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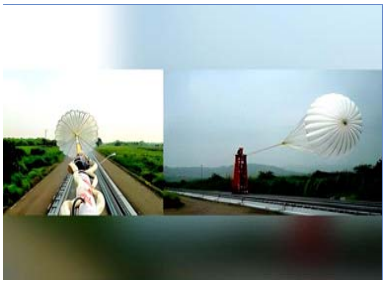
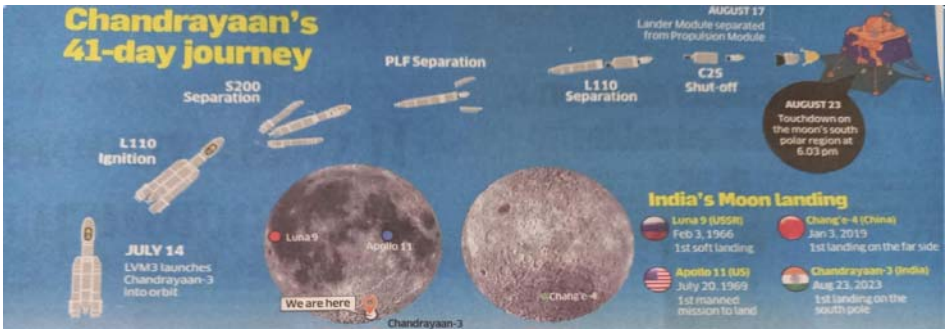
ISRO Conducts Drogue Parachute Deployment Tests for Gaganyaan Mission



'History made': Scientists hail Chandrayaan-3's successful landing on lunar south pole



The successful soft landing of India's ambitious Chandrayaan-3 mission on the Moon's enigmatic south pole has captured the attention and admiration of the scientific community. Leading scientists and experts said this monumental accomplishment not only marks India's indelible imprint on lunar exploration but also demonstrates the prowess of human collaboration, determination, and cutting-edge technology. Dr. Chrisphin Karthick, a scientist at the Indian Institute of Astrophysics, Bengaluru, expressed his elation. "The successful landing of Chandrayaan-3 is a testament to our collective progress towards space travel. It showcases the beauty of unity in diversity as we sail the cosmic seas together," he told PTI. "Slow and steady - reaching the goal is better than saying we won the race. I emphasise this since many are comparing it with our friendly nation programmes. It's good to say we earthlings won the race in sailing the universe in many ways," Karthick added. The Chandrayaan-3 is a follow-on mission to Chandrayaan-2 and its objectives are to demonstrate safe and soft-landing on the lunar surface, roving on the Moon, and to conduct in-situ scientific experiments. Chandrayaan-2 had failed in its lunar phase when its lander 'Vikram' crashed into the surface of the Moon following anomalies in the braking system in the lander while attempting a touch down on September 7, 2019. The Chandrayaan

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CURRENT AFFAIRS

Defence Minister to Dedicate to Nation 74 Projects of BRO Including Air Strips, Tunnels: DG BRO

Defence minister Rajnath Singh will soon dedicate to the nation 74 projects of the Border Roads Organisation (BRO) including airstrips, tunnels and bridges along the northern and western borders, BRO Director General Rajeev Chaudhry said. Lieutenant General Chaudhry was speaking after an inspection of the nearly half-a-kilometre-long fully constructed bridge on River Devak that connects areas along the International Border (IB) with the mainland. “Date (for the inauguration of Devak bridge) will be finalised soon. It will be inaugurated and dedicated to the nation. The defence minister will be visiting the Jammu region. He will also be inaugurating 74 more projects including two airstrips, tunnels, bridges and roads,” the DG told reporters here. He said that the construction of the Devak Bridge in Samba district has been accomplished within two years under Project Sampark. “This bridge, positioned on the Devika River, holds immense importance from both strategic and socio-economic perspective. “It enables rapid movement of forces along the border, benefiting the villages of Folpur and Gulpur situated along the IB”, he said. The officer said that previously, villagers faced challenges crossing the river, especially during periods of high water levels. “The bridge, located approximately 3.5 km from the International Border, spans 422 metres,” he added. The DG said that a pivotal road under construction along the border is the Akhnoor-Poonch road. “We have widened this road, which features four tunnels of Kandi, Sungal, Nowshera, and Bhimbergali. The project is progressing at a commendable pace and is anticipated to conclude within the next two years,” he added. He also spoke about the strategic hinterland road of Bani-Basholi-Baderwah. “Out of the total 165 km, 125 km of the road has been surfaced. Work is ongoing on the remaining 40 km and is projected to be finished by March 2025. Notably, 89 km of road between Basholi and Bani, as well as 35 km from Baderwah to Chatergalla, has already been completed”, he added. On the question of BRO’s efforts to connect remote areas through roads, he said that this achievement has been highlighted by the President of India during her address to the joint parliamentary session. The prime minister has also been emphasising BRO’s vital role, he said. Villages have gained access to various developmental amenities, such as schools, health centres, police stations and administrative offices due to the infrastructure push, he said.

