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Make in India products developed by DRDO are world-class and have huge export potential, says Dr G Satheesh Reddy

DRDO develops critical defence technologies and products to meet the requirements of the Indian Armed Forces, says Dr G Satheesh Reddy

By Huma Siddiqui

Products developed by the Defence Research and Development Organization (DRDO) including a range of Missiles, Armaments and Ammunitions, Avionics, EW systems, Sonars, Torpedoes, Communication Systems, have huge export potential. In an exclusive interview, *Dr G Satheesh Reddy*, Secretary, Department of Defence R&D and Chairman, DRDO tells *FE Online* that products based on DRDO technologies are being exported by the industry as well as by the DPSUs.

Following are excerpts

During the recently concluded DefExpo, the concentration was on exports. What is your view on this?

Many products based on DRDO technologies has already been exported by DPSUs and Industry. Off late, we have increased our thrust on exports of different products and weapon systems, which attracted the attention of friendly countries. As premier indigenous development agency of defence technologies, it is our endeavour not only to build self-sufficiency for the country but also to become a net exporter of defence equipment as envisaged by our Prime Minister Narendra Modi.



Have you identified what you want to export?

DRDO develops critical defence technologies and products to meet the requirements of the Indian Armed Forces. The products developed by DRDO are world-class and have huge export potential. These products include a range of Missiles, Armaments & Ammunitions, Avionics, Electronic Warfare Systems, Sonars, Torpedoes, Communication Systems, Engineering Systems, EO systems, Life Sciences products and many more.

To further facilitate Indian industries for exports, DRDO has evolved a compendium of “DRDO Developed Products with Potential for Export” which will provide the necessary and handy information about the DRDO products, which are ready for export.

Are you satisfied with the response from the private sector companies to whom you have transferred technologies (ToT)?

We have transformed a number of private companies, from simple fabricators to Aerospace manufacturers through ToT and guidance in Quality practices. Now they have become handy in the development of new products as partners. Quite a number of them have come up with their own subsystems designs and manufacture as BTS vendors for many of DRDO programs and Joint Ventures. We are happy the way industry has grown in the aerospace and defence sector with DRDO initiatives and TOTs.

Do you think the recent proposal by the CDS of staggered procurement would impact Make in India initiative?

No, I don't think so.

Make in India, Skill India, Digital India, StartUps – how is DRDO contributing to these initiatives of the government?

DRDO has conducted a competition “Dare to Dream” for startups and we received a very enthusiastic response. Selected top three startups have been given good prize money. We are at the forefront of ‘Make in India’ through indigenous development of high-value Defence products as we have recently showcased in DEFEXPO. To support the Skill India program, all our laboratories spread over the country offer internship and apprenticeship schemes every year for a sizeable number of technical graduates as well as technicians. We are completely digital in our transactions inside and to the outside world for procurements, payments, documentation etc.

Are the SMEs and MSMEs involved with the DRDO projects?

A number of SMEs and MSMEs are supplying starting from small components to subsystems for all DRDO projects from the beginning. We have nurtured them with development orders in Technological areas. Now they have become partners in all new developments. They are spread across all over the country. There is a government’s policy directive now to give some portion of orders to SME/MSMEs, which we are religiously being followed.

<https://www.financialexpress.com/defence/make-in-india-products-developed-by-drdo-are-world-class-and-have-huge-export-potential-says-dr-g-satheesh-reddy/1887603/>



Wed, 04 March 2020

Scientists from DRDO & IIT Delhi receive national award for young women showing excellence through application of technology for societal benefits

Dr Shweta Rawat from Defence Institute of Physiology and Allied Sciences (DIPAS), DRDO, Timarpur, Delhi has developed a female-specific Full Body Protector (प्रबला) to safeguard the Female troops deployed in riot control actions.

This gear has been developed in collaboration with the Rapid Action Force using the ergonomic design principle based on anthropometric dimensions specific for female troops. The full Body Protector has unique properties, including anti-stab, anti-puncture, flame retardant and acid resistance. It is designed to assure greater comfort and flexibility to the women forces while deployed in law and order maintenance duties.

Dr. Shalini Gupta, Department of Chemical Engineering, Indian Institute



of Technology (IIT), Delhi, has successfully led the development of a technology Septiflo™, which offers fast and affordable assay for point-of-care diagnosis and treatment of bacterial septicemia, one of the biggest in-hospital killers worldwide.

