

India's DRDO grants free patent access to local industry to boost indigenous production

By Rahul bedi

New Delhi: India's government-run Defence Research and Development Organisation (DRDO) has decided to grant local materiel manufacturers free access to technology for many of its patents in a bid to boost New Delhi's 'Make in India' initiative.

In an internal communication issued in September, but only recently made public, the DRDO said it will waive all licence fees and royalties for several patents.

Official sources told *Jane's* that the DRDO patents include technologies for missile development, aeronautics and naval systems, life sciences, combat engineering, armaments, and electronics and communication systems. The companies will include state- and privately-owned defence equipment manufacturers, start-ups, as well as micro, small, and medium-sized enterprises.

"The availability of DRDO-developed patents to Indian industry at zero cost provides an opportunity for enhancing its capabilities and climbing up the supply chain [for military equipment]," said the DRDO.

India's prevailing intellectual property (IP) landscape has been "characterised by a certain level of disconnect between the IP creators and potential users", it added, pointing out that the policy initiative to provide free patents would "synergise" the Indian defence industry.

According to the DRDO, local manufacturers will only be charged a "processing fee" of INR1,000 (USD13.97) for each of the patents, a list of which is set to be displayed on its website.

Eligible applicants will need to demonstrate their capacity to absorb the respective patent-protected technology, have an "adequate" manufacturing capability, and possess a "robust" quality control mechanism.

<https://janes.ihs.com/Janes/Display/1920681>

DRDO grants free patent access to boost indigenous production

By Vijay Mohan

Chandigarh: To boost indigenous production and give a fillip to the 'Make in India' policy, the Defence Research and Development Organisation (DRDO) has decided to grant the Indian industry free access to patents held for technologies developed by it.

A new policy formulated by the DRDO recently states that no licence fee or royalty will be applicable on the use of Indian patents held by the research agency. There are hundreds of such patents covering missile technology, aeronautics, naval systems, life sciences, armaments, combat engineering, electronics and communication material.

The previous DRDO policy called for managing intellectual property (IP) rights in an effective, efficient and ethical manner to derive full economic potential and consider opportunities for commercial exploitation of IP and wealth creation.

"Earlier, licence fee for patents and royalty could range anywhere from several lakh rupees to over a crore depending upon the type of technology involved, the cost of the project, baseline price and post-production quantum of sales to non-defence sector," a DRDO official said. Now, only a processing fee of Rs 1,000 would be charged.

Pointing out that the current IP landscape in the country was characterised by a certain level of disconnect between IP creators and potential users, the policy states that the availability of the DRDO patents to Indian industry at zero cost provides an opportunity for enhancing their capabilities and climbing up in supply chain.

Policy shift

- Indian public and private entities, including startups, will be granted free licence to DRDO patents
- Firms must have capacity to absorb technology, production capability, quality control mechanisms
- Will be required to submit annual commercial reports to DRDO

Licence fee

Earlier, licence fee for patents and royalty could range from several lakh rupees to over a crore depending upon the type of technology involved, the cost of the project, baseline price and post-production quantum of sales to non-defence sector. A DRDO official

<https://www.tribuneindia.com/news/nation/drdo-grants-free-patent-access-to-boost-indigenous-production/859684.html>

के-4 मिसाइल : समुद्र के भीतर से परमाणु वार की क्षमता

जनसत्ता संवाद

भारत ने हाल में अपनी के-4 परमाणु मिसाइल का परीक्षण किया। आठ नवंबर को आंध्र प्रदेश के तट से पनडुब्बी के जरिए प्रयोगिक तौर पर के-4 परमाणु मिसाइल दागी गई। रक्षा एवं अनुसंधान विकास संस्थान (डीआरडीओ) ने इसे तैयार किया है जिसकी मारक क्षमता 3500 किलोमीटर है। यह दो हजार किलोग्राम का आयुध (वॉरहेड) ले जा सकती है। इस मिसाइल के परीक्षण के बाद भारत पनडुब्बियों से मारक क्षमता बढ़ा चुका है।