Source: https://timesofindia.indiatimes.com/india/defence-minister-to-dedicate-to-nation-74-projects-ofbro-including-air-strips-tunnels-dg-bro/articleshow/102507221.cms

CAS Review of LCA Programme

The Chief of Air Staff (CAS) Air Chief Marshal VR Chaudhari reviewed the status of the Light Combat Aircraft (LCA) programme in Air Headquarters yesterday. Also in attendance were senior functionaries from the Ministry of Defence, DRDO, HAL and ADA. Opening the proceedings, the CAS brought out that the LCA has been the flag bearer of the Indian Air Force’s (IAF) efforts towards indigenisation of its aircraft fleet. He said that given the nature of this project of national importance, it is required that all stakeholders adopt a collaborative approach towards its success. The programme has been the harbinger of Atmanirbhar Bharat and Make in India initiatives of the nation. More importantly, it is a flag bearer of India’s self-reliance in the aerospace sector. During the review, it was brought out that all contracted fighter variants of the LCA Mk 1 had been delivered to the IAF. Representatives of HAL assured the CAS of the timely delivery of the contracted twin-seaters in the coming months, as well. Further to the LCA Mk 1, 83 LCA Mk-1A aircraft have also been contracted by the IAF in 2021. The Chairman & Managing Director of HAL assured those present that the deliveries of this advanced variant of the LCA would commence by Feb 2024. While complimenting HAL, the CAS indicated that based on these assurances, the LCA Mk 1A could be inducted in a newly raised squadron in one of the IAF’s operational bases, early next year. Notwithstanding the project delays that were brought

out during the course of the review, the CAS lauded the efforts of all stakeholders and emphasized on the need to incorporate the lessons learnt from the LCA programme into future indigenous Design & Developmental projects. With timely deliveries of the more capable variant, the LCA Mk 1A is likely to see increased deployments at forward bases, besides participation in International exercises in the days to come.

Source: https://pib.gov.in/PressReleasePage.aspx?PRID=1951408

MDL's Project 17A Stealth Frigate 'Mahendragiri' to be Launched on September 1

The fourth stealth guided missile frigate of Project 17A 'Mahendragiri' will be launched in Mumbai on September 1, marking a major step in India's defence indigenisation programme. A Nilgiri-class frigate - Mahendragiri - is expected to be commissioned into the Indian Navy in 2027. Vice President Jagdeep Dhankhar would be the chief guest on the occasion. The ship is being built by the Mazagon Dock Shipbuilders Limited (MDL) in Mumbai. The MDL involves four ships of the class - Nilgiri, Udaygiri, Taragiri and Mahendragiri. The lead ship of the class, Nilgiri was launched on 28 September 2019 and it is expected to be commissioned in 2024. Udaygiri was launched on 17 May 2022, while Taragiri was launched on 11 September 2022. Mahendragiri, whose keel was laid on 28 June 2022 is being launched on 1 September 2023. Udaygiri, Taragiri and Mahendragiri are expected to be commissioned in 2025, 2026 and 2027, respectively. There other ships of Nilgiri-class are being made at the Garden Reach Shipbuilders & Engineers Ltd in Kolkata. These are Himgiri, Dunagiri and Vindhyagiri, which were launched on 14 December 2020, 15 July 2022 and 17 August 2023, respectively and are due for commissioning in 2025-2026. These ships are designed by the Indian Navy's in-house design organization, Bureau of Naval Design. \The 149.02 M long and 17.8 M wide ship, propelled by a CODOG combination of two Gas Turbines and 02 Main Diesel Engines which are designed to achieve a speed of over 28 knots at a displacement of approx. 6670 tons. The steel used in hull construction of P17A frigates is indigenously developed DMR 249A which is a low carbon micro alloy grade steel manufactured by SAIL. The indigenously designed ships will have state-of-the-art weapons, sensors, an advanced action information system, an integrated platform management system, world class modular living spaces, sophisticated power distribution system and a host of other advanced features. It will be fitted with a supersonic surface-to- surface missile system. The ship's air defence capability, designed to counter the threat of enemy aircraft and anti-ship cruise missiles will revolve around the vertical launch and long range surface to air missile system. Two 30 mm rapid-fire guns will provide the ship with close-in-defence capability while an SRGM Gun will enable her to provide effective naval gunfire support. Indigenously developed triple tube light weight torpedo launchers and rocket launchers will add punch to the ship's anti-submarine capability.

