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From Tejas fighter to bullet-proof jackets, Indian Army gets boost as DRDO develops indigenous tech for arms

While the DRDO is known for its core competencies in various areas of military technology, its life sciences department is involved with developing technology for the armed forces.

By Huma Siddiqui

A number of Defence Research and Development Organisation (DRDO) developed weapon systems, platforms, dual use equipment have been accepted and inducted in the Indian armed forces and paramilitary forces. Technology developed by Defence Materials and Stores Research and Development Establishment (DMSRDE), a Kanpur-based premier laboratory of DRDO, for bullet-proof jackets was recently handed over to Kanpur-based company MKU Ltd. This technology is challenging and one of the most significant matured personal protection systems developed by DRDO among the various GSQRs of Indian Army meeting NIJ III+ Standard, which refers to ballistic resistance of a body armour. DRDO has urged the private sector MKU to maintain a strict vigil on the quality of the bullet-proof jackets and to collaborate with DRDO to absorb the technologies developed by it.

Some of the notable successful tests completed and inducted are Tejas fighters, Airborne Early Warning and Control System (AEW&C) System, Akash Weapon System, SONAR systems, Varunastra Torpedo, Bharani Weapon Locating Radar (WLR), Nuclear Biological Chemical (NBC) Recce Vehicle, AGNI-V, Long Range Surface to Air Missile (LRSAM), Medium Range Surface to Air Missile (MRSAM), NAG, Advanced Towed Array Gun (ATAG), Wheeled Armoured platform (WhAP), RUSTOM-II MALE Unmanned Aerial Vehicle, etc.

R&DE (Engrs), a premier system engineering laboratory under Armament & Combat Engineering (ACE) cluster of DRDO has recently undertaken the design and development of Trawl System for the minefield area in the battle zone to meet the operational requirements of Indian Army.

The indigenous developed Trawl System is employed for breaching land mines and creating a vehicle safe lane, through a minefield for the advancing columns of mechanised forces in combat zone. The equipment consists of Trawl roller, track width mine plough and electro-magnetic device (EMD), which identifies all types of mines usually encountered by the battle tank in such a scenario. The Trawl System developed by DRDO is capable of breaching a variety of land mines, including passive and active influence mines.

The Trawl system recently crossed a major milestone with the successful completion of blast trials in collaboration with HEMRL Pune, which demonstrated the survivability of the equipment when subjected to successive series of blast directly underneath it. The fieldable prototype of the Trawl System is in the final stage of realisation and would be shortly ready for conduct of user evaluation trials by the Army. The indigenous development of Trawls by DRDO is an important step towards achieving self-reliance in the area of critical military equipment under ‘Make in India’ initiative and would result in saving of precious foreign exchange for the country.

Recently, the final Development Flight Trials of Astra – Beyond Visual Range Air to Air Missile (BVRAAM) were successfully conducted over the Bay of Bengal, off the coast of Chandipur, Odisha. A total of seven trials were conducted against Pilotless Target Aircrafts (PTA) successfully. This effort for building a state-of-the-art BVRAAM by DRDO, together with Indian Air Force (IAF) has completed the development phase of the weapon system successfully. Hindustan Aeronautics Ltd (HAL) has played a role in modifying the aircraft for weapon integration. More than 50 public and private industries have contributed in building the

Astra weapon system. S Venugopal, programme director, led the launch operations and flight trials along with the teams from multiple organisations.

After a successful trial of the Anti-Tank Guided Missile (ATGM) Prospina back in June 2017, the missile has passed its final trial in Rajasthan's desert range recently before its induction into the army. The DRDO successfully tested the flight of India's indigenously developed third generation ATGM, also known as 'Nag', twice in the Rajasthan test range. The Nag project, now re-launched under the name Prospina, is a 4-km range missile system incorporated with most advanced technologies. The missile has high resolution Imaging Infrared (IIR) Seeker, which can sense heat or infrared signals in three different thermal scenarios.

Goa's nascent food processing industry could be heading for a technology boost with latest technologies in preservation and packaging coming in from DRDO. According to Shashi Bala Singh, head of Life science cluster, DRDO, "The organisation is targeting about 100 technology transfers to Goan units for processing of local agricultural produce such as cashew, coconut, jackfruit, etc."

The technologies were showcased at a two-day industry conclave on food technology organised by the Goa Small Industries Association (GSIA) and directorate of industries, trade and commerce (DITC) in collaboration with the DRDO. While the DRDO is known for its core competencies in various areas of military technology, its life sciences department is involved with developing technology for the armed forces. The technology development is by the DFRL and it is cost effective as the fees charged by the laboratory are Rs 20,000-2.5 lakh.

About 142 processing technologies have been developed by the DFRL in categories such as ready-to-eat foods, energy bars, biscuits, instant food mixes, etc. Companies that are selling food products using defence technology include prominent players such as MTR, ITC, Kohinoor Basmati, PaperBoat, etc.

