or six nations currently have the capability of manufacturing an aircraft carrier — India joins this elite club now. Experts and Navy officials said India has demonstrated the capacity and self-reliance to build what is considered to be one of the most advanced and complex battleships in the world.

India's earlier aircraft carriers were either built by the British or the Russians. The INS Vikramaditya, currently the Navy's only aircraft carrier that was commissioned in 2013, started out as the Soviet-Russian Admiral Gorshkov. The country's two earlier carriers, INS Vikrant and INS Viraat, were originally the British-built HMS Hercules and HMS Hermes before being commissioned into the Navy in 1961 and 1987 respectively.

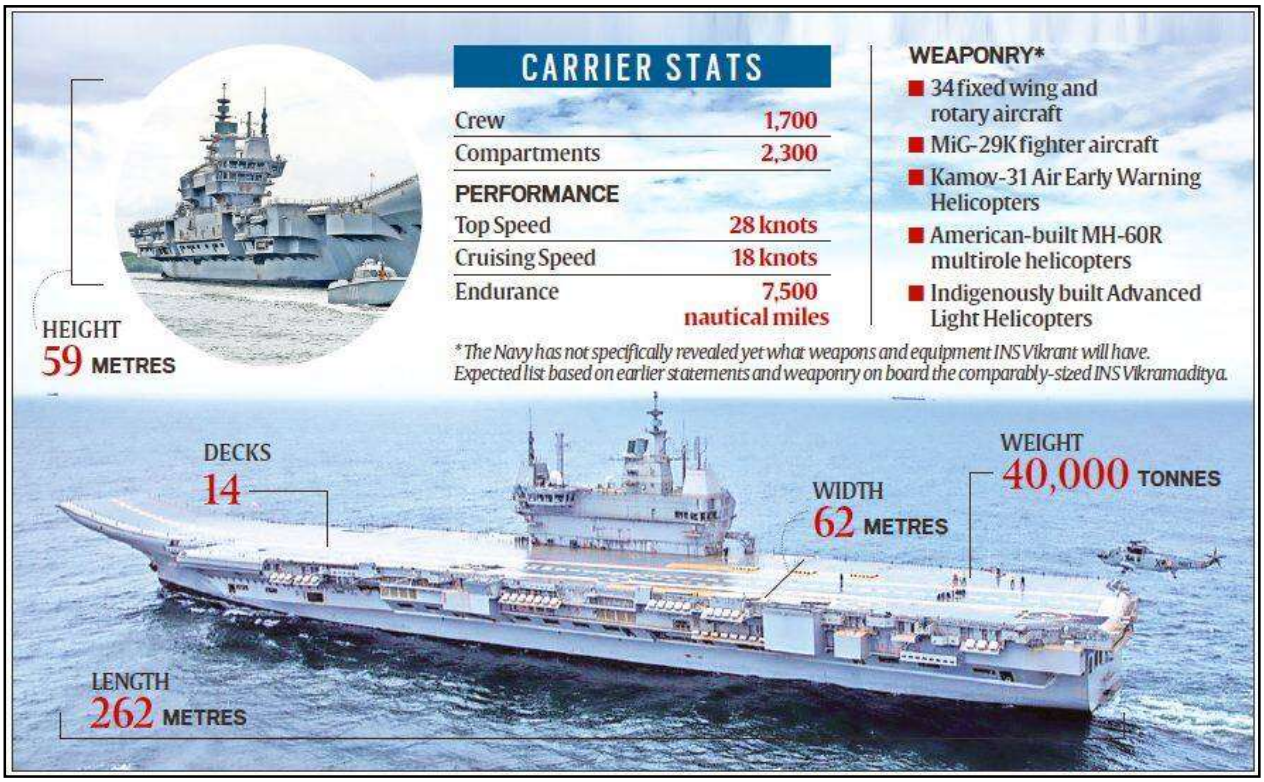
According to the Navy, over 76 per cent of the material and equipment on board IAC-1 is indigenous. This includes 23,000 tonnes of steel, 2,500 km of electric cables, 150 km of pipes, and 2,000 valves, and a wide range of finished products including rigid hull boats, galley equipment, airconditioning and refrigeration plants, and steering gear.

