



# E-NEWS

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DRDO & Indian Navy conduct successful maiden test trial of indigenous Air Droppable Container 'ADC-150' from IL-38SD aircraft off Goa coast

HAL to replace key component of Dhruv ALH following recent crashes



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## ISRO Successfully Launches 2nd-Gen Navigation Sat

The Indian Space Research Organisation (ISRO) placed NVS-01, the first of the five second-generation navigation satellite series, into a geosynchronous transfer orbit. The satellite, which will continue the services of the NavIC constellation, was placed by a geosynchronous satellite launch vehicle (GSLV-MkII), in its 15th flight. Around 19 minutes after the rocket lifted off from the



second launch pad at the Satish Dhawan Space Centre, Sriharikota, the 51.7m-tall, 420 tonnes three-stage GSLV-F12 placed the 2,232kg satellite at a 251km altitude. In the coming days, Isro scientists will perform manoeuvres by firing the onboard propellant to place the satellite in its final orbit. Isro chairman S Somanath said the rocket achieved an orbit better than expected, which would give the satellite more life as this would save onboard fuel. The NVS-01 satellite had additional capabilities including providing new service in L1 band for civilians and carries a space-qualified rubidium atomic clock developed by Space Applications Centre, Ahmedabad. “Earlier, we had only L5 and S-band and we were not given authorisations to use L1 and L2 band, which are being used in GPS for civilian services. We made a lot of effort to use L5 and S-band. But it is not a civilian frequency, so they had to put in additional chipsets. There were a lot of difficulties in adopting NavIC in the civilian sector. We have got the L1 band now. Once the remaining satellites are launched and L1 becomes fully operational, naturally all your mobile phones can be made compatible without any additional investment or cost to the manufacturer,” Somanath said. On other upcoming missions, Somanath said they would be testing the crew escape systems of the Gaganyaan project rocket in July. After that, an unmanned Gaganyaan mission is planned for early next year. “We are getting ready for the test vehicle mission. We have to get the crew module and crew escape system. By July, we will integrate the systems with the rocket,” he said. Somanath said the space agency is working on upgrading the payload capability of GSLV-MkIII or LVM3 rocket from 4 tonnes to 5.5 tonnes and is designing the next-generation launch vehicle (NGLV), which will be recoverable and expendable, for carrying much higher payloads.

Source: <https://timesofindia.indiatimes.com/india/isro-successfully-launches-2nd-gen-navigation-sat/ articleshow/100603976.cms>

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## CURRENT AFFAIRS

### Tests commenced on Semicryogenic engine at IPRC, Mahendragiri

Today, ISRO carried out the first integrated test on an intermediate configuration of the 2000kN Semicryogenic Engine at the newly commissioned Semicryogenic Integrated Engine & Stage Test facility at the ISRO Propulsion Complex (IPRC), Mahendragiri. The intermediate configuration, designated as Power Head Test Article (PHTA), comprises all the engine systems except the thrust chamber. The test is the first of a series of tests planned to validate the design of the propellant feed system, including the low-pressure and high-pressure turbo-pumps, the gas generator, and control components. The Liquid Propulsion Systems Centre (LPSC) of ISRO has undertaken the design & development of a Semicryogenic engine with 2000 kN thrust with Indian industry participation, and will power the booster stages of future launch vehicles and works on Liquid Oxygen (LOX)-Kerosene propellant combination. The test on May 10, 2023, is a major milestone before integrating the complete engine and its qualification. This test demonstrated the complex chill-down operations spanning about 15 hours duration that was conducted successfully, meeting all the required conditions for engine start. After the chill down of the LOX circuit, the feed circuit of kerosene was filled, and LOX was admitted into the gas generator by opening the injection valve. The newly established test facility at IPRC, Mahendragiri, with a state-of-art PLC-based control system and data acquisition system, is capable of testing semi-cryogenic engines up to 2600 kN thrust and will support the subsequent testing and qualification of the fully integrated Semicryogenic engine and stage.

