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THE NEW INDIAN EXPRESS

Sun, 08 Dec 2019

India's indigenously designed Arjun Mk-1A clears trials, ready to go into production

Meet Arjun 'Mk-1A' main battle tank, a 68-tonne rugged bull, waiting to join the Indian army and one of the star attractions at the 11th biennial edition of DefExpo India 2020

By SV Krishna Chaitanya

Chennai: It's the most lethal, sophisticated and all-weather battle tank that India has indigenously designed and conceptualised till date.

Meet Arjun 'Mk-1A' main battle tank, a 68-tonne rugged bull, waiting to join the Indian army and one of the star attractions at the 11th biennial edition of DefExpo India 2020 scheduled to be held in the Uttar Pradesh capital of Lucknow in February.

Armoured Corps has cleared the tank after successful completion of the final integration tests conducted earlier this year in the western sector of Rajasthan. Arjun Mk-1A is an improved variant of Arjun Mk-1, whose two regiments (124 tanks) are currently in service.

Scientists of Chennai-based Combat Vehicles Research and Development Establishment (CVRDE), a laboratory of the Defence Research and Development Organisation (DRDO), are the architects of this improved avatar of Arjun and the Heavy Vehicles Factory (HVF) in Avadi is soon expected to commence production after receiving the order.

Top DRDO officials confirmed to Express that the new variant of Arjun had passed the rigorous army evaluation.

"The tank has fulfilled all user specifications and undergone elaborate field trials. We expect the order of intent any time soon."

Officials said 72 improvements were made to Arjun MBT Mk-1A over the existing version, of which 14 were major upgrades that were specifically requested by the army.

CVRDE Director V Balamurugan told Express the fundamental parameters of a battle tank are "fire power, protection and mobility". Arjun MBT Mk-1A has been improved on all these fronts.

Under firepower segment, four upgrades have been made. An improved Gunner's Main Sight (GMS) integrated with Automatic Target Tracking (ATT) has been fitted, which helps the crew to track moving target automatically making it easy for the gunner to fire even when the tank is on the move.

The Commander's Panoramic Sight (CPS Mk II) has been integrated with Thermal Imager that enables the commander to effectively conduct surveillance both in day and night through eye-safe Laser Range Finder with an advanced Hunter Killer Capability.

Besides, additional varieties of ammunition were incorporated to enhance the lethality of the enemy battle tank.

Other than conventional Fin Stabilised Armour Piercing Discarding Sabot (FSAPDS) and High Explosive Squash Head (HESH) ammunition, Thermo Baric (TB) and Penetration Cum Blast (PCB) ammunition have been developed.

Lastly, the vehicle was upgraded with a Remote Controlled Weapon Station that provides the loader the capability of engaging ground targets and aerial targets from the protective envelop of the tank armour. It also provides an additional capability to fight in urban area called Hatch-closed firing.

Extra protection for crew

The battle tank will have a crew of four -- commander, gunner, loader and driver. Keeping them out of harm's way is paramount. For this, Arjun Mk-1A comes with a slew of new features.

Balamurugan said Track Width Mine Plough (TWMP) is a significant addition which provides capability for the battle tank to cross minefields with ease as the plough mounted to the front of the vehicle creates a mine-free path by ploughing through mines and throwing them to the sides of the tank.

The Explosive Reactive Armour (ERA) panels are provided for effective protection against the ever-evolving anti-tank threats like shoulder-fired anti-tank grenades and missiles. These panels have been mounted along the frontal arc of the hull and the turret.

Another key feature added is a Containerised Ammunition Bin with Individual Shutter (CABIS) that gives crew enhanced protection from inadvertent burning of ammunition stored in the ready round bin.

The hot gases generated due to ammunition burning is vented out by blow-off panels from the roof of the turret, thus saving the crew.

Besides, Arjun Mk-1A has protection against chemical attacks. A special chemical sensor is mounted to detect the presence of harmful toxic chemicals in the atmosphere around the tank.

"The sensor detects the harmful chemicals, triggers an alarm and the Nuclear Chemical warfare system increases the pressure in the tank compartment to a little higher than in the atmosphere thus preventing toxic air from entering the tank. The tank crew get air through a particulate filter for their survival," CVRDE official said.

The Roof Mounted Driver's Seat protects the driver from shocks and enhances driving comfort.

Other new upgrades include Laser Warning and Counter Measure System that protects the crew by creating a smokescreen between itself and the enemy and Anti Infra-Red / Anti Thermal Imaging paints that reduce the signature of the tank when viewed using an IR/TI camera or goggles making the tank difficult to be detected by enemies.

Mobility-related improvements

Officials told Express one of the challenges in making of Arjun MBT Mk-1A was the overall weight. Every improvement comes with baggage, which the user may not like as the mobility may be compromised.

To counter added weight, an Advanced Running Gear System has been developed where the hydro-pneumatic suspension system was completely redesigned to enhance agility of the Arjun MBT Mk-1A. Tweaking the final drive also ensured the required agility of the tank.

Meanwhile, an Advanced Land Navigation System is added to provide enhanced navigation capability of the tank in desert terrains during war.

It provides accurate information of where the tanks is using either Inertial Navigation or GPS or both and where the tank needs to go in the absence of any signage in the war theatre.

An uncooled Night Vision camera for driver has also been provided.

The earlier Image Intensifier (obsolete technology) for the tank driver has been replaced with a un-cooled Thermal imager with binocular sights for the driver thus providing him with a capability to travel at reasonable speeds even in pitch-dark conditions.

https://www.newindianexpress.com/nation/2019/dec/08/indias-indigenously-designed-arjun-mk-1a-clears-trials-ready-to-go-into-production-2073023.html

International Business Times

Mon, 09 Dec 2019

Will indigenously designed Arjun Mk-1A be a game-changer in armoured warfare?

The tank has been designed by the scientists of Combat Vehicles Research and Development Establishment (CVRDE), a state-owned DRDO laboratory

By Ashish Shukla

India's most lethal all-weather tank manufactured with cutting edge technology - Arjun 'Mk-1A' - main battle tank has cleared the final hurdle after successful completion of the final integration tests.

Earlier this year, the armoured corps of the Indian Army had cleared India's next-generation tank. It is one the most awaited attractions of the 11th biennial edition of DefExpo India 2020, which is scheduled to be held in Lucknow. The tank, a 68-tonne rugged bull, is being indigenously manufactured by the Defence Research and Development Organisation (DRDO).

Notably, Arjun Mk-1A is an enhanced version of Arjun Mk-1 that is already in service with two regiments in the Army.

As reported by the New Indian Express, the tank has been designed by the scientists of Combat Vehicles Research and Development Establishment (CVRDE), a laboratory of state-owned DRDO. Now, with the final go-ahead signal from the army, it is ready to be manufactured on a large scale at the Heavy Vehicles Factory (HVF) in Avadi.

What are the major improvements in Arjun?

The officials of DRDO have said that in comparison to its earlier variant, Arjun Mk-1A has undergone 72 improvements, of which 14 were the major upgrades directly requested by the Indian Army. CVRDE Director V Balamurugan said that the basic parameter of the tank includes "firepower, protection and mobility".

Under firepower, CVRDE has included four major upgrades with an improved Gunner's Main Sight (GMS), integrated with Automatic Target Tracking (ATT), that help the tank crew fire while the tank is in motion. Moreover, the Commander's Panoramic Sight (CPS Mk II) has been integrated with Thermal Imager.

The upgrade would mean that the tank commander would be able to effectively conduct surveillance during daytime as well as in the dark. The tank is also now loaded with a Remote Controlled Weapon Station that will allow the loader to engage with the ground targets and aerial targets from the protective envelope of the tank armour.

In terms of protecting the tank crew, the vehicle has Track Width Mine Plough (TWMP) which means it can cross minefields without any hindrance as the minesweeper would easily create a mine-free path.

One of the most striking features of this tank would be the protection against chemical attacks. A special sensor has been loaded on the tank which detects the presence of harmful toxic chemicals in the atmosphere around the tank.

One of the CVRDE officials said, "The sensor detects the harmful chemicals, triggers an alarm and the Nuclear Chemical warfare system increases the pressure in the tank compartment to a little higher than in the atmosphere thus preventing toxic air from entering the tank. The tank crew get air through a particulate filter for their survival."

https://www.ibtimes.co.in/will-indigenously-designed-arjun-mk-1a-be-game-changer-armoured-warfare-810010#

hindustantimes

Mon, 09 Dec 2019

Metal-cutting for single-engine Tejas fighter planes to begin in February

The Tejas (Mk-II) are slated to replace the existing French-made Mirage -2000 and Russian -made MiG-29 class of fighters

By Sudhi Ranjan Sen

New Delhi: Metal cutting, the first step in the start of commercial production, of the of indigenously made single-engine fighter plane Tejas (Mk-II) is scheduled for February 2020, according to Dr Girsh S Deodhare, director of the Aeronautical Development Agency (ADA) and head of the Tejas programme.

The Mk-II will have more advanced sensors including a powerful radar, empowering the fighter for operations beyond the visual range, and improved avionics. The fighter will be able to fly with more weapons and fuel than its predecessors Mk-1 and Mk-1A.

The IAF is buying 123 Mk-1 and Mk-II fighters. The Tejas Mk-II will be several tons heavier and is designed to fit into the medium weight categories of fighters.

Recently the IAF told the government that it is ready to buy more indigenous fighters to replace its aging fighter fleet.

The Tejas (Mk-II) are slated to replace the existing French-made Mirage -2000 and Russian -made MiG-29 class of fighters.

“The detailed designing stage is over; drawings are frozen,” Dr Deodhare said.