Source:https://www.deccanherald.com/india/maharashtra/mdls-project-17a-stealth-frigate-mahendragirito-be-launched-on-september-1-2664731

Current Space Situation around the Moon – An assessment

Introduction

Exploration of space beyond the near-Earth regime has been one of the most challenging and fascinating ventures of humankind and continues to capture the imagination of generations. Over the ages, several space-faring nations have undertaken numerous missions to explore most of the planets in the solar system, their natural moons, various minor planets/ asteroids, comets and even interplanetary voyages. The Moon and Mars are the most explored and also comparatively more crowded planetary bodies at present. India's Chandryaan-3 (CH3) is the latest entry into the lunar orbit. More intensified activities around the Moon are foreseen in the next few years due to the renewed interest in lunar exploration, heralded by Artemis missions for return to the Moon and preparations for colonisation of Mars. While the previous missions were essentially aimed at scientific explorations, upcoming ventures will likely involve multiple actors of diverse interests, including those primarily driven by resource utilisation

for commercial purposes. A better understanding of the environment is needed to formulate reasonable mitigation practices to avoid close-approach threats in planetary orbits.

The current Space Debris Mitigation Guidelines by the UN and Inter-Agency Space Debris Coordination Committee (IADC) are applicable to spacecraft and orbital stages “that will be injected into Earth orbit.Currently space debris pose a major threat to the long-term sustainability of outer space activities in the ever-increasingly congested Earth orbits. Therefore, based on the lessons learnt while operating in the near-Earth regime, it is interesting and desirable to undertake studies related to close approaches in view of the increasing number of objects in the lunar orbits.

Tracking of deep space objects

Observation and tracking of deep space objects are inherently more complex compared to that in the near-Earth regime, mainly due to the vast distance involved between the object and the observer which introduces considerable latency, signal attenuation and associated complexities. Functional assets like spacecraft/landers/rovers are tracked by active and passive means. Typical active techniques involve range and Doppler measurement, very long baseline interferometry (VLBI)/Delta Differential One-way Ranging (DOR), and laser ranging with retro-reflectors. Optical transponders have also been demonstrated for missions like the Messenger, Mars Global Surveyor, and Hyabusa-2 which can give better accuracy.

Lunar orbits

Orbital evolution in lunar orbit is primarily influenced by lunar gravity, gravity of the Sun and the Earth, and the Sun Radiation Pressure. For orbits lower than 500 km, non-uniformity of lunar gravity due to mass concentrations dominates, which along with the third body perturbations due to the Earth and the Sun causes the orbit eccentricity (without any change in the semi-major axis) to increase. As a result, the perilune altitude is gradually lowered leading to eventual impact with the lunar surface. For example, the expected orbital lifetime of a spacecraft at a 100 km circular orbit is about 160 days.

The major types of lunar orbitsinclude Halo orbit around Langrange’s point, Nearly Rectilinear Halo Orbit (NRHO), Low Lunar Orbit (LLO), and Distant Retrograde Orbit (DRO). NRHO orbits offer the advantages of being stable and requiring less orbit maintenance, maintaining continuous communication with Earth and other lunar orbiting crafts, eclipse avoidance etc. and are highly suitable to host lunar gateways. Several forthcoming missions may also be placed in similar orbits, but given the vast spatial extent of such orbits (far larger than the GEO belt), no congestion is anticipated in the foreseeable future. Majorityof the currentlyorbiting lunar probes operate in LLO.

