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Mon, 02 March 2020

Easily available home-made explosives major threat, DRDO Chairman

By Steffy Thevar

Pune: Homemade explosives, like petrol bombs and gelatin sticks, which are easily available in the market are more dangerous than high-end explosives, said Satheesh Reddy, secretary, Department of Defence Research & Development and Chairman Defence Research and Development Organisation (DRDO)

He was speaking during the second national conference on explosive detection, at Pashan, on Sunday.

During the conference, a rapid identification detector Raider-X was also officially launched. Raider-X can detect up to 20 explosives within a distance of about two metres, but can be expanded as the requirements with certain limitations. It is developed jointly by High Energy Materials Research Laboratory (HEMRL), Pune and IISc Bengaluru.

The conference was held on the occasion of the diamond jubilee celebration of High Energy Materials Research Laboratory, Pune based DRDO laboratory on Sunday.

Reddy, stated that with increasing terrorist activities, detection of explosives became a compelling need of the hour. He said, “Security agencies are continuously suffering from Naxal attacks in various parts of our country. To effectively thwart the attempts of these anti-social elements, academia, DRDO and other scientific institutes must focus on explosive detection in both bulk and trace forms.”

He further said most of the recent terrorist attacks or violent attacks where explosives are observed to be not necessarily high end but are made with elements which are easily available like petrol, gelatin sticks, ammonium nitrate and others. He said, “The research agencies need to focus on such detection too.”

Jayant Naiknavre, DIG, ATS, Mumbai, in his address highlighted the need for indigenous development of versatile explosive detection devices.

He said, “As end-users, we want detection devices which are compact, accurate and can detect with maximum stand-off distance so that the security personnel is not at risk. The DRDO can work on these challenges.”

Shiva Umapathy, director Indian Institute of Science Education and Research (IISER), Bhopal, who had worked on the device said, “The stand-off distance can be increased but this will also increase the size and weight of the kit which might make it difficult for security personnel to move around. The data library also can be upgraded as and more explosives can be added.”

“The device has various applications including narcotics, for local police, for customs and other detection agencies who need to detect various elements which may be explosive or non-explosive in nature,” said Umapathy.

https://www.hindustantimes.com/cities/easily-available-home-made-explosives-major-threat-drdo-chairman/story-paNxUUGO9w54d0QeCJfIAL.html

Outlook
THE NEWS SCROLL

Mon, 02 March 2020

DRDO Chief calls for synergy in developing explosive detectors

Pune: DRDO Chairman Dr G Satheesh Reddy on Sunday said that with the rising terror activities, detection of explosives has become the need of the hour, and called upon the scientific institutes, academia and security forces to focus on explosive detection in bulk and trace forms.

He was speaking at a national workshop on Explosive Detection at the High Energy Material Research Laboratory (HEMRL) here.

"There is no universal solution in the field of explosive detection as it is constantly evolving. There is a need for a synergetic approach towards developing latest explosive detectors by bringing scientific institutes, academia, security agencies, armed forces and police on one platform," Reddy said.

"With increasing terrorist activities, detection of explosives became a compelling need of the hour. Security agencies are continuously suffering from Naxal and other attacks by inimical forces in various parts of the country," he said.

"To effectively thwart the attempts of these anti- social elements, academia, the Defence Research and Development Organisation (DRDO) and other scientific institutes must focus on the explosive detection in both bulk and trace forms," he added.

According to him, a number of technologies were evolving for detection of explosives.

"Particularly in a country like India, which is suffering from these attacks, both at the cross border and within, there has been continuous pressure from the nation and the security forces, agencies to develop various detection mechanism of these explosives," he said.

To fulfil the requirements, several labs under the DRDO, educational institutes have been trying to develop devices and instruments, Reddy added.

During a media interaction later, Reddy was asked if there was any possibility of a setting up a single entity in order to bring the efforts together. In his reply, he said that four laboratories under the DRDO were already working on it.

"We would like to have a steering committee, which will actually drive the outcome of this kind of conference, such as who will do what, the finance, requirements and other things," he said.

During the workshop, a new explosive detection device named "Raider-X, developed by HEMRL, Pune and IIS Bangalore was launched. It is a rapid identification detector, used in the identification of wide range of explosives.

In his key-note address, Director of IISER, Bhopal, Dr Umapathy, mentioned that serious research on explosive detection technologies in academia started in India only a decade ago, which is now rapidly expanding.

He said no single technology would suffice to detect all types of explosives.

"Hence scientists should think of amalgamation of two or three technologies and come out with devices to provide a comprehensive solution," he added.

Jayant Naiknavare, DIG of ATS, Mumbai, called for the need to indigenously develop versatile explosive detection devices.

He said explosive detectors should be made available to the security agencies for countering the threats faced by the forces.

Around 250 delegates from different DRDO labs, Army, CRPF, CISF, BDDS, Police, academic institutes, industry and other security agencies took part in the workshop.

(Disclaimer: This story has not been edited by Outlook staff and is auto-generated from news agency feeds. Source: PTI)

https://www.outlookindia.com/newsscroll/drdo-chief-calls-for-synergy-in-developing-explosive-detectors/1748813

THE TIMES OF INDIA

Mon, 02 March 2020

Armed with DRDO's tech, city co makes electronic grenades

By Shishir Arya

Nagpur: Economic Explosives Limited (EEL), a company under city's Solar Group, a major producer of commercial and defence explosives, expects to put up its latest electronic multimodal hand grenade for trials soon. This is one step ahead of the latest grenade being acquired by the Army.

The technology for making the grenade has been shared with the company by Chandigarh-based Terminal Ballistics Research Laboratory (TBRL), a unit under DRDO, a senior official of EEL told TOI.

Based on it, EEL has come up with initial units of the grenade, that were also put up on display at Axis-2020 exhibition under way at VNIT.

TBRL has also shared the technology of the non-electronic multimodal grenades with EEL, making it the sole private player to take part in the process for supplying the weapon to the army.

EEL has already taken part in a request for proposal (RFP) by the Army to make multimodal grenades without using the electronic mechanism. The weapon will also be made by the Ordnance Factory, Khamaria in Madhya Pradesh. Both the entities await the bulk production order from the Army.

In the meantime, EEL said it has also developed electronic grenade — mechatronic — which also has a multimodal function. The mechatronic was on display at Axis 2020.

A senior official from the company told TOI that the company has finished internal trials of the electronic grenades and soon user trials, which is an evaluation by the Army, will take place. The electronic device will ensure the perfect timing for explosion in the grenade.

Maintaining the timing for explosion, once the pin is removed, is a crucial requirement for a grenade's functioning. As per the Army's requirements, it has to be not before 3.5 seconds and not later than 4.5 seconds.

In the grenades made so far, the process is chemically controlled. "With the electronic chip fitted, precise timing can be maintained," said the company's official.

https://timesofindia.indiatimes.com/city/nagpur/armed-with-drdos-tech-city-co-makes-electronic-grenades/articleshow/74431028.cms

The Indian EXPRESS
JOURNALISM OF COURAGE
NEW DELHI
WWW.INDIANEXPRESS.COM

Sat, 29 Feb 2020

'Indian Navy ships armed with BrahMos can defeat warships of any country'

Sudhir Mishra, scientist and Director General (BrahMos), DRDO, said, "Had we exported to other countries, we would have certainly become much bigger and made much more money."

Ahmedabad: Stating that all the Indian Naval ships guarding the Indian Ocean and the Arabian Sea are armed with BrahMos missiles that give only 22 seconds reaction-time to the enemy, Sudhir Mishra, scientist and Director General (BrahMos), DRDO (Defence Research and Development Organisation), said on Friday that these supersonic cruise missiles have given the Navy the capability to "defeat warships of any country."

While speaking on the topic of the "Role of BrahMos in nation building" at an event organised by the Confederation of Indian Industry (CII) in Ahmedabad, Mishra said, "It is an unmanned aircraft loaded with explosives… A ship usually has a radar that can only see only up to 20 kilometres… the speed of the BrahMos is 970 metre per second. When it is about 20 kilometres away, the enemy gets only 22 seconds to react. It is very difficult to engage a projectile coming with so much speed."

The BrahMos missile has a range of 300 km and a speed of Mach 3.

Mishra, who is also the CEO and MD of BrahMos Aerospace Pvt Ltd, said there are currently eight variants of the Brahmos that can be fired from different platforms like ships, Sukhios, submarines and land systems.

"One of the Naval captains told me that for a 600 kilometre diameter I have only friends in the ocean. The reason is nobody can afford to be an enemy within this diameter. Because, we are having a capability to defeat warships of any country. When I underline any country, you can include all the countries without telling you the name," he said. Mishra also showed videos of BrahMos hitting a ship and breaking down into two pieces and said, "This is the fear our enemies and adversaries are having. This kind of capability we provide to our Navy."

Serving Naval officers have spoken in public about the increasing might of the Chinese in the Indian Ocean which is a key trade route for ships plying to South-East Asia and beyond.

BrahMos Aerospace Pvt Ltd a private entity developed in joint venture with Russia that began operations with Rs 1,300 crore about 21 years ago has today "created business worth Rs 34,000 crore" with only Indian Armed forces as the only customer.

"Had we exported to other countries, we would have certainly become much bigger and made much more money," Mishra said.

Brahmos Aerospace, the joint venture between DRDO and NPOM of Russia, was formed on February 12, 1998. "DRDO has a 50.5 per cent equity in the project. Had it crossed 51 per cent, it would have become a defence Public Sector Undertaking and the government never wanted another PSU to come up. So we are a private company which is owned and run by the government," he added.