Both the Indian Air Force (IAF) and the Defence Research and Development Organisation (DRDO) are looking at the Tejas as a replacement for the the French-made Mirage-2000 class of fighters, around a dozen of which were pressed into action on February 26 to bomb a Jaish-e-Mohammed terrorist camp in Balakot, Pakistan, in reprisal for the February 14 terrorist attack in Pulwama that killed 40 Central Reserve Police Force (CRPF) troopers.

The prototype of the Tejas (Mk-II) is expected to be flying in about two years. The metal cutting will take about a year to 18 months. Tejas Mk -II, which will be fitted with a GE-414 engine, is scheduled to make its first flight in 2024. .

The DRDO has been criticized and even ridiculed for slow progress made in key military programmes, especially the Tejas light combat aircraft (LCA) programme, which has taken about a decade-and-a-half to mature. Nonetheless, the Tejas has the unique distinction of not being involved in a single crash or accident till date despite hundreds of hours of flying.

Using learnings from the past and in an effort to shorten the manufacturing and maintenance process, the DRDO has decided to build the Tejas (Mk-II) in a modular fashion and plans to lean on the private sector more than it did in the past.

Modular construction, where components like the fuselage, wings and landing gear area built separately but are put together in the final assembly line, increases the speed of construction and shortens delivery time. Modular construction requires detail exacting design of each component and

allows more than on unit to be involved in the production process. It also helps maintenance and reduces time between sorties. Components can be changed easily by replacing a module making the fighter easily serviceable. A major complaint against the initial batch of Tejas fighters was that they weren't designed in a modular fashion increasing maintenance and turn-around time.

Interestingly, the DRDO is also working on an "optimally manned" cockpit technology for the LCA and the next-generation Advanced Medium Combat Aircraft (AMCA).

The cockpit technology will help regain control of the aircraft in case the pilot loses consciousness or is incapacitated. A helmet-mounted sensor will alert ground control, which will be able to take over the aircraft's controls to safely land the aircraft. "It is an artificial intelligence-based application. Till now we were following (the west), now we want to take the lead," Dr Deodhare said.

"Metal Cutting of the Tejas (Mk-II) is a very important development. The ADA and DRDO must ensure that going forward they should hand-hold private sector. Also I must underline that both the airforcr and DRDO must sort out power and thrust requirements or in short what kind if engine is being used from the very beginning. On the whole it is very positive and crucial development for the fighter programme," Air Marshal S J Nanodkar said when asked about the metal-cutting for the Tejas (Mk-II).

https://www.hindustantimes.com/india-news/metal-cutting-job-for-tejas-to-begin-in-feb/story-wyYM6Iwz0HsC1XHkDUlX3K.html

hindustantimes

Mon, 09 Dec 2019

Philippines likely to finalise BrahMos deal by next year

India has been in talks with several countries, including Thailand, Indonesia and Vietnam, over the past few years to sell them land and sea-based versions of the supersonic cruise missile

By Rezaul H Laskar

New Delhi: The Philippines is set to become the first country to buy the BrahMos cruise missile jointly developed by India and Russia, with New Delhi and Manila focusing on price negotiations with the aim of concluding a deal in 2020, people familiar with the discussions said.

India has been in talks with several countries, including Thailand, Indonesia and Vietnam, over the past few years to sell them land and sea-based versions of the supersonic cruise missile.

The people cited above said the Philippines Army had zeroed in on the BrahMos after extensive trials and everything now revolved around the cost of the system and financing for the deal.

"As far as the Philippines Army is concerned, the consensus on the BrahMos system is a done deal. Now, it's all about the price negotiations and we hope the deal will be finalised next year," said a person familiar with the negotiations who declined to be named.

The cost of the system will be the key factor in Manila's decision on the number of units to be purchased to equip the Philippines Army's first Land Based Missile System Battery, which was raised and activated in October, the people said.

Though India has offered a $100 million line of credit to the Philippines for defence purchases, Manila is exploring the option of acquiring the BrahMos system with its own funds to be allocated in the next budget.

"Various options are being looked at – whether it should be internal funding or a preferential loan – and whether there will be some preferential terms offered for the sale. The cost will determine how many systems are bought," said the person cited above.

The Philippines Army's decision to opt for the BrahMos became evident when a mock-up of the land-based version of the missile was displayed at an expo in Manila on December 5. The missile was displayed mounted on a truck launcher system and a chart outlined the Philippines Army's development road map for the first Land Based Missile System Battery.

The chart said the battery had been activated and its personnel would undergo special courses on rockets, missiles and training simulators to be prepared for inducting the missiles. The chart also said: "Equipment: For acquisition of LBMS (BRAHMOS)."

The chart showed the Philippines Army expects the battery's personnel and equipment to be ready and for all the equipment to be acquired by 2024.

It also showed the army expects the battery to be fully capable of defending the Philippines against external threats by 2028.

In recent years, the Philippines has concluded several deals with India for personal protective items or bulletproof gear and armour plating for military vehicles.

An Indian firm has also bid for a recent Philippines tender for bulletproof gear.

During Prime Minister Narendra Modi's visit to the Philippines in 2017, the two sides signed an MoU on defence industry and logistics cooperation to provide a framework for strengthening cooperation and coordination in logistics support and services, and in the development, production and procurement of defence hardware.

In July, Thailand ambassador Chutintorn Gongsakdi had told HT his country was hoping to conclude negotiations on the purchase of the BrahMos missile by next year. He said Thailand is eyeing "important purchases" of Indian military hardware, including coastal radars and the BrahMos.

India is also exploring the possibility of selling the BrahMos to Indonesia, and a team from the Indo-Russian joint venture that makes the system visited a state-run shipyard in Surabaya in 2018 to assess the fitting of the missile on Indonesian warships.

Talks have also been held with Vietnam for the sale of the BrahMos, which was developed by the Indo-Russian joint venture set up in 1998. The Indian Navy inducted the missile on its frontline warships in 2005 and the army began inducting the BrahMos from 2007 after a series of tests.

https://www.hindustantimes.com/india-news/philippines-likely-to-finalise-brahmos-deal-by-next-year/story-pzQe35AYmpvKKByglm4osL.html

GIZBOT

Sat, 07 Dec 2019

ISRO Gaganyaan mission scheduled to launch in 2021

Sharmishte Datti

ISRO is gearing up for a lot of missions in 2020. However, the ambitious Gaganyaan mission to explore the Sun is said to take off in 2021. Union Minister Jitendra Singh confirmed during the Parliamentary session about the same. The manned Gaganyaan mission will likely launch in December 2021, two years from now.

ISRO Gaganyaan Mission The ISRO Gaganyaan mission is the first manned mission, comprising a crew of three people. The spacecraft, crew selection, training process, and other mission-related proceedings will begin shortly. The training will be in Russia under the ISRO guidance, the press release stated.

ISRO will join hands with international agencies for the mission. The Indian Space Research Organization has immense experience with multiple launches and space missions over the years. However, other international agencies will support the mission and guide ISRO in areas where it lacks experience. Astronaut training, crew recovery, and human-centric systems are the areas where other space agencies will guide ISRO.

ISRO Gaganyaan Mission Crew Module The statement by the union minister said that the crewed vehicle will launch on the GSLV Mk III. The design of the crew module has been completed earlier this year in May. The capsule is reportedly equipped with life support, environmental control, and emergency mission abort systems. The emergency escape can be pulled out during the first or the second stage of the mission, the report states.

There are many national and international agencies assisting ISRO in the Gaganyaan mission. The DRDO labs and the Indian Air Force are the national agencies supporting the mission. DRDO will be supplying space food, crew health monitoring systems, emergency survival kits, parachutes for a safe recovery, crew modules, and radiation measurement and protection systems.

The Defense Research and Development Organization laboratories' technological capabilities for defense applications will be customized to meet the requirements of the human space mission of ISRO said Dr. G Satheesh Reddy, Secretary, Department of Defense R&D and Chairman DRDO. The Russian space agency is the one international space agency that ISRO is teaming up with. ISRO has already signed MoU with all the above agencies.

https://www.gizbot.com/news/isro-gaganyaan-mission-to-take-flight-in-2021-064199.html

Sat, 07 Dec 2019

Indian young scientist finds a cheaper solution to stop bleeding in just 30 seconds

Indian young scientist has developed cheap and effective indigenous powder. It will stop the bleeding within 30 seconds as soon as it is put on the wound. Explain that such powders have become popular in foreign countries, but this technology of MTech Sabir Hussain from Biomedical Engineering at NIT (National Institute of Technology) Rourkela has been recognized by Defense Research and Development Organization (DRDO).

According to media reports, this research by Sabir, son of Mubarak Hussain, who hails from Khandaghosh in East Bardhaman district of Bengal, recently got the first prize in the DRDO's Dare to Dream Innovation Contest. Sabir says, he often used to hear about the death of people due to excess blood in an accident. Only then vowed that after studying biomedical engineering, I would do something big, so that people's lives could be saved. This stop bleed powder will act as a lifeline for the people who are dying from death. Sabir's startup is now preparing to patent it.

In his statement, Sabir said that he had started research to make such an economical and effective powder during his studies. In 2017, he did M.Tech. After that, I got an assistant engineer job in a good company but did not join. In 2018, Sabir started startup Miracles Med Solutions Pvt Ltd to create and research drugs. Built a lab at a cost of 20 lakhs. The search for the drug to stop bleeding during studies was completed here. In a three-year effort, we developed a completely new formula for powder.

https://english.newstracklive.com/news/national-swadeshi-powder-will-stop-bleeding-from-injury-in-just-30-seconds-mc23-nu-1052926-1.html

THE TIMES OF INDIA

Sat, 07 Dec 2019

India must build satellite to harness solar energy from space, former DRDO Chief Sivathanu Pillai says

By Shanmughasundaram J

Chennai: India should work with friendly nations to build a solar power satellite and place it in orbit to harness solar power as the country is running out of conventional sources like coal, says former chief of DRDO A Sivathanu Pillai.