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Five ways Artificial Intelligence is aiding defence

By Alekhya Hanumanthu

Artificial Intelligence (AI) is making sweeping changes in every area it touches and the Indian Defence is no exception. The Defence Research and Development Organisation (DRDO) has a laboratory – Centre for Artificial Intelligence and Robotics (CAIR) – that exclusively researches, prototypes and builds AI-based solutions for applications in Indian Armed Forces.

According to Indian defence review, CAIR has built the following solutions:

1. Robots for non-destructive testing of composite parts of Light Combat Aircraft (Tejas).

2. RoboSen: A mobile robot system targeted at patrolling, reconnaissance and surveillance. It is capable of autonomous navigation in semi structured environments with obstacle avoidance capability and continuous video feedback.

3. Miniaturised man portable Unmanned Ground Vehicle (UGV) for low intensity conflicts and surveillance.

4. Also under their belt, a Chess playing Robot, robots for inspection of components and an intelligent wheel chair for physically challenged persons.

5. Network Traffic Analysis (NETRA) monitors internet traffic. It can analyse voice traffic passing through software such as Skype, Google Talk and intercept messages with key words attack, bomb, blast, kill and other words in real time.

Other possible applications of robots include functions ranging from a sentry to a surgeon in the battle field. Eventually, difficult operations like mining, demining and flying across water obstacles will see AI applications. Field logistics is another area that will benefit from the use of robots.

What should the Indian Armed Forces look at?

Projects like Multi Agent Robotics Framework (MARF) are unleashing a wide range of robot force for various uses, just like the Armed Forces use its soldiers. However, AI offers a wider scope.

Here are a few areas that Indian Armed Forces can look at:

- Image interpretation for target identification and classification
- Systems for maintenance of sophisticated weapon systems
- Missile – target range and trajectory analysis for evaluation of kill zones and launch time.

Big picture: What are the moral implications?

According to Analytics India Magazine, using AI-based systems for support and managerial jobs is one thing, but utilizing Artificial Intelligence for developing non human combatants is a completely different thing. One wrong move and the AI based system can turn against its creator. So, questions abound in matters of legality, morality and usefulness of the systems. But the Indian Armed Forces is not relenting yet – it is making use of AI based systems in every area it can use, taking a leaf out of the strategies of the United States.

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DRDO chief is hopeful about Arjun Mark-II tank getting accepted by army

By Sandip Dighel

PUNE: The chairman of defence research and development organisation (DRDO), S Christopher, sounded hopeful on Sunday about the Indian Army accepting the Arjun Mark-II tank after certain modifications recommended by the army were incorporated.

Speaking on the sidelines of a function at the Defence Institute of Advanced Technology(DIAT), Christopher told TOI, "We have carried out certain modifications as recommended by the army. The tank will go through trials and there is every possibility that it will be accepted considering that the army has already agreed to induct the tank in two regiments."

The DRDO chief was on a visit to DIAT — a deemed university under the defence ministry — for the inauguration of the 21st batch of Post Induction Training School (POINTS), a programme for newly inducted DRDO scientists. He also held a meeting with senior scientists.

The army had recommended nearly 71 modifications to the tank and had asked the DRDO to redesign the hull and the turret structures and use new materials in order to reduce the weight. The weight of the Mark-I is 62 tonne while Arjun Mark-II is 68 tonne.

A senior army officer from the armoured corps, told TOI on Sunday, "The army has a major issue with the weight of Mark-II as it will not meet its operational requirements in the western sectors where the tank will be deployed in future. During the past trials, it had come to our notice that the tank is heavier than the existing culvert, thereby, making mobility a major issue. It was, therefore, paramount to recommend a reduction in weight of the tank from an operational point of view." A senior DRDO scientist closely associated with the project said, "The army had specified their operational requirement on three aspects — weight, missile firing capability and ammunition. We have addressed these issues. Besides, we have kept the agility and mobility of

the tank at par with the existing one. We are confident that the tank will meet the army's requirements in the trials." The army has about 3,500 tanks mostly comprising the old T-72 and the improvised T-90 tanks.

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Necessary changes made to main battle tank Arjun Mark II: DRDO

Pune**:** The Defence Research and Development Organisation (DRDO) Chairman S Christopher today said necessary modifications have been made to the advanced version of the indigenous Arjun Mark II main battle tank as recommended by the Army. The DRDO chairman expressed confidence that the tank will be accepted by the Army. The Army had asked for 93 improvements to the tank which includes the capability of firing the anti-tank LAHAT missile, laser protection suite and improved armoured protection for the vehicle.

Christopher was here to inaugurate POINTS 21 Batch of Post Induction Training School programme for newly inducted DRDO scientists at the Defence Institute of Advanced Technology here.

As per DRDO, Arjun Mark II can fire missiles, has advanced explosive reactive armour panels, mine plough, automatic target tracking, advanced land navigation system, digital control harness and advanced commander panoramic sight among other features.

Arjun will have a better gun barrel with an equivalent firing charge (strength of the barrel to sustain firing) of 500 rounds against the T 72's 250 rounds. The Chennai-based Combat Vehicle Research and Development Establishment has designed the Mark II version of MBT at its facility there.