He said 70-75 per cent of the Brahmos systems were being manufactured in an indigenous manner and more than 200 industries have employed 20,000 workers for the development and manufacture of the missile. These industries include L&T which manufacturers canisters for the missile near Vadodara.

https://indianexpress.com/article/india/indian-navy-ships-armed-with-brahmos-can-defeat-warships-of-any-country-6292227/

The Indian EXPRESS
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WWW.INDIANEXPRESS.COM

Sat, 29 Feb 2020

Gujarat to sign MoUs with DRDO next week

In the budget presented by Deputy Chief Minister Nitin Patel, the state government has made a provision of Rs 7 crore for starting a "School for Defence Studies in Gujarat University" by signing an MoU with DRDO

Ahmedabad: The Defence Research and Development Organization (DRDO) will sign MoUs (Memorandum of Understanding) with educational institutes in Gujarat next week. These will help begin defence-related courses in the state, said retired Air Marshal RK Dhir who is the advisor to the Gujarat government for Defence and Aerospace industries.

Pointing to a "good engineering base in Karnataka", which is being tapped by global aircraft manufacturer Airbus for operating an engineering centre at Bangalore, Air Marshal Dhir said, "We plan to do something similar here. With DRDO's help — the Chairman has agreed — next week, the Education Secretary is going to sign an MoU where a special school of Defence Studies will be opened in Gujarat University and a Defence Technology centre at IIT RAM," said Dhir at an event organised by the Confederation of Indian Industry (CII) on Friday.

In the budget presented by Deputy Chief Minister Nitin Patel, the state government has made a provision of Rs 7 crore for starting a "School for Defence Studies in Gujarat University" by signing an MoU with DRDO. An additional Rs 12 crore has been provided for introducing the course of Department of Advance Defence Technology at Ahmedabad-based IITRAM in collaboration with DRDO.

"The government has factored it in the budget (announced on Friday). We plan to start the courses this year itself. Retired scientists from DRDO will be helping us in build the curriculum and to teach. Thereafter, these students will be able to go to the laboratories and work for a year," he added. The official said these courses will help Gujarat build a good base of blue-collar workers who can be employed by the defence and aerospace industries who set up base in Gujarat.

https://indianexpress.com/article/india/gujarat-to-sign-mous-with-drdo-next-week-6292256/

Jane's

Fri, 28 Feb 2020

India's technology demonstration vessel receives new radar as it nears completion

By Kerry Herschelman

Washington DC: A technology demonstration vessel (TDV) being built for India's Defence Research and Development Organisation (DRDO) at Cochin Shipyard Limited (CSL) has been fitted with a housing for a new type of dual-panel long-range radar system.

There is limited publicly available information on the radar, but details on the sensor, known as the Long-Range Multi-Function Radar (LRMFR), emerged in 2016.

Indian sources have described the radar as an active phased array radar with a range in excess of 500 km. Like the Elta MF-STAR, it features octagonal faceplates that are approximately 5.5–6 m in diameter.

The TDV project was contracted on 11 August 2015 with a value of INR3.65 billion (USD50.2 million), and this was subsequently increased to INR3.9 billion as the scope of work expanded.

https://www.janes.com/article/94571/india-s-technology-demonstration-vessel-receives-new-radar-as-it-nears-completion

BIG NEWS NETWORK.com

Sun, 01 March 2020

India beats Russia, Poland to bag $40 million defence deal in Europe

By Ajit K Dubey

New Delhi: In a major success, India has bagged a deal worth USD 40 million to supply four indigenously-built weapon locating radars to Armenia by beating Russian and Polish firms.

"The deal is for supplying four Swathi weapon locating radars developed by the Defence Research and Development Organisation (DRDO) and manufactured by the Bharat Electronics Limited (BEL) to Armenia in Europe," government sources told ANI.

The supply of the equipment to Armenia has already started and this is being considered as a big achievement for 'Make in India' programme in the defence sector, they said.

Sources said Armenians had conducted trials of systems offered by Russia and Poland that were also good but they decided to go for the reliable Indian system.

The contract is for four Swathi weapon locating radars which provide fast, automatic and accurate location of enemy weapons like mortars, shells and rockets in its 50-km range.

The radar can simultaneously handle multiple projectiles fired from different weapons at different locations. The Indian Army is also using the same radars for its operations along the Line of Control in Jammu and Kashmir where they trace the source of attack by Pakistani positions. The system was given for trial to Army in 2018.

Officials said the export order will help India open a new market for the sale of its indigenous systems, which are cheaper than their European and other rivals.

The Defence Ministry is also now looking at other orders from South-East Asia, Latin America and Middle-East countries for boosting defence exports for which a target of Rs 35,000 crore has been set by Prime Minister Narendra Modi. (ANI)

https://www.bignewsnetwork.com/news/264180208/india-beats-russia-poland-to-bag-40-million-defence-deal-in-europe

hindustantimes

Sat, 29 Feb 2020

India's top science minds to bomb national explosion workshop with latest inventions

Pune Scientists from across India will present and share their research work on detection of explosives during the second national workshop on explosive detection, organised at the APJ Abdul Kalam auditorium in Pashan on March 1.

To be Inaugurated by Satheesh Reddy, Secretary, Department of Defence R&D, and Chairman DRDO, the workshop has been organised to commemorate the golden jubilee of the High Energy Material Research Laboratory, operating under DRDO Pune.

The workshop provides a platform to scientists, technocrats and users to share knowledge, experience and technological advancements made in the recent past.

A total of 250 delegates from different DRDO labs, Army, Central Reserve Police Force (CRPF), Central Industrial Security Force (CISF), bomb detection and disposal squad (BDDS), police, academic institutes, industry and other security agencies will attend.

Raider-X: bomb disposal from a safe distance

A new explosive detection device, named the Raider-X, developed jointly by HEMRL, Pune and IISc Bengaluru will be launched.

Raider –X is a Rapid Identification Detector, used to identify a wide range of explosives. The device is capable of detecting concealed explosives using the Raman Spectroscopy-based technique Umars (Universal Multiple Angle Raman Spectroscopy) from a distance.

The data library can be built in the system to expand its capability to detect a number of explosives in pure form as well as with the contaminants.

https://www.hindustantimes.com/cities/india-s-top-science-minds-to-bomb-national-explosion-workshop-with-latest-inventions/story-Xfc9M2q9KSAu9awtb2RX7L.html

hindustantimes

Sun, 01 March 2020

Nat'l science day: Mission Shakti Chief takes aim with 'smaller, but lethally accurate' weapons for the future

Kinetic energy is the future concept for weapons. Challenges are to achieve a low miss, or direct hit, at conditions of high closing velocity and low homing duration, says U Raja Babu, project director, Mission Shakti, DRDO, Hyderabad

Pune: The evolution of warfare was laid out for science enthusiasts, with U Raja Babu, project director, Mission Shakti, DRDO, Hyderabad, insisting that "smaller, but lethally accurate" is the way forward.

Babu was speaking on 'Technological Challenges - Missile and Space Defence', at the CSIR National Chemical Laboratory (NCL) on the occasion of National Science Day on Friday.

Babu, who comes from a defence background, laid out his view of what the future holds.

"The future will be of nature-centric warfare and information warfare. Constantly, new technologies are coming out. Today, smaller ones but targeted weapons are needed. From tactical systems we are working on network-centric system. Improvement is coming in accuracy of weapons."

"Kinetic energy is the future concept for weapons. Challenges are to achieve a low miss, or direct hit, at conditions of high closing velocity and low homing duration.

"We need faster autopilots, accurate estimators and advanced guidance subsystems to lethally enhance or neutralise a payload. Space security is another important future challenge and I look forward to you all students as working in this field," Babu said.

Babu called for students to pursue challenging careers to take India ahead.

"Mission Shakti is not just a mission, but a message to the nation and to the outside world that India is no longer a developing country and a developed country," Babu said, adding, "We have the technical capabilities to do major projects. When we got the go ahead by PM Modi to do this mission (Shakti) in 2016, within two years our scientists worked round the clock and executed the mission. It was very challenging for us and I look forward to all Science students working on such missions or projects in the future" Babu said.

Mission Shakti is India's anti-satellite weapon system, developed at DRDO, and headed by Babu.

Ashwini Kumar Nangia, director of CSIR NCL, talking on the occasion said, "This is the 70th year of NCL and we will be displaying the history of the NCL through a permanent exhibition inside the campus. Research scholars of NCL will make movies on NCL's work. In the next two months we will open the exhibition room here on the campus."

https://www.hindustantimes.com/cities/mission-shakti-chief-takes-aim-with-smaller-but-lethally-accurate-weapons-for-the-future/story-2P9e6nJTLVwL1zB0rrEMNM.html

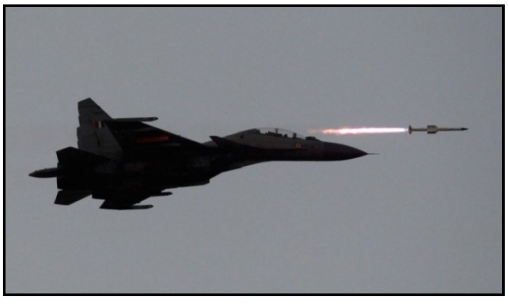
DEFENCE AVIATION POST

Your Connect To The World Of Defence And Aviation

Sat, 29 Feb 2020

ASTRA air-to-air missile is quietly killing it

A handful of yellow journalists in the Indian media have been postulating that the Indian Air Force is not even ready for any kind of aerial skirmish with PAF similar to the events that occurred last year after the incisive Balakot air strikes.



Contrary to these ostensibly motivated alarmism, DRDO and the IAF have readied a potent air-to-air missile which is touted to be the best in class currently available anywhere in the world. Way back in May 2014, the Astra has battled steady headwinds to turn the corner and find an unusually pleased customer in the Indian Air Force.

Following a rapid-fire spate of seven guided tests, topped off with the two 'combat' tests, the IAF was persuaded to sign on for 50 pre-production Astra missiles, its healthiest show of confidence in a program. These missiles could prove invaluable if and when an exigency arises.

One of India's most ambitious and challenging missile projects, the ASTRA (Sanskrit for 'weapon') beyond visual range air-to-air missile had entered a final round in Sept 2018 of trial launches ahead of service with the Indian Air Force.