“One nation cannot do this. So, India should work with friendly nations, which have equal interest, to develop a technology to harness the solar energy from space for sustainable growth,” Pillai told TOI on the sideline of the TAN-ENERGY Summit 2019 here on Friday. The summit was organised by the Federation of Indian Chambers of Commerce and Industry (FICCI).

He said the heat energy should be harnessed and converted into microwaves. It should be channalised to the earth. “A floating station on the sea is the best option to receive it and convert it into electricity. The same can be used to operate desalination plants,” he said.

Technology should be developed, keeping in mind the living organism and birds in the earth, to safely transport the energy from the orbit to the earth, he added.

https://timesofindia.indiatimes.com/city/chennai/india-must-build-satellite-to-harness-solar-energy-from-space-former-drdo-chief-sivathanu-pillai-says/articleshow/72403760.cms

DECCAN HERALD

Sat, 07 Dec 2019

IAF's Maintenance Command Chief bats for indigenisation

The Chief of the Indian Air Force's Maintenance Command, Air Marshal R K S Shera, on Friday emphasised upon the need for continuous efforts at indigenisation by India in defence productions to be self-reliant in the defence sector.

The air marshal advocated for indigenisation while also flagging the emerging defence threat from drones and the need to develop a system to counter it.

“We are huge importers of defence and this trend has to be reversed,” he said in his speech after inaugurating a day-long national level 'Nodal Technology Centre (NTC)' symposium, held jointly with the PHD chamber of commerce, at 3 Base Repair Depot (3BRD), Air Force Station, Chandigarh.

A number of senior officials and domain experts from the Ministry of Defence, Air Headquarters, Headquarters Maintenance Command, Army Headquarters, Naval Headquarters, DRDO, academia and industry including CII, ASSOCHAM and FICCI also participated in the event.

Referring to the IAF's commitment to indigenisation, Air Marshal Shera urged the participants to evolve a conclusive strategy to implement various projects under the Nodal Technology Centre (NTC).

Emphasising upon the need for continuous efforts at indigenisation for India defence production, he said, "As far as this (3BRD) depot is concerned, it has been involved in indigenisation projects for the last 40-50 years right from the beginning.”

Flagging the emerging threat from drones and the need to come up with technologies to counter it, he said, “Drones have become a serious threat in the recent past. We are now going to work very seriously on some good drone system, which can take care of our air defence.”

Further touching upon the indigenisation, Shera said IAF has been partnering with industry and academia and holding “indigenisation weeks and symposiums”.

“If I talk about military aviation, we had very less participation from the industry until recent few years. Over the last couple of years, we are having indigenisation weeks and symposiums, where we call the industry partners and academia, quality assurance agencies. We sit together and try to find out what we need as far as self-reliance is concerned and how we can do that,” he said.

The IAF's Base Repair Depots across the country have been doing a lot of work on indigenisation and finding solutions to complex projects, Shera said.

“Most of the engineers working in depots are exposed to the best of the technologies,” he said.

“There are huge challenges in maintaining and sustaining these legacy machines,” he said, referring to aircraft which have been in service for decades.

The IAF is also partnering with the industry to carry out some “part tasks” like repainting, structural repairs of the aircraft.

"We are partnering with the industry in all these things," he said.

The day-long event covered presentations, display and demonstrations of niche technologies under development by academia and industry, who together discussed ways to exploit the indigenisation opportunities in the Indian Air Force.

The symposium included presentations from IITs, DRDO labs and industry, which were complemented by a display of a number of successful projects of indigenisation.

A special session for MSMEs was conducted by PHD Chamber of Commerce towards their envisaged role in indigenisation and opportunities.

The symposium concluded with a speech from Air Commodore Sanjiv Ghuratia, Air Officer Commanding, 3 Base Repair Depot who covered the active role of the Depot in indigenisation and self-reliance.

https://www.deccanherald.com/national/iafs-maintenance-command-chief-bats-for-indigenisation-783315.html

THE FINANCIAL EXPRESS

Sat, 07 Dec 2019

Indian Air Force to get 114 fighter aircraft! SQRs gettng finalised

Explaining the procedure a senior officer said, "Now that the SQRs for the fighter aircraft are getting finalised, as per the laid down the procedure will go to the technical management committee before being put up in the DAC which is headed by the defence minister Rajnath Singh."

By Huma Siddiqui

New Delhi: With the SQRs (Services Qualitative Requirements) being finalised for the 114 Fighter Aircraft for the Indian Air Force (IAF), the stage is now set for the process for the procurement of these aircraft has started. Explaining the procedure a senior officer said, "Now that the SQRs for the fighter aircraft are getting finalised, as per the laid down the procedure will go to the technical management committee before being put up in the DAC which is headed by the defence minister Rajnath Singh. Once the DAC approves then the RfPs will be to be sent out to the global aerospace majors."

"Minimum time it will take the process to be completed is not less than a couple of years," he explained. The acquisition of these 114 fighter aircraft which is under the Defence Ministry's `Strategic Partnership' (SP) Model, has seven contenders who have envisaged their interest in the Rs 1.75 lakh crore deal.

Among the European companies including Dassault Aviation of France has offered `Rafale', the UK based BAE Systems is leading `Typhoon' bid and the Swedish offer of Gripen E/F from SAAB. From the US-based Boeing Company has offered F/A-18 E/F Super Hornet and Lockheed Martin has offered the F-16V which as reported earlier has been optimised for India. At this year's Aero India Lockheed Martin had recast its offering as the 'F-21'. And from Russia MiG-35 is in the race.

In an earlier interaction, Dan Gillian, vice president of F/A-18 and E/A-18 programs at Boeing had said that "If the Company gets contracts from the IAF and the Indian Navy then it was ready to set up a new production facility in India."

Talking about the growing Indo-US relations, Gillan had said that the defence and security have been on an upswing, therefore there will be no issues related to transfer of technology (ToT).

Both Boeing Company and Lockheed Martin have tie-ups with state-owned Hindustan Aeronautics Limited (HAL) and Mahindra Defence Systems (MDS) and Tata Advanced Systems for manufacturing the aircraft in India and creating an ecosystem for the aerospace sector.

Interestingly the US-based Boeing is also in contention with the French Rafale for an aircraft deal for the Indian Navy which is looking for 57 twin-engine fighters for its aircraft carriers.

https://www.financialexpress.com/defence/indian-air-force-to-get-114-fighter-aircraft-sqrs-gettng-finalised/1786698/

पंजाब केसरी

Mon, 09 Dec 2019

राफेल पर होगा धनोवा का नाम

● वायुसेना ने अपने पूर्व प्रमुख को दिया सम्मान, राफेल के 'टेल नंबर' में 'बीएस' अक्षर होंगे

नई दिल्ली, (भाषा): राफेल सौदे का समर्थन करने के लिए वायुसेना के पूर्व प्रमुख एयर चीफ मार्शल (सेवानिवृत्त) बीएस धनोआ को सम्मान देते हुए भारतीय वायु सेना ने फैसला किया है कि 30 राफेल लड़ाकू विमानों पर 'टेल नम्बर' में 'बीएस' लिखा होगा, जो धनोआ के नाम के अक्षर हैं। छह राफेल प्रशिक्षक विमानों में 'टेल नम्बर' में 'आरबी' श्रृंखला है। यह मौजूदा वायु सेना प्रमुख एयर चीफ मार्शल आरकेएस भदौरिया के नाम के अक्षर हैं। उन्होंने विमान खरीद का करार कराने में वार्ताकार के तौर पर अहम भूमिका निभाई है। फ्रांस की कंपनी दसॉल्ट एविएशन से 59 हजार करोड़ रुपये में 36 राफेल विमान खरीदने को लेकर काफी राजनीतिक विवाद हुआ है। यह विवाद धनोआ के वायुसेना प्रमुख रहने के दौरान अपने चरम पर था। हालांकि उन्होंने मजबूती के साथ करार का बचाव किया था। वायुसेना के एक वरिष्ठ अधिकारी ने 'पीटीआई-भाषा' से कहा, '' प्रशिक्षक राफेल विमानों को छोड़कर सभी राफेल लड़ाकू विमानों के टेल नम्बर में 'बीएस' होगा। पूर्व वायुसेना प्रमुख ने हमें ये विमान दिलाने के लिए जो भूमिका निभाई है, उसके लिए उन्हें धन्यवाद कहने का यह हमारा तरीका है।'' 36 राफेल विमानों में से छह विमान प्रशिक्षक हैं जबकि 30 विमान लड़ाकू हैं।

THE HINDU

Mon, 09 Dec 2019

Rafale jets to have tail numbers with 'BS' initials in ode to former IAF Chief B.S. Dhanoa

Six Rafale trainer aircraft will carry 'RB' series tail numbers which stand for Air Chief Marshal R.K.S. Bhadauria, the current Chief of Air Staff who played a key role as lead negotiator for the mega deal

New Delhi: In recognition of Air Chief Marshal (retd) B.S. Dhanoa's unrelenting backing for the Rafale deal, the Indian Air Force has decided to put tail numbers in 30 Rafale jets with 'BS' initials.

Six Rafale trainer aircraft will carry RB series tail numbers which stand for Air Chief Marshal R.K.S. Bhadauria, the current Chief of Air Staff who played a key role as lead negotiator for the mega deal.

The political controversy relating to purchase of 36 Rafale jets from French aerospace major Dassault Aviation for the IAF at a cost of ₹ 59,000 crore peaked during Mr. Dhanoa's tenure as chief of the air staff and he had stoutly defended the deal.

