

Fri, 25 Oct 2019

## Submarine launched ballistic missile (SLBM) K-4 test imminent

Defence Research and Development Organisation (DRDO) is contemplating crucial tests of India's longest range and most potent Submarine Launched Ballistic Missile (SLBM) K-4 between 23rd and 25th of October 2019. The missile is expected to be launched from India's indigenous nuclear SSBN INS Arihant. India has activated a possible 3400+ Km path (See pic below) for the test of an "experimental flight trial" on the east coast indicates a possible LR missile test.

The nuclear capable homegrown strategic missile scheduled is expected to add more teeth to the navy once they are inducted. A successful trial of the underwater K-4 missile will pave the way for development of its long range sibling K-5, which will have a strike range of over 5,000 km. K-4 is an intermediate-range SLBM. It is a 10 m long missile weighing 20 tons, capable of carrying a 1 ton payload up to a range of 3,500 km.



"The missile systems are ready. We are expecting the launch schedule in next few days." said a defence official from New Delhi.

It's worthy to note that the scientists are keen on K-4 trial as the last attempt on December 17 had failed. The missile could not be launched from the pontoon positioned in the Bay of Bengal off the Vizag coast due to some technical snags. The missile, world's best in this class, will have to undergo a couple of more developmental trials before being inducted in the armed forces.

The 12 metre tall missile weighs around 17 tons and can carry a warhead weighing up to 2,000 kg. The missile is powered by solid rocket propellant.

The manoeuvrable missile having an innovative system of interlacing in three dimensions can also cruise at a hypersonic speed and this exceptional feature makes it difficult to be tracked easily and destroyed by any anti-ballistic missile defence systems.

One of the lesser known missiles being developed under DRDO's 'K Series' project is the K-5 missile. K-5 would be a long range Submarine Launched Ballistic Missile (SLBM). It reportedly can deliver nuclear warhead of up to one tonne 5,000 km away.

Other missiles under 'K Series' - 750-km range K-15 (B-05) and 3,500 km range K-4 - have already been test fired successfully several times.

Both the missiles have strengthened the country's position in the exclusive club of six nations including Russia, US, France, UK and China which have the capability of firing nuclear tipped missiles from air, land and undersea.

[http://www.defencenews.in/article/Submarine-Launched-Ballistic-Missile-\(SLBM\)-K-4-Test-Imminent-737639](http://www.defencenews.in/article/Submarine-Launched-Ballistic-Missile-(SLBM)-K-4-Test-Imminent-737639)

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## **Make-II: Need to prevent duplication of efforts and backdoor entry of import**

*By Laxman Kumar Behera*

The Defence Acquisition Council (DAC), Chaired by Defence Minister Rajnath Singh, on Monday announced it had approved the purchase of Rs 3,300 crore of indigenously designed and developed military equipment.

In a major boost to Make in India and private sector's participation in defence production in particular, the Defence Acquisition Council (DAC) on October 21 approved three capital procurement projects worth Rs. 3300 crore for indigenous design and development. <sup>1</sup> The first two projects pertain to Make-II category of the defence procurement procedure (DPP) and include third generation anti-tank guided missiles (ATGM) and auxiliary power units (APUs) for the T-72 and T-90 tanks. The third project relates to the design and development (D&D) of electronic warfare (EW) systems for mountain and high-altitude terrain by the Defence Research and Development Organisation (DRDO), and manufacturing of the same by a design-cum-production partner selected from the Indian industry.

The importance of DAC's October 21 decision is that it is the first time that the government has allowed the private sector to undertake D&D of complex defence equipment, a task which was hitherto reserved for the DRDO and, to a smaller extent, state-owned/controlled production entities. The government's bold decision to allow the private sector to undertake complex D&D is a step in the right direction to forge a larger innovation system to meet the diverse requirements of national security. However, caution may be required to avoid duplication of efforts and prevent indirect import which is otherwise not permitted directly.