With over 20 the missile was fired in a fully guided mode at a manoeuvring aerial target drone. With over 20 aerial tests since it was first fired from an IAF Su-30 MKI in May 2014, the weapon is to

be tested a handful more times before being handed over to the Indian Air Force for a cycle of user trials before induction into service.

ASTRA initially had some technological challenges which have been overcome successfully. With persistent effort by DRDO and with active IAF support, all the user evaluation has been completed and ASTRA is now ready for induction.

https://www.defenceaviationpost.com/2020/02/astra-air-to-air-missile-is-quietly-killing-it/

hindustantimes

Sat, 29 Feb 2020

Balakot changed the paradigm: IAF Chief

Bhadauria said the use of air power was considered taboo in sub-conventional conflict until the government took the "tough and bold call" to strike at the very heart of terrorist training infrastructure located deep across the LoC.

By Rahul Singh

Indian Air Force Chief Air Chief Marshal RKS Bhadauria on Friday said that last year's Balakot air strikes showed there is scope to use the air force for taking out targets in Pakistan below the threshold of conventional war, something that was previously considered unviable.

"It [the Balakot operation] was a very clear demonstration that there exists a space below the conventional [war] boundary wherein IAF can be utilised for targeting and yet have escalation control," Bhadauria said at a seminar to mark the first anniversary of India's unprecedented, peace time air strikes inside Pakistan.

The seminar titled Air Power in No War No Peace, was organised by think thank Centre for Air Power Studies. Defence minister Rajnath Singh, Chief of Defence Staff General Bipin Rawat, navy chief Admiral Karambir Singh and Defence Research and Development Organisation chief G Satheesh Reddy were present when Bhadauria made his comment.

Bhadauria said the use of air power was considered taboo in sub-conventional conflict until the government took the "tough and bold call" to strike at the very heart of terrorist training infrastructure located deep across the Line of Control (LoC).

During his speech, Rajnath Singh said India's "out-of-the-box response" forced the rewriting of many doctrines across the LoC and an adversary would think a hundred times before any future misadventures.

General Rawat said it was important for the military to have credible deterrence to execute the tasks assigned to it. "Credible deterrence comes from the will of the military leadership and intent of the political class while taking tough decisions. This was amply shown after Kargil, Uri and Pulwama," Rawat said.

The air chief said the use of air power in sub-conventional sphere had been talked about previously -- but never employed.

Former IAF chief Air Chief Marshal Fali Major (retd) said, "If we have hard intelligence and there is reason for us to act, we should take down terrorists and terror infrastructure across the LoC from the air. Balakot has shown it can be done." As air chief, Major had proposed aerial strikes against terror pads in Pakistan-occupied Kashmir after the 26/11 Mumbai terror attacks but the government did not take that route.

The IAF's Mirage-2000s struck a Jaish-e-Mohammed camp in Balakot on February 26, 2019, in response to the Pulwama suicide bombing attack in Kashmir in which 40 Central Reserve Police Force men were killed twelve days earlier.

The air chief said the IAF struck its targets in Pakistan's Balakot with precision and the decision to use air power in a sub-conventional scenario was a paradigm shift. It was a clear message to Pakistan that terrorist attacks on Indian soil were unacceptable and would draw a military response, he added.

The air chief said that India was also able to use different channels to de-escalate the conflict and bring things back to normal, something that was not thought to be possible after the use of air power. He lauded the political and diplomatic efforts to quickly de-escalate the situation.

He said the air force could have struck Balakot with twice the number of warplanes and launched four times the weapons but it didn't do so to ensure there was no collateral damage and India could take the moral high ground.

He said Pakistan's response on February 27 to the Balakot air strikes was tailored to seek de-escalation as the neighbouring air force didn't strike any targets and its action was aimed only at the domestic Pakistani audience. The air chief said the Pakistan Air Force was in a "hurry to disengage" and the IAF's engagement surprised them.

The air chief said one of the main takeaways for India from the aerial engagement was that the IAF, which had the edge when it comes to beyond visual range (BVR) missiles Pakistan during the Kargil war, had "allowed it to slip" over the years. "We had an edge over Pakistan Air Force in terms of BVR missile capability at the time of Kargil. We allowed that to slip and thereafter it took a decade and half in our struggle to acquire better capabilities," the air chief said.

He said the BVR edge would be restored with the induction of Meteor missile-armed Rafale fighter planes.

"With Rafale we will recover the edge, but we can't depend only on Meteor. This capability on Rafale has to be complemented with similar capability on our other platforms…The indigenous Astra missile is required on Sukhoi-30s, MiG-29s and the light combat aircraft," he said.

Developed by the DRDO, the Astra BVR air-to-air missile has a range of more than 100 km. User trials of the missile have been completed and the IAF is expected to place orders soon. The missile is expected to be the standard long-range weapons across the air force's fighter fleet.

Bhadauria said the IAF would be "very happy" if it could use indigenous weapons "in the next skirmish".

Rawat said the Indian armed forces should stay prepared to get "launched again and again" should acts of terrorism be perpetrated on Indian soil.

"If the defence forces have to be prepared to execute the roles and tasks assigned to them, it is important we maintain credible deterrence at all times… on land, at sea and in the air. The capabilities of the three services must run concurrently so that together they become a force to reckon with," he added.

The defence minister said the surgical strike of 2016 and Balakot air strikes were not just military strikes but a strong message to Pakistan that terror infrastructure across the border cannot be used as a safe haven to wage low-cost war against India.

"Our approach to terrorism was and will remain a judicious combination of clinical military action and mature and responsible diplomatic outreach."

He said, "We have recently seen the impact of collective diplomatic and financial pressure on Pakistan. Terrorists like Hafiz Saeed who were treated like VIPs and heroes, have been put behind bars. We realise that this is not enough and unless Pakistan is made accountable, it will continue with its previous policy of duplicity and deceit. All attempts are being made to work in this direction."

https://www.hindustantimes.com/india-news/balakot-shows-targets-can-be-struck-in-pak-iaf-chief/story-M9yJFVvQusf88ibFeiFbsI.html

The Sentinel
of this land, for its people

Sun, 01 March 2020

GOC 4 Corps of Indian Army Lt Gen Shantanu Dayal visits DRL-DRDO, Tezpur

Tezpur**:** General Officer in Commanding (GOC) of 4 Corps of the Indian Army Lt Gen Shantanu Dayal, visited the Defence Research Laboratory (DRL-DRDO), Tezpur on Friday as a chief guest on the occasion of National Science Day 2020 along with Simmi Dayal. Dr SK Dwivedi, Director of DRL, gave a comprehensive overview of the ongoing research programme of the laboratory under the Arunodaya programme.

The GOC appreciated the good efforts being undertaken by the scientists of DRL for improving and promoting the well-being of the troops in the border and forward areas of Northeast India. He encouraged and motivated all the scientists as there is a need to do a lot for the well-being and combat effectiveness of the troops in ground conditions including acclimatisation in high altitude areas, stabilisation of fragile mountain soils because of infrastructure development, water quality issues and sewage disposal in cantonment areas etc.

The GOC awarded the National Science Day medal and certificate to Dr PK Raul, Sc. 'D' of DRL for his National Science Day Oration. He visited the DRL Exhibition Hall "Chitramandap" and was explained about the exhibits of various innovative products and technologies developed by the DRL-DRDO.

https://www.sentinelassam.com/north-east-india-news/assam-news/goc-4-corps-of-indian-army-lt-gen-shantanu-dayal-visits-drl-drdo-tezpur/

दैनिक जागरण

Mon, 02 March 2020

तेजस की मारक क्षमता और बढ़ेगी

सीएसआइओ ने ईजाद की खास टेक्नोलॉजी 'एचयूडी', पायलट को दुश्मन पर हमला करने में होगी आसानी, दुश्मन की ना-पाक हरकतों का देंगे और करारा जवाब

डॉ. सुमित सिंह श्योराण

दुश्मन की नापाक हरकतों का जवाब भारत अब और कारगर तरीके से देगा। लड़ाकू विमानों का निशाना एकदम अचूक होगा। देश में बने फाइटर एयरक्राफ्ट एलसीए तेजस (लाइट कंबेट एयरक्राफ्ट) की मारक क्षमता को मजबूत बनाने में चंडीगढ़ स्थित केंद्रीय वैज्ञानिक उपकरण संगठन (सीएसआइओ) ने खास टेक्नोलॉजी हेडअप डिस्प्ले (एचयूडी) इमेज को तैयार किया है। दो हजार किलोमीटर प्रति घंटे की रफ्तार वाले तेजस को उड़ाने वाले पायलट को दुश्मन पर हमला करने के साथ ही अन्य प्रणाली पर नियंत्रण के लिए अधिक मशक्कत नहीं करनी पड़ेगी।

शुक्रवार को चंडीगढ़ सीएसआइओ के डायरेक्टर डॉ. आरके सिन्हा की उपस्थिति में एचयूडी टेक्नोलॉजी को पंचकूला की भारत इलेक्ट्रॉनिक लिमिटेड (बीईएल) को सौंपा गया। परीक्षण में नई टेक्नोलॉजी के शानदार परिणाम रहे। अब लड़ाकू विमानों में सीएसआइओ द्वारा तैयार टेक्नोलॉजी का प्रयोग किया जाएगा।

इस टेक्नोलॉजी का इस्तेमाल करने वाला भारत दुनिया का पांचवां देश : एचयूडी इमेज टेक्नोलॉजी को सीएसआइओ के मुख्य वैज्ञानिक डॉ. विनोद करार की देखरेख में तैयार किया गया है। उन्होंने बताया कि इस टेक्नोलॉजी से लड़ाकू विमान तेजस की मारक क्षमता और पायलट की सुरक्षा को मजबूती मिलेगी। दुनिया में इस टेक्नोलॉजी को विकसित करने वाला भारत पांचवां देश है। यह टेक्नोलॉजी इजराइल, फ्रांस, यूके व यूएसए के पास पहले से ही है। एचयूडी टेक्नोलॉजी से पायलट को कॉकपिट में बने ग्लास पर ही सभी जरूरी जानकारी एकदम स्टीक मिलेगी। दुश्मन के ठिकानों पर सौ फीसद अचूक निशाना लगाया जा सकेगा।