"All the Rafale fighter jets barring the trainer ones will carry 'BS' in the tail number. This is our way of thanking the former IAF Chief for the role he played to get us the jets," a senior IAF official told *PTI*.

Out of 36 Rafale jets, 30 will be fighter jets and six will be trainers. The trainer jets will be twin-seater and they will have almost all the features of the fighter jets. Mr. Dhanoa, who retired in September after a tenure of 41 years in the IAF, strongly maintained that the deal was clean and that the force needed the jets to significantly enhance its combat capabilities.

The Rafale jets will have the most advanced weapons package comprising Meteor and Scalp missiles which will provide the IAF deep strike capability and air dominance in the region.

Three Rafale jets have already been handed over to India and they are being used to train IAF pilots and technicians in France.

Defence Minister Rajnath Singh received the first Rafale jet at an air base in France on October 8. The first batch of four Rafale aircraft will arrive in India by May 2020.

The aircraft is capable of carrying a range of potent weapons. European missile maker MBDA's Meteor beyond visual range air-to-air missile and Scalp cruise missile will be the mainstay of the weapons package of the Rafale jets.

Meteor is a next generation of BVR air-to-air missile (BVRAAM) designed to revolutionise air-to-air combat. The weapon has been developed by MBDA to combat common threats facing the UK, Germany, Italy, France, Spain and Sweden.

Guided by an advanced active radar seeker, Meteor provides all-weather capability to engage a wide variety of targets from fast jets to small unmanned aerial vehicles and cruise missiles.

The scalp is an air-launched long range deep strike missile, designed to deal with pre-planned attacks against high value fixed or stationary targets. Scalp has been part of the UK's Royal Air Force and the French Air Force and was used in the Gulf War.

Besides the missile systems, the Rafale jets will come with various India-specific modifications, including Israeli helmet-mounted displays, radar warning receivers, low band jammers, 10-hour flight data recording, infra-red search and tracking systems among others.

https://www.thehindu.com/news/national/rafale-jets-to-have-tail-numbers-with-bs-initials-in-ode-to-former-iaf-chief-bs-dhanoa/article30238493.ece

hindustantimes

Sat, 07 Dec 2019

Drone threat: IAF seeks cooperation from academia, industry to develop solutions

Air Marshal RKS Shera, air force commanding-in chief, maintenance command, Indian Air Force (IAF), was speaking at the inaugural ceremony of the one-day national-level Nodal Technology Centre (NTC) symposium in association with PHD chamber of commerce at the Harjinder Hall in 3 BRD Air Force, Chandigarh, on Friday

By Amanjeet Singh Sanyal

Chandigarh: The drone technology posed serious threat in the recent past and work is going on to develop a good drone system that can take care of the air defence system, said Air Marshal RKS Shera, air force commanding-in chief, maintenance command, Indian Air Force (IAF), said.

He was speaking at the inaugural ceremony of the one-day national-level Nodal Technology Centre (NTC) symposium in association with PHD chamber of commerce at the Harjinder Hall in 3 BRD Air Force, Chandigarh, on Friday.

He sought cooperation from industry, academia and defence public sector undertakings to find a good solution.

He said we have seen how drones were used in conflict zones (like Syria) and they pose a threat.

He said it is a huge challenge to maintain vintage assets and modern, state-of-art aircraft which are getting inducted to its fleet.

“There is a large canvas of vintage and state-of-art aircraft and imagine the kind of challenge the maintainer has to ensure that legacy machines fly safely. We have to find out what is bothering us in those machines as ten years technology changes and the component starts becoming obsolete. So we have to put a system in place where we can see forward what will happen after five years as far as components are concerned,” he said.

Senior officials and domain experts from Ministry of Defence, air headquarters, headquarters of maintenance command, army headquarters, naval headquarters, Centre for Military Airworthiness and Certification, Defence Research and Development Organisation, academia and industry, including Confederation of Indian Industry, Associated Chambers of Commerce and Industry of India and Federation of Indian Chambers of Commerce and Industry also participated.

The event witnessed presentations, display and demonstrations of niche technologies under development by the academia and industry, who together discussed ways to exploit the indigenisation opportunities in the Indian Air Force.

https://www.hindustantimes.com/chandigarh/drone-threat-iaf-seeks-cooperation-from-academia-industry-to-develop-solutions/story-aX2jUG4VZR6mfuvKzZ3JaK.html

The Indian EXPRESS

Sun, 08 Dec 2019

Sindhu Sudarshan desert exercise: Testing ground for capabilities, message for adversaries

Exercise Sindhu Sudarshan, one of the largest field exercises of the Indian Army, concluded in Thar desert in Rajasthan recently The Indian Express explains the objectives of the exercise, how it was conducted and the message an effort of this scale sends

By Sushant Kulkarni

The scale of the exercise

The exercise was conducted by the Sudarshan Chakra Corps, which is a strike formation of the Southern Command, to assess the capabilities to strike across the border, deep in enemy territory in the Western theatre. The exercise was named Sindhu Sudarshan, signifying the target of reaching the Sindhu river, in the case of an offensive.

Nearly 40,000 troops, 700 Armoured Vehicles and 300 artillery guns, with the support of Indian Air Force elements, were part of the exercise. Preparations for this massive training exercise had started almost a year ago. Other than being a training event, the exercise also intended to send a message to the adversary, and was a show of capability for the world and also a confidence-building measure within the country.

How it was conducted

An important feature of the exercise was organisation of available forces in the form of several 'Integrated Battle Groups' which would simulate an attack deep into the enemy territory. The battle groups comprised units of rocket launchers, artillery guns, armoured vehicles and Infantry, with the close support of air defence element.

An imaginary international border was drawn and adversaries, namely Blue Land and Red Land, engaged in full-scale battles. Several such battle groups mounted an attack into the Red Land as part of the exercise. While the actual firing from these elements was only done in Pokhran firing ranges, their tactical manoeuvres were held in the area spread over 100 km in Thar desert.

To put it simply, it was a full-scale war game with real equipment.

The aim of the exercise

The movements of these units and their responses to simulated contingency situations were closely watched by observers of the exercise. Officials believed that the exercise will also result in additions to the existing battle strategies of the Indian Army.

With such training events, the Army also had a chance to test its own equipment and cohesion within, and to draw lessons which shall again be put to its own test in the years to come.

The special equipment

The armoured element comprised Bhishma or T90 tanks and the Infantry Combat Vehicle BMP2, which have night-vision capabilities. The artillery element comprised newly-inducted K9 Vajra along with war-tested Bofors and field guns, and the 'sensor to shooter' technology, which brings high precision to firing capabilities with the help of UAVs and satellite data.

The Infantry or foot soldiers used the newly-inducted high-mobility vehicles and tested the sustenance of manpack load for over 96 hours under extreme conditions.

All these elements got an air defence cover, with their anti-aircraft guns and radars deployed all across the exercise area, and with important assets on the ground.

Other elements put to test were the engineering formations, which, as the saying goes, ‘pack their bags first and unpack last’. Their preparedness was tested by laying assault trackways, bridging over water obstacles, negotiating various obstacle systems, building new ones and constructing helipads in quick time in enemy territory, among other drills. Communication capabilities, crisis management drills,
ammunition management, transportation, and staging ahead of supplies were also tested and feedback was given for future actions.

The lessons

While these numerous formations took home a lot of lessons from the exercise, the effort underlined the time-tested quote: ‘The more you sweat in peace, less you bleed in war.’

https://indianexpress.com/article/cities/pune/desert-exercise-testing-ground-for-capabilities-message-for-adversaries-6156363/

THE NEW INDIAN EXPRESS

Sat, 07 Dec 2019

Ordnance factories unable to meet army's ammunition demand: CAG

The CAG reports loss of Rs 62.10 crore on replacement of defective ammunition by ordinance factories

New Delhi: The ordnance factories, which supply around 80 per cent of its total production items to Indian Army, are unable to meet significant quantity of army's demand for some principal ammunition thus adversely affecting their operational preparedness, exposes Comptroller And Auditor General (CAG) in its report on (Defence Services) Ordnance Factories presented in the Parliament on Friday.

The reports also point that factories achieved the production targets for only 49 per cent of items. It also highlights that the exports by ordinance factories have decreased by 39 per cent in 2017-18 over 2016-17.

The report clearly states, "A significant quantity of army's demand for some principal ammunition items remained outstanding as on March 31, 2018, thus adversely affecting their operational preparedness."

This report contains the results of audit of financial transactions of Ordnance Factories Organisation, under the Department of Defence Production of the Ministry of Defence.

The Ordnance Factories Board received budgetary grant of Rs 14,793 crore and Rs 804 crore in 2017-18 for its revenue expenditure and capital expenditure, respectively.

In 2017-18, it supplied materials of Rs 14,251 crore to its different indentors.

The reports also points the production capacity for empty and filled fuzes, an essential and critical part of ammunition to provide safe and reliable detonation at the desired time and place, was not adequate to meet army's requirement of ammunition.

Filling factories fill empty fuzes with explosives and assemble it with other components to form complete ammunition.

It also stated that there were mismatches in the availability of empty fuze from in-house production as well as from trade sources and their filling capacity in factories.

"Major shortfalls in production were noticed for eight types of empty fuzes mainly due to material constraints and quality problems. This resulted in slippages in issue of related ammunitions and spare filled fuzes to the users leading to critical deficiency of seven types of ammunition," the CAG stated.

Due to non-availability of spare fuzes, Army had stock of ammunitions worth Rs 403.27 crore lying in unusable condition, the report stated.