The current situation around the moon

As of July 2023, there are 6 active lunar orbiters (see Fig-1). Two of the five probes of NASA’s THEMIS mission have been re-purposed under ARTEMIS (Acceleration, Reconnection, Turbulence and Electrodynamics of the Moon’s Interaction with the Sun) as ARTEMIS P1 and ARTEMIS P2, both operate in eccentric orbits of low inclination. NASA’s Lunar Reconnaissance Orbiter (LRO) orbits the Moon in a nearly polar, slightly elliptical orbit. Chandrayaan-2, the second lunar mission of ISRO and Korea Pathfinder Lunar Orbiter (KPLO) also operate in polar orbits of 100 km altitude. NASA’s Capstone operates in a 9:2 resonant southern L2 NRHO, its perilune passes over the lunar North pole at 1500-1600 km altitude, while the apolune is over the South pole at a distance of nearly 70,000 km. The Japanese spacecraft Ouna which was placed in lunar orbit as part of Kaguya/SELENE mission in 2009 and Chandrayaan-1 launched in 2008 are the two defunct spacecraft. All the other orbiters have been either moved out of the moon-bound orbital regime or have landed/impacted the lunar surface, either deliberately or due to failure to land softly. For example, Chang’e 4 mission’s data relay satellite Queqiao, launched by China in May 2018, was later moved to a halo orbit near the Earth-Moon L2 point. Currently, the only operating rover is China’s Yutu-2 rover released by Chang’e 4, which operates on the far side. From the available media sources, it is expected that Luna-25 of Russia with a Lander and Rover will be in Lunar orbit of 100 km by August 16, 2023 and will be landing on South pole of the moon by August 21-23, 2023.

Name	Country/ Organisation	Launch	Type
Luna-25	Russia	2023	Lander
Commercial Lunar Payload Services (CLPS)	USA	2023	Lunar delivery services
Lunar Trailblazer	USA	2023	Orbiter
Beresheet 2	Israel	2024	Orbiter and lander
VIPER (Volatiles Investigating Polar Exploration Rover)	USA	2024	Rover
Artemis II	USA	2025	Lander
China's Lunar Exploration Programme (CLEP): Chang'e 6,7,8	China	2024-2027	Lunar robotic research station
China's lunar communication and navigation satellite constellation	China	2023	Relay satellites to support lunar surface operations
Hakuto-II and III	Japan	2024-2025	Orbiter/lander
SLIM (Smart Lander for Investigating Moon)	Japan	2023	Orbiter/lander
LUPEX (Lunar Polar Exploration Mission)	India/Japan	After 2024	Orbiter, lander, rover

Table 1: Future Missions to Moon

Risk of Close Approaches in Lunar Orbits and its Mitigation

Even with a handful of orbiting spacecraft, frequent conjunctions are experienced by LRO, KPLO, and CH2O as their orbital regimes in LLO overlap. Sometimes such conjunctions even warrant collision avoidance manoeuvres to be executed to be on the safer side because of the uncertainty associated with orbital estimates. Till July 2023, Chandrayan-2 has performed 3 collision avoidance manoeuvres to mitigate critical close approaches with LRO and KPLO. It is noteworthy that effective coordination is taking place among the agencies to avoid critical conjunctions in the Lunar orbit. For Chandryaan-3 (CH3) mission, the propulsion module is expected to orbit around the moon in a circular LLO of about 150 km altitude for many years to come. Majority of the lunar landers are also likely to temporarily reside in LLO (typically for a few days or weeks) before landing.

Under the ambit of ISRO System for Safe and Sustainable Space Operations Management (IS4OM) critical analyses of each of the Lunar Bound Manoeuvres for orbit loweringare being performed to assess potential risks of close approaches with the other lunar orbiters before executing the manoeuvres.

Role of India and way forward

The space object population has been growing for space beyond the Earth as well as in the lunar environment, where the greater uncertainty associated with the orbital knowledge entailscollision risk assessment to be a necessity for safe operations for a spacecraft orbiting the Moon.

India has pro-actively taken up many initiatives in collaboration with International Organisations like Inter Agency Space Debris Coordination Committee (IADC), which include studies related to future evolution of space object environment in cislunar and lunar region to bring out specific guidelines and best practices for space operations to be sustainable in these regions.

Source: https://www.isro.gov.in/

‘History made’: Scientists hail Chandrayaan-3’s successful landing on lunar south pole