परीक्षण के बाद 37 एचयूडी इमेज के ऑर्डर दिए जा चुके हैं। प्रति यूनिट इस टेक्नोलॉजी पर 90 लाख के करीब खर्च आएगा जबकि दूसरे देश से लेने पर एक से सवा करोड़ रुपये खर्च करने पड़ते थे। हर लड़ाकू विमान में एचयूडी की दो यूनिट लगाई जाएंगी ताकि एक खराब होने पर दूसरे का इस्तेमाल किया जा सके।

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सीएसआइओ चंडीगढ़ द्वारा तैयार नई टेक्नोलॉजी से लड़ाकू विमानों की मारक क्षमता और बेहतर होगी। पूरी टीम ने काफी लंबे समय तक इस पर काम किया। परिणाम भी काफी अच्छे मिले हैं। इंस्टीट्यूट के लिए यह बड़ी उपलब्धि है।

– डॉ. विनोद करार, चीफ साइंटिस्ट एंड हेड ओपटिक्स बेस्ड स्ट्रेटेजिक इंस्ट्रूमेंटेशन सीएसआइओ, चंडीगढ़

यह पूरी तरह से स्वदेशी टेक्नोलॉजी है। जिसे कम लागत में तैयार किया गया है। सीएसआइओ ने अब कामर्शियल एयरक्राफ्ट से लेकर वाहनों तक में एचयूडी टेक्नोलॉजी को विकसित करने पर काम शुरू कर दिया है। लड़ाकू विमान में भी इस टेक्नोलॉजी का प्रयोग किया जा सकेगा। टेक्नोलॉजी के मामले में भारत अब आत्मनिर्भर बनने की दिशा में बड़ा कदम बढ़ा रहा है।

– डॉ. सुरेंद्र सिंह सैनी, हेड बिजनेस इनोवेटिव एंड प्रोजेक्ट प्लानिंग सीएसआइओ, चंडीगढ़

दैनिक जागरण

Mon, 02 March 2020

देश में ही तैयार होंगे अपाचे सरीखे बनेंगे युद्धक हेलीकॉप्टर

वर्ष 2032 तक एमआइ-17 की जगह लेंगे नए चॉपर, 2027 तक एचएएल बनाएगा पहला चॉपर, डिजाइन तैयार-सरकारी मंजूरी इस साल, नौसेना के अलग किस्म के और थलसेना और वायुसेना के लिए एक जैसे बनेंगे

नई दिल्ली, प्रेट्र : भारत अब अमेरिकी कंपनी बोइंग के अपाचे हेलीकॉप्टर की टक्कर के स्वदेशी युद्धक हेलीकॉप्टर बनाएगा। इस महत्वाकांक्षी परियोजना का बीड़ा हिंदुस्तान एयरोनाटिक्स लिमिटेड (एचएएल) को सौंपा गया है, जिसे वर्ष 2027 कर 10 से 12 टन के युद्धक हेलीकॉप्टर बनाने हैं। यह स्वदेशी हेलीकॉप्टर 'मेक इन इंडिया' परियोजना के तहत तीनों भारतीय सेनाओं के लिए बनाए जाएंगे जो हर तरह से वैश्विक स्तर के मध्यम भार के युद्धक चॉपर होंगे।

एचएएल के प्रबंध निदेशक और चेयरमैन आर.माधवन ने रविवार को एक इंटरव्यू में बताया कि सरकार ने इस साल परियोजना को मंजूरी दे दी तो इसके कम से कम पांच सौ यूनिट तैयार किए जाएंगे। हालांकि इसका पहला प्रोटोटाइप वर्ष 2023 तक यानि अगले तीन साल में ही तैयार हो पाएगा जबकि पहले चॉपर का उत्पादन वर्ष 2027 तक होगा। एचएएल इस हेलीकॉप्टर केप्रोटोटाइप के लिए प्रारंभिक डिजाइन तैयार कर चुका है। इस हेलीकॉप्टर के डिजाइन और उसके प्रोटोटाइप के उत्पादन के लिए 9,600 करोड़ रुपये की आवश्यकता होगी।

माधवन ने बताया कि यह प्रोजेक्ट इसलिए भी बेहद अहम है कि अपाचे की तर्ज पर बननेवाले यह स्वदेशी युद्धक हेलीकॉप्टर एमआइ-17 फ्लीट की जगह लेंगे। दस से बारह टन के भार वाले इन स्वदेशी हेलीकॉप्टरों के कारण विभिन्न देशों से आयात किए जाने वाले हेलीकॉप्टरों पर खर्च होने वाले चार लाख करोड़ रुपये की बचत होगी। एमआइ-17 हेलीकॉप्टर फिलहाल भारतीय वायुसेना की हेलीकॉप्टर फ्लीट की रीढ़ हैं। लेकिन वर्ष 2032 तक इन्हें रिटायर करने की तैयारी है।

10 व 12 टन की दो श्रेणियां बनेंगी : एक सैन्य विशेषज्ञ का कहना है कि तेजस विमानों के बाद एचएएल का यह अब तक का सबसे बड़ा प्रोजेक्ट है। माधवन ने कहा कि प्रस्तावित मेगाप्रोजेक्ट के तहत इन स्वदेशी हेलीकॉप्टरों की दो श्रेणियां तैयार की जाएंगी जिसमें एक दस टन और दूसरा 12 टन श्रेणी का होगा। हेलीकॉप्टर के प्रारंभिक डिजाइन को पूरा कर लिया गया है। वायुसेना और नौसेना से बातचीत चल रही है। नौसेना का हेलीकॉप्टर थलसेना और वायुसेना से अलग होगा।

उन्नत हथियारों से लैस होंगे चॉपर : माधवन ने बताया कि अपाचे सरीखे हेलीकॉप्टर दो इंजन वाले होंगे। नौसेना के जहाज के डेक के अभियानों के लिए इनके पंखों के ब्लेड को फ्लोडेबल बनाया जाएगा। इन हेलीकॉप्टरों का इस्तेमाल हमले, हवाई परिवहन, युद्धक अभियानों व बचाव कार्यों में किया जाएगा। यह बेहद उन्नत किस्म के हथियारों से लैस होंगे।

आर्मेनिया को 280 करोड़ रुपये की रडार प्रणाली निर्यात करेगा भारत पेज>>3

अपाचे हेलीकॉप्टर फाइल फोटो

अमेरिका से खरीदे जा रहे 28 अपाचे

पिछले ही हफ्ते अमेरिकी राष्ट्रपति डोनाल्ड ट्रंप की भारत यात्रा के दौरान हुए रक्षा सौदे से भारतीय वायुसेना को कुल 22 अपाचे गार्जियन युद्धक हेलीकॉप्टर हासिल होने वाले हैं। यह भारत ने अमेरिकी कंपनी बोइंग से कई अरब डॉलर के सौदे में हासिल किए हैं। जबकि भारतीय थल सेना को भी हथियार प्रणाली से सुसज्जित छह अपाचे हेलीकॉप्टर मिलेंगे। लेकिन फौरी जरूरतों को पूरा करने के साथ ही भारत आने वाले सालों में सैन्य हथियारों और उपकरणों के मामले में आत्मनिर्भर होना चाहता है।

THE HINDU

Mon, 02 March 2020

With falling allocation, Navy looks at fleet optimisation

It is firm on a third aircraft carrier and six advanced submarines under Project-75I, but will also look for more unmanned solutions

By Dinakar Peri

Facing increasing budgetary constraints and with several big-ticket acquisitions lined up, the Navy is looking at adopting unmanned platforms, both aerial and underwater, in a big way, Navy sources said.

However, it is firm on a third aircraft carrier and the next line of six advanced submarines under Project-75I.

This year, the Navy's share in the capital allocation of the defence budget is ₹26,688 crore, while officials said the committed liabilities alone stood at ₹45,000 crore. "We are working on ways to manage it," one official said.

Last year too, the Navy's capital allocation was ₹23,156 crore, while the liabilities were ₹25,461 crore. In the past few years, the Navy's share as a percentage of the defence budget has been going down.

As part of the fleet rationalisation plan, the Navy has cut down on the requirement of minesweepers from 12 to eight and additional P-8I long-range patrol aircraft from 10 to six. The Navy now has no dedicated minesweepers in service, and is resorting to makeshift arrangements. It has procured some autonomous underwater vehicles, and efforts are on to procure more. Similarly, the Navy operates some Israeli drones, and is in the process of procuring 10 General Atomics Seaguardian High Altitude Long Endurance (HALE) armed drones from the U.S. for maritime surveillance. "It is imperative to look for more unmanned solutions," the official said.

Recently, Chief of the Defence Staff, General Bipin Rawat, called for a staggered approach to big procurements, and said the third carrier was too expensive, and the Navy would have to choose between submarines and a third carrier.

"As an expanding blue-water Navy with growing responsibilities, we need power projection. It is not about one over the other. We need more submarines, but we also need a third aircraft carrier so that we have two operational carriers on each seaboard at any given time," a Navy source said. "We will push the case," he said.

Pointing out that big-ticket procurements were inherently staggered, the source said, "Both are long-gestation projects and each has a different role. If we start planning now, it will take 10 to 15 years to get an aircraft carrier. So we cannot delay it."

The P-75I is being processed through the Strategic Partnership (SP) route. The Navy has short-listed five foreign original equipment manufacturers (OEM) and two Indian strategic partners, based on the response to the Request for Information and the subsequent criteria-based evaluation. "The project is on track, and there is no change in the numbers. We should be able to issue the Request for Proposal by April," the source said.