It is significant to note that of the two projects approved by DAC under Make-II, the DRDO is already engaged in the development of ATGM. The R&D agency seems to have achieved a degree of success in the project. This is the reason why the government has twice ignored in the past an import option in favour of the home-grown project. However, permitting the private sector to undertake the development of ATGM has raised doubts about the status of the DRDO's project. More significantly, if the DRDO, India's premier defence R&D agency with a budget of more than Rs. 19,000 crore (in 2019-20), is not able to design and develop an ATGM, how could the private sector, which has little expertise in missile development, achieve the same and that too with no funding support from the government under Make-II?

The Make-II procedure was carved out as a separate sub-category of the 'Make' procedure as part of the revised DPP-2016 to give a boost to the Make in India initiative in defence production. The intention behind the sub-category was to leverage the industrial and financial powers of the Indian industry, particularly the private sector, for greater indigenisation through import substitution with some technical assistance from overseas, if required. Leveraging industry's financial power was, however, not meant to ask the industry to spend a huge sum on D&D efforts. Therefore, projects with a large developmental cost was meant to be executed through Make-I procedure in which the government bears up to 90 per cent of the prototype development cost, whereas all other projects with smaller financial implications were intended to be executed under Make-II through industry's self-funding.

The Make-II is undoubtedly a novel idea of the Ministry of Defence (MoD) to promote innovation within the industry. Its three distinct features – allowing the industry to submit *suo moto* proposals, MoD's willingness to entertain single bid, and assurance of time-bound and guaranteed order post

successful development – are refreshingly different from the government’s routine contractual norms that give prominence to tender-based bid solicitation, multi-vendor participation and uncertainty of order placement. The innovativeness of the sub-category and the government’s zero financial liability for prototype development has allowed the MoD to go the whole hog in embracing a large number of proposals under Make-II. In comparison to mere three projects under Make-I, the MoD has so far accorded acceptance-in-principle (AIP) to nearly five dozen proposals under Make-II.

Significantly, apart from ATGM, the AIP has also been given to a number of other big projects including the long range air-to-air beyond visual range (BVR) missile, on which the DRDO has been working for a long time and has achieved some major success in recent years. By allowing these projects to be executed through Make-II, the MoD not only runs the risks of forgoing the opportunity of deploying its home-grown technology but unwittingly gets into a trap of foreign suppliers who rarely pass on any key technology and whose only interest in India is to bind it with perpetual dependency.

The question, therefore, is whether the foreign original equipment manufacturers (OEMs) should be allowed to use Make-II to sell their hardware which they are otherwise denied to do directly. The question merits debate as it has a huge implication on India’s own efforts in developing key defence technologies. Even though Make-II requires local design and development and a minimum 40 per cent indigenous content (IC), it nonetheless leaves a plenty of scope for technology assistance from external sources which allows foreign companies an opportunity to push their products, albeit indirectly, through Indian partners who are willing to play a second fiddle to their overseas collaborators. In their attempt to sell their products, the foreign companies also do not hesitate in exploiting the age-old turf wars between key stakeholders of the Indian defence establishment.

As of now, the Indian defence companies, especially the ones from the private sector have very little capability of designing and developing complex weapon systems, and that too in a period of 105 weeks, the maximum time allowed under Make-II for user trial of prototype. If a company claims it could do so, it is important for the MoD to decipher the real motives, examine what new technologies are being promised to be developed, and see to it that the company has the overall intellectual property rights (IPR), including for exports. Furthermore, when the government has already sanctioned a developmental project to the DRDO, or any other agency, which involves a significant investment of taxpayers’ money, it is important for the MoD to ensure that such projects are delivered on time before a parallel development is sought outside.

This is not to suggest that the DRDO, or any other state-owned/controlled agencies, should have exclusive monopoly over all developmental projects approved under Make-II. In fact, the Make-II procedure categorically states that projects once approved would not be retracted just because India’s premier defence R&D agency is developing such projects. However, such restraint on the DRDO appears to be based on the organisation’s chequered past, and not on the organisation’s stellar contribution especially to strategic programmes. Identifying the issues and concerns of DRDO’s R&D projects, including in the post-developmental phase, and addressing them in a time bound manner is far more important than marginalising the organisation in favour of parallel development within the industry. Suffice to say that the DRDO is currently engaged with nearly 370 R&D projects (excluding strategic ones) with government making an investment commitment of over Rs. 78,000 crore.<sup>2</sup> The MoD could least afford to ignore its premier R&D agency and all the sanctioned projects and rely on an industry whose R&D effort is hardly anything.