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

### ISRO and the Indian Navy firm up the Crew Recovery Training Plan for Gaganyaan Mission

Recovery Operations for the Gaganyaan mission took a major step forward with the release of the Gaganyaan Recovery Training Plan at the Water Survival Training Facility (WSTF) at INS Garuda, Kochi on May 24, 2023. The training document was jointly released by Vice Admiral Atul Anand, Director General of Naval Operations, Indian Navy, Dr. Unnikrishnan Nair, Director, Vikram Sarabhai Space Centre, (VSSC) and Dr. Umamaheshwaran R, Director, Human Space Flight Centre (HSFC) of ISRO. The document highlights the training plan for the recovery of the crew module for the mission. It defines overall requirements with respect to training of various teams participating in Recovery operations viz. marcos, parajumpers, medical specialists, technicians etc. The Recovery training is planned in incremental phases starting from unmanned recovery to manned recovery training in harbour and open sea conditions. The overall recovery operations of the crew module are being led by the Indian Navy in coordination with other maritime agencies. The Crew Module Recovery Model was formally handed over to Indian Navy at Water Survival Training Facility (WSTF) at INS Garuda, Kochi. The mass and shape simulated mock-up will be used for familiarisation and training of Gaganyaan recovery teams. WSTF is equipped with its state-of-the-art facility in the new avatar with a team of highly qualified divers all set to assist ISRO by undertaking a series of trials and fine-tuning of Standard Operating Procedures to train the crew and recovery team of Gaganyaan.

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

### Scientists Discover an extreme Massive Giant and Most Dense Exoplanet

A new Jupiter size exoplanet with highest density of  $\sim 14 \text{ g/cm}^3$  known till this date, and mass 13 times that of Jupiter has been discovered by an international team of scientists led by Prof. Abhijit Chakraborty at the Exoplanet Research Group of the Physical Research Laboratory (PRL), Ahmedabad. The team includes

scientists from India, Germany, Switzerland and the USA. The discovery of this massive exoplanet was made using the indigenously made PRL Advanced Radial-velocity Abu-sky Search spectrograph (PARAS) at the 1.2 m telescope of PRL at its Gurushikhar Observatory in Mt. Abu by measuring the mass of the planet precisely. The newly discovered exoplanet is found around the star called TOI4603 or HD 245134. NASA's The Transiting Exoplanet Survey Satellite (TESS) initially declared TOI4603 as a possible candidate to host a secondary body of unknown nature. Using PARAS, scientists discovered it as a planet by measuring the mass of the secondary body and hence the planet is called TOI 4603b or HD 245134b. It is located 731 light years away. It orbits a sub-giant F-type star TOI4603 every 7.24 days. What sets this discovery apart is that the planet falls into the transition mass range of massive giant planets and low-mass brown dwarfs with masses ranging from 11 to 16 times the mass of Jupiter. Only fewer than five exoplanets are currently known in this mass range so far. Massive giant exoplanets are those having mass greater than four times that of Jupiter. The newly discovered exoplanet TOI 4603b is one of the most massive and densest giant planets that orbits very close to its host star at a distance less than 1/10th the distance between our Sun and Earth. The exoplanet with a surface temperature of 1670 K is likely undergoing high-eccentricity tidal migration with an eccentricity value of approximately 0.3. The detection of such systems provides valuable insights into the formation, migration, and evolution mechanisms of massive exoplanets. This discovery marks the third exoplanet discovery by India, and by the PRL scientists using PARAS spectrograph and the PRL 1.2m telescope, following the discoveries in 2018 (K2-236b) and 2021 (TOI-1789b).

**Source:** <https://www.isro.gov.in/>

## **DRDO & Indian Navy conduct successful maiden test trial of indigenous Air Droppable Container 'ADC-150' from IL-38SD aircraft off Goa coast**

Defence Research & Development Organisation (DRDO) and Indian Navy conducted the successful maiden test trial of 'ADC-150' from IL 38SD aircraft off the coast of Goa on April 27, 2023. 'ADC-150' is an indigenously designed and developed Air Droppable Container with 150 kg payload capacity. The trial was conducted to enhance the naval operational logistics capabilities by providing quick response to meet the requirement of critical engineering stores to ships (under distress), which are deployed more than 2,000 kms from the coast. It reduces the requirement of ships to come close to the coast to collect spares and stores. Three DRDO laboratories - Naval Science & Technological Laboratory (NSTL), Visakhapatnam; Aerial Delivery Research & Development Establishment (ADRDE), Agra and Aeronautical Development Establishment (ADE), Bengaluru - have been involved in the development of ADC-150 container. The crucial flight clearance certification was given by Regional Center for Military Airworthiness (RCMA), Kanpur headed by Centre for Military Airworthiness & Certification (CEMILAC), Bengaluru. Secretary, Department of Defence R&D & Chairman DRDO has congratulated the scientists and the Indian Navy for the successful trial of ADC-150.