The Navy envisages the proposed second Indigenous Aircraft Carrier (IAC-II) to be displacing 65,000 tonnes and conventionally powered, with a steam-launched catapult for launching and recovering aircraft. "The Navy has done a detailed study, and the specifications have been arrived at based on the requirements. The IAC-II should cost around ₹45,000 crore," another source said, adding there were exaggerated cost estimates being quoted.

In addition, the Navy has several big-ticket acquisitions lined up. These include 111 naval utility helicopters, six additional Boeing P-8I aircraft and 13 BAE Systems MK45 naval guns.

https://www.thehindu.com/news/national/with-falling-allocation-navy-looks-at-fleet-optimisation/article30958009.ece

THE ECONOMIC TIMES
WWW.ECONOMICTIMES.COM

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36 Rafale aircraft will not be adequate for IAF: Air Chief Marshal RKS Bhadauria

Bhadauria, while speaking at a seminar "Air Power in 'No War No Peace' Scenario", explained that the induction of the Rafales armed with Beyond Visual Range (BVR) Meteor missiles, will give the IAF an edge over the Pakistan Air Force in terms of BVR technology. The first Rafales arrive in India in May

By Shaurya Karanbir Gurung

New Delhi: The 36 Rafale fighter aircraft will not provide the Indian Air Force a complete solution and there is a need to develop indigenous weapons and technology which will be a major "gamechanger" in the future, IAF Chief Air Chief Marshal RKS Bhadauria said on Friday.

Bhadauria, while speaking at a seminar "Air Power in 'No War No Peace' Scenario", explained that the induction of the Rafales armed with Beyond Visual Range (BVR) Meteor missiles, will give the IAF an edge over the Pakistan Air Force in terms of BVR technology. The first Rafales arrive in India in May.

But, he said that the IAF cannot just depend on the Rafale's Meteor BVR missiles to sort out the force's requirements. He added that when the indigenous Astra missile is integrated with the Su-30 and MiG-29 aircraft, it will ensure better performance and parity across the IAF. He said that the indigenous industry needs to give the IAF an edge in weapons, adding that the force will be "happy" to use such technology in the next skirmish.

While the IAF Chief said that the force didn't have the BVR edge over the Pakistan Air Force at the time of the Balakot strikes in February last year, the hit showed the will to strike targets across the Line of Control. He said it was a demonstration on the use of airpower below the conventional boundaries, wherein the IAF can be used for targeting and have escalation control. He added that to prevent collateral damage, the weapons & their quantity was chosen to be just adequate, otherwise the IAF could have "doubled the aircraft and launched four times the weapons".

Defence Minister Rajnath Singh, who also attended the seminar, said that the Balakot strikes were a strong message to Pakistan that terrorist infrastructure across the border cannot be used as a safe haven to wage a "low-cost war" against India.

He said that following the Balakot strikes the government has initiated "major structural changes" to tackle future threats. But, he added that arresting terrorists like Hafiz Saeed is not enough and unless Pakistan is made accountable it will continue with its policy of "deceit".

On the Rafales and indigenous technology, Bhadauria said, "The 36 Rafales will not give the IAF an entire solution. But when our indigenous Astra goes on to the Su-30 and MiG-29 that is the real power of parity and better performance that will spread across the air force...Indigenous technology projects need to succeed on a time frame that is robust and the industry needs to give us these products that are indigenous. That is a major game changer that should happen in future. We will be happy that in the next skirmish the weapons that we use are indigenous."

The Astra is a BVR air-to-air missile developed by the Defence Research and Development Organisation. He also said that over the last year the air force has concentrated on advanced weapon systems and has examined some sensors and indigenous missiles that it has expedited. “We cannot just depend on meteor class BVR on Rafale to sort out the entire air force requirements. It is also important that this capability on rafale is complemented with similar capability on other platforms,” he said.

“We had a BVR edge over the Pakistan Air Force at the time of Kargil. We allowed that to slip and thereafter it took a decade and a half in our struggle through the acquisition process to be able to get back to a better capability. It didn’t materialise at the time of Balakot and it will materialise with the Rafale inducting,” he said.

Speaking on Balakot's lessons, Bhadauria said, “First is the demonstration of the will to strike against targets across the LoC. This was a major shift and fundamental to our actions in the future…This was a clear demonstration on the use of airpower that exists a space below the conventional boundaries wherein the IAF can be utilised for targeting and yet have escalation control.”

He also said, “It was important to get the target and to ensure no collateral damage. That was the choice of weapons was chosen and the quantity chosen in a manner that it is just adequate, otherwise we could have doubled the aircraft and launched four times the weapons.”

Meanwhile, Singh said that India’s out-of-the-box response reflected in the Balakot airstrikes forced the rewriting of many doctrines across the LoC and the adversary has to think “100 times for any future misadventures”.

Stressing on the importance of diplomatic and financial pressure to thwart cross-border terrorism, he said, “We have recently seen the impact of collective diplomatic and financial pressure on Pakistan. Terrorists like Hafiz Saeed who were treated like VIPs and heroes, have been put behind bars. We realise that this is not enough and unless Pakistan is made accountable, it will continue with its previous policy of duplicity and deceit. All attempts are being made to work in this direction.”

https://economictimes.indiatimes.com/news/defence/36-rafale-aircraft-will-not-be-adequate-for-iaf-air-chief-marshal-rks-bhadauria/articleshow/74403772.cms

Business Standard

Sun, 01 March 2020

Indian Navy makes a case for third aircraft carrier amid fund crunch

Opponents claim it will create another white elephant, but Naval planners say funding is possible

By Ajai Shukla

With the military short of funds for modernising its arsenal, India’s most contentious and consequential weapons procurement debate is taking place over the Navy’s proposal to build a second indigenous aircraft carrier – Indian Naval Ship (INS) Vishal.

There are already two aircraft carriers – the Russian-built INS Vikramaditya, which joined the fleet in 2013 and INS Vikrant, which Cochin Shipyard Ltd (CSL) expects to make fully operational in 2022, INS Vishal, the third carrier, would allow the navy to operate two carriers while allowing one to be in the dockyard for repair, overhaul or upgrades.

Given the military’s modest capital budget of Rs 1.18 trillion ($16.5 billion) for 2020-21 – which is one-fourth of the total defence allocation of Rs 4.71 trillion ($65.8 billion) – the Indian Air Force (IAF) and the Army are opposed to committing a large chunk of money to a single naval procurement.

Tri-service chief, General Bipin Rawat, has made it clear that he too does not regard a third carrier as a priority. “What will be its effect on the Air Force and the Army? We have to… see the impact of the third aircraft carrier,” he said.

For the IAF, a third aircraft carrier would leave less funding for its own big priority: a $15-20 billion plan to buy 114 medium fighters. The army similarly wants the lion’s share of the capital budget to be expended on artillery guns, tanks, rifles and aviation assets such as attack helicopters.

However, this is as much about turf as about funding. Air forces have historically regarded aircraft carriers as naval encroachments into their domain; which is control over all combat aircraft. The IAF argument is that fighter aircraft, operating from well-protected shore bases, can support the navy fleet better than a handful of fighters operating from a vulnerable carrier that the enemy would be targeting relentlessly.

Navies worldwide have fought this turf battle, including Britain’s Royal Navy (RN). Old salts recount when Winston Churchill, as First Lord of the Admiralty (the RN used to have its own minister!), boarded an aircraft carrier in 1939 for a day at sea. While he was looking around, a siren blared and he found himself alone. Making his way to the ship’s bridge, Churchill asked the young lieutenant on watch what was happening.

The lieutenant pointed to the sky at a Messerschmitt 109 fighter circling the carrier. “Enemy aircraft,” he explained.

Churchill glowered at him. “Son, that’s a Luftwaffe (German Air Force) fighter! Always remember: the Luftwaffe is only the adversary. The enemy is the Royal Air Force.”

In keeping with that relationship, a spate of recent articles in the Indian media has argued against buying a third carrier. These air power votaries have described aircraft carriers as “white elephants”, exorbitantly expensive in themselves, but also tying down a whole flotilla of escort vessels – frigates, destroyers, logistic support vessels and submarines – that make up a “carrier battle group” (CBG) with the firepower and staying power needed to survive and project power far from India’s shores.

A linked argument is that carriers are such powerful symbols of national prestige that the sinking of one would be a damaging psychological blow to national morale. This echoes the logic of the German Navy in World War I, which shied away from sending its vaunted dreadnoughts (heavy cruisers) into battle since they were “too big to lose.”

The air power lobby also argue that it would be rash to spend some Rs one trillion on the massive, 65,000 tonne INS Vishal – with half that amount required for its aviation complement of 50-55 aircraft. Instead, that money would be better spent on more usable assets, such as frigates and submarines.

The survivability of carriers is a question mark, say the air power theorists, since China’s People’s Liberation Army (Navy), or PLA(N), has over the last two decades implemented a potent Anti Access/Area Denial (A2/AD) doctrine to deter any repeat of the Taiwan Strait Crisis of 1996, when an American CBG sailed between Taiwan and China to signal support to the former. As part of the A2/AD strategy, China has developed weapons such as the Dong Feng 21D “carrier killer” ballistic missile that can supposedly destroy enemy aircraft carriers at ranges out to 1,500 kilometres.

The air power advocates acknowledge the fleet needs air support. However, they say it should be delivered from shore bases, through the IAF’s long-range fighters, such as the Sukhoi-30MKI and soon the Rafale, which can strike targets far in the Indian Ocean. Mid-air refuelling would increase the reach of land-based fighters, once India concludes its long-delayed acquisition of air-to-air refuelling aircraft.