This has led to the incubation of the start-up Nano DX Healthcare Pvt. She is pursuing unconventional approaches to design novel bio-systems for medical diagnosis, drug delivery, and biomaterials fabrication on a chip. A prototype diagnostic kit, using naturally amplified pathogen-derived endotoxins for early bedside diagnosis of bacteremia has been developed, which is currently undergoing clinical trials. In drug delivery systems, cancer and bacterial therapies have been combined into a single delivery platform in order to co-eliminate cancer and bacterial infections residing inside cancer.

<https://dst.gov.in/pressrelease/scientists-drdo-iit-delhi-receive-national-award-young-women-showing-excellence-through>



Wed, 04 March 2020

Autoclave seized from Chinese ship can be for Pak's Shaheen II Nuke Missile

Analysts said DRDO's confirmation exposes the nuclear nexus between China and its all-weather ally Pakistan

By Shishir Gupta

Experts from the Defence Research and Development Organisation (DRDO) have confirmed that an industrial autoclave seized from the Chinese ship Dai Cui Yun can be used for the manufacture of very long-range ballistic missiles or satellite launch rockets. The ship was detained by Customs at Kandla Port while en-route to Port Qasim, Karachi, on February 3 on the basis of an intelligence tip-off and allowed to proceed to the Pakistani port on February 20 after the so-called dual-use (civilian and military) equipment was seized. The autoclave was misdeclared as an industrial dryer.

Hindustan Times first reported the seizure.

Analysts said DRDO's confirmation exposes the nuclear nexus between China and its all-weather ally Pakistan. According to top government and intelligence officials, the DRDO's technical experts and missile scientists informed the Kandla Customs, the ministry of external affairs and national security planners on Tuesday morning that the seized 18 metre by 4 metre autoclave can indeed be used in the manufacture of weapons of mass destruction (WMD) platforms.

"The autoclave can be used for the manufacture of the motor of very long range missiles, with range upwards of 1,500 kilometres or even in the construction of a motor for the launch of satellites. Pakistan has the Shaheen II missile in the 1,500-2,000 kilometre range and the platform was tested last May," said one of the officials, who asked not to be named.

According to the officials, it is now up to India's national security planners to invoke the Weapons of Mass Destruction and Their Delivery Systems (Prohibition of Unlawful Activities) Act 2005 as well as inform the UN under the WMD Convention to expose the nuclear proliferation nexus between Beijing and Islamabad. Under Indian law, any contravention of the above law attracts a punishment of not less than five years' imprisonment which may be extended to imprisonment for life with an added fine. The autoclave was being imported by the Islamabad-based United Construction Company and Hong Kong-based General Technology had booked the consignment.

North Korea, initially, and then China have helped Pakistan in the development of nuclear missile delivery platforms by supplying M-11 and M-9 missiles. Islamabad's nuclear missile programme is not indigenous and is based on Chinese design with Beijing helping Islamabad since the 1980s. It is for no other reason that China is blocking India's entry into the Nuclear Suppliers Group (NSG) till Pakistan is also allowed into the nuclear club.

Given the seizure of the autoclave, India's friends such as France and the US can now pressure Beijing to allow India into the NSG, the officials said, adding that the country's record in context of nuclear proliferation was spotless.

<https://www.hindustantimes.com/india-news/drdo-says-ship-cargo-can-be-used-for-missiles/story-lzmcK3jUO7c3edy5NfSBdI.html>



Wed, 04 March 2020

Meet the IISc, UMARS researchers whose bomb detection device for DRDO could change security as we know it

We speak to Professor Umopathy who is a radio spectroscopy expert and one of his students to find out how RaIDer-X, a new explosive detection device developed at IISc and about their future projects

By Rashmi Patil

If you are interested in national security and intelligence sort of subjects, then you will know that the detectors at the airport cannot detect exactly what's in an envelope or whether the liquid in the bottle is really water or shampoo and so on. But with the RaIDer-X, you can detect what is inside the plastic bottle or an envelope even when they are concealed.



Yesterday, when the RaIDer-X, a new explosive detection device was unveiled at the National Workshop on Explosive Detection (NWED-2020) in Pune, the UMARS team from the Indian Institute of Science (IISc) was very happy about it. This device built by UMARS along with High Energy Materials Research Laboratory (HMERL) will now be used by the DRDO in their lab.