The MoD has already taken a host of initiatives to contain India’s arms import and enhance self-reliance. These initiatives have started paying dividend as is evident from the continuous increase in domestic arms production and phenomenal increase in defence exports. Further, the MoD is presently engaged in implementing a major plan for the defence public sector undertakings for the indigenisation of Rs. 15,000 crore worth of previously imported items by 2022-23.<sup>3</sup> The Make-II is ideally suited for import substitution of these types of items and all efforts need to be undertaken to

make it a success. The MoD needs to send a strong signal that Make-II is not to kill India's own technology development but to supplement it.

*(Views expressed are of the author and do not necessarily reflect the views of the IDSA or of the Government of India.)*

<https://idsa.in/idsacomment/make-ii-need-to-prevent-duplication-lkbehera-231019>



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## Self-reliance in defence sector a major challenge

***While due credit must be given to the many indigenisation successes, this needs to be tempered with an objective assessment of what ails the present system and how it needs to be restructured to successfully achieve the Make-in-India mission. This challenge is not unique to India. Those with successful defence industries have faced it and found answers while we appear to be in denial and content with ad hoc solutions.***

***By Marshal Brijesh Jayal (retd)***

On the 88th birth anniversary of APJ Abdul Kalam, addressing the Defence Research and Development Organisation (DRDO) directors' conference, Defence Minister Rajnath Singh lauded the former President's contribution to science and missile technology. He urged the scientific community to follow Kalam's work ethos, emphasising that the time was right to decrease our dependence on imported systems and become self-reliant in critical defence technologies.

A few days later, while addressing the Indian Defence and Aerospace Summit, the minister highlighted that the technological gap between the indigenous Light Combat Aircraft and the state-of-the-art Rafale had to be bridged if India wanted to be a competitive defence production player in the world. Commenting on our import dependence, he cautioned that a country like India, aspiring to be a global nation on a par with the top five global economies, cannot continue depending so heavily on defence imports from foreign players.

Clearly, the minister's visit to France, where he received the first Rafale aircraft from Dassault Aviation and held discussions, and a message from China were playing on his mind. The latter was the military parade in Beijing earlier in the month, showcasing the continuing growth in China's military and technological capabilities, chief amongst them being the remarkable advances made in the field of aerospace. On display were J-20 stealth fighters, fourth-generation J-16 and J-10C fighters, Y-20 heavy transport aircraft and the Z-20 transport helicopter amongst drones encompassing diverse roles of supersonic high-altitude reconnaissance and multi-role combat for precision attacks. This display of military and aerospace technology conveyed a clear political message to the international community, at a time of growing security concerns over China's rise.

Interestingly, both the above-named gatherings also saw the active participation of the three service chiefs, along with officers concerned. Since it is the armed forces, more particularly the Army and the IAF, that have been at the receiving end of some of the problems that plague our indigenisation efforts, one had expected a frank appraisal from the user's perspective of what is positive and what is lacking in the entire defence research and production ecosystem that has resulted in the existing state of import dependence.

The Chief of Army Staff (COAS) complimented strides made by the DRDO to meet service requirements through home-grown solutions and expressed confidence that "we will fight the next war through indigenised weapon systems and equipment" Yet, little was mentioned of why the country has to rely on Russian technology and licence production for the Army's assault rifle.

The COAS said technology leadership defined the DRDO and that over seven decades, the organisation has been able to achieve objectives of self-reliance to a great extent. Again, little was said on the reasons why the ambitious Light Combat Aircraft is decades behind schedule but is yet to achieve full operational clearance and the IAF is likely to need foreign platforms for the foreseeable future.