Not so expensive

Top naval planners contest the notion of a “Rs 100,000 crore carrier.” A top admiral told Business Standard: “INS Vikrant, the first indigenous carrier (IAC-1) will have a final cost of Rs 19,800 crore. The defence ministry’s Cost Committee has fixed the cost of IAC-2 at Rs 40,000 crore – twice that of

IAC-1. That caters for the larger size of IAC-2 (65,000 tonnes, compared to the 40,000 tonne IAC-2). It also caters for the IAC-2's more sophisticated and expensive weaponry, and for inflation."

Crucially, IAC-2 does not need a new air wing. The navy already has 45 MiG-29K/KUB fighters and the additional 57 carrier deck fighters currently under purchase will give the navy enough fighters for two air wings. A third air wing in unnecessary, since one of the three carriers is planned to be in refit at any given time.

The Navy's "White Tigers" squadron, with its MiG-29K/KUBs

The navy plans to pay the Rs 40,000 crore cost of IAC-2 over a decade, which averages to an annual pay out of Rs 4,000 crore. Of the navy's current capital budget of Rs 26,688 crore, 30 per cent – or Rs 8,000 crore – is available for new purchases. With the capital budget expected to rise by an annual 10 per cent, naval planners are confident they can afford the expense.

The Rs 40,000 crore projection for INS Vishal appears realistic, when compared with what the UK paid to build two similar, 65,000-tonne, conventionally powered carriers – HMS Queen Elizabeth and HMS Prince of Wales. Together they cost £6.2 billion, or about £3.1 billion (Rs 28,700 crore) apiece.

The navy, long at the forefront of indigenisation, underlines the benefits of building INS Vishal in India. While the IAF's acquisition of foreign aircraft mainly benefit foreign corporations, the Rs 40,000 crore pay out on IAC-2 will go mainly to Indian medium, small and micro enterprises (MSMEs). For example, 2,100 Indian MSMEs are working on Project 17A – the construction of three stealth frigates in Garden Reach Shipbuilders and Engineers (GRSE), Kolkata.

Power projection in the Indian Ocean

The admirals also rebut the IAF's claim that it can provide the navy adequate air support. India's military doctrine requires the navy to project power far from our shores, as the "net security provider" in the Indian Ocean. Establishing "sea control" far from one's shores – for example, off Africa's western coast, or south of Indonesia – requires "persistent" air power, which can remain in the target area. Even if IAF fighters, operating from faraway shore bases, manage to reach the target area, they lack the endurance to remain there for any length of time. In contrast, a carrier can keep its aircraft on deck and launch them at short notice when they are needed.

There was some merit in the IAF's contention that smaller 40,000-tonne carriers, such as INS Vikramaditya and Vikrant, which embark barely 20-24 fighters (along with 8-10 helicopters), are capable of generating only enough air power to protect themselves and their escort vessels, not to dominate large oceanic expanses. However, naval planners say that would certainly not be true of the 65,000-tonne INS Vishal, which would embark some 50-54 aircraft, including fighters, electronic warfare aircraft, airborne command posts and anti-submarine helicopters. Along with another ten-odd helicopters on the CBG's other warships, INS Vishal can both protect and dominate.

Nor does the modern aircraft carrier need protection from a flotilla of escort vessels. INS Vishal's integral anti-submarine warfare (ASW) weaponry, including the newly contracted MH-60 Romeo helicopters, would handily detect and destroy enemy submarines, especially when networked with the long-range P-8I Poseidon aircraft.

INS Vishal would also be armed with new-generation, long-range surface-to-air missiles (LR-SAM), which India and Israel are collaborating to upgrade, to detect and destroy incoming anti-ship missiles at ranges out to 250 kilometres. INS Vishal's escort warships are needed less for protecting the carrier and more for enhancing the CBG's sea control capability. Given that these are multi-role destroyers and frigates, capable of dealing with sub-surface, surface and air threats – the flotilla will be able to also detach task forces for independent missions.

The navy believes there is no alternative to aircraft carriers if we wish to control the Indian Ocean. The US Navy describes its flattops as "four-and-a-half acres of sovereign and mobile American territory", which carry US military power to crisis spots worldwide. Former US Secretary of State Henry Kissinger described a carrier as "100,000 tonnes of diplomacy."

The Indian Navy is one of the world's few with six decades of experience in aircraft carrier operations. Many others – such as Russia, China, Italy and Spain – are either learning on the job or forgetting the skills they once possessed. Emerging as a highly capable, three-carrier force would build on existing strengths, provide strategic heft to India's "Act East" policy and encourage the US, French and British navies to partner India in developing the operational doctrines and technologies that will be needed to counter an increasingly assertive China.

THE HINDU

Mon, 02 March 2020

HAL finalises plan to produce military helicopter on par with Boeing's Apache Guardian

The Indian Air Force is procuring a total of 22 Apache Guardian attack helicopters from aerospace major Boeing under a multi-billion dollar deal

New Delhi: In an ambitious project with strategic significance, aerospace major Hindustan Aeronautics Ltd (HAL) has started ground work to produce a 10 to 12 tonne attack helicopter by 2027 which will be comparable with some of the best medium-lift military choppers globally like the Apache of the Boeing.

Chairman and Managing Director of HAL, R. Madhavan, said the aim of the mega project is to stop import of more than ₹4 lakh crore worth of military helicopters for the three services in the coming years.

In an interview, Mr. Madhavan said the HAL has completed the preliminary design of the helicopter and that initial plan is to produce at least 500 units with the first prototype set to be ready by 2023 if the government gives the go ahead to the project this year.

"One major project we are focusing on is to produce a helicopter in 10 to 12 tonnes category to replace the Mi-17 fleet. It will be an indigenous platform with the potential to manufacture around 500 helicopters. It will stop import of more than ₹4 lakh crore worth of platforms from foreign countries," he said.

Mr. Madhavan said an amount of ₹9,600 crore will be required for design as well as to produce the prototype of the helicopter.

"If we get the approval in 2020, we will be able to manufacture the first chopper by 2027. We are looking at producing at least 500 helicopters of the variant. It will be a major project we are working on," he said.

A military expert described the project as the biggest by the HAL after development of the Tejas military aircraft.

"We have done the preliminary design. We have also been in discussion with the Air Force and the Navy. The 10-12 tonnes category will have two basic structures on similar platforms. The naval version will have different dimension compared to the one for the Army and the Air Force," Madhavan said on the proposed mega project.

"Like the LCH (Light Combat Helicopter) we developed from the Dhruv platform, a similar variant of 10-12 tonnes category can be produced to make it an Apache equivalent," said Mr. Madhavan.

The helicopter will be powered by twin engines and will feature blade folding option for ship deck operations. The planned roles for the helicopter will be to support air assault, air transport, combat logistics and combat search and rescue. The chopper will also have a very superior weapons package.

Mr. Madhavan said the helicopter will have a huge potential for export.

The Mi-17 helicopters make up the backbone of the IAF's helicopter fleet and they are planned to be phased out by 2032.

The HAL's product range includes a number of helicopter like the LCH (Light Combat Helicopter) and multi-role ALH (Advanced Light Helicopter) and Chetak choppers.

India is one of the largest importers of arms and military platforms globally. The government has been focusing significantly on promoting defence indigenisation by taking a slew of reform initiatives including liberalising FDI in defence sector.

The Indian Air Force is procuring a total of 22 Apache Guardian attack helicopters from aerospace major Boeing under a multi-billion dollar deal. Additionally, the Army is procuring six Apache helicopters along with weapons systems, a deal for which was sealed during U.S. President Donald Trump's visit to India last week.

https://www.thehindu.com/news/national/hal-finalises-plan-to-produce-military-helicopter-on-par-with-boeings-apache-guardian/article30956575.ece

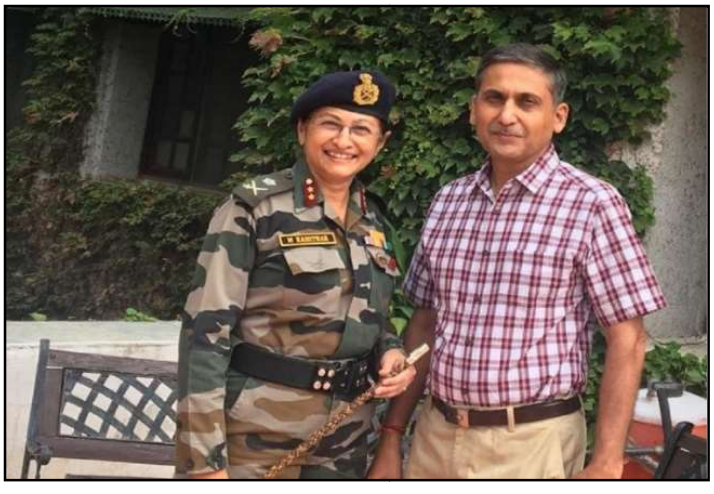
THE ECONOMIC TIMES
WWW.ECONOMICTIMES.COM

Sun, 01 March 2020

Pediatrician Dr. Madhuri Kanitkar cracks the glass ceiling in Indian Army

Kanitkar will be the third woman officer from defence services to bag this prestigious position. Vice admiral Dr. Punita Arora was the first woman from the Indian Navy to get the second highest rank in the armed forces and Padmavathy Bandopadhyay, the first woman Air Marshal of the IAF, was the second woman in the forces to be promoted to a three-star rank after Arora

A pediatrician has achieved one of the rarest feats in the armed forces this year. Major General Dr. Madhuri Kanitkar, former Dean of Armed Forces Medical College Pune, has been promoted to the second-highest rank of Lt. General in the Indian Army.



Kanitkar will be the third woman officer from defence services to bag this prestigious position. She is currently posted in Udhampur's Army Command Hospital.

Vice admiral Dr. Punita Arora was the first woman from the Indian Navy to get the second highest rank in the armed forces and Padmavathy Bandopadhyay, the first woman Air Marshal of the IAF, was the second woman in the forces to be promoted to a three-star rank after Arora.