The project was envisioned by Professor Siva Umopathy, who is the current Director of the Indian Institute of Science Education and Research (IISER) Bhopal has studied Raman Spectroscopy in-depth and has various patents to his name. He is also part of Universal Multiple Angle Raman Spectroscopy (UMARS) and has played a key role in several other projects. Explaining what led him to develop RaIDER-X, he says, "This idea for this project took birth when I met Subhananada Rao in 2007 during one of the committee meetings in Delhi. He has worked in different capacities in DRDO, HMERL and other organisations. When we were discussing various technologies, I invited him to Bengaluru to see the UMARS Lab. He said since I have expertise in Raman Spectroscopy, why not develop something for DRDO. There were no second thoughts. I agreed to it."

Deepak Kumbhar is a research fellow at UMARS and a part of this project. "Prof Umopathy guided me to build this device along with two other students," he says and explains how it works, "This device uses laser rays to detect anything from a distance of only two metres. When the laser is put on the object that has to be detected, it uses the scattered light around it and reflects in the same path to enter the spectrometer." Once the reading is received, it is compared with spectral readings from various dangerous objects by a computer programme, "The device works on the principle of Raman Spectroscopy. We have stored multiple spectrums of various explosives and chemicals contents and pharmaceuticals. It is a kind of database which we use to analyse the sample or object detected. The sample is analysed with the database through a Machine Learning algorithm. And we get the output to see what exactly it is made of. We call this database a library and we have multiple libraries available worldwide that consist of various chemicals as well as their information."

While one can store as many chemicals as one want in this library, the team has kept more than 20 explosives and 60 chemical samples in their library for RaIDER-X device. How accurate is it? He lets on, "If there is a paper bomb in the envelope then we can detect it without opening it. Similarly, if there is a drug inside a container or plastic then we will be able to find out the same without touching it or smelling it. The device is designed in such a way that it can also detect samples that are in the form of mixtures and not in their pure form. After the successful implementation at DRDO, the same can be used by the other security agencies. "

Talking about how they developed it further, he says, "The project started in 2018 and we were in touch with scientists at HMERL. We developed the design of the device and demonstrated it to them. They approved it and finally decided to build the device. "

At the NWED-2020 exhibition, Prof Umopathy and team received an overwhelming response from various security agencies. Dr G Satheesh Reddy, DRDO Chairman also emphasised that the detection of explosives is a compelling need of the hour. He said, "Security agencies are continuously monitoring vulnerable targets with the help of intelligence agencies to thwart the attempts of anti-social elements. The joint pursuit of academia and DRDO in developing portable devices, which can now be safely and effectively used by security agencies, is vital."

Prof Umopathy and team are working to build another device that can analyse the skin of a human body. It can help us detect the skin diseases as well as chemical composition of the skin. We need not penetrate or take out the skin for testing. It can directly moved on the body to know what one is suffering from. For example, the device can detect diseases like vitiligo and identify various stages of the disease. Using this, the doctor will be able to cure skin diseases.

<https://www.edexlive.com/people/2020/mar/03/meet-the-iisc-umars-researchers-whose-bomb-detection-device-for-drdo-could-change-security-as-we-kn-10463.html>

Indian Navy set to go unmanned in the future with remotely operated vehicle

India's first-ever Chief of Defence Staff Gen Bipin Rawat had in a media interaction suggested a staggered approach to big procurements

By Huma Siddiqui

In the face of a major shortage of funds, the Indian Navy has plans to opt for unmanned platforms especially underwater vehicles. Indian Navy at all times maintains a well-trained diving team which is always under deployment onboard warships. According to a senior naval officer who wished to remain anonymous, "Naval divers are highly trained in handling underwater explosives and other covert activities. Onboard a warship, a divers' complement plays an active role in fleet-level mission planning. For any combat or commercial underwater activities, the cost of a diver is very high, and includes adequate risk compensation in his emoluments."

For commercial and military applications, the underwater environment has always been a risky zone for human activities.

"The training and upkeep of diver and diving equipment for the navy is a long term and an expensive gambit, even though the divers are usually volunteered from the main complement of the ships and submarines. They undergo a rigorous and tough training regime and pass percentage is usually on the lower side," explained the naval officer.