It also stated that inadequate quality checks both by the factories and quality assurance agencies in manufacturing led to significant quantum of return and rejection of empty fuzes and filled fuzes.

"A total 18 accidents occurred at the users' end relating to six ammunitions mainly because of fuze related defects and problems," the report stated.

Further the ordinance factories could not fulfil the army's requirement of electronic fuzes due to lack of infrastructure and capability.

Army had to order electronic fuzes Rs A1,511 crore during 2013-14 to 2017-18 from Electronic Corporation of India Ltd (ECIL) and Bharat Electronics Ltd (BEL).

The CAG also finds that functioning of e-procurement system, introduced in September 2011, Rules and Procedures stipulated in Procurement Manual of Ordnance Factories were not followed completely in its e-procurement system.

"Transparent bidding could not be ensured as instances of submission of multiple bids from a single machine and use of same Digital Signature Certificate by multiple users were noticed," it stated.

The report also stated that ordnance factories continued their payments and receipts of government money partially through manual method. This is in contravention to the directives of Controller General of Accounts in 2012 for making e-payment and of Controller General of Defence Accounts in 2016 for depositing government receipts into the government Account through e-challan.

The CAG reports loss of Rs 62.10 crore on replacement of defective ammunition by ordinance factories.

Army reported exudation of explosives from ammunition supplied in March, 2009 and March 2010 by Ordnance Factory Badmal within their shelf life.

This was on account of lower set point melting point on TNT than the specified range. Set point value of TNT was not tested at ordinance factories before filling in shells due to absence of such provision in the specification of Controllerate of Quality Assurance.

This led to a loss of Rs 62.10 crore on account of replacement of defective ammunition by the Ordnance Factory.

https://www.newindianexpress.com/nation/2019/dec/06/ordnance-factories-unable-to-meet-armys-ammunition-demand-cag-2072454.html

दैनिक जागरण

Sun, 08 Dec 2019

13 से 16 तक विजय दिवस समारोह मनाएगी सेना

जासं, कोलकाता: 1971 के युद्ध में पाकिस्तान पर मिली ऐतिहासिक जीत के उपलक्ष्य में भारतीय सेना के पूर्वी कमान मुख्यालय की ओर से 13 से 16 दिसंबर तक कोलकाता में विजय दिवस समारोह मनाया जाएगा। शनिवार को फोर्ट विलियम स्थित मुख्यालय में आयोजित संवाददाता सम्मेलन में पूर्वी कमान के एमजीजीएस मेजर जनरल एनडी प्रसाद ने यह जानकारी दी।

उन्होंने कहा कि 1971 में मिली जीत भारतीय सेना व पूर्वी कमान के लिए ऐतिहासिक उपलब्धि है। भारतीय सेना ने बांग्लादेश के मुक्ति योद्धाओं के साथ मिलकर पाकिस्तान पर ऐतिहासिक जीत दर्ज की थी, जिसके बाद बांग्लादेश का निर्माण हुआ। उन्होंने बताया कि कोलकाता में 13 से 16 दिसंबर तक विजय दिवस समारोह मनाया जाएगा। इस बार समारोह में बांग्लादेश का 72 सदस्यीय प्रतिनिधिमंडल भाग लेगा, जिसमें 30 मुक्ति योद्धा व उनके परिवार के सदस्यों के अलावा वहां के सेना के अधिकारी होंगे। यहां चार दिनों तक आयोजित होने वाले विभिन्न कार्यक्रमों में वे हिस्सा लेंगे।

मेजर जनरल प्रसाद ने बताया कि 13 दिसंबर को प्रिंसेप घाट पर मिलिट्री बैंड कंसर्ट से समारोह की शुरुआत होगी। इसे आम लोग भी देख सकेंगे। वहीं, 14 व 15 दिसंबर को आरसीटीसी ग्राउंड में भव्य मिलिट्री टैटू का आयोजन होगा, जिसमें सेना के जांबाज हैरतअंगेज प्रदर्शन कर अपनी शौर्य का परिचय देंगे।

THE ECONOMIC TIMES
WWW.ECONOMICTIMES.COM

Sat, 07 Dec 2019

India, US may sign a pact on defence technology sharing at 2+2 Washington meet

It is expected that the two sides will sign the Industrial Security Annex (ISA) that will enable transfer of technology by a US firm to its Indian partners in the private sector. While several US companies, including Lockheed Martin and Boeing, ar...

By Manu Pubby

New Delhi: India and the US are heading in the right direction on the defence technology-sharing pact. The two countries are expected to sign a deal at the upcoming 2+2 dialogue in Washington on December 19. The deal will make way for the participation of aviation majors in the contest to manufactureo and supply 114 combat jets to the Indian Air Force.

A key Indo-US industry body feels that the best way to go ahead with procurement — valued at about $20 billion — is through a government-to-government deal to enable 'Make in India' and technology-sharing.

Sources told ET that the upcoming dialogue, being led by defence minister Rajnath Singh and external affairs minister S Jaishankar, will focus on renewed efforts to take forward the Defence Technology and Trade Initiative (DTTI) to include drone warfare, light-weight arms and virtual augmented reality.

It is expected that the two sides will sign the Industrial Security Annex (ISA) that will enable transfer of technology by a US firm to its Indian partners in the private sector. While several US companies, including Lockheed Martin and Boeing, are already working on defence products with Indian partners — mostly to meet offset obligations — the projects are primarily of the 'build to print' kind.

The ISA, sources said, would enable transfer of key high-end technology pieces regulated under the US law and would have safeguards to ensure that the information is protected under Indian law. "Basically, an ISA lets the US industry share sensitive US information and technology with Indian companies. Used effectively, it enables India to jump start its indigenous defence industry through much more sophisticated partnerships with the US industry," US-India Strategic Partnership Forum senior advisor Vikram J Singh told ET

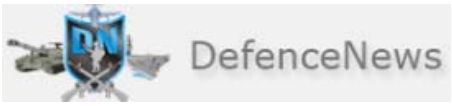
The industry forum shares the perspective of several global aviation majors that the complex plan to build 114 fighter jets after a selection process would be best served under a government-to government deal that would assure transfer of technology.

"FMS, which is the government to-government system for the United States, is probably the only way for this deal to work with a US firm. FMS is also desirable — there have been no incidents of corruption or scandal in billions of dollars of FMS transactions with India. Integrating into a global f

leet of thousands of aircraft would do more to boost India's defence industry than almost anything else," Singh said.

As reported by ET, India and the US are unlikely to sign a key foundational defence agreement for mutual access to high accuracy geospatial maps as technical issues on sharing of data have still not been worked out. The pact will however come up for discussion during the meeting. Talks will also focus on revitalising the DTTI initiative that has little to show for in terms of projects but is currently being reworked. As reported by ET, a DTTI plan to share technology for building fighter jet engines has been 'suspended' but new areas of cooperation are being identified.

https://economictimes.indiatimes.com/news/defence/india-us-may-sign-a-pact-on-defence-technology-sharing-at-22-washington-meet/articleshow/72407318.cms



Sun, 08 Dec 2019

More Apache Helicopters are on the agenda at the 2-plus-2 India US meeting

India and US will further cement their special strategic relationship with defence minister Rajnath Singh and external affairs minister S. Jaishankar meeting their US counterparts, Mark Esper and Mike Pompeo, for the two-plus-two dialogue in Washington on December 18, with the focus being on Indo-Pacific and the early conclusion of India's hardware purchases from the US.

The only other country with which India holds a dialogue in the two-plus-two format is Japan.

According to Indian and US diplomats familiar with the matter but who asked not to be named, the forthcoming dialogue will be important as it will synergise positions and views of the foreign and defence ministries of the two countries and try and achieve convergence in terms of a common view on emerging global threats and challenges.

The dialogue also gives and opportunity to the defence and foreign ministries to harmonise their perspectives on issues such as terrorism, Pakistan, Afghanistan and West Asia.

According to senior government officials who spoke on condition of anonymity, the meeting may help close pending arms purchases from the US, including that of 24 multi-role helicopters, six additional Boeing P 8I multi-mission aircraft and six additional Apache helicopters.

Apart from this, the meeting could also discuss India's acquisition of armed drones and strategic inputs for India's second aircraft carrier being built in Kochi.

The US-India trade negotiations will be kept out of the dialogue; this is currently seeing serious negotiations between Commerce Minister Piyush Goyal and US Trade Representative Robert Lighthizer.

While both sides have decided to maintain radio silence on the negotiations, an early harvest agreement is possible before the final deal is signed.

One of the main objectives of the two-plus-two meeting, the diplomats and officials said, is synchronizing India's Act East policy with the larger Indo-Pacific architecture adopted by India, the US, Japan, and Australia; both countries are for free navigation and demilitarization of the South China Sea, they added. There are pressing regional concerns as well. With US President Donald Trump ready to resume negotiations with the Taliban, India also needs to understand the recent change of Washington's strategy towards stabilization of Afghanistan.

Terrorism emanating from Pakistan with India and Afghanistan as targets will also be the key focus of the dialogue as also the large presence of so-called Islamic State Khorasan fighters in the Achin district of Nangarhar province.

Cabinet Ministers from both countries will also share their perspective on China and the Far -East with Beijing using the Belt and Road Initiative as an economic weapon in the Indian sub-continent and beyond.

https://www.defencenews.in/article/More-Apache-Helicopters-are-on-the-agenda-at-the-2-plus-2-India-US-Meeting-798333

Sat, 07 Dec 2019

Does India need a 3rd aircraft carrier amid China's breakneck Naval expansion?

China's strategic power projection in the Indian Ocean has made it necessary for India to build a stronger navy, according to defence analysts. The People's Liberation Army Navy (PLAN) has been expanding at a breakneck pace commissioning its third aircraft carrier in ten years recently and beginning to build its fourth 'flat-top'.