इस मिसाइल प्रणाली को अरिहंत श्रेणी की परमाणु पनडुब्बियों के लिए विकसित किया जा रहा है। ये पनडुब्बियां भारत में विकसित की जा रही हैं, जो समुद्री इलाके में परमाणु सुरक्षा छतरी का काम करेंगी। आइएनएस अरिहंत पनडुब्बी को एक बार में चार के-4 मिसाइल से लैस किया जा सकता है। कुछ साल में सेना, वायुसेना और नौसेना को के-4 की सेवाएं हासिल होंगी। अंतरराष्ट्रीय दबाव से के-4 का परीक्षण गुप्त रूप से किया गया और डीआरडीओ ने आधिकारिक रूप से कोई टिप्पणी नहीं की।

डीआरडीओ ने आंध्र प्रदेश के विशाखापट्टनम तट पर समुद्र के भीतर बनाए गए 'अंडरवॉटर प्लेटफॉर्म' से के-4 परमाणु मिसाइल दागी। के-4 के अलावा भारत अन्य एक परमाणु मिसाइल प्रणाली बीओ-5 बना रहा है, जिसकी मारक क्षमता सात सौ किलोमीटर से ज्यादा है। कुछ हफ्ते में डीआरडीओ ने अग्नि-3 और ब्रह्मोस समेत कई और मिसाइलों के परीक्षण की योजना बना रखी है। के-4 मिसाइल प्रणाली पर काम तब शुरू हुआ, जब इसी तरह (के-4 की तरह) की क्षमताओं वाली अग्नि-3 मिसाइल को परमाणु चालित पनडुब्बी आइएनएस अरिहंत

में लगाने में तकनीकी समस्याएं खड़ी हो गईं। अरिहंत का व्यास 17 मीटर है, जिसमें अग्नि-3 फिट नहीं हो पाती। के-4 मिसाइल 12 मीटर लंबी है। इसका व्यास 1.3 मीटर का है। इसका वजन लगभग 17 टन है। ठोस ईंधन के रॉकेट से चलने वाला यह प्रक्षेपास्त्र लगभग दो टन भार का विस्फोटक ले जा सकता है। डीआरडीओ के अनुसार इस मिसाइल का लक्ष्य अचूक मारक क्षमता हासिल करना है।

के-4 के गैस प्रक्षेपक का 2010 में एक पंटून (छोटी पनडुब्बी) से सफलतापूर्वक परीक्षण किया गया। इसके बाद इसका परीक्षण 2014 में 30 मीटर की गहराई से हुआ था। परीक्षण सफल रहा था और मिसाइल हिंद महासागर में तीन हजार किलोमीटर तक पहुंची थी। इसके बाद सात मार्च 2016 को के-4 का एक बार फिर एक प्लेटफॉर्म (पंटून) से बंगाल की खाड़ी में परीक्षण किया गया। अप्रैल 2016 में फिर जानकारी आई कि इसका सफलतापूर्वक परीक्षण 31 मार्च 2016 को आइएनएस अरिहंत से विशाखापत्तनम के तट से 45 नॉटिकल मील की दूरी पर किया गया। परीक्षण में सभी मानकों पर खरी उतरी और शून्य त्रुटि के साथ लक्ष्य भेदने में सफल रही।

खास बात यह है कि के-4 मिसाइल और अरिहंत पनडुब्बी दोनों को देश में ही बनाया गया है। के-4 की रेंज 3,500 किलोमीटर है, साथ ही यह



बड़ा कदम

पूर्व नौसेना प्रमुख एडमिरल अरुण प्रकाश (सेवानिवृत्त) ने इसे एक बड़ा कदम करार दिया है, लेकिन उनके मुताबिक जल्द ही आइएनएस अरिहंत को 5000 किलोमीटर से ज्यादा रेंज की अंतर प्रायद्वीपीय मिसाइल (इंटर बैलेस्टिक मिसाइल) से लैस करने की जरूरत है, ताकि यह पनडुब्बी भारतीय समुद्र के किसी भी हिस्से में अपने लक्ष्य के लिए खतरा साबित हो सके।