Remotely Operated Vehicle (ROVs)

"During diving operations, in order to support or as a substitute to the underwater teams, specialized underwater electrically operated Remotely Operated Vehicle (ROVs) is also utilized. ROVs are operated through an umbilical cable Control Unit fitted onboard the mother ship. This tether link between the ROV and Tether Management System onboard the Ship is mainly formed by a group of armoured cables comprising of separate cable each for electrical power, control signals, and fibre optics (for data and video signals)," explains Milind Kulshreshtha, C4I expert.

According to the C4I expert, "The primary applications of naval ROVs are mainly for underwater hull inspection, and explosive ordnance disposal (EOD), as a stand-in for detecting and disarming an explosive. ROVs also can be used for special operations like detection of enemy submarines and the Search & Rescue (SAR) role. ROVs provide for a long underwater submerged capability and, with the manipulator arm fitted, can exert a strong force to pull or manipulate an object. With specialized payloads, ROVs can assist in the Submarine rescue missions also, and Indian Navy's Deep Sea Rescue Vessel (DSRV) operates one to assist in submarine rescue role."

Unmanned Aerial Vehicle

An Unmanned Aerial Vehicle (UAV) comprises of two standard configurations viz. a fixed-wing (with aeroplane like wings) or a Rotary configuration (with helicopter-like propellers). Indian Navy has always preferred fixed-wing UAVs due to its capability as a sensor-operating platform in a hostile environment of the battlefield. It is also a cost-effective peacetime Intelligence gathering tool. The first batch of naval drones introduced was Israeli make 'Heron' and 'Searcher' UAVs.

"Indian Navy created a new dedicated Air Squadron for operating these UAVs as part of maritime reconnaissance role in various theatres of operations. The Naval Squadron was designed for coast-based 'launch and recovery' of these UAVs, with UAV Direction commands from the ships and they typically carried a payload of Electro-optic camera and COMINT (Communication Intelligence) equipment," Kulshreshtha says.

Adding, “Heron is the longer endurance UAVs with provision for fitment of a maritime radar payload for enhanced surveillance roles. Naval UAVs can further provide the Target Tracking and Target Designation (TD) coordinates to facilitate ship-based suitable weapon launch. These UAVs are capable of OTHT (Over the Horizon Target) data transmission, accomplish SAR (Search & Rescue) missions and provide Battle damage assessment to the Fleet Commander at sea.”

As has been reported by Financial Express Online, later this year the Indian Navy for maritime surveillance will procure 10 Sea Guardian High Altitude Long Endurance (HALE) armed drones from the US-based General Atomics.

With COMCASA (Communications Compatibility and Security Agreement), these UAVs can assist in inter-operability and joint surveillance/Intelligence gathering activities.

Plans for the third aircraft carrier and submarines remain alive

Despite the constraints the plans for the third aircraft carrier, submarines under Project 75I remain.

While the liabilities for the Indian Navy stand at Rs 45,000 crore, in the capital budget allocation for 2020-21, it has got Rs 26,688 crore.

For 2019-20 the Navy’s capital allocation was Rs 23,156 crore and the liabilities were Rs 25,461 crore.

In its fleet rationalisation plan, according to a senior naval officer, “Due to the shortage of funds, the Navy has cut down its plans to get twelve minesweepers to eight and additional P-8I long-range patrol aircraft from 10 to six.”

“Since the Navy has no dedicated minesweepers it has adopted other measures and to ensure the safety of the Indian waters has acquired some autonomous underwater vehicles, and has plans to get more.”

India’s first-ever Chief of Defence Staff Gen Bipin Rawat had in a media interaction has suggested a staggered approach to big procurements.

The Indian Navy has proposed a second Indigenous Aircraft Carrier (IAC-II) which will cost Rs 45,000 crore, displacing 65,000 tonnes and conventionally powered. It will have a steam-launched catapult for launching and recovering aircraft.

<https://www.financialexpress.com/defence/indian-navy-set-to-go-unmanned-in-the-future-with-remotely-operated-vehicle/1887951/>

Global Village Space

Wed, 04 March 2020

36 Rafales not enough to beat Pakistan

Air Force: Indian Air Force Chief

Indian Air Chief warned the Indian authorities that 36 or any number of Rafale jets are not going to be enough to maintain a technological edge over Pakistan Air Force as Pakistan's

JF-17 Thunder poses a grave threat to anything India currently has in its arsenal

Indian Air Force Chief Rakesh Kumar Bhadauria has issued a strong warning to the political leaders of India, as \$7.8billion Rafale jet is insufficient to meet the country’s defence requirements. India previously signed a \$7.8billion contract with French Dassault Aviation to buy the aircraft in 2019.