'String of Pearls' ::

Although the Indian Navy traditionally had only one aircraft carrier, the need for more floating armouries was felt with the Chinese rise as a naval power. Though China initially focused on building its submarine fleet, its offshore naval bases made it necessary to induct aircraft carriers. Indian defence analysts have been wary of the Chinese effort to encircle India by what they call the 'String of Pearls' by which they mean a series of ports around the strategically important western Indian Ocean to keep a watch on all ship movement.

It started with Pakistan's Gwadar Port, which China has developed as part of the China-Pakistan Economic Corridor (CPEC) programme. The Chinese navy has expanded control to ports in Myanmar, Maldives, Sri Lanka, and Kenya.

Navy Chief Admiral Karambir Singh recently said India's long-term programme is to acquire a third aircraft carrier to augment its offshore capabilities by complementing INS Vikramaditya, which is currently in service, and indigenous aircraft carrier INS Vikrant (IAC-1), whose basin tests have begun after firing up its engine for the first time at the Cochin Shipyard Limited. Admiral Karambir Singh also assured the nation that the Navy was fully prepared to deal with national security challenges, a report on the Economic Times website said.

While the Indian Navy has ambitious plans to expand the fleet, its annual budget allocation has come down from 18 per cent to 13 per cent in the last five years. This will be a major hurdle in achieving expansion targets, analysts say.

The naval authorities have been seeking more collaboration with friendly navies in the neighbourhood. The admiral saidthe Navy would not allow any action of any other player in the region to have an impact on the nation. "We are ready to work with like-minded nations in the region," he said.

Anti-submarine warfare

Stressing India's stabilising role in the region, the Naval Chief said the presence of seven to eight Chinese warships in the Indian Ocean region is usual and not of much concern. Naval sources said the

first indigenously built aircraft carrier would also have onboard indigenously developed Tejas Naval version, apart from MiG-29K and helicopters equipped with anti-submarine warfare suit.

Aircraft carriers have been vital in power projection of naval forces around the world and the 11 flat-top behemoths serving the US Navy are proof of this, with USS Gerald R Ford, commissioned in 2017 being the latest. The Royal Navy of the UK also returned to the aircraft carrier club by commissioning HMS Queen Elizabeth the same year. Russia has stuck to its only aircraft carrier Admiral Kuznetsov because of economic constraints. India would need a third aircraft carrier considering the hotbed of naval tensions that the Indian Ocean is becoming.

https://www.defencenews.in/article/Does-India-need-a-3rd-Aircraft-Carrier-amid-Chinas-breakneck-naval-expansion-798311

THE TIMES OF INDIA

Sun, 08 Dec 2019

India-China joint Army training exercise begins in Meghalaya

By Prabin Kalita

Guwahati: A joint Army training exercise between India and China 'Hand-in-Hand-2019' commenced at the Joint Training Node (JTN) in Meghalaya's Umroi on Saturday. This is the eighth edition in the series of the bilateral exercise, which will end on December 20.

"The People's Liberation Army (PLA) contingent arrived at Air Force Station Borjhar, Guwahati on Friday. There are 130 personnel of Tibet Military Command. On arrival at the Air Force Station the Indian Army extended a warm and traditional welcome to the PLA contingent which was followed by exchange of pleasantries between soldiers of both nations," said defence PRO Lt Col P Khongsai.

Major General Deepak Mehra, general officer commanding of Red Horns Division attended the opening ceremony. "The focus on initial four days of the exercise will be on orientation to training area, lectures on counter- insurgency/counter-terrorism environment, firing by each other's weapons, improvised explosive devices drills and various practices on above aspects."

"The scope of this exercise covers company level joint training on counter-terrorism operation in semi urban terrain under United Nations mandate. The exercise is aimed at building and promoting positive relations between both the armies," the PRO said.

https://timesofindia.indiatimes.com/india/india-china-joint-army-training-exercise-begins-in-meghalaya/articleshow/72419486.cms

The Statesman
PEOPLE'S PARLIAMENT, ALWAYS IN SESSION

Sun, 08 Dec 2019

India-Russia Joint Tri-Services Exercise 'Indra 2019' to begin next week in Pune, Goa & Babina

New Delhi: Indra 2019, joint tri-services exercise between India and Russia will be conducted in India from 10 to 19 December simultaneously at Babina (near Jhansi), Pune, and Goa. The Indra series of exercise began in 2003 and the 1st joint tri-services exercise was conducted in 2017.

It will be a historic occasion for two of the world's greatest Armed Forces to join hands and successfully conduct an exercise of this magnitude with professionalism, to imbibe the best practices from each other, jointly evolve and drills to defeat the scourge of terror under the United Nation mandate.

Company sized mechanised contingents, fighter and transport aircraft, as well as ships of respective Army, Air Force and Navy, will participate in this exercise of ten days duration. The exercise will consist of a five-day training phase consisting of a comprehensive training curriculum.

Tactical operations end drills such as cordon house intervention, handling and neutralisation of Improvised Explosive Devices (IED), prevention of arms smuggling through the sea route and anti-piracy measures will be practised. This training phase will be followed by a 72-hour validation exercise.

The contingents of both countries will share expertise and their professional experience. The esprit-de-corps and goodwill shall be the key areas during the exercise which will facilitate further strengthening of bonds between the defence forces of India and Russia.

Indra will culminate on 19 December with an Integrated Fire Power demonstration and the Closing Ceremony.

THE NEW INDIAN EXPRESS

Sat, 07 Dec 2019

US faults India's response to cyber attack on Kudankulam nuclear plant

The US has imposed stringent sanctions on North Korea over the communist country's nuclear and ballistic missile programme

By Mayank Singh & Pushkar Banakar

New Delhi: US State Department officials are on a hush-hush visit to India in connection with the recent cyber attack on the Kudankulam nuclear plant, which has been traced to North Korea, it is learnt. Sources said the US expressed concern over India's bid to play down the incident. Washington feels New Delhi should have raised the issue at the global level to expose N Korea's intentions.

"US State Department officials are in India and had a meeting with select officials of the Indian Ministry of External Affairs. They expressed unhappiness at the way India handled the cyber attack," sources told this newspaper.

However, neither the MEA nor the US embassy in New Delhi confirmed the visit with foreign ministry officials saying they have “no such information”.

It was on October 30 the Nuclear Power Corporation of India, which runs Kudankulam, admitted to the presence of malware in one of its computers. However, it claimed none of the systems was hit.

Junior foreign minister Gen VK Singh was the first Indian minister to go on a two-day official trip to North Korea in May 2018.

India has complied with the UN sanctions and has appealed to N Korea to abide by international commitments on nuclear and missile issues. India has been raising the issue of clandestine nuclear and missile cooperation between Pak and North Korea.

The US has imposed stringent sanctions on North Korea over the communist country’s nuclear and ballistic missile programme.

https://www.newindianexpress.com/nation/2019/dec/07/us-faults-indias-response-to-cyber-attack-on-kudankulam-nuclear-plant--2072653.html

DefenceNews

Sat, 07 Dec 2019

China's defence budget increased 850 percent over 20 years: Pentagon official

China's defense budget has grown 850 per cent in the last 20 years from $20 billion to $170 billion in 2018, a top Pentagon official told lawmakers on Thursday.

China possesses one of the largest militaries in the world. It continues to add to its capabilities and is increasingly provocative, such as its activities in the South China Sea and in Africa, where China established its first overseas base ever in Djibouti in 2017, said Under Secretary of Defense for Policy John C Rood.

"China's official defense budget has grown 850 per cent over the past 20 years from USD 20 billion to USD 170 billion in 2018," Mr Rood said in his testimony before the Senate Armed Services Committee.

He also noted that the real figures are significantly higher than China's official budget.

China Mr, Rood said, has also sought to spend funding in ways that are specifically targeted at key US military advantages with new capabilities in such areas as space, cyber, electronic warfare, undersea warfare, fighter aircraft, bombers equipped with long range cruise missiles, and other anti-access, area denial (A2AD) capabilities.

Giving example, he said China is using cyber capabilities to advance its military and strategic.

China's ground forces alone exceed one million personnel. A large maritime militia supplements its 300-ship navy and 250-ship coast guard. Its air forces operate over 2,600 aircraft. It maintains a ballistic missile arsenal consisting of 750-1500 short range, 150-450 medium range, and 80-160 intermediate range variants, Rood said.

Chinese development of nuclear capabilities is extensive, he said, adding that the People's Liberation Army (PLA) Navy intends to increase the number of operational SSBN class submarines from four to six.

The Rocket Forces maintain approximately 90 Intercontinental Ballistic Missiles, including road mobile delivery systems. Rounding out their nuclear triad is the PLA Air Force"s operational H-6K, and the prospect of a future nuclear capable stealth strategic bomber, estimated to debut in 2025.

These delivery systems equipped with nuclear weapons give China several ways of reaching the United States, and exemplify China"s large-scale effort to build larger and more capable forces armed with nuclear weapons, Rood said.

The senior Pentagon official told lawmakers that Beijing's activities, such as militarisation of the South China Sea, development of offensive cyber and space capabilities, and legal and illicit efforts to acquire sensitive or advanced dual-use technologies to support its military objectives, are inconsistent with the rules-based international order, which has benefited all nations, including China.

Senator Jim Inhofe, Chairman of Senate Armed Services Committee, said while China was increasing it military spending, the US under the Obama administration "actually reduced" its defence appropriations by 25 per cent.

https://www.defencenews.in/article/Chinas-Defence-Budget-Increased-850-percent-Over-20-Years-Pentagon-Official-798322

Sun, 08 Dec 2019

North Korea conducts 'very important test': KCNA

Seoul: North Korea has conducted a "very important test" at its Sohae satellite launch site, state media reported Sunday, as nuclear negotiations between Pyongyang and Washington remain deadlocked.