Kanitkar is the first woman pediatrician to be elevated to the highest rank of Lieutenant General for Indian Army Doctors and is the only doctor on the Prime Minister's STIAC (S&T) Innovation Advisory Committee. This will also be the first time in the history of the Indian armed forces that a couple will hold the 3-star rank of Lieutenant General. Kanitkar's husband, Lt Gen Rajeev Kanitkar, retired from the Army recently.

Kanitkar also holds the distinction of being the first trained paediatric nephrologist of the armed forces and has been the key person behind the setting up of Army units to monitor kidney ailments in Pune and Delhi.

2020 has already become a memorable year for women in the services. In January, Army office Tania Shergill became the first woman army officer to lead the Army contingent in the Army Day and Republic Day parades. In a landmark judgement in February, the Supreme Court ordered the government to grant permanent commission to women officers in Army's non-combat support units on par with their male counterparts.

https://economictimes.indiatimes.com/news/defence/pediatrician-dr-madhuri-kanitkar-cracks-the-glass-ceiling-in-indian-army/articleshow/74413059.cms

THE ASIAN AGE

Sat, 29 Feb 2020

Army's women: On way towards full acceptance

A more nuanced explanation is perhaps that WOs today don't wish to be seen as only seeking pensions, but look towards soldiering as a career

By Syed Ata Hasnain

In the few days after the Supreme Court judgment on permanent commission for women officers (WOs) of the Indian Army and command opportunities for them, both of which got a positive nod from the court, there has been euphoria on one side but an equal amount of consternation among the older school of professional soldiers. Representing a strong view against command opportunities in particular and the potential of possible induction of WOs into combat units of the Army, senior Army veterans have reasoned that permanent commissions could be given to WOs only to allow them to serve till pensionable service, or rules on pension could be slightly bent for their benefit. Further, in their view, command of soldiers by WOs is problematic as soldiers, who are all male and mostly from rural stock, are used to seeing their womenfolk in a different role. The veterans believe rural India's social norms forbid contact between men and women other than relatives, and therefore soldiers from such areas would not take orders from a woman. But personnel management issues about WOs are known only perfunctorily. A more nuanced explanation is perhaps that WOs today don't wish to be seen as only seeking pensions, but look towards soldiering as a career.

First, the issue of WOs in combat arms like the infantry, armoured corps or mechanised infantry is unnecessarily being discussed, fearing that another legal appeal by some WOs may once again gain them the Supreme Court's sympathy. That aspect wasn't in court. Most operationally experienced officers will say its time may come in years, but may not be immediately. It's best to treat it as something that will remain in consideration for an appropriate decision when the environment is conducive; no need to fight it. Besides the fact that the issue of induction into combat arms was not even under consideration, one point seems to elude all post-judgment analyses is that whatever applies to WOs by way of the Supreme Court judgment is strictly for those who are selected for that role by a deep selection process. I would never be happy to serve with a bunch of male officers who have been randomly thrust into operations which involve physical contact with the enemy. Similarly, WOs who receive permanent commissions and will serve till at least the age of 54 will only be those who "have it in them" to perform their outlined tasks; there is no laid-down percentage for selection in such selection boards for male short service officers. To doubt this is to doubt the entire selection procedure of the Army. What needs reiteration is that permanent commission has been opened to WOs only in 10 non-contact arms and services, including the Corps of Signals, Corps of Engineers, Air Defence Artillery, Intelligence, Army Aviation (currently non-flying role), Army Service Corps, Army Ordnance Corps, Electrical and Mechanical Engineers, Judge Advocate General and Army Education

Corps. Since permanent commission offers a full career opportunity and the Indian Army is essentially command oriented, it is only fair that similar career opportunities are also open to WOs; career progression without being tested in command criteria is not a possibility.

A few functional issues do arise. First, there is to be no reservation in promotion vacancies for WOs. This means that they will compete on equal terms with their male counterparts for the restricted number of vacancies (sometimes as little as 30 per cent of batch strength). It means some male officers already at such reduced approval percentages will make way for WOs with better qualifications and potential. It may be remembered that the Army's selection boards examine the record of candidates through a closed system where the identity is anonymous. Thus, selection is entirely fair. Only those women whose record is comparable to their male counterparts will make it to selected status. The question then is their acceptability to the soldiers and subordinate male officers while placed in command appointments. It is my experience that I could have quite easily recognised command potential, or the lack of it, in the WOs who served under me. Many of these WOs were in command of sub-units (the actual command in the Army starts at unit level in the rank of colonel, but the testing for that ultimate capability is done while officers are in command of sub-units as majors and lieutenant-colonels). Most WOs now immediately vying for permanent commissions and later for unit command would have commanded sub-units with soldiers and some male officers as their subordinates. In the 28 years since WOs entered service, male subordinates are already sufficiently sensitised. The rural mindset may well exist, but Indian society has largely decided to give its daughters a fairer chance. A state like Haryana, which is often seen as conservative, is also the one which produces India's finest female boxers and wrestlers; by no means very ladylike sports. Besides this, the modalities of implementation of the Supreme Court judgment remain flexible to the extent that command of frontline units of the 10 arms and services need not be thrust upon WOs with any degree of immediacy. This can be progressive with initial experimentation in command appointments of units and installations in peace stations, which are very much counted as command criteria for male counterparts too. Command of supply depots, rear ordnance depots, station workshops, area HQ signal resources or air support signal regiments and appointments such as Commander Works Engineers, may involve lesser personnel management and more technical expertise. It will no doubt throw up challenges for the Army Military Secretary's branch which believes in the policy of level playing field of opportunities when it comes to promotion boards. To overcome that, a few WOs with permanent commissions, at the outset, can be given command of frontline support units. It will add much confidence to WOs as a whole.

Most field commanders with experience of having WOs serve under them will anecdotally relate instances of severe challenges overcome by these officers; and an equal number will also recall moments of abject failure. That is a natural phenomenon which provides inputs for the MS Branch's selection procedures. At the end of it, the best largely get through, and perform or perish at the next rank. This process of nature will ensure that the role of career WOs in the Army continues to mature and eventually leads to full acceptance.

https://www.asianage.com/opinion/columnists/290220/armys-women-on-way-towards-full-acceptance.html

ThePrint

Sat, 29 Feb 2020

Army and IAF fought over Apache choppers, costing us Rs 2,500 crore more. Blame their silos

Purchase of 28 Apache helicopters is the prime example of how India could have worked out a better deal had the IAF and Army not acted in silos

By Snehesh Alex Philip

Do this math: 22 AH-64E Apache helicopters in 2015 cost $2.1 billion, or Rs 14,910 crore, and six of these in 2020 cost Rs 6,600 crore.

In just five years, the cost of one helicopter jumped by 62 per cent.

Yes, about Rs 1,100 crore each is what the Army will pay for six iconic pure attack helicopters that come armed with the state-of-the-art weapon system and are a big boost to the military's firepower.

If one does a basic calculation, then each IAF helicopter in 2015 cost approximately Rs 678 crore while the Army ones in 2020 cost about Rs 1,100 crore. This means that the six new helicopters cost about Rs 2,500 crore more.

Before you start outraging over the overpriced helicopters, which is due to the military's mistake, here's a caveat. Remember that the price also includes the cost for the simulators, creation of infrastructure and performance-based logistics, which will also take care of spares, besides the training of the initial group of pilots.

But the difference in the cost is an important window into the silos that Indian armed forces operate in.

The deal for the Army came after a fight with the Indian Air Force (IAF) during the UPA government. While the Army was of the view that the attack choppers should go to them, the IAF did not want to lose its position since it has traditionally played the integrated combat aviation cover to the Army's Strike Corps.

Former IAF chief N.A.K Browne had even said that he could not allow "little air forces doing things of their own".

To buy peace between the warring services, it was decided by then-UPA government that while the IAF will get the first 22 helicopters, the future purchase will go to the Army.

With the final clearances for both IAF and Army deals coming through during the Narendra Modi government, India ended up paying for two separate training process, infrastructure creation, spares, simulators, etc.

Had India decided to buy the helicopters in one go, the country could have bargained for a better deal overall since it is common sense that higher volumes bring down cost.

Why two wings need the same chopper?

Why should two forces have the same attack helicopters and for the same task? The political establishment should have cracked the whip and decided which force gets to keep all the helicopters. In my opinion, the attack helicopters should be with the Army, just like in the US military.

Chief of Defence Staff General Bipin Rawat is absolutely correct in his approach to bring in jointness in the armed forces, not just in terms of ethos and operations but also in defence acquisition.

"There are many systems that are common to the services or are duplicated. We are trying to see how we can look at it jointly so that the cost can come down and optimal utilisation is done," Gen Rawat told me recently.

A lesson for future purchases

While the Apache is a prime example of how India could have worked out a better deal had the services not thought in silos, it also shows why India should not go about doing piecemeal purchases.

The fact is that 28 Apache helicopters are not enough for a country like India, which has multiple theatres of threats. India needs more attack helicopters.

The six Apaches to the Army is a joke because they do not fulfil even a fraction of the requirements, except bringing a feel-good factor of having the iconic choppers.

The talk is that India will eventually buy more and will depend on the Light Combat Helicopter (LCH) being manufactured by the state-run Hindustan Aeronautics Limited (HAL).

LCH in waiting

Incidentally, while the LCH is ready for operational induction, no order has been placed with HAL yet. Even the techno-commercial proposal for 15 Limited Series Production (LSP) is yet to be decided upon by the IAF and army. HAL is looking for an eventual order of 160 helicopters, including 93 from the Army.

Another example is the Rafale. When Prime Minister Narendra Modi announced the intention to buy 36 Rafale fighter jets in fly-away condition, it was welcomed by everyone in the IAF and the defence community.

The negotiations of the previous MMRCA (medium multi-role combat aircraft) contract had reached a stalemate and Rafale will decisively add to the IAF's firepower. However, the fact remains that 36 Rafale jets are just not enough. India could now go in for additional 36 jets, which could be partly assembled in the country under a new contract.