**Source:** <https://pib.gov.in/PressReleasePage.aspx?PRID=1921291>

## **Explore Cross-Movement of Scientists with Other Institutions: Rajnath to DRDO**

Defence Minister Rajnath Singh mooted the idea of the cross-movement of scientists between DRDO and other institutions as an option to enhance the links between the two research establishments leading to the development of new technologies. Addressing a conclave here, Singh asked scientists from both sides to explore the possibility of deploying Defence Research and Development Organisation researchers as faculty in academic institutions while allowing scientists from other institutions to serve on deputation in DRDO. Elaborating on the benefits of the DRDO-academia partnership, he said a synergy will help the defence research body get skilled human resources from institutions like the Indian Institute of Science, IITs, NITs and universities. The academia, on the other hand, will benefit from the R&D fund of DRDO that it spends on developing new technologies. Also, scientists from non-DRDO institutions will get access to the infrastructure and advanced laboratory facilities in the defence research organisation. "Such a symbiotic relationship will be helpful in further enhancing the start-up culture in our country,"

Singh said. The Union government last year announced that the defence R&D will be opened up for industry, start-ups and academia with 25% of the defence R&D budget earmarked for such joint projects. “Unless we do research, we will not be able to adopt new technologies. R&D has the ability to convert ordinary substances into valuable resources. It has been a key factor in the development of civilisations throughout history,” Singh added. Addressing another conference largely attended by industry leaders, Singh asked the industry to become a ‘leader’ from an ‘imitator’ in futuristic technologies. “Security equations are changing at an unprecedented pace and countries are focusing more than ever on technological advancements in the fields of artificial intelligence, quantum computing & genetics, etc. This is an opportunity to make a mark with the aim to help the nation leapfrog on the path of progress,” he said at the CII annual session.

**Source:** <https://www.deccanherald.com/national/explore-cross-movement-of-scientists-with-otherinstitutions-rajnath-to-drdo-1222001.html>

### **Bengaluru: HAL, IICA in academic, research tie-up**

Hindustan Aeronautics Limited (HAL) will partner with the Indian Institute of Corporate Affairs (IICA) for programmes in capacity-building, education, research and consulting. The institutions, under the partnership formalised, will design and deliver training programmes in areas like leadership development, strategy, corporate finance, governance, valuation, and mergers and acquisitions. The programmes will be offered to HAL officers and participants from other organisations, an HAL statement said. The MoU envisages exchange of knowledge and resources between HAL and IICA for conducting research, training and consultancy sessions. C B Ananthkrishnan, CMD, HAL, said the HAL Management Academy as the apex learning and development centre for HAL officials has “in-depth understanding of the training needs” and takes care of competence development requirements at various levels of the organisation. The MoU will facilitate a collaboration between the two institutions in the spirit of industry-academia interfaces, he said. Praveen Kumar, Director-General and CEO, IICA, said the institution looked at the collaboration as a step to equip central public sector enterprises in enhancing competitiveness while operating in challenging environments.

**Source:** <https://www.deccanherald.com>

### **What does it take to be a pilot?**

The life of an airline pilot is exacting. The irregular hours, rigid health and fitness requirements and multiple steps involved to get the job, render it one of the most challenging careers to take up. So it follows that when pilots have some downtime, relaxing and unwinding are top priority. Metrolife spoke to some captains to learn about the demands of the job and how they de-stress.