However, Indian Air Force (IAF) veteran, Vijinder Thakur, believes it is the best aircraft in the forces’ inventory now. He said: “The IAF allowed itself to be outgunned by focusing on platform acquisitions, rather than weapon system and sensor upgrades. The technical advantage gained by the

IAF through the acquisition of the Rafale would be transient because it would be based largely on the weapon systems and sensors of the Rafale.

“With sufficient military foresight, the IAF could have armed its Su-30MKI with longer range air-to-air missiles acquired from Russia rather than continuing to rely on the lesser ranged missile ordered years ago from Ukraine.

“The IAF fulfilled the expectations only after it made an emergency purchase of Laser-Guided Bombs and targeting pods.”

However, a determined nemesis like the Pakistan Air Force could deploy longer-ranged Chinese PL-15 missiles on an updated version of the JF-17 jet.

The Pakistan Air Force’s single-engine multirole fighter, the JF-17 manufactured by the Chengdu Aircraft Corporation, is due for a major upgrade.

The Chinese newspaper, Global Times, reported earlier this year that the upgraded JF-17 fighter jet will have “an infrared search and track system and a radar cross-section reducing ‘pseudo-stealthy’ airframe”.

The Indian Air Force’s focus on platforms rather than sensors and weapon systems was evident during the Kargil conflict with Pakistan two decades ago.

The JF-17 fighter jet has also been equipped with a PL-15 Beyond Visual Range air-to-air missile that has posed serious concern among the US air force.

The former head of the US Air Force, Herbert Carlisle, believes that the missiles’ long-range is an ‘exceedingly high priority’.

He said: “The PL-15 and the range of that missile, we’ve got to be able to out-stick that missile.”

Last year, a day after the IAF allegedly struck a target inside Pakistan, the Pakistani Air Force surprised the IAF with its longest-range AMRAAM.

The Indian Air Force ordered a large amount of Russian air-to-air missiles, such as R-27 and R-73’s very shortly after.

Emphasising the importance of air-to-air missiles, the Indian Air Force Chief, Bhadauria, attended a seminar on it in New Delhi on Friday.

He said that when the missile goes on to the SU-30 And MiG-29, that the power of parity and better performance will spread across the air force.

The Indian Air Force will start taking delivery of the Rafale jets in May 2020.

Mr Thakur’s comments come one year after Pakistan’s military accused India’s aircraft of crossing into its territory and carrying out an airstrike.

Pakistani villagers were in the area where Indian jets struck and said they heard four loud bangs at approximately 3am on February 26th 2019, according to Reuters.

A senior government source said 300 militants had been killed in the strikes, but no further details were provided.

However, in a conflicting report, Pakistan’s military has said there were no casualties from the air attack.

<https://www.globalvillagespace.com/36-rafales-not-enough-to-beat-pakistan-air-force-indian-air-force-chief/>

Indian Army's plan to privatise base workshops faces resistance

Officials who are opposed to the move have claimed that it could increase the cost and that private companies in India didn't have the skills to carry out this work. The model will also deplete the army's capabilities built over years to overhaul equipment

By Shaurya Karanbir Gurung

New Delhi: A project to bring in private firms to operate the army's workshops is facing resistance from its officials. Under the proposed Government-Owned Contractor-Operated (GOCO) model, private contractors were to operate the army's base workshops that repair and overhaul equipment from guns and vehicles to tanks and helicopters.

Officials who are opposed to the move have claimed that it could increase the cost and that private companies in India didn't have the skills to carry out this work. The model will also deplete the army's capabilities built over years to overhaul equipment, they have said.

The matter has been raised with the army top brass, officials aware of the developments said. Those supporting the model, however, say privatisation was important. They army then doesn't have to run workshops in remote areas and this is away to reduce administrative flab, they said.

PricewaterhouseCoopers, which in January was selected as a consultant and attract private players for the project, has submitted a report to the army, officials said.