The Navy has said that more than 50 Indian manufacturers were directly involved in the project, and about 2,000 Indians received direct employment on board IAC-1 every day. Over 40,000 others were employed indirectly.

The Navy calculates that about 80-85 per cent of the project cost of approximately Rs 23,000 crore has been ploughed back into the Indian economy.

Why will this warship be named INS Vikrant?

INS Vikrant, a Majestic-class 19,500-tonne warship, was the name of India's much-loved first aircraft carrier, a source of immense national pride over several decades of service before it was decommissioned in 1997. India acquired the Vikrant from the United Kingdom in 1961, and the carrier played a stellar role in the 1971 war with Pakistan that led to the birth of Bangladesh.



Carrier statistics

The Vikrant was deployed in the Bay of Bengal, and its two air squadrons of Sea Hawk fighter jets and Alize surveillance aircraft were used in strikes on ports, merchant ships, and other targets, and to prevent Pakistani forces from escaping through maritime routes.

On Wednesday, the Navy hailed the "proud and historic day for India as the reincarnated Vikrant sails for her maiden sea trials…, in the 50th year of her illustrious predecessor's key role in victory in the 1971 war".

What weapons and equipment will the new Vikrant have?

The Navy has not officially revealed specific details of the weapons and aircraft that INS Vikrant will carry. However, the new warship is comparable to India's existing carrier INS Vikramaditya, which is a 44,500-tonne vessel and can carry up to 34 aircraft, including both fighter jets and helicopters.

The Navy had earlier said that once commissioned, IAC-1 will be "the most potent sea-based asset", which will operate the Russian-made MiG-29K fighter aircraft and Kamov-31 Air Early Warning Helicopters, both of which are already in use on the Vikramaditya.

The new Vikrant will also operate the soon-to-be-inducted MH-60R Seahawk multirole helicopter manufactured by the American aerospace and defence company Lockheed Martin, and the Advanced Light Helicopter (ALH) built by Bengaluru-based Hindustan Aeronautics Ltd.

According to the Navy, the warship will offer an "incomparable military instrument with its ability to project Air Power over long distances, including Air Interdiction, Anti-Surface Warfare, offensive and defensive Counter-Air, Airborne Anti-Submarine Warfare and Airborne Early Warning".

Now that India has the capability, will it build more carriers?

Since 2015, the Navy has been seeking approval to build a third aircraft carrier for the country, which, if approved, will become India's second Indigenous Aircraft Carrier (IAC-2). This proposed carrier, to be named INS Vishal, is intended to be a giant 65,000-tonne vessel, much bigger than IAC-1 and the INS Vikramaditya.

The Navy has been trying to convince the government of the "operational necessity" of having a third carrier. Chief of the Naval Staff Admiral Karambir Singh said on Navy Day last year that the Navy could not remain a "tethered force". Navy officials have argued that to project power, it is

essential that India is able to venture far out on the oceans, which can be done best with an aircraft carrier.

For the government to be convinced of the need for IAC-2, however, a "change in mindset" is required, sources in the Navy had told The Indian Express earlier. Chief of Defence Staff General Bipin Rawat, who is tasked with prioritising acquisition for the armed forces, has spoken against investing in another aircraft carrier, and has instead suggested that Lakshadweep and the Andaman & Nicobar Islands could be developed as "unsinkable" Naval assets.

But Navy officials have said that to defend the vast Indian Ocean Region, persistent air power is required day and night. A third carrier will provide the Navy with surge capability, which will be essential in the future, they have argued.

Also, it is argued that now that India has developed the capability to build such vessels, it should not be whittled away. The expertise gained by the Navy and the country over the past 60 years in the "art of maritime aviation" should not be wasted either.

While the United States Navy has 11 aircraft carriers, China too is moving ahead aggressively with its aircraft carrier programme. It has two carriers now, a third is in the making, and another two are likely to be commissioned within a decade.

Navy officials point out that even if India gives the IAC-2 project the go-ahead now, it will be over 10 years before the warship is commissioned.