दो हजार किलोग्राम गोला-बारूद साथ ले जाने में सक्षम है। के-4 मिसाइल का नाम पूर्व राष्ट्रपति एपीजे अब्दुल कलाम के नाम पर रखा गया है, जिसमें के-4 मिसाइल का कोड नेम है। इस परीक्षण के कामयाब होने के साथ ही भारत पानी के भीतर मिसाइल दागने की ताकत रखने वाला पांचवां देश बन गया है। इससे पहले यह तकनीक अमेरिका, रूस, फ्रांस और चीन के ही पास थी।

Operational air-independent propulsion for Kalvari submarines: A critical technology for underwater stealth

The Made in India AIP system is therefore already planned to be retrofit onboard first submarine which enters a major refit. The indigenous AIP system is still at a developmental stage whilst pending four Submarines under the project are scheduled for commissioning in the next two years

By Huma Siddiqui

New Delhi: The recent announcement by Defence Research and Development Organisation (DRDO) about the Land-Based testing of the indigenous Air-independent Propulsion (AIP) is going to take time before it gets operationally ready to be fitted on the submarines of the Indian Navy.

Before a Defence Quality Assurance (QA) approved 'productionised' version is available for operational exploitation onboard Kalvari-class submarine, the Ministry of Defence/Indian Navy have options open to procure AIP system from an international supplier. "While the preference will be given to the indigenously made AIP, keeping the submarine performance issues in mind in the face of the hostile situation in the waters, options are always open to buy urgently from vendors who meet all parameters," said a top source.

Six Kalvari class (Scorpene) diesel-electric attack submarines (SSKs) under Project 75 are being built by Mazagon Dock Limited (MDL) with the support and technology transfer (ToT) from French company Naval Group (former DCNS). As has been reported earlier, two out of six submarines have been commissioned.

What is the function of AIP?

"An Air-independent Propulsion (AIP) system onboard a submarine allows conventionally powered submarine to operate without access to the outside air. A Kalvari Class submarine when fitted with an AIP system onboard shall be able to run its electric propulsion motor and electrical network while bypassing the conventional batteries. This shall allow it to remain submerged for a longer duration by reducing the need to surface often to take in the air for running diesel engines for charging conventional batteries" explains Milind Kulshreshtha, a C4I expert.

Though the Kalvari class submarines are powered by conventional diesel-electric propulsion systems, as per the original plans, the last two submarines were to be equipped with an indigenously developed AIP technology. This state of the art Fuel-cell based AIP design was taken up by the DRDO for indigenous development since such technology from abroad was extremely expensive. The fuel cell-based AIP uses hydrogen and oxygen to generate electricity has almost no moving parts (making them quieter) and produces minimal waste.

The indigenous AIP system is still at a developmental stage whilst pending four Submarines under the project are scheduled for commissioning in the next two years. The Made in India AIP system is therefore already planned to be retrofit onboard first submarine which enters a major refit.

Tests & Trials of Indigenous AIP System

It has to undergo a well-defined stringent Testing & Trial stage prior to being qualified even for installation onboard (an operational ship or submarine). According to Kulshreshtha, "A system like AIP shall initially be undergoing multiple Land Based Test Site (LBTS) trials to prove its efficacy ashore. This ashore system version shall be re-designed for fitment onboard a Kalvari class submarine and subsequently installed for experimental trials. The risk here with an R&D version system fitted on

an operational vessel is that it may keep going for sea trials as part of multiple iterative improvement cycles, leading to a very undesirable operational situation.”

Indian Navy shall be always eager to enhance the submarine’s operational capabilities (especially in hostile waters) for an active role like intelligence gathering etc. but stuck with an experimental system. Further, it is all too well known that getting an operational vessel tied down ashore for experimental work (as a priority over and above its Operational commitments) is not easy.