"A very important test was carried out at the Sohae Satellite Launch Site on December 7th, 2019," a spokesman for the North's National Academy of Science said.

The result of the latest test will have an "important effect" on changing the "strategic status" of North Korea, the spokesman said in a statement carried by the KCNA news agency.

The statement did not provide further details on the test.

North Korean leader Kim Jong Un had agreed to shutter the Sohae site during a summit last year with South Korean President Moon Jae-in in Pyongyang as part of trust-building measures.

Kim has also held three meetings with US President Donald Trump since June 2018 but little progress has been made in efforts towards denuclearisation.

The latest test comes as Pyongyang is ramping up pressure ahead of its end-of-year deadline for the US to propose a new offer to kickstart stalled nuclear talks.

On Thursday, the North's vice foreign minister warned of returning to a war of words with the US, threatening to resume referring to Trump as a "dotard" - Pyongyang's nickname for the US leader at the height of tensions in 2017.

The comments came a day after it warned that if the US used military force against the North it would take "prompt corresponding actions at any level".

At the recent NATO summit, Trump boasted about Washington's "most powerful military", adding: "Hopefully, we don't have to use it, but if we do, we'll use it. If we have to, we'll do it."

https://www.dailypioneer.com/2019/trending-news/north-korea-conducts--very-important-test---kcna.html

the pioneer

Mon, 09 Dec 2019

Israel strikes in Gaza after rocket attack

Gaza City: Israeli aircraft carried out attacks in the Hamas-controlled Gaza Strip on Sunday, Palestinian security officials said, hours after militants in the enclave launched three rockets at the Jewish State.

The strikes targeted two sites belonging to Al-Qassam Brigades, the Hamas military wing, in northern Gaza, with another series of sorties at a Qassam site west of Gaza City, Hamas officials said.

There were no immediate reports of injuries.

Late Saturday night, Palestinian militans in Gaza launched three rockets at southern Israel.

All three projectiles were intercepted by the Iron Dome defence system, the army said, amending an earlier statement according to which two of the three rockets were shot down over southern Israel.

Medics had treated three people in the southern Israeli town of Sderot who suffered minor injuries while seeking shelter as air raid sirens went off, the Magen David Adom emergency medical service said.

There were no immediate reports of material damage.

On November 29, Israeli warplanes struck Hamas positions in Gaza in response to rocket fire at the Jewish state the previous day.

Hamas has controlled Gaza since 2007, and Israel holds the Islamist movement responsible for all rocket fire coming from the territory, although it has targeted other militant groups there.

Last month, Israeli forces assassinated a senior Islamic Jihad leader in the Gaza Strip, sparking a two-day flare-up which killed 36 Palestinians.

Islamic Jihad fired around 450 rockets at Israel, many of which were intercepted by the Iron Dome defence system

Israel has fought three wars with Hamas and allied armed groups in Gaza since 2008.

https://www.dailypioneer.com/2019/world/israel-strikes-in-gaza-after-rocket-attack.html

जनसत्ता

Mon, 09 Dec 2019

भारतीय उपग्रहों को मलबे से सुरक्षित रखने के लिए 33 करोड़ रुपए का प्रस्ताव

नई दिल्ली, 8 दिसंबर (भाषा)।

सरकार ने अंतरिक्ष में भारतीय उपग्रहों को मलबे और अन्य खतरों से सुरक्षित रखने वाली इसरो की 'नेटवर्क फार स्पेस आब्जेक्ट्स ट्रैकिंग एंड एनालिसिस' या 'प्रोजेक्ट नेत्र' के लिए 33.30 करोड़ रुपए का प्रस्ताव किया है। अनुदान की पूरक मांगों के दस्तावेज से यह जानकारी मिली है। वित्त मंत्री निर्मला सीतारमण ने वर्ष 2019-20 के अनुदान की पूरक मांगों के पहले बैच में 'नेटवर्क फार स्पेस आब्जेक्ट्स ट्रैकिंग एंड एनालिसिस' परियोजना के वास्ते 33.30 करोड़ रुपए मंजूर करने के लिए संसद की मंजूरी मांगी थी। लोकसभा ने पिछले सप्ताह इसे मंजूरी दे दी।

सितंबर 2019 में भारत ने अंतरिक्ष में अपने उपग्रहों एवं अन्य संपत्तियों की मलबे एवं अन्य वस्तुओं से सुरक्षा के लिए प्रारंभिक चेतावनी प्रणाली संबंधी 'प्रोजेक्ट नेत्र' की घोषणा की थी। इस पर 400 करोड़ रुपए की अनुमानित लागत आने की संभावना है। वैज्ञानिकों का कहना है कि मानव के 50 वर्षों के अंतरिक्ष इतिहास में पृथ्वी की कक्षा के चारों तरफ घूमने वाली कचरे की एक पट्टी बन गई है, जिसके कई तरह के खतरे हैं। ऐसे में अंतरिक्ष में देशों के लिए अपनी संपत्ति की सुरक्षा सुनिश्चित करना जरूरी है।

- वर्तमान में भूस्थैतिक कक्षा में 15 भारतीय संचार उपग्रह सक्रिय हैं।
- निम्न भू-कक्षा में 13 रिमोट सेंसिग उपग्रह तथा पृथ्वी की मध्य कक्षा में आठ नेविगेशन उपग्रह स्थापित हैं।

वर्तमान में भूस्थैतिक कक्षा में 15 भारतीय संचार उपग्रह सक्रिय हैं। इसके अलावा निम्न भू-कक्षा (2,000 किलोमीटर के दायरे) में 13 रिमोट सेंसिग उपग्रह तथा पृथ्वी की मध्य कक्षा में आठ नेविगेशन उपग्रह स्थापित हैं। इसके अलावा भी कई छोटे उपग्रह अंतरिक्ष में मौजूद हैं। सतीश धवन अंतरिक्ष केंद्र के पूर्व वरिष्ठ वैज्ञानिक डा. एमवाईएस प्रसाद ने कहा कि भारत एक जिम्मेदार अंतरिक्ष शक्ति है और इस तरह की निगरानी क्षमता अंतरिक्ष संपत्ति की सुरक्षा के लिए जरूरी है।

उन्होंने कहा कि 'नेटवर्क फार स्पेस आब्जेक्ट्स ट्रैकिंग एंड एनालिसिस' परियोजना से भारत को अंतरिक्ष में मलबे एवं अन्य खतरों का आकलन करने की अमेरिका और रूस के समान क्षमता हासिल हो जाएगी। एक रिपोर्ट के अनुसार, अंतरिक्ष में लगभग 17,000 मानव निर्मित वस्तुओं की निगरानी की जाती हैं, जिनमें से सात फीसद वस्तुएं सक्रिय हैं। एक समयावधि के बाद ये वस्तुएं निष्क्रिय हो जाती हैं और अंतरिक्ष में घूर्णन करने के दौरान एक-दूसरे से टकराती रहती हैं। प्रत्येक वर्ष अंतरिक्ष में वस्तुओं के टकराने की अनेकों घटनाएं होती हैं। इसके फलस्वरूप मलबे के छोटे-छोटे टुकड़े अत्यंत तीव्र गति से घूर्णन करते रहते हैं। अंतरिक्ष में उपस्थित निष्क्रिय उपग्रहों और अन्य मलबा पृथ्वी की कक्षा में कई वर्षों तक विद्यमान रहता हैं और ये मलबा किसी भी सक्रिय उपग्रह को क्षति पहुंचा सकता है।

THE TIMES OF INDIA

Sun, 08 Dec 2019

Chandrayaan-3 is official, ISRO seeks Rs 75 crore

By Chethan Kumar

HIGHLIGHTS

- ***The money has been sought under the provisions of a supplementary budget for the present financial year.***
- ***Of this, Rs 60 crore will be for "meeting expenditure towards machinery, equipment and other capital expenditure," while the remaining Rs 15 crore is sought under revenue expenditure head.***

Bengaluru: Chandrayaan-3 is now official. Indicating the urgency in implementing the project, the Indian Space Research Organisation's (ISRO) has sought Rs 75 crore from the Centre specifically for the mission as an addition to its existing budget.

TOI, which was the first to report that Isro is looking to launch another Moon landing mission as early as next November, has now been able to get a confirmation from the department of economic affairs that the space agency has, in fact, sought Rs 75 crore for Chandrayaan-3.

As per initial plans, Chandrayaan-3 will have a lander, a rover and a detachable propulsion module to carry fuel.

The money has been sought under the provisions of a supplementary budget for the present financial year. Of this, Rs 60 crore will be for "meeting expenditure towards machinery, equipment and other capital expenditure," while the remaining Rs 15 crore is sought under revenue expenditure head.

The Rs 75 crore sought specifically for Chandrayaan-3 makes up for more than 11% of the Rs 666 crore the space agency has demanded over and above the funds granted as part of the original 2019-2020 budget.

Of the Rs 666 crore, Rs 8.6 crore has been asked for the proposed human spaceflight programme, to be implemented in 2022, nearly Rs 12 crore is for the development of small satellite launch vehicle (SSLV), while Rs 120 crore is for the development of the launchpad of SSLV.

The largest demand for additional capital funds has come from the UR Rao Satellite Centre — responsible for assembling and testing satellites — followed by Satish Dhawan Space Centre (the spaceport). They have together sought Rs 516 crore.

ISRO has already set up multiple committees to work on Chandrayaan-3, which some insiders told TOI, should not be the agency's immediate priority given that other big-ticket projects like Aditya (solar mission) and Gaganyaan (human spaceflight) are in the pipeline.