20+ years in making

1999: Project 'P71' to build Air Defence Ship (ADS) cleared

2003: Aircraft Carrier project gets government nod

2006: Navy says ADS changed to Indigenous Aircraft Carrier

2009: Keel laid

2011: Floated out of dry dock

2013: Launched

Nov 2020: Harbour and basin trials completed

Aug 2021: Sea trials begin

Next: Shipbuilder will continue sea trials over the next 6-7 months; then hand over IAC-1 to Navy for trials

Aug 2022: Expected to be commissioned. Trials of aircraft and component parts will follow.

https://indianexpress.com/article/explained/the-importance-of-iac-1-the-made-in-india-aircraft-carrier-7438715/

The Statesman

Thu, 05 Aug 2021

Theatre commands must have an Indian flavour

The Indian armed forces have, when necessary, displayed the ability to operate jointly

By Harsha Kakar

A report last week stated that the Chief of Defence Staff (CDS) had been chairing meetings with representatives of service HQs and other ministries to iron out differences in the creation of theatre commands.

According to the report, these differences have yet to be ironed out.

Simultaneously, there are rumours that raising of theatre commands would be announced by the PM from the ramparts of the Red Fort on Independence Day.

This implies that differences have to be resolved by then. It also confirms that the government is determined to establish theatre commands.

There is no doubt that creation of theatre commands must not be rushed as decisions taken today will have ramifications in the future. Simultaneously, they must not be inordinately delayed. Within the forces, major reservations stem from the air force, which has limited multi-role assets that it is unwilling to fritter to theatres based on the variety of tasks it is expected to fulfil.

In addition is the fact that a smaller air force could be overshadowed by a larger army.

Maritime operations will remain a naval domain. Other ministries have their reservations on shedding of resources to theatres. Globally, Indian armed forces are considered amongst the most formidable and experienced, however they function in silos as they have resisted integration.

This has limited their ability to project unified power across the region, despite being considered as net security providers in Asia and an invaluable member of any global coalition in the Indo-Pacific. Even in established joint commands such as the Andaman and Nicobar Command, individual services are reluctant to share their service assets.

The Indian armed forces have, when necessary, displayed the ability to operate jointly.

Kargil, once the air force got its act together, was a classic case of army-air force collaboration, which resulted in victory.

The rapid build-up of forces to counter the Chinese aggression in Ladakh was due to army-air force cooperation. Exploitation of strategic airlift ensured weapons, equipment and manpower moved from all parts of India into Ladakh at a pace unprecedented in recent times.

It was air force assets which ensured that forces remained combat-ready throughout the harsh winters when most surface means of communication were closed. The deployment of frontline fighters and recent acquisitions, including heavy lift and attack helicopters, in high altitude added to Chinese concerns and were a major deterrent.

There is no doubt that India needs theatre commands, not copying any global model, but tailored to Indian conditions.

The Indian scenario is vastly different. Indian armed forces would rarely operate beyond Indian shores unless requested by other nations. In such cases, the involvement would be for short durations, mainly to restore an adverse scenario.

One of the theatre commands could possibly be assigned this role and be equipped accordingly. India never intends to occupy land belonging to other nations. The only other scenario where India may move forces overseas would be under the UN flag. For India, security threats are mainly land-based and hence emphasis would remain on theatre commands aimed at securing India’s land frontiers.

China claims large parts of Ladakh, some regions in Uttarakhand and Sikkim and all of Arunachal, while Pakistan claims J and K. The borders with both countries in disputed areas remains undemarcated.

It is to ensure security of these regions that emphasis has remained on large scale army deployment along the LoC and LAC. Hence, even currently suggested commands are based on this premise.

Indian theatre commands are being designed for securing the homeland and not for global operations. This has been interpreted in some quarters as them being armydominated commands.

Another specific Indian flavour is J and K. It is unique and hence has been considered as an independent theatre. The region has adversaries seeking to grab Indian territory on either side and there is always a possibility that they could operate jointly, or Pakistan could attempt to add to internal security concerns to support Chinese offensive actions on the northern front.

The region has limited arteries for induction of forces and stores as also common logistic and medical facilities to sustain forces operating in the region. Reserves within the theatre could be utilised on either front, while counter insurgency operations in Kashmir impact movement of forces and stores on both fronts. Airfields are common to both theatres as also are air assets. The northern theatre therefore cannot be split and hence is being considered as a single entity.