The army and the defence ministry didn't respond until press time Tuesday to emails seeking comment. PwC said it didn't want to comment.

The eight base workshops established during World War II in different states are meant to keep the army operationally ready at all times.

<https://economictimes.indiatimes.com/news/defence/armys-plan-to-privatise-base-workshops-faces-resistance/articleshow/74464754.cms>

Indian Navy's hoary Tupolev aircraft to become tourist attraction at Karwar

A decommissioned Tu 142M to be reassembled as a museum to showcase Navy operations

By Gururaj A Paniyadi

Karwar: The much-awaited Aircraft Museum is all set to become a reality in Karwar with the Karnataka government and the Indian Navy signing a memorandum of understanding (MoU) on handing over of a Tupolev TU 142M aircraft.

The TU 142M was the Indian Navy's long-range maritime patrol aircraft. It played a key role in various operations until it was decommissioned in 2017.

The Karnataka government wanted to convert it into an aviation museum, placing it alongside the Chapal Warship Museum to make it a tourist attraction in Karwar.

After the then chief minister Siddaramaiah wrote to the defence minister, the latter agreed to the proposal. But it lay in cold storage for about two years.

Now the project has gained momentum with initiative being taken by Uttara Kannada deputy commissioner K Harish Kumar and Officer Commanding of the Karnataka Naval Area (FOK) Rear Admiral Mahesh Singh.

Speaking at a press conference after the signing of the MoU, the deputy commissioner said the Tupolev Aircraft Museum will come up at the Ravindranath Tagore Beach next to the Chapal Warship Museum.

The aircraft will be dismantled and brought from Chennai. At Karwar, Navy experts will resemble it. The aircraft museum will showcase models and photos of important operations taken up by the Navy.

"We propose to complete the work by December and get the museum inaugurated on Navy Day. The Navy is bearing the transportation and assembling costs. We will have to only spend on maintenance," Harish Kumar said.

The maintenance cost is estimated at about Rs 6 lakh per month. The district administration plans to fund it through entry fee.

As the aircraft would be placed next to the warship museum, the district administration plans to have a common entry fee for both.

Speaking to reporters, Rear Admiral Mahesh Singh thanked the people of Karwar for their cooperation.

"The Tupolev aircraft have been gifted by the Navy to Visakhapatnam and Kolkata and now Karwar is the third city to receive it. The Sea Bird here is growing to become Asia's largest base. The Navy is committed to the development of Karwar," he said.

<http://www.asianage.com/regional/030320/indian-navys-hoary-tupolev-aircraft-to-become-tourist-attraction-at-karwar.html>

SMBSTORY

Wed, 04 March 2020

National Security Day: A look at India's 10 best defence-manufacturing companies

*On National Security Day, SMBStory lists India's 10 glorious
state-owned and private-owned defence manufacturing companies*

By Bhavya Kaushal

'My India, My Pride', goes a motto of the Indian armed forces. There have been tens of thousands of our brave soldiers who have laid down their lives, fighting our enemies. For our tomorrow, they sacrificed their today.

The defence logistics and equipment that are provided to these soldiers also deserve to be hailed. A lot goes into manufacturing machinery and weapons for our soldiers. Infact, the state-owned and private-owned companies have a rich history. They have come a long way in establishing themselves in the enviable position that they are in today.

On National Security Day, SMBStory takes you through 10 such defence equipment manufacturing companies that have set benchmarks for the world to see.

Government-run companies

Defence Research and Development Organisation (DRDO)

DRDO started its journey with 10 laboratories in 1958. Today, the number has grown to 50 across the length and breadth of the country with many achievements to its credit.

DRDO hit headlines after an anti-drone system developed by it was deployed to provide aerial security to US President Donald Trump during his visit to India recently. The anti-drone weapon can detect and neutralise any suspicious device that could have intruded into the boundaries of the US President's safety zone. DRDO is also known for successfully pulling off an indigenous operation code named -- Mission Shakti -- in which a defunct satellite in low-earth orbit (LEO) was destroyed in just three minutes.

With more than 500 defence products in its kitty, DRDO is undoubtedly one of the top defence equipment manufacturing companies in India. DRDO functions under the Defence Ministry, currently led by Union Defence Minister Rajnath Singh. The Delhi-headquartered organisation has 501-1000 employees.