According to media reports, at the IDAS (Indian Defence Accounts Service), the country's three defence chiefs and the Ministry of Defence were on the same page — that Make-in-India should be a productive tool to achieve the objective of self-reliance. While due credit must be given to the many indigenisation successes, this needs to be tempered with an objective assessment of what ails the present system and how it needs to be restructured to successfully achieve the Make-in-India mission. This challenge is not unique to India. Those with successful defence industries have faced it and found answers while we appear to be in denial and content with ad hoc solutions.

Jacques Gansler, later the under secretary of defence for acquisition and technology in the Bill Clinton administration, was best known for his work on defence acquisition and procurement issues and how these processes could be used to serve the war-fighter and make the government more efficient. He believed that 'in order to understand the economic operation of the US defence industry, it is first absolutely essential to recognise that there is no free market at work in this area and that there cannot be one because of the dominant role played by the federal government. The combination of a single buyer, a few large firms in each segment of the industry, and a small number of extremely expensive weapons programmes constitute a unique structure for doing business.'

This, in essence, sums up the challenge to governments, defence research institutions and industries across the globe — how to keep a unique structure for doing business finely balanced between free markets on the one hand and state control on the other.

If, indeed, the nation aspires to take its place in the forefront of defence technology and manufacturing, to become a force to reckon with in the international market, then it is the entire defence research and production system, both public and private, that must come under scrutiny to arrive at our own 'unique structure for doing business.'

A proposed national aeronautics policy was submitted to the government by the Aeronautical Society of India (AeSI) in 1994. In its preamble, the then President of the AeSI, Kalam, had stated: "Aviation is one of the most significant technological influences of modern times and empowers the nation with strength for international partnership. It is a major tool for economic development and has a significant role in national security and international relations."

Since this proposal elicited no response, in 2004, the AeSI resubmitted a revised proposal for an overarching national aeronautics policy, along with a proposed supporting organisation with a view to according aeronautics the status of a national mission to enable it to take its rightful place internationally. This proposal, too, remains stillborn.

It would indeed be a fitting tribute to Kalam if the Defence Minister can get the MoD to retrieve this proposal from the archives and open it for debate among various stakeholders. This would help reach India's own 'unique structure of doing business' in the military and civil aeronautics field and indeed show the way for other high-technology defence systems and free us from the dubious record of being the second largest arms importer internationally.

<https://www.tribuneindia.com/news/comment/self-reliance-in-defence-sector-a-major-challenge/851467.html>

## **PhD scholar from IIT Gandhinagar wins DRDO contest**

*The award ceremony was held at DRDO Bhawan, New Delhi, on October 15, 2019,  
on the occasion of India's former President, Dr APJ Abdul Kalam's birth anniversary*

Chandan Kumar Jha, a PhD scholar in Electrical Engineering at the Indian Institute of Technology Gandhinagar (IITGN), has won the first prize in the 'Dare to Dream DRDO Innovation Contest' organised by the Defence Research and Development Organisation.

He received this award in the challenge area of 'Wearable Communication Technologies for Special Operations Soldiers' for his project titled, "An optical fibre-based microphone with very high background noise suppression capability for use in combat zones". The fibre-based contact microphone innovated by Chandan picks up the signal from the neck region and greatly suppresses the ambient noise with very little signal processing, official release from the institute said.

The award ceremony was held at DRDO Bhawan, New Delhi, on October 15, 2019, on the occasion of India's former President, Dr APJ Abdul Kalam's birth anniversary.

Chandan is working on his PhD research with Dr Arup Lal Chakraborty in the Photonic Sensors Lab, IITGN. "This award has become a great encouragement to me. It has given me confidence that our innovation can be useful for defence and has motivated me to develop it further into a reliable product that can be readily used by our army. The mentoring and support assured by the DRDO in developing this product has further boosted my enthusiasm...", Chandan said in a statement.

The PhD scholar conceived the project along with his supervisor Professor Chakraborty while attempting to record the human voice from the throat using a fibre-optic sensor.

This optical fibre-based contact microphone picks up the human voice with high sensitivity even in the presence of very high background noise, typically encountered in combat situations.