For the past two decades, the forces have avoided discussing creation of theatre commands, while suggesting enhancing jointness employing the bottom-up approach. The bottom-up approach has been a farce and an eyewash. There has been no attempt to enhance joint operational cooperation and services have functioned in silos.

With theatre commands established, the forces would be compelled to adopt joint training concepts under an integrated training command, creating an environment where joint operations can be effectively planned.

Till this stage is reached, the dominating service would command respective theatres. The other aspect which the CDS led committee is attempting to push through is amalgamating forces deployed along disputed borders under one commander. There are CAPFs of the Ministry of Home Affairs, mainly the BSF and ITBP, deployed alongside the army on both disputed borders. In addition, there are multiple intelligence agencies operating under the NSA, responsible for garnering strategic and tactical intelligence.

None of them function under control of the commander responsible for the border. With growing security challenges, it is essential that India must adopt a policy of one border, one force, one ministry. Intelligence cannot flow from border regions to Delhi and then trickle down. It has to be real time.

The number of theatre commands, control and future role of service chiefs are currently being debated. There is no doubt that India will remain one theatre of operations, with responsibility and resources distributed to ensure employment of maximum effective combat power. Securing land borders will be a prerequisite and this must be accepted as the basic tenant for theatre commands.

(The writer is a retired Major-General of the Indian Army.)

https://www.thestatesman.com/opinion/theatre-commands-must-indian-flavour-1502990107.html

DNA
DAILY NEWS & ANALYSIS

Thu, 05 Aug 2021

ISRO to launch Bhutanese satellite in December 2021

Ruchira Kamboj was speaking at an event organised by the Indian embassy in Bhutan as part of India's 75th year of Independence

By Sidhant Sibal

India's ISRO or Indian Space Research Organization will be launching a Bhutanese satellite in December 2021. The satellite is being built by 4 Bhutanese engineers who are being trained by ISRO, with the first phase already over.

Ambassador of India to Bhutan Ruchira Kamboj said, "Our 2 countries are collaborating to build a satellite...this satellite is going to be launched in 2021 from ISRO's facilities". She highlighted, that it is "only natural that these 2 best friends are cooperating in this final frontier".

She was speaking at an event "Space odyssey: showcasing India's achievements in space technology" organised by the Indian embassy in Bhutan as part of India's 75th year of Independence--Azadi Ka Amrit Mahotsav. The 4 Bhutanese engineers were also present at the occasion. The engineers completed 2 months of training at ISRO's UR Rao Satellite center in February and in the second phase of training will put the finishing touches on the satellite they are building.

R Umamaheswaran, Scientific Secretary, ISRO who was the keynote speaker at the event making a mention of the Bhutanese satellite that is being developed said, it "will fly hopefully by end of this year in PSLV mission, that is what we are planning".

India and Bhutan have engagement in space cooperation with a ground Earth station for South Asia Satellite being inaugurated in Thimphu during PM Modi's August 2019 Bhutan visit. Ground Earth station was built with the help of ISRO. In 2017 India launched the South Asia satellite project with all countries barring Pakistan part of it. Under the project, New Delhi has offered to increase bandwidth on an additional transponder on the satellite for Bhutan as a gift as per the country's requirement.

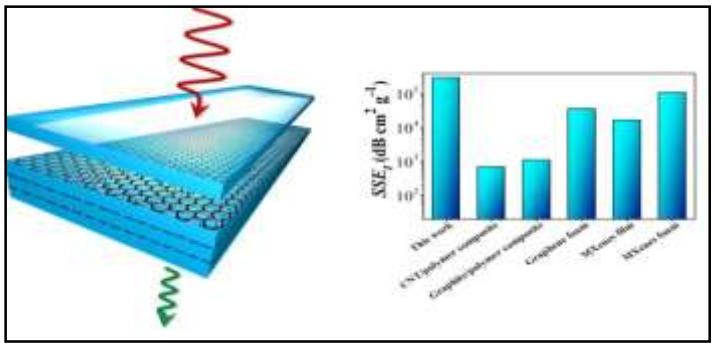
https://www.dnaindia.com/india/report-isro-to-launch-bhutanese-satellite-in-december-2021-2904126