Thankfully, India went in for creation of two bases, which means that there would be no additional cost on infrastructure development.

Gone are the days when there would be actual dogfight in the air. Today, a lot depends on hitting the enemy from beyond visual distance.

And hence, the induction of the Rafale — which is equipped with missiles like the air-to-air Meteor and air-to-surface Scalp — would give a huge fillip to India's air capability.

Focus on capability

So, at a time of budgetary constraints, rather than just focusing on numbers, the armed forces should also look at capability, something which the Modi government is increasingly interested in.

As former defence secretary G. Mohan Kumar wrote in *The Economic Times*: "The armed forces' 15-year Long Term Integrated Perspective Plans (LTIPP) — the mainstay of their modernisation programme — remains an ambitious paper exercise without any realistic link to the annual capital allocations."

"With better jointness the LTIPPs could be reworked and prioritised, but slow acquisitions taking several years and uncertainties in funding can plague rapid modernisation," he wrote.

A non-silos approach to defence requirements will not just help the forces, but the government will also get maximum penny out of a buck.

(This article has been updated to provide clarity on how the author arrived at the figure of Rs 2,500 crore.)

https://theprint.in/opinion/brahmastra/army-and-iaf-fought-over-apache-choppers-costing-us-rs-2500-crore-more-blame-their-silos/372553/

daily O

Sat, 29 Feb 2020

Why India's Light Combat Helicopter could be a game changer

It will complement the US-made Apache helicopter gunships and give India's integrated theatre command a large fleet of attack helicopters

By Air Chief Marshal Falih Major (Retd)

Attack helicopters have been in the news lately. Earlier this week, a government-to-government deal for eight Apache helicopter gunships for the Indian Army was signed during the visit of President Donald Trump. In September 2019, the Indian Air Force (IAF) began taking deliveries of the first batch of their 22 Apaches contracted for under a $1.1 billion deal in 2015.

With the Indian armed forces set to operate 30 of these highly capable machines, it's easy to lose sight of the indigenous Light Combat Helicopter (LCH) being developed by Hindustan Aeronautics Ltd (HAL). Defence Minister Rajnath Singh on Thursday inaugurated the new LCH production hangar at HAL's Helicopter Division. HAL officials said the LCH "is completely ready for induction and the complex fully geared up for its production".

I have been following the LCH's development and flight testing over the past four years, and in my opinion, it has progressed very well. I was fortunate to fly this mean machine during Aero India 2017. It was a delightful experience. The test pilot demonstrated a fairly wide array of combat/weapon delivery and high-G manoeuvres and later, I flew the entire flight profile myself.

I can say with great confidence and pride that the LCH has evolved into a very sturdy, potent and highly manoeuverable platform. I was particularly impressed by the platform stability, ease of handling it in high-G manoeuvres and control responses in the entire flight envelope that we flew. Given the fact that these features form the basic requirements for a combat helicopter for accurate weapon delivery, the LCH meets most attack helicopter requirements and parameters with distinction. The indigenous helicopter could be a valuable stepping stone for our pilots moving on to the Apache.

The armed forces are to set up theatre commands, as recently announced by the Chief of Defence Staff General Bipin Rawat.

Thirty Apaches will be grossly inadequate to perform the close air support missions in these three or four theatres. The planned acquisition of nearly 200 LCHs for the army and air force will bring battlefield support helicopters in the numbers for these new commands.

While the Apaches would do well in the plains, they would have limitations operating in the upper reaches of the Himalayas. During the Kargil War of 1999, there was a need felt for armed attack helicopters capable of operating at high altitude. That's where the LCH fits in. It has successfully been tested in altitudes over 13,000 feet and was the first attack helicopter to land at the forward landing base in Siachen.

Today, as the LCH heads towards achieving its full operational capability (FOC) standards, especially after successful test firing of almost its entire weapons suite, the only aspects which will have to be dealt with very carefully and intelligently are the aspects of flawless weapons integration and maintainability. HAL needs to focus on robust product support and maintenance of these machines to ensure availability.

If done well, the LCH will be a success story. I say this with some confidence since I have flown many types of helicopters over 40 years, and the LCH to me is evolving as a fine combat helicopter. The LCH can be the game changer in our indigenisation and Make in India pursuit, if flawlessly monitored and progressed. The Ministry of Defence and HAL must not spare any effort to pursue the

LCH FOC targets with vigour, so that this ‘lean and mean machine’ evolves into a great combat asset for the Indian Armed Forces and indeed, the nation.

https://www.dailyo.in/variety/light-combat-helicopter-hindustan-aeronautics-limited-hal-apache/story/1/32521.html

THE WEEK

Sat, 29 Feb 2020

Wary of India's Apache helicopters, Pakistan eyes gunships from China

Pakistan's attempts to get helicopters from the US, Turkey have been unsuccessful

With a deal to supply six AH-64E Apache attack helicopters to the Indian Army being signed during the recent India visit of President Donald Trump, the Pakistan Army appears to be nervous.

In July last year, the Indian Air Force took delivery of the first of 22 Apache helicopters, meant for destroying tanks and providing fire support to troops. The Indian Army had an original requirement for 39 Apache helicopters for its three Strike Corps, meaning follow-on orders are likely.

Flight Global, an international aviation news site, reported on Thursday that the Pakistan Army is looking at getting new attack helicopters. The Pakistan Army has had trouble buying new attack helicopters in recent years. In 2015, Pakistan sought the purchase of 15 AH-1Z 'Viper' attack helicopters from Bell Helicopters, a US firm, at an estimated cost of $952 million.

The AH-1Z is lighter than the Apache and has a lower operating altitude. However, the transfer of the AH-1Z fleet to Pakistan was embargoed in June 2018 after the Donald Trump administration announced a freeze on military aid to Islamabad.

In 2018, Pakistan agreed to a $1.5 billion deal with Turkey to buy 30 T-129 attack helicopters, a design Ankara developed from an older Italian chopper. The T-129 uses an engine manufactured by LHTEC, a joint venture of Rolls Royce and Honeywell, a US company. The US government has not given Turkey export licences for the engine.

Major General Syed Najeeb Ahmed, commander of the Pakistan Army's aviation unit, told *Flight Global* that Islamabad had given Turkey time till July this year for a "final decision" on the supply of the T-129. New attack helicopters are considered vital for the Pakistan Army, which relies on ageing US-supplied AH-1F 'Cobra' helicopters. “The Cobras are no match for the Apaches that the Indians are getting,” Ahmed said, adding “We definitely want to match that [capability].”

Jane's Defence Weekly quoted a former Pakistan Army official as saying its current AH-1F helicopters "cannot be employed effectively in high-altitude operations above 8,000ft".

Ahmed claimed, “We are looking at other options. One of them is in China in the shape of the new attack helicopter they have created called the Z-10ME... In case the first two options (US and Turkish aircraft) do not materialise, this third option will be considered.”

The Z-10 is considered China's first purpose-built attack helicopter. The Z-10 first flew in 2003 and was reportedly designed with assistance of the Kamov design bureau in Russia. The Z-10 is in service with the People's Liberation Army. Interestingly, Pakistan had conducted trials of both the T-129 and Z-10 in 2015-2016. Reports suggested the Chinese helicopter had under-performing engines, which minimised its effectiveness in carrying a maximum load of weapons and in operations in high-altitude areas. Ahmed told *Flight Global* the latest iteration of the Z-10 had "improved weapons and systems".

Earlier this month, China's *Global Times* reported the People's Liberation Army had unveiled a new variant of the Z-10 that was likely to have upgraded engines, which would enable it to carry heavier payloads and possibly be equipped with "additional millimeter wave fire control radar".

A distinguishing feature of the Apache helicopters being ordered by the Indian Army and Air Force is their 'Longbow' millimeter wave radar, which can detect up to 256 targets.

https://www.theweek.in/news/world/2020/02/28/wary-of-india-apache-helicopters-pakistan-eyes-gunships-from-china.html

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Expo Axis ’20 showcases India’s modern military might

By Manshika Vaikkath

Nagpur: School and college students got a glimpse of the Indian defence ecosystem on the 2nd day of AXIS ’20, the annual technical festival of Visvesvaraya National Institute of Technology (VNIT), on Saturday.

The two-day exhibition features models by ten organizations. The main attraction of the exhibition is Indro 3.0, India’s tallest autonomous humanoid robot with high speed microcomputer especially designed for real-time communication and human interaction.

The Indian Space Research Organization (ISRO), in association with the National Remote Sensing Centre (NRSC), informed visitors about rockets, space missions, Mars orbiter mission and Chandrayan 1 and 2.

The artillery of the Indian Army is on display in association with the National Cadet Corps (NCC). Besides the exhibition of arms and ammunition, cadets briefed students about the training activities and weapon data.

Miniature replicas of INS Vikramaditya and a submarine by the Indian Navy attracted large crowds.

Senior draftsman Anil Suryavanshi said, “It was a mesmerizing sight. If we nurture kids from a tender age, they will bloom when they grow up.”

Bhabha Atomic Research Centre (BARC) demonstrated its research in nuclear power technology. Visitors got an opportunity to experience augmented and virtual reality at the exhibition with the aid of global logic, a digital product engineering services company.

RC aircraft models and drones have been displayed as well.

The Indian Air Force has displayed replicas of aircraft and fighter jets that are piloted by professionals. A display of extrusions, shells and assembly components of weapons is being demonstrated by Ordnance Factory while explosives like the multimode hand grenade is being shown by Solar Industries.

Student Rohan Singh was delighted after seeing the impressive infrastructure of the defence sector. He said, “It was an amazing experience to witness models of drones, aeroplanes, fighter jets, arms and ammunition and to get familiarized with the work of our brave armed forces.”

Apart from the exhibition, students participated in recreational activities like bubble play, paradeigma, robocup, paintball, manual robotics and aquahunt among others.

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