The successful soft landing of India’s ambitious Chandrayaan-3 mission on the Moon’s enigmatic south pole has captured the attention and admiration of the scientific community. Leading scientists and experts said this monumental accomplishment not only marks India’s indelible imprint on lunar exploration but also demonstrates the prowess of human collaboration, determination, and cutting-edge technology. Dr. Chrisphin Karthick, a scientist at the Indian Institute of Astrophysics, Bengaluru, expressed his elation. “The successful landing of Chandrayaan-3 is a testament to our collective progress towards space travel. It showcases the beauty of unity in diversity as we sail the cosmic seas together,” he told PTI. “Slow and steady - reaching the goal is better than saying we won the race. I emphasise this since many are comparing it with our friendly nation programmes. It’s good to say we earthlings won the race in sailing the universe in many ways,” Karthick added. The Chandrayaan-3 is a follow-on mission to Chandrayaan-2 and its objectives are to demonstrate safe and soft-landing on the lunar surface, roving on the Moon, and to conduct in-situ scientific experiments. Chandrayaan-2 had failed in its lunar phase when its lander ‘Vikram’ crashed into the surface of the Moon following anomalies in the braking system in the lander while attempting a touch down on September 7, 2019. The Chandrayaan programme’s maiden mission was in 2008. Aakash Sinha, Professor of Practice at the Shiv Nadar Institution of Eminence, Delhi-NCR, and CEO of Omnipresent Robot Tech, hailed ISRO’s (Indian Space Research Organisation) feat as a ‘monumental achievement’ that will inspire a new generation of aspiring scientists and explorers. “With this unparalleled accomplishment, India has etched its name in history by becoming the first country to land in this lunar region,” Sinha, who was involved in developing the software for the Pragyan rover of Chandrayaan-3, told PTI. The lander module comprising the lander (Vikram) and the 26-kg rover (Pragyan) made the soft landing near the south polar region of the Moon at 6.04 pm, less than a week after a similar Russian lander crashed. “ISRO’s Chandrayaan mission, which was the pioneer in discovering water on the moon, continues to break barriers and set new standards. Beyond its immediate scientific impact, this mission holds the promise of inspiring a new generation of young minds to join the realms of space exploration and science,” he added. Sinha highlighted that the mission’s accomplishments will ‘break barriers and set new standards,’ positioning India as a frontrunner in lunar research. “Our team worked relentlessly with ISRO to develop the software for the navigation of the Pragyan rover. We are delighted to see our work and research reach the Moon,” he added. Astrophysicist Sandip Chakraborty noted that the significance of Chandrayaan-3’s soft landing cannot be overstated. “Soft landing is a start for future activities, such as science of the Moon and from the Moon. It is a gateway to the outer world,” the director of the Indian Centre for Space Physics, Kolkata, told PTI. He emphasised that this achievement propels India into an elite group of spacefaring nations, where it can stake its claim to the Moon’s scientific and exploratory potential. India became the fourth country in the world to perform a soft landing on the Moon. Only three countries namely Russia, the US, and China have achieved this remarkable feat. “The successful landing imbibes the confidence in every citizen. Students ambition increases. No future regulation on the Moon can be made without the concurrence of India. So, it would be a paradigm shift event in the Indian context,” Chakraborty added. Underpinning this success to the remarkable contribution of artificial intelligence (AI)-powered systems developed by ISRO and the Indian academia, scientists believe these systems enabled the craft to navigate the lunar surface with precision, detect hazards, and ultimately achieve a safe landing. Dr. TV Venkateswaran, a scientist at Vigyaan Prasar, an autonomous organisation under the Department of Science and Technology (DST), and member of the public outreach committee of the Astronomical Society of India, lauded this integration of technology, saying that it will inspire young minds and bolster scientific curiosity. “The safe and soft landing shows that the AI-powered algorithms have worked well. The same algorithms can be tweaked and used to control other autonomous vehicles,” Venkateswaran told PTI. “The success will give a boost to the morale of ISRO and also scientists across the country. Further, it will pave the way for the consistent study of the Moon and the international community. The same technology will also help ISRO land on Mars in a future mission,” he added. The experts also concur that this success is not an endpoint but a stepping stone toward further exploration. “No future regulation on the Moon can be made without the concurrence of India,” Chakraborty emphasised, hinting at the country’s newfound influence in shaping lunar exploration policies. He said the successful landing of Chandrayaan-3 resonates as a clarion call for aspiring scientists, space enthusiasts, and the global community at large. Venkateswaran said the common public may enjoy

the fruits of science and technology or have a modicum of exposure to the school's general science curriculum. However, they hardly get an opportunity to experience science in its making. "The massive coverage and enthusiasm generated by the media outreach allow the common public to share science in the making. The incredible excitement naturally attracts the young towards science and technology," he added.

Source: https://www.deccanherald.com/

Lander 'Vikram' touched down within the area identified on lunar surface: ISRO Chairman

ISRO Chairman S Somanath said the Chandrayaan-3 spacecraft's lander 'Vikram' touched down on the Moon's surface well within the area identified for the purpose. Speaking to PTI, Somanath said, "(The lander landed) perfectly in the intended site. The landing location was marked as 4.5 km x 2.5 km — I think on that space, and the exact centre of that was identified as the location of landing. It landed within 300 metres of that point. That means it is well within the area identified for landing." India scripted history as ISRO's ambitious third Moon mission Chandrayaan-3's Lander Module (LM) touched down on the lunar surface, making it only the fourth country to accomplish the feat, and first to reach the uncharted south pole of Earth's only natural satellite. The LM comprising the lander (Vikram) and the rover (Pragyan) made the soft landing near the south polar region of the Moon last evening. Earlier today, ISRO announced that the rover rolled down from the lander, stating "India took a walk on the moon." The ISRO chief, in response to a question, said the rover movement is happening now, and is working 'very well'. He said there are two instruments in the rover and three instruments on board the lander, and all of them have been switched on sequentially. "They will study basically the mineral composition of the moon, as well as the atmosphere of the Moon and the seismic activities there," he added.