PHYS.ORG

Thu, 05 Aug 2021

Effective EMI shielding behavior of thin graphene/PMMA nanolaminates

Since its isolation in 2004 by Geim and Novoselov from the University of Manchester (Nobel Prize in Physics in 2010), graphene has been termed a 'wonder material' due to its exceptional properties, which have already been exploited in many applications and products. However, the use of graphene in the form of tiny flakes in polymer composites limits the full exploitation of its excellent properties, requiring high filler loadings for achieving satisfactory electrical and mechanical properties.



Sketch of the CVD graphene/polymer nanolaminates for EMI shielding. Credit: Foundation for Research and Technology - Hellas

A team of researchers led by Professor Costas Galiotis had the innovative idea to use centimeter-size graphene sheets as reinforcement in polymer composites with a nanolaminate architecture. This has been demonstrated to be a smart strategy to overcome the typical drawbacks of nanoparticle fillers, thanks to the large lateral size, which ensures efficient stress transfer and uniform and controllable dispersion through the alternation of the polymer and graphene layers. Large-size monolayer graphene was produced by the technique of chemical vapor deposition (CVD): it produces a monoatomic thickness and, unlike small flakes, there are no size limitations in the other dimensions (length and width).

The centimeter-scale CVD graphene/polymer nanolaminates were then produced with a semi-automatic process that allows for the manipulation of ultra-thin film, and have been found to outperform, for the same graphene content, state-of-the-art flake-based graphene polymer composites in terms of mechanical reinforcement and electrical properties. Most importantly, these thin laminate materials show a very high electromagnetic interference (EMI) shielding effectiveness in the Terahertz range, reaching 60 dB for a small thickness of 33 μm, and an absolute EMI shielding effectiveness per unit weight and thickness which is amongst the highest values for synthetic, non-metallic materials produced to date.

Prof. Galiotis says that "in this paper, we have tried to exploit the excellent mechanical and electrical properties of monolayer graphene when used as a reinforcement of engineering polymers. So far, by the use of short graphene flakes, this was not possible, due to the small size of the inclusions. Recent developments in the production of continuous (large size) monolayer graphene membranes allowed us to fabricate nanolaminates that incorporated tens and even hundreds of graphene layers embedded into commercial polymers. This has led to graphene nanolaminates with stiffnesses approaching those of perfect graphene per volume fraction and effective EMI shielding performance. This work paves the way for the development of nanolaminates with exceptional properties for aerospace, automotive but also a number of electronic applications."

The research work was published in *Nature Communications*.

More information: Christos Pavlou et al, Effective EMI shielding behaviour of thin graphene/PMMA nanolaminates in the THz range, *Nature Communications* (2021). DOI: 10.1038/s41467-021-24970-4

Journal information: *Nature Communications*

https://phys.org/news/2021-08-effective-emi-shielding-behavior-thin.html

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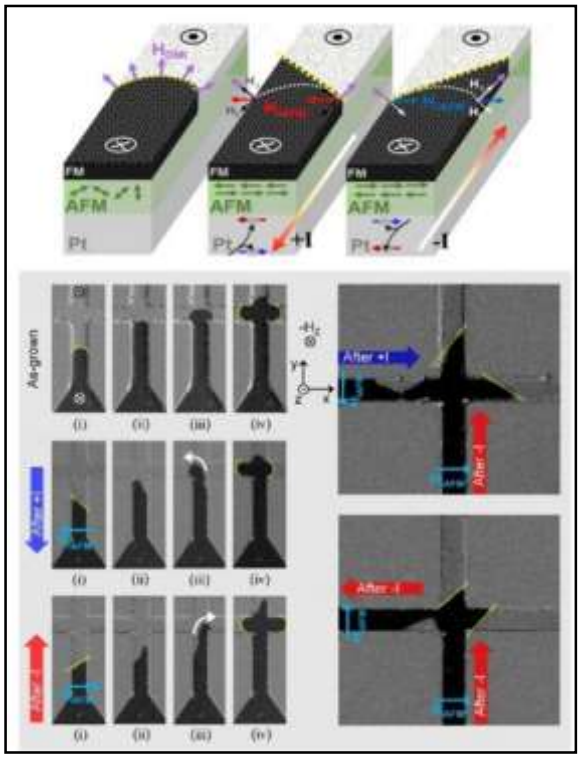
Manipulating magnetic domain dynamics in ultrathin multi-layered materials