Once the R&D version fitted onboard achieves all the desired parameters as per laid down Naval requirements (like noise signatures, efficiency etc.), a ‘production’ version design of indigenous AIP will evolve.

“Then the design shall be handed over to a manufacturing partner (like a Defence PSU) under a ToT for further supply to the Indian Navy. The local Industrial agency shall setup an AIP production division and the first of the system manufactured shall undergo a rigorous Director General Quality Assurance (DGQA) Test Schedule. This procedure includes specialised tests like Type Testing and Environmental Tests. A Type Test procedure establishes the suitability of the manufactured system for Defence application,” the expert adds.

Environmental Checks for Indigenous AIP

As per DGQA procedure, the first AIP system shall undergo Environmental checks like Vibration Test, High Temperature, Damp test, Drip Proof and Tropical test as laid down in the Joint Services Standard (JSS) 55555. While being verified against the laid down Environmental specs, the system usually gets ‘Yellow Banded’ i.e. earmarked as ‘not fit’ for use onboard and kept in the workshop as a reference set.

Installation & Commissioning of AIP

Installation on board a submarine is an involved activity and follows some tough guidelines. The supplier has to provide System Specialists to assist in supervising the work and inspection of work throughout onboard fitment including Connectorisation, Setting to Work, Harbour and Sea Trials. T

Explaining the process, Kulshreshtha adds, “Board of officers from Naval Headquarters, submarine, and Dockyard with assistance from OEM, Shipyard or other suitable agencies shall be constituted for the promulgation of Feasibility of fitment document. This will be further approved by the HQtrs so as to ensure a smooth retro fitment of AIP system. Final acceptance of the system shall be the responsibility of a designated Naval Trial & Testing team for handing over of a completely proven system to the Submarine staff for exploitation and maintenance onboard.”

<https://www.financialexpress.com/defence/operational-air-independent-propulsion-for-kalvari-submarines-a-critical-technology-for-underwater-stealth/1761445/lite/>

DRDO team visits CUJ for setting of Kalam centre for Science & Technology

Jammu: To select the site for Kalam Centre for Science & Technology (KCST) and to recommend the submitted research projects for execution, a DRDO team visited the Central University of Jammu.

The team of ten members was led by Dr Sudhir Kamath, OS & DG, DRDO. The other members of the DRDO team were Dr Shiv Kumar, Dr K K Pathak, Dr Renu Tyagi, Dr GSBS Rawat, Dr Padmavathi, Dr Rajesh Pillai, SAG, Dr Saibal Pal, Amit Sharma, Advisor Cyber and Mohd Ikram.

The DRDO team interacted with the Science faculty and especially with all the Project Investigators (PIs, who presented their research proposal. After thorough discussions and deliberations, DRDO officials recommended three research proposals for execution under vertical 1(Computational System Security). Out of the eight submitted research projects under vertical 2 (Sensors), only four research proposals have been recommended for execution by DRDO experts.

Earlier, DRDO and CUJ had entered into a Memorandum of Understanding (MoU) for establishment of Kalam Centre of Science and Technology (KCST) at its campus on Sept 26, 2019 at New Delhi in the presence of Defence Minister, Rajnath Singh. The sanctioned amount of this centre is Rs 59.94 crores. The site for centre was finalized by the visiting team during this visit. It is expected that the Bhoomi Puja and foundation laying ceremony will be graced by the Defence Minister very soon.

In the end of meeting, Dr K K Pathak briefed the gathering about the future road map of the KCST. The proposed drawings of KCST were also presented by engineering wing of the University. The meeting was also attended by Heads of various Departments, including Prof Devanand, Dean School of Basic and Applied Sciences; Prof B S Bhau, Dean Research Studies, CUJ; Mohd Iqbal (Finance Officer) and Er Vishal Bargoitra (Exen). The vote of thanks was delivered by Dr Ravi Kumar, Registrar of the University.