### **Health focus**

Ajesh D’Souza’s work has taken him to multiple locations in India and around Asia. The Spicejet pilot shares that he has flown to Saudi Arabia, Vietnam, Thailand, Sri Lanka and the UAE. “You get to stay at the best hotels and try different cuisines, but it is important to be conscious of how much you are eating or drinking, and work out regularly,” says D’Souza, explaining that they are required to have a normal body mass index. While each airline has a different schedule, D’Souza currently flies four days a week, but technically has just one weekly off. “The other days I’m required to be on stand-by should they require backup,” he says. There’s a mandatory 14-hour gap between flights, but the schedule is taxing on the body, he shares. “Sometimes you’re sleeping through the day, then the next day you have a flight. There’s no time for your body to adjust to a fixed schedule,” he explains, adding that they go through regular medical tests. “If there are anomalies in your blood, if you have abnormal blood pressure, diabetes or cholesterol, a deviated septum etc, you will not be able to fly, because the lives of hundreds of people are in your hands,” he tells Metrolife.

Are things more complicated for female pilots? Roopa Virupakshaiah does not think so. “I can only speak for myself. I’m unmarried and do not have kids, so it hasn’t been particularly challenging for me. But yes, I do think having to manage kids could present some problems,” says the pilot, who has been working with Air India for over two decades. Rashmi Sharma, a new mother, explains that the aviation industry is a gender-neutral world. “It’s one of the few fields where there’s no salary disparity based on gender,” reveals the Spicejet employee, whose husband is also a pilot. However, she says that in some ways, it is more complicated for women. For instance, when she learnt that she was pregnant, she had to go on maternity leave immediately. “Women in other industries begin their six-month maternity leave mostly a month before the baby is due. But for us, it’s too risky so we are required to go on leave as soon as we find out we are pregnant,” she says. This does not cover the entire maternity period so they extend it voluntarily until after the delivery and when they are ready to go back. “Then you have to take an eight-session training again before you can operate an aircraft,” she shares.

## **Unruly travellers**

Talking about the increasing number of unruly passengers making headlines, Ankur Suri, an Indigo pilot, explains that one could put it down to the high volume of flights in recent months. “There have always been badly behaved passengers, but we are noticing them more often now because the number of flights have increased and consequently so have these incidents,” says Suri. When asked what he does when he is between flights, he says getting enough rest and dedicating time to fitness are important to him. “I enjoy running. I also relax by reading and writing,” he explains, adding that the job requires one to make huge sacrifices. Rashmi echoes his thoughts. “It is demanding. If you do not have the passion to do this day in and day out, you’re simply not cut out for it,” she says.

**Source:** <https://www.deccanherald.com>

## **Test pilots and the taste of danger**

On a muggy, helicopter blades slapping in the distance, I listen to Gp Capt Pupinder Singh (Retd.) as he tells me how the self-protection suite in our glassy cockpit could be a lifesaver. We are not flying; this is inside a weaponised variant of the Dhruv Mk 4, parked on the tarmac at Hindustan Aeronautics Limited (HAL)’s helicopter flight test centre on Old Airport Road in Bengaluru. Singh tells me the suite protects the pilot from “missiles and all that”. He goes on to explain the workings of the other components in the Advanced Light Helicopter (ALH) — the electro-optical pod, night vision goggles, the alerts on the electronic warfare system — as a scene simulates itself in my mind I imagine a faceless man in the night sky, quietly surveying the ground from above.

## **Into the unknown**

Earlier in the day, I had walked into utilitarian buildings at the central PSU, watching office assistants bringing coffee to rooms tagged with the names of the occupants. The test pilots emerge from their cabins and head out for a briefing. This is office proper — functional, no frills. Gp Capt M R Anand (Retd.), the Chief Test Pilot (CTP) at HAL’s Rotary Wing, breaks the method down to two must-haves — proven processes and exceptional discipline in following them. The flight test engineers conduct the briefings where they plan the test points in coordination with the designers and the test pilots.

The everyday rigours of a structured, state-owned organisation appear to complement the easy-banter comradeship shared by pilots and engineers. In the briefing room, they say the years spent in the forces help them prepare better for the inevitable risks but they also wear a rookie curiosity and passion as they head out to work every day. The constant risk assessment and predictive analyses and the engagement with evolving technologies make the everyday new, and different. An experimental test pilot, unlike a production test pilot, is involved with the aircraft from the

conceptual phases till its formation as a full-fledged aircraft. The test pilot flies the prototypes all through the run-up to their certification, and doubles up as an interface between the designer's ideas and the customer's requirements. "We are the eyes and ears on the project," says Anand, who joined HAL in 2012, after serving 26 years in the Indian Air Force (IAF).