Aditya, which was earlier expected to be launched in the first quarter of the next calendar year, is now unlikely to meet the deadline. However, there is so far no direct link to Chandrayaan-3 and the delay in Aditya.

ISRO had failed to soft-land Vikram, the lander on Chandrayaan-2 mission, on the lunar surface on September 7, 2019.

While ISRO has largely remained mum on the reasons for Vikram's hard-landing, a written reply in the Lok Sabha late last month said that the "reduction in velocity during the second phase of descent was more than the designated value. " This confirmed a September 8, 2019 report of TOI with the headline: "Extra brake thrust may have sent Vikram out of control in the home stretch."

https://timesofindia.indiatimes.com/india/chandrayaan-3-is-official-isro-seeks-rs-75-crore/articleshow/72421303.cms

THE TIMES OF INDIA

Mon, 09 Dec 2019

ISRO space tech cells at IITs to promote student research

By Surendra Singh

HIGHLIGHTS

- ***The cells have been set up at IITs — Bombay, Kanpur, Kharagpur and Madras, IISc, Bengaluru, and joint research programme with Savitribai Phule Pune University, Pune.***
- ***The information about the space cells was provided to the Rajya Sabha by MoS for department of space Jitendra Singh recently.***

New Delhi: To promote research in space technologies, Indian Space Research Organisation (Isro) has set up five space technology cells at premier institutions.

The cells have been set up at IITs — Bombay, Kanpur, Kharagpur and Madras, IISc, Bengaluru, and joint research programme with Savitribai Phule Pune University, Pune. The information about the space cells was provided to the Rajya Sabha by MoS for department of space Jitendra Singh recently.

Talking to TOI, Isro chairman K Sivan said, "We are setting up different kinds of hubs to promote space research. The cells are in addition to incubation centres and research centres being set up across the country to promote research by youths and students. "

On the upcoming PSLV-C48 launch on December 11, Sivan told TOI that "one of the nine customer satellites to be launched along with primary payload Risat-2BR1 (surveillance satellite) has been made by Israeli students".

Jointly built by Herzliya Science Center and Sha'ar Hanegev High School students in Israel, experimental satellite Duchifat-3, weighing just 2.3 kg, is designed to help Israeli students observe the Earth from space. The educational satellite, which has an on-board camera for earth imaging and an amateur radio transponder, will mainly be used for ecological research like checking air and water source pollution and forest monitoring. Three Israeli students — Alon Abramovich, Meitav Assulin and Shmuel Aviv Levi, all 17 to 18 years old— are arriving in the country on Monday to witness the launch of Duchifat-3 by PSLV C48 rocket from Sriharikota next Wednesday, says an agency report.

For youths, ISRO has already set up incubation centres on the campuses of NITs in Agartala, Jalandhar and Tiruchirappalli. The work on the rest (in Bhubaneswar, Nagpur and Indore) is going on, the Isro chief informed.

On space research centres, Sivan said, "Places where academic excellence and industry are there, we will be establishing R&D centres there so that people can make use of the industry to research and make their products." These R&D hubs will come up in Guwahati, Jaipur, Varanasi, Kurukshetra, Patna and Kanyakumari. "The centres will give a platform to talented youths across the country to come up with bright ideas and do research on those ideas for developing space technologies," he said.

Even schoolchildren are being enrolled in different Isro- and government-sponsored programmes like 'Samwad with Students', guided tours to ISRO centres and PM innovative learning programme "Dhruv" to raise their interest in space technology.

https://timesofindia.indiatimes.com/india/isro-space-tech-cells-at-iits-to-promote-student-research/articleshow/72431337.cms

DefenceNews

Sat, 07 Dec 2019

ISRO to attempt mega-world-record to launch 104 satellites in a single launch - Next is Mars and Venus

India will boldly go to Venus for the first time and re-visit the Red Planet very soon.

Buried and hidden in the hundreds of pages of the new format electronic budget documents, is the first formal acknowledgement by the government about these two new bold inter-planetary sojourns to Earth's immediate neighbours.

This uplifting news comes ahead of the Indian Space Research Organisation attempting to undertake its mega launch where it will drop off into space not one, two or three but a full load of 104 satellites in space in a single mission.

No other country has ever tried to hit a century in a single mission. The last world record is held by Russia which in 2014 rocketed 37 satellites in a single launch using a modified inter-continental ballistic missile.

If all goes according to plan, on the morning of February 15, ISRO will hurl into space using the Polar Satellite Launch Vehicle three Indian satellites and a 101 small foreign satellites.

India is hoping to better the previous world record by a whopping two-and-a-half times. ISRO, considered the new kid on the block in the multi-billion dollar world launcher market, hopes to set an enviable benchmark for the space fairing nations.

Prime Minister Narendra Modi's love affair with space is quite evident. The government, it seems, is rather pleased with the Indian space agency as Finance Minister Arun Jaitley gave the department of space a whopping 23 per cent increase in its budget. Under the space sciences section, the budget mentions provisions "for Mars Orbiter Mission II and Mission to Venus".

The second mission to Mars is tentatively slated for in 2021-2022 timeframe and as per existing plans it may well involve putting a robot on the surface of the Red Planet.

While India's first mission to Mars undertaken in 2013 was a purely Indian mission, the French space agency wants to collaborate in making the Mars rover.

In fact on a visit to India this month, Michael M Watkins, Director of the Jet Propulsion Laboratory of NASA, said they would be keen to at least put a telematics module so NASA's rovers and the Indian satellites are able to talk to each other.

The second Indian mission to Mars is likely to be all about doing good science since the first one had a nationalistic streak on it in trying to beat China to the orbit of Mars which the Mars Orbiter Mission did magnificently.

India's maiden mission to Venus, the second planet of the solar system named after the Roman goddess of love and beauty, is in all probability going to be a modest orbiter mission.

Watkins said a mission to Venus is very-very worthwhile as so little is understood about that planet and NASA would definitely be willing to partner in India's maiden voyage to Venus.

Towards that, NASA and ISRO have already initiated talks this month on trying to jointly undertake studies on using electrical propulsion for powering this mission.

India's original inter-planetary dreamer K Kasturirangan, former chairman of ISRO, says, "India should be part of this global adventure and exploring Venus and Mars is very worthwhile since humans definitely need another habitation beyond Earth."

Closer to home on its 39th launch India's workhorse rocket the PSLV will lift off carrying 1378 kg of robots to be deployed in space.

The first to be let off will be India's high resolution Cartosat-2 series satellite made especially to monitor activities of India's hostile neighbours at a resolution of less than a metre keeping a bird's eye view on both Pakistan and China.

This earth imaging capability is not unusual but the rest of the passengers are unique. There are two small Indian satellites each weighing less than 10 kg that are forerunners of a new class of satellites called ISRO Nano Satellites which the engineers seek to master.

What follows next is a trailblazing performance by the PSLV when at an altitude of over 500 km in space it will release from its womb, 101 co-passengers one each from Israel, Kazakhstan, The Netherlands, Switzerland, the UAE and a whopping 96 from the US. It is only recently American private companies have warmed up to ISRO as India offers cheap and reliable option.

Eighty-eight of the American satellites belong to a San Francisco based start-up company Planet Inc which is sending a swarm of small 4.7 kg each satellite it calls 'Doves'. This constellation will image earth like never before and with a high repeat rate providing satellite imagery at an affordable cost.

This suite of 101 small satellites all together weighing 664 kg will be released in space in a manner akin to a typical school bus which drops of its passengers namely children at their respective bus stops in a sequential manner, avoiding squabbling and elbowing in near zero gravity is not easy.

Ensuring that no collisions take place even is an art that ISRO has mastered from previous launches. In less than 600 seconds all 101 satellites will be released into space each travelling at whopping velocity of over 27,000 km per hour or at 40 times the speed of an average passenger airliner.

Some experts are suggesting that in a bid to earn some money ISRO is actually contributing significantly to the creation of space junk as these small satellites are really not very useful.

But Laura Grego, Senior Scientist, Global Security Program, Union of Concerned Scientists, Cambridge, USA says, "I think that these launches can be done responsibly and provide benefits to all people. Developing a culture of responsible space launch and operations is key as more and more countries become space-faring.

"While the number of countries that can launch satellites independently is still quite small, many dozens of countries own and operate satellites."

Kasturirangan says, "India has the capability putting several satellites in a single launch and demonstrating that capability is certainly not bad as it adds to India's credibility and then later if ISRO deploys this capability of formation flying in a constellation of its own satellites it would be a useful addition to its arsenal."

https://www.defencenews.in/article/ISRO-to-attempt-Mega-World-Record-to-launch-104-satellites-in-a-single-launch---Next-is-Mars-and-Venus-798338

THE TIMES OF INDIA

Mon, 09 Dec 2019

PSLV's golden jubilee launch on December 11

By Srinivas Laxman

Mumbai: When the golden jubilee flight of the four-stage PSLV lifts off at 3.25 pm on Wednesday, from the Satish Dhawan Space Centre, Sriharikota, Israeli school students will have reason to cheer and celebrate. Reason? A satellite designed entirely by school kids will be launched on the 50th flight of the highly-proven PSLV, described as the workhorse of India's space programme.

The first launch of the PSLV, on September 20, 1993, failed. Thereafter, of the 49 launches so far, 46 were successful, two were complete failures, and one a partial success.

Some of the significant payloads of PSLV include India's maiden lunar mission, Chandrayaan-1 and country's first mission to Mars, the Mangalyaan.

https://timesofindia.indiatimes.com/india/pslvs-golden-jubilee-launch-on-december-11/articleshow/72431452.cms