<https://www.dailyexcelsior.com/drdo-team-visits-cuj-for-setting-of-kalam-centre-for-science-technology/>

IIT Mandi Invites applications for national workshop on aerospace

The workshop will help participants to understand and implement state-of-the-art concepts of design, manufacturing and conditioning monitoring pertaining to advanced composite for aerospace application

IIT Mandi is calling for applications for the National Workshop on 'Advanced Composites for Aerospace: Design, Manufacturing and Condition Monitoring Perspective'.

The workshop will be held from 11th to 15th February 2020. Interested participants can apply through the workshop website on or before 30th November 2019.

Designed especially for engineers and researchers, the objective of this workshop is to introduce state-of-the-art concepts of design, manufacturing and conditioning monitoring pertaining to advanced composite for aerospace application.

The Institute is expecting to host eminent scientists from Aeronautics Research & Development Board (the aerospace research wing of DRDO) who will provide the exposure to cutting edge research perspectives on composites in the aerospace industry.

The subject experts delivering lectures in this workshop include:

- S.C. Jain, Professor, School of Engineering, IIT Mandi
- Dr. Himanshu Pathak, Assistant Professor, School of Engineering, IIT Mandi
- Dr. Subhamoy Sen, Assistant Professor, School of Engineering, IIT Mandi
- Dr. Sunny Zafar, Assistant Professor, School of Engineering, IIT Mandi
- Dr. Rajeev Kumar, Associate Professor, School of Engineering, IIT Mandi
- Dr. Viswanath Balakrishnan, Associate Professor, School of Engineering, IIT Mandi
- Dr. Vishal Singh Chauhan, Associate Professor, School of Engineering, IIT Mandi
- Dr. Makarand Joshi, AR&DB, DRDO
- Dr. S.K. Pandey, AR&DB, DRDO

Speaking about the importance of this workshop, Dr. Subhamoy Sen, Workshop Coordinator and Assistant Professor, School of Engineering, IIT Mandi, said, "To materialize the aspiration of making India a global manufacturing hub, the in-house development of state-of-the-art design and manufacturing concepts for all spheres of industry is being encouraged. The civil, defence and commercial aerospace industries are also pushing their limits to compete with the world leaders in this domain."

"Over the last decade, composite materials have found large scale applications in aerospace industries. With the advent of cheap sensor technologies and powerful computational facilities, condition monitoring has come up as another avenue to ensure safety and serviceability of composite materials in use in the aircrafts," he added.

The one week workshop has been designed to introduce theoretical and practical aspects of composite material research to engineers and researchers to make them equipped to solve problems. This workshop will be particularly beneficial for engineering students, engineers and scientists working in various institutions.

The workshop is open to faculty members, students from Engineering Institutes, Colleges, Polytechnics and Practicing Engineers and Researchers from Industries and R&D Institutions.

The workshop will also provide a thorough idea of Micro-Macro mechanics-based analysis of composite using ANSYS and DIGIMAT software; hands-on experience of Condition Monitoring of composites and Manufacturing techniques for a wide range of composite materials.

At the end of this workshop, the participants will be in a position to identify and select appropriate manufacturing technique for the composite materials, implement design and conditioning monitoring criterion to ensure efficient mechanical performance.

The primary objective of this workshop includes:

- Introduction to Composite Materials: Basics and Fundamentals
- Manufacturing techniques for Polymer Matrix Composites, Metal Matrix Composites and Ceramic Matrix Composites
- Mechanics of Composite Materials
- Introduction to Finite Element Method for the design analysis of Composite materials
- Micro-macro mechanics-based analysis using ANSYS and DIGIMAT software
- Condition monitoring of composites and application of machine learning
- Hands-on experience with composite condition monitoring
- Exposure to cutting edge research on composites in aerospace industries (will be presented by Scientists from Aeronautics Research & Development Board, DRDO)

Intimation of selection will be communicated to the participants by 5th January 2020.

<http://bweduction.businessworld.in/article/IIT-Mandi-Invites-Applications-For-National-Workshop-On-Aerospace/11-11-2019-178767/>