Source: https://www.deccanherald.com/

Pragyan rover re-confirms sulphur presence, to inspire search for origins

In-situ scientific experiments carried out on the lunar surface by the Chandrayaan-3 rover have led to another confirmation of the presence of Sulphur in the landing region near the moon's south pole. This is the second such confirmation, in two days, of the presence of sulphur in the region. The finding could inspire new scientific theories about the sources of Sulphur in the region that explore the possibilities of its origins – intrinsic, volcanic, or meteoritic, the Indian Space Research Organisation (ISRO) said. The Alpha Particle X-ray Spectrometer (APXS) on board the rover, Pragyan, has spotted interesting minor elements including sulphur and major elements like aluminium, silicon, calcium, and iron that were expected to be found on the lunar surface. The rover, with its two scientific instruments, has been conducting experiments to determine characteristics of soil and rocks in the moon's south polar region and compare them with features of soil and rocks from other highland regions. The Chandrayaan-3 lander module touched down near the lunar south pole on August 23. APXS comes with capabilities to analyse the elemental composition of the surface of planetary bodies with little atmosphere, like the moon. "It carries radioactive sources that emit alpha particles and X-rays onto the surface sample. The atoms present in the sample, in turn, emit characteristic X-ray lines corresponding to the elements present. By measuring the energies and intensities of these characteristic X-rays, researchers can find the elements present and their abundances," Isro said. APXS is developed by the Physical Research Laboratory (PRL), Ahmedabad, with support from the Space Applications Centre, Ahmedabad. Ahead of the landing, PRL Director Prof Anil Bhardwaj told DH that the APXS findings – the first ever from the surface near the lunar south pole – could "transform" the understanding of minute distributional changes in the elemental composition of the region. ISRO also released a video, showing the operation of APXS, as observed from the lander, Vikram, on August 29. In the video, an automated hinge mechanism is seen rotating the 18 cm-tall APXS, aligning the detector head to be about 5 cm near the surface. The other instrument on Pragyan – the Laser-Induced Breakdown Spectroscope – confirmed the presence of sulphur in the region, in what were the first-ever in-situ measurements carried out in the region. The "unambiguous" finding is significant since orbiter instruments from earlier missions could not make this confirmation.

Source: https://www.deccanherald.com

TECHNOLOGY

India's First Unmanned Aerial Systems Common Testing Centre to be Established in Tamil Nadu

India's first Unmanned Aerial Systems (Drone) Common Testing Centre under Defence Testing Infrastructure Scheme (DTIS) will be established in Tamil Nadu. According to a communication issued by the State government, this centre would be established over an area of about 2.3 acres at the SIPCOT Industrial Park, Vallam Vadagal near Sriperumbudur. The testing centre would enable the State to be a significant contributor to the self-reliance of the country in the aerospace and defence sectors. TIDCO had floated an RFP for identifying industrial partners for establishing this testing centre as a joint venture in compliance to the guidelines of the DTI Scheme. A consortium of companies consisting of Keltron, Sense Image Technologies, Standards Testing & Compliance and Avishka Retailers had been chosen based on their response to the transparent bid process to partner with TIDCO for establishing the facility at an estimated cost of 45 crore. [1] T.R.B. Rajaa, Minister for Industries, Investment Promotion and Commerce, said, "Setting up India's first Unmanned Aerial Systems (Drone) Common Testing Centre here in Tamil Nadu showcases Chief Minister M.K. Stalin's commitment towards building a thriving defence and aerospace manufacturing ecosystem in the State." He further said, "We are attracting investors in this sector by addressing the needs of the industry in an innovative manner. This testing centre will enable Tamil Nadu to become a preferred destination for aerospace and defence companies to set up their Indian operations.Tamil Nadu Industrial Development Corporation (TIDCO) is the nodal agency for the implementation of the Tamil Nadu Defence Industrial Corridor (TNDIC). As part of the implementation of the TNDIC, the government of Tamil Nadu has adopted a multi-pronged strategy. One of them is the creation of an enabling ecosystem including Common Testing Centres for the Aerospace and Defence Industry.