A novel route to tune and control the magnetic domain wall motions employing combinations of useful magnetic effects inside very thin film materials, has been demonstrated by researchers from Daegu Gyeongbuk Institute of Science and Technology (DGIST) in Korea. The research, published in the journal *Advance Science*, offers a new insights into spintronics and a step towards new ultrafast, ultrasmall, and power-efficient IT devices.



In the crossbar-patterned sample, various behaviors of perpendicualr field driven down-up DW motions without HX can be generated dependening on the configuration of AFM spins. DW propagations were measured in a) as-grown state with randomly distributed AFM domains, and after current injections of b) positive and c) negative currents along the vertical direction (y-axis), respectively. DW motions in the horizontal branch after injection of d) positive current and e) negative current along x-axis were also measured. Credit: Advanced Science

Spintronics is a branch of electronics that utilize the direction of an electron's spin instead of its electrical charge. Combining spin with electron's charge—already exploited in conventional electronic systems—offers more powerful and diverse ways to code and decode data. Researchers think spintronics could be used to develop so-called 'racetrack memory' for example, with the stored information pushed along a thin wire at high speed.

The new study demonstrates a new way to handle the information processing using the movement of magnetic state of the thin film device. It takes advantage of some unusual effects that occur when materials with contrasting types of magnetic material are squashed together.

The research focuses on a device that combines so-called ferromagnetic and antiferromagnetic materials, in which the directions of electron spins align differently within the respective magnetic materials.

Much research in spintronics focuses on the narrow region where two such contrasting magnetic materials meet, and how this 'domain' and 'domain wall' can propagate. An external electric current, for example, can shift the magnetic domain, although this process is hard to control and does not offer a precise enough movement as yet that scientists seek.

Jung-Il Hong of the Department of Emerging Materials Science at DGIST, and his colleagues take advantage of another 'effective' magnetic field that was already present in the system combining the DMI and exchange bias effects. Spins line up in different ways in response to the magnetic field and electrical currents in the magnetic structure, and the behavior of magnetic domains could also be controlled due to those combined magnetic effects.

They also demonstrate that the direction of the exchange bias field can be reconfigured by simply injecting spin currents through the device, enabling electrical and programmable operations of the device. Hong says that "in order for spintronics devices to go from theory to reality, the behaviors of magnetic domains and the domain wall interfaces that separate them need to be understood properly in multi-layered materials. Our work takes a step towards a finer operation of

domain manipulation in the device structure that we believe could easily be integrated in logic devices."

More information: Hyun-Joong Kim et al, Programmable Dynamics of Exchange-Biased Domain Wall via Spin-Current-Induced Antiferromagnet Switching, *Advanced Science* (2021). DOI: 10.1002/advs.202100908

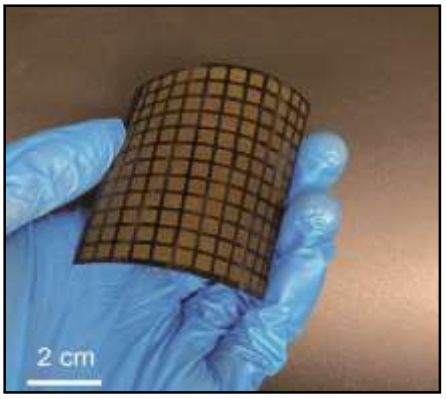
Journal information: *Advanced Science*

https://phys.org/news/2021-08-magnetic-domain-dynamics-ultrathin-multi-layered.html

Thu, 05 Aug 2021

Flexible, wearable X-ray detector doesn't require heavy metals

X-ray imaging is a fast and painless way for doctors to see inside a person. But radiation detectors, which go under the body part being imaged, are rigid panels that contain harmful heavy metals, such as lead and cadmium. Now, researchers in ACS' *Nano Letters* report a proof-of-concept wearable X-ray detector prepared from nontoxic metal-organic frameworks (MOFs) layered between flexible plastic and gold electrodes for high-sensitivity sensing and imaging.