Hindustan Aeronautics Ltd (HAL)

Hindustan Aeronautics Ltd (HAL) was founded in December 1940 as Hindustan Aircraft Ltd by industrialist Walchand Harichand in association with the then Government of Mysore. It was established with the aim of manufacturing aircraft in India. In 1941, the Indian government became one of its shareholders and acquired the company completely in 1942.

The state-owned company is known for manufacturing some very competitive aircraft and helicopters, including 'Light Combat Aircraft', 'Chetak', and 'Cheetah'.

Recently, HAL announced an ambitious project of developing a 10-12 tonne attack helicopter by 2027, touted to be India's answer to America's Apache helicopter, which is manufactured by Boeing.

Bharat Electronics Ltd (BEL)

Think about a company that has carved a niche in defence manufacturing and BEL's name instantly comes to mind. BEL and DRDO sealed a deal recently with the Armenian government to build four weapon-detection radars beating Polish and Russian firms, according to a report by The Times of India.

Launched in 1954, BEL is one government PSU that has managed to rise and shine in a big way. The defence equipment manufacturer and turnkey solutions provider has eight manufacturing units across India, including Pune, Ghaziabad, Chennai, and Hyderabad and clocks a turnover of approximately Rs 11,700 crore in the year 2018-19. It has over 10,000 employees.

Ordnance Factory Board (OFB)

One of the oldest and biggest defence organisations run by the government is the Ordnance Factory Board or OFB. Running since almost 200 years, OFB was started during the British reign as Gun Carriage Agency at Cossipore for manufacturing arms and ammunition. Today, it has grown into a giant group with 41 factories across India, nine training institutes, three regional marketing centres and four regional controllers of safety.

Last year, rumours of this PSU going private had taken the country by a storm. This also sparked a debate on whether defence undertakings going private could hamper the security of the nation. However, refuting all such claims, the Defense Ministry issued a statement claiming, "Rumours being spread that OFB is being privatised are misleading and with the intent to mislead workers."

Bharat Dynamics Ltd (BDL)

Another defence PSU spearheading the government's 'Make in India' campaign is Hyderabad-based missile systems and ammunition manufacturer Bharat Dynamics Ltd (BDL). It has three manufacturing units in Hyderabad, Telangana, and Visakhapatnam.

Started in 1970, BDL has bagged orders worth Rs 14,810 crore from the Indian Army for supplying the Akash Weapon System (AWS) taking India to the elite club of countries supplying surface-to-air missiles.

Private-run companies

Tata Advanced Systems

Founded in 2007 in Hyderabad, Tata Advanced System is a wholly-owned defence subsidiary of the Tata Group. Employing 3,000 employees, the defence arm bagged a deal to manufacture air-to-air refuelling equipment for British manufacturer Cobham.

Mahindra Defence Systems (MDS)

Involved in supplying defence equipment since 1947, the journey of Mahindra Defence Systems began when a licensing agreement allowed them to become importers, assemblers, and then adapters of the iconic Willys Jeeps used in World War-II. In 2012, the company began designing and manufacturing its own line of armoured vehicles and supplied it to the government.

Kalyani Rafael Advanced Systems (KRAS)

Kalyani Rafael Advanced Systems Ltd (KRAS) is a joint venture between Pune-based business giant Kalyani Group and Israel-based Rafael Advanced Defence Systems Ltd. KRAS has one manufacturing unit in Hyderabad. Recently, it made news for bagging its first order worth \$100 million for manufacturing 1000 Barak-8MRSAM missile kits from overseas partner Rafael for Indian Army and the Indian Air Force (IAF).

Larsen & Toubro (L&T)

Infrastructure giant Larsen & Toubro (L&T) has a defence unit that designs, engineers, develops, and manufactures a variety of defence equipment, including missiles, weapon launchers, and surface warfare in its manufacturing unit in Gujarat since the last three decades.

It has a total of eight R&D centres in Powai and Bangalore and claims to have developed over 100 products with DRDO labs.

Ashok Leyland

Ashok Leyland is a defence unit of the Mumbai-based business conglomerate Hinduja Group. Its most famous offering is the Stallion, an Army vehicle, which is also its flag bearer brand. With around 70,000 of these produced, Ashok Leyland has carved a niche in the private sector companies spearheading the defence manufacturing vertical.

<https://yourstory.com/smbstory/national-security-day-defence-manufacturing-businesses-india>