Source:https://www.thehindu.com/news/national/indias-first-unmanned-aerial-systems-drone-commontesting-centre-under-defence-testing-infrastructure-scheme-to-be-established-in-tamil-nadu/article67202641.ece

LCA Tejas Successfully Test-Fires Indigenous ASTRA

Beyond Visual Range Air-to-Air Missile off Goa Coast Tejas, Light Combat Aircraft (LCA) LSP-7 successfully fired the ASTRA indigenous Beyond Visual Range (BVR) air-to-air missile off the coast of Goa on August 23, 2023. The missile release was successfully carried out from the aircraft at an altitude of about 20,000 ft. All the objectives of the test were met and it was a perfect text book launch. The test launch was monitored by the Test Director and scientists of Aeronautical Development Agency (ADA), Defence Research and Development Organisation (DRDO), Hindustan Aeronautics Limited (HAL) along with officials from Centre for Military Airworthiness and Certification (CEMILAC) and Directorate General of Aeronautical Quality Assurance (DG-AQA). The aircraft was also monitored by a Chase Tejas twin seater aircraft. ASTRA, a state-of-the-art BVR air-to-air missile to engage and destroy highly maneuvering supersonic aerial targets, is designed and developed by Defence Research and Development Laboratory (DRDL), Research Centre Imarat (RCI) and other laboratories of DRDO. The indigenous Astra BVR firing from home grown Tejas fighter is a major step towards 'Aatmanirbhar Bharat'. Raksha Mantri Shri Rajnath Singh has complimented ADA, DRDO, CEMILAC, DG-AQA and the industry for the successful firing of the missile from Tejas-LCA. He said the launch would significantly enhance the combat prowess of Tejas and reduce the dependency on imported weapons. Secretary, Department of Defence (R&D) and Chairman DRDO has also congratulated the teams involved in the successful launch.

Source: https://pib.gov.in/PressReleasePage.aspx?PRID=1951428

ISRO Conducts Drogue Parachute Deployment Tests for Gaganyaan Mission

Vikram Sarabhai Space Centre (VSSC)/ISRO, successfully conducted a series of Drogue Parachute Deployment Tests at the Rail Track Rocket Sled (RTRS) facility of the Terminal Ballistics Research Laboratory, Chandigarh, during

August 8-10, 2023. The tests were conducted in collaboration with Aerial Delivery Research and Development Establishment (ADRDE)/DRDO. The Gaganyaan mission entails the safe transportation of astronauts to space and back. A crucial component of this mission is the deployment of drogue parachutes, which play a pivotal role in stabilizing the crew module and reducing its velocity to a safe level during re-entry. Drogue parachutes, packed within pyro-based devices known as mortars, are ingeniously designed to eject the parachutes into the air upon command. These conical ribbon-type parachutes, boasting a diameter of 5.8 meters, employ a single-stage reefing mechanism, ingeniously minimizing canopy area and mitigating opening shock, ensuring a smooth and controlled descent. During the three comprehensive tests conducted at the RTRS facility, a range of real-world scenarios were simulated to rigorously evaluate the performance and reliability of the drogue parachutes. The first test simulated the maximum reefed load, marking a groundbreaking introduction of reefing in a mortar-deployed parachute within India. The second test emulated the maximum disreefed load, while the third test showcased the deployment of the drogue parachute under conditions mirroring the maximum angle of attack experienced by the Crew Module during its mission. These successful RTRS tests serve as a critical qualification milestone for the drogue parachutes, confirming their readiness for integration into the upcoming Test Vehicle-D1 mission. Notably, earlier this year, the RTRS tests of Pilot and Apex cover separation parachutes were also conducted, further accentuating the progress of the Gaganyaan mission's parachute system development. The intricate parachute sequence for the Gaganyaan crew module's deceleration system encompasses a total of 10 parachutes. The sequence commences with the deployment of two Apex cover separation parachutes, followed by the stabilization achieved through the deployment of two drogue parachutes. Upon release of the drogue parachutes, the mission transitions into the extraction phase, with three Pilot chutes individually extracting three main parachutes, a pivotal step in reducing the Crew Module's speed to safe levels for a secure landing.