A flexible semiconductive metal-organic framework was incorporated into a prototype wearable X-ray detector for radiation monitoring and imaging. Credit: Adapted from Nano Letters 2021, DOI: 10.1021/acs.nanolett.1c02336

Most X-ray detectors are integrated into big, immobile instruments, such as computerized tomography (known as CT) and mammography equipment, or are stiff, like the sharp-edged bitewing detectors used in dental offices. Detectors that could conform to rounded body parts or mold to the inside of confined spaces could be beneficial in some radiation monitoring and medical imaging applications. Previous researchers have used MOFs for flexible radiation detectors because they are semiconducting materials that respond to electromagnetic radiation by creating an electrical current. However, some of these MOFs still include lead, just like the X-ray detectors that are currently in use. So, Shuquan Chang, Shenqiang Ren and colleagues wanted to create a heavy-metal-free MOF for a flexible X-ray detector and imager.

The researchers mixed a solution of nickel chloride salt and 2,5-diaminobenzene-1,4-dithiol (DABDT) for several hours, creating a MOF in which nickel linked the DABDT molecules. In initial tests, the nickel-containing MOF was more sensitive than recently reported detectors when irradiated with 20 keV X-rays, equivalent to the energy released during medical diagnostic imaging. Then, to make a flexible X-ray radiation detector, the team sandwiched the nickel-containing MOF between gold film electrodes, one of which was on a flexible plastic surface. They used copper wires to transmit current from each pixel of a 12x12 array and covered the whole device with a silicone-based flexible polymer. Finally, they placed an aluminum letter "H" on the detector and irradiated it with X-rays, measuring a much lower current output underneath the H than under the unimpeded material. The researchers say that their proof-of-concept device is promising for the next generation of radiology imaging equipment and radiation detection when wearable or flexible devices are needed.

More information: "Flexible Lead-Free X-ray Detector from Metal-Organic Frameworks" *Nano Letters* (2021). DOI: 10.1021/acs.nanolett.1c02336

Journal information: *Nano Letters*

https://phys.org/news/2021-08-flexible-wearable-x-ray-detector-doesnt.html

THE HINDU

Thu, 05 Aug 2021

Fully vaccinated one-third as likely to get COVID-19: study

They may also be less likely to pass on the virus to others

London: Fully vaccinated people in England were one-third as likely to test positive for COVID-19, according to an ongoing survey of the population released on Wednesday.

The latest findings, from a long-running study by scientists at Imperial College London and market research company Ipsos MORI, were based on 98,233 swabs taken between June 24 and July 12.

They showed one in 160 people infected with coronavirus, with a prevalence rate of 1.21% for unvaccinated respondents and 0.40% for those fully jabbed.

The study also found double vaccinated people may be less likely to pass on the virus to others than those who have not received a vaccine.

However, officials and scientists in Britain have urged caution after the government eased all virus curbs in England on July 19, including the legal requirement to wear masks in certain indoor settings.

A new 'Pop Up' vaccination centre is opened in the Big Top of Circus Extreme in Shibden Park in Halifax, England on July 31, 2021. | Photo Credit: Getty Images

A U.S. government document leaked last week warned that infections among fully vaccinated people are not as rare as previously thought and that such cases are highly contagious.

Paul Elliott, a Professor at Imperial's School of Public Health and director of the survey programme, said the findings "confirm our previous data showing that both doses of a vaccine offer good protection against getting infected". "However, we can also see that there is still a risk of infection, as no vaccine is 100% effective."

COVID-19 cases registered daily by Britain's Health Ministry have declined since the relaxation of rules, while population surveys have suggested they may still be rising, albeit at a slower rate. The trend has surprised experts and officials, who predicted a surge in new infections. The Imperial-Ipsos study — covering the period up to July 12 — showed even then cases were climbing more gradually than during the previous month.

https://www.thehindu.com/news/international/fully-vaccinated-one-third-as-likely-to-get-covid-19-study/article35732806.ece