<https://indianexpress.com/article/india/phd-scholar-from-iit-gandhinagar-wins-drdo-contest-6084950/>

## **NIT-T scholar's radome design tops DRDO contest**

Trichy: The radome designed by a research scholar at the National Institute of Technology, Trichy, (NIT-T) has come first in the Defence Research and Development Organisation's (DRDO) dare to dream contest.

The radome, a structural, weatherproof enclosure that protects a radar antenna, designed by V Krushnakanth, research scholar in the ECE department, shields the aircraft's radar from getting detected by enemy radar. His was awarded commendable certificate and a cash prize of Rs 5 lakh from defence minister Rajnath Singh last week in the 41st DRDO Directors Conference in New Delhi on Technology Leadership for Empowering India. The project stood first among 3,000 odd projects presented at DRDO's dare to dream contest – a scheme to foster innovation and technology development in defence and aerospace. The front nose cone of an aircraft accommodates radar for

scanning and identifying targets for bombing. This needs to be protected from enemy radar from identification. His design on selective frequency can make the radar in combat aircraft invisible from enemy radars.

Signals coming from radar is the main source of detection by enemy aircraft. The radome designed by me will only allow reception of selective electro-magnetic frequency and thereby remains undetected by enemy radar,” said Krushnakanth. “The radome is designed in such a way that it will allow only certain electro-magnetic frequency. “This basically means we can see others but enemies should not see us. Our radome works in specific frequency which will be known only to us,” he said. Saying that there has not been much research in this area in the country, he said the exposure he gained in CSIR - National Aerospace Laboratories, Bengaluru, as project assistant before joining NIT-T helped his work in the area. Saying his guide S Raghavan was a driving force, he said that he is planning to take up projects under DRDO apart from exploring the possibilities on doing post-doctoral research.

<https://timesofindia.indiatimes.com/city/trichy/nit-t-scholars-radome-design-tops-drdo-contest/articleshow/71712660.cms>

## Telangana Today

Fri, 25 Oct 2019

### **International conference at NIT Warangal**

*A two-day International Conference on Communications, Signal Processing and VLSI organised by the Department of Electronics and Communication Engineering (ECE), National Institute of Technology (NIT), Warangal, commenced here on Wednesday*

Warangal: B H V S Narayana Murthy, Director RCI, DRDO, Hyderabad, said the field of signal processing and Very Large-Scale Integration (VLSI) has been a very vigorous area of research and application for more than five decades.

A two-day International Conference on Communications, Signal Processing and VLSI organised by the Department of Electronics and Communication Engineering (ECE), National Institute of Technology (NIT), Warangal, commenced here on Wednesday.

Addressing the participants, Murthy said: “The rapid improvement of signal processing in the areas of communications, information processing, consumer electronics, control systems, radar and sonar, medical diagnosis aerospace systems with increased processing speed size reduction and low cost. With the invention of IC technology all discrete components are integrated into single silicon wafer offering numerous advantages of portability, power and performance. Signal processing and VLSI faces many challenges with the demand of IoT autonomous vehicles, machine learning AI and internet traffic is growing exponentially which acts as driving force for scaling down the transistors for higher performance and low cost effectiveness,”

Prof G. Rajesh Kumar, Dean (R&C), explained about the different funding from MHRD to organize such conferences. Prof. N Bheema Rao, General Chair and Head of the Department presented the department profile and gave the gist of ongoing research projects worth of Rs 4.50 crores sponsored by DST, SPARC, DRDO and other organizations and existing academic programmes.

According to Dr Sreehari Rao and Dr Mani, the PC chairs of the conference, nearly 100 research papers had been received out of which 39 papers were accepted for oral presentation after a thorough review by nearly 35 reviewers. Six key note speakers are taking part to present the state of the art developments on smart design, sensor system design, defence developments etc.,

Registrar S Govardhan Rao and Prof L Krishnanand, TEQIP coordinator, spoke on the occasion.

<https://telanganatoday.com/international-conference-at-nit-warangal>