Source: https://www.isro.gov.in/

BUSINESS

Self-Reliance in Defence Sector

Government has taken adequate steps to make the country self-reliant by developing indigenous advanced technologies and complex systems. Following are the initiatives/ steps taken by Government for indigenisation of manufacturing of technology-intensive defence equipment and weapons and for creating a domestic defence production eco-system: Defence Acquisition Procedure (DAP 2020) is promulgated to maximize acquisition of defence equipment through indigenous sources and promote domestic manufacturing. Government of India has ensured that the most preferred option for capital acquisition is 'Buy Indigenously Designed Developed and Manufactured (IDDM)' category equipment followed by 'Buy (Indian)' category. The 'Make' categories aim to achieve the objective of self-reliance by involving

greater participation of Indian industrial eco-system including private sector. The provisions of Government funding have been introduced for Make-I, Technology Development Fund (TDF) and Innovations for Defence Excellence (iDEX) projects. TDF Scheme executed by DRDO supports indigenous development of components, products, systems and technologies by MSMEs and Start-ups. Funding under TDF scheme was enhanced from Rs 10 crore to Rs 50 crore per Project, and the same under iDEX Prime scheme has been enhanced from Rs 1.5 crore to Rs 10 crore It will give further boost to the vision of 'Aatmanirbharta in defence'. Four 'Positive Indigenization Lists' of defence equipment and platforms for which there would be an embargo on the import. The 'Development cum Production Partner (DcPP)' model of DRDO is implemented where-in Industry is taken up as DcPP in system development projects. Both development and production units are manufactured by industry along with life cycle support. DRDO test facilities have been opened to the industries for utilisation. The test facilities have been listed on DRDO website and have been communicated to them. The facilities are being utilized by the industries. Two Defence Industrial Corridors have been set up in Uttar Pradesh and Tamil Nadu to catalyse indigenous production of defence and aerospace-related items. Defence R&D has been opened up for industry, start-ups and academia with 25% of defence R&D budget earmarked for the purpose. This is being implemented through various existing schemes and new schemes have been proposed. In order to promote indigenous design and manufacturing, funds have also been earmarked for procurement from indigenous sources.

For the FY 2023-24, funds have been earmarked in the ratio 4 Defence News Defence Strategic: National/International 67.75:32.25 between Domestic and Foreign procurement in the Capital Acquisition Budget of the Ministry of Defence (MoD). In addition, the MoD has also directed for spending an amount of Rs 1,500 crore towards procurement from start-ups. Nil Transfer of Technology (ToT) fees are being charged from DcPPs/PAs/LSI. Industries have been provided with free access for DRDO patents. Lists of systems which will be developed by industry only have been identified by DRDO. The same has been promulgated by MoD. DRDO will not develop such systems. DRDO is skilling youth (Internships, apprenticeship, electives in B Tech, M Tech courses) to make ready for Defence industries. Acceptance of Necessity (AoN) for 43 DRDO developed/ being developed systems has been accorded for induction in the Services during the last three years i.e. 11 in 2021, 25 in 2022 and seven in 2023. During the last three financial years (2020-21 to 2022-23), 122 contracts have been signed for capital procurement of defence equipment, out of which, 100 contracts accounting for 87% of total contracts value, have been signed with Indian vendors for capital procurement of Defence equipment. Ratio of import-export in defence sector for the year 2013-14 as compared to 2021-22 is given below: (Rs in crore) Year 2013-14 2021-22 Import Value (Capital + Revenue) 41,198.61 50,061.67 Export value 1,153 12,815 Ratio (Import to Export) 35.73 3.90 This information was given by Raksha Rajya Mantri Shri Ajay Bhatt in a written reply to Shri Chandra Prakash Joshi and Shrimati Rekha Verma in Lok Sabha today.

Source: https://pib.gov.in/PressReleasePage.aspx?PRID=1945710

OBITUARY

Former DRDO Chief Dr. V.S. Arunachalam no More

The former Scientific Advisor to Defence Minister and former Chairman of Defence Research Development Organisation, Dr. V.S. Arunachalam has passed away at the age of 87. Dr. Arunachalam, a resident of Bengaluru, passed away in his sleep in the Bay Area of California in the United States of America. He is survived by his daughter, two sons and wife. A recipient of the Padma Vibhushan, Dr. Arunachalam was the Chief Architect of many strategic programs like the Integrated Missiles Development Programme which included Agni, Prithvi, Akash and Nag, Light Combat Aircraft now called Tejas and Airborne Early Warning and Control System. Dr. Arunachalam, who served under five Prime Ministers and many Defence Ministers, was undergoing treatment for acute pneumonia and

Parkinson's. He had set up a Think Tank, Centre for Study of Science, Technology and Policy (CSTEP), in Bengaluru. In 2015, he was awarded DRDO's Lifetime Achievement Award for his outstanding contribution to the field of scientific research and technology.

Source: https://www.thehindu.com/news/national/karnataka/former-drdo-chief-vs-arunachalam-no-more/article67202204.ece