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“We have done the modifications… it will go through the trials and there is a possibility that Arjun MK II (battle tank) will be accepted by Army and two regiments have already agreed to induct the tanks,” said DRDO Chairman, while talking to reporters here. Christopher was here to inaugurate POINTS 21 Batch of Post Induction Training School programme for newly inducted DRDO scientists at the Defence Institute of Advanced Technology here. As per DRDO, Arjun Mark II can fire missiles, has advanced explosive reactive armour panels, mine plough, automatic target tracking, advanced land navigation system, digital control harness and advanced commander panoramic sight among other features. Arjun will have a better gun barrel with an equivalent firing charge (strength of the barrel to sustain firing) of 500 rounds against the T 72’s 250

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On Army's recommendation, DRDO makes modifications in battle tank Arjun Mark II

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NSG's new test enables forces to handpick street smart personnel

Previously the commandos had to undergo the DRDO approved Defence Institute of Psychological Research (DIPR) Military Psychology Test.

By Kamaljit Kaur Sandhu

Induction to become a Black Cat Commando in the National Security Guard (NSG) has just got a bit tougher.

India's elite counter terrorism force with perhaps the best brawn amongst the security forces, now requires street smart personnel. The black cat commando recently switched to the internationally acclaimed Vienna Test System for what is already one of the country's toughest selection process.

The analysis yields information about applicants behavioral repertoire with psychological tests focusing on fundamental characteristics such has courage, integrity, teamwork, besides inclusion of psychomotor, stress tolerance fine motor skills, and cognitive personality test.

Previously the commandos had to undergo the DRDO approved Defence Institute of Psychological Research (DIPR) Military Psychology Test. The Special Protection Group (SPG) has been undergoing the Vienna Test System for at least 15 years.

A senior officer of the NSG said, "The test enables us to make a choice of better candidate. The commandos are to be super fit, but with a sharp mind. They need to take split-second decision which can be life saving or threatening. So, we look for qualities of determination, courage, and stress management among many other such skills."

The decision was taken by DG Sudhir Pratap Singh, "The Vienna Test is considered as the best in the world, so why not the best for our commandos. We already have two batches who have undergone the test. This will give us quality officers and jawans."

If the test of fire was not enough, the 90 day period of commando training sees 14-20 percent drop outs.

The Vienna Test enables the officers to look for best brawns with more gray matter.

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IIT-Hyderabad to hold conference on Composite Materials

The Theme for International conference on Composite Materials and Structures ICCMS 2017 is "Recent Advances in Composite Materials and Structures."

Sangareddy: Indian Institute of Technology- Hyderabad (IIT-H) is organising an International Conference on Composite Materials, which have wide applications in Medicine, Space, Air-crafts, and Automotive Structures.

The Theme for International conference on Composite Materials and Structures ICCMS 2017 is "Recent Advances in Composite Materials and Structures," which will explore the role of innovation in developing Composite Materials. The three day Conference will be scheduled from December 27 to 29.

Over 570 Scientists from Research and Development institutions such as Defense Research and Development Organisation (DRDO), Indian Space Research Organisation (ISRO), Bhabha Atomic Research Centre (BARC) and National Aerospace Laboratories (NAL) besides from Academic Institutes across the country will be taking part. Research Scholars, students and Industry representatives are also expected to participate.

According to Prof. Amirtham Rajagopal, Organizing Secretary for ICCMS 2017, "The past decade has seen remarkable advances in the use of composite materials in various applications. Within engineering domain, composites have revolutionised traditional design concepts and made possible an unparalleled range of new and exciting possibilities as viable materials."

Prof. U B Desai, Director, IIT Hyderabad is the Patron of the conference, under whose guidance the conference is being organised. Prof. J N Reddy, a Distinguished Professor, Regents' Professor and Holder of Oscar S. Wyatt Endowed Chair in Mechanical Engineering at Texas A&M University, U.S., is the Chairman of the conference. He is renowned all over the world in the field of Composites and Mechanics of Composites.

Composite Materials is an Interdisciplinary area where chemists, material scientists, chemical engineers, mechanical engineers and structural engineers contribute to the overall product.

The Conference will serve as a platform to bring together Academicians, Industry Researchers and Research Students to share views and interact with the eminent people working in the Composite field. It would be a forum to bring together the users, manufacturers, designers and researchers involved in understanding structures or structural components manufactured using composite materials.

As many as 650 Papers dealing with Mechanics, Analysis and Design, Research and Development studies, Experimental Investigations, Theoretical Analysis and Fabrication Techniques relevant to the application of composites in various assemblies, ranging from individual components to complete structure would be presented during the three-day Conference.

The various subjects that would be discussed include Materials, Mechanics, Experimental analysis, Computational Modelling, Manufacturing, Applications in Aerospace, Defense, Mechanical, Automobile, Medicine, and Civil Industry.

The Conference is organised by IIT Hyderabad. Agencies such as Department of Science and Technology (DST), Council of Scientific and Industrial Research (CSIR), Advanced Systems Laboratory, DRDO, ISRO, INSA and Industrial Partners like Ansys, Abaqus, Simulia, Cadmarc, Kirby, Bhamys Construction and Physical Acoustics are also supporting this Conference.