## Switch to testing

Anand had about 1,000 hours on Mi-8 helicopters in the IAF's Sri Lanka operations in the 1980s — he received Vayusena Medal (Gallantry) in 1989. He has flown 17 types of helicopter and fixed-wing aircraft for 5,600-plus hours. After being an instructor and working across terrains in multiple roles, a sense of monotony hit the 58-year-old from Chennai. "The possibility of becoming a test pilot was exciting. It involved the whole gamut — the design, the technology, and I was getting to apply the aerodynamics I studied," he says. At HAL, he flies 15-20 hours a month. At the briefing, a presentation is being made ahead of a test to ascertain the low hover point of a Light Utility Helicopter (LUH). Wg Cdr Subash P John (Retd.) tells me this is the daily 0930h where the day's flying tasks are assigned. The helicopter's preparedness is assessed. Discussions also cover wind speeds, ballast and the position of the videographer.

## Four-feet drop

About 20 minutes later, I am at the test location watching Wg Cdr Anil Bhambhani (Retd.) in the LUH, attempting a four-feet engine-off landing. I sense that it is taking longer than usual and understand from the chatter around me that it has something to do with hydraulic pressure. Later, sitting in Anand's office, Bhambhani says all parameters will be reassessed before the team heads out again for the test two days later. The processes are non-negotiable, and the detailing is nuanced — cockpit ergonomics, for instance, is customised to complement the helicopter variant's design and overall utility. Each test flight has to be executed with precision to assess the helicopter's performance. The Aviator-sporting test pilot is a composite of pop culture imagery that finds greater context in all the groundwork that goes into the flight. For the test pilot, flying is a brief, familiar interlude. The action happens before and after.

The pilots are all men but things are changing. Over the past couple of years, women flight engineers have graduated from the IAF Test Pilots School, at the Aircraft and Systems Testing Establishment in Bengaluru. India will soon see women as test pilots, says Anand.

## Understanding risk

The office of the CTP has some of his art, including the impression of a flight formation. The pilots have off-work interests that keep them in physical and mental shape — golf, yoga, tennis — but sometimes, the sortie itself is the calming routine, they say. "There is no escaping the risk. The pilot has to be prepared for all eventualities. There are processes in place to handle them. The rest is about executing them; some of it works like muscle memory," says Bhambhani. The testing, at times, is done at varying altitudes and across terrains. There is always the unseen risk a pilot cannot prepare for, like a change in weather. "At these times, reliance and faith in the aircraft instruments and the skills honed over the years are what bring you and the aircraft back safely," says Anand. He recalls an operation in the Vavuniya sector of Sri Lanka where the helicopter he was co-piloting was hit by ground fire, leaving him injured. "We did manage to recover the machine and land on a nearby spot but we lost an army officer on board," he says. The stress-coping mechanisms are also shaped by families that understand what constitutes the making of a pilot. "They don't tell us much but have their own networks (where the concerns are discussed). They are amazing. In the Air Force, when an officer moves up the ranks, we first congratulate the family," he says.

## Racing machines

"I was a raw, unguided missile, steered home by the Indian Air Force," Gp Capt K K Venugopal (Retd.) says as he sits down to talk about his story from cadet to decorated combat pilot. As the CTP (Fixed Wing) at HAL, he leads a team

of six test pilots and five flight test engineers with experience across the Sukhoi, Jaguars, MiGs and others. A Vayusena Medal (Gallantry) recipient, he puts together the HAL playbook for fixed-wing flight testing, which he calls “the final phase of Quality Control”. This is well into the second half of the day. My interactions with over 10 test pilots and engineers helped me break down the abstractions around the romance of flying, around the allure of that faceless star pilot I had been looking for in this campus. Test pilots, by training, are oriented to analyse the aircraft’s behaviour and respond. In the event of an unserviceable situation in flight, the prescribed approach is to call off the test, recover the craft, analyse the data, and re-attempt the test. “A prototype is precious; every possible effort has to be made to recover it safely. That is the motto,” says Venugopal. The conversations keep returning to certain themes like legacy, history, vision, culture, and growth. The personnel I speak with, most with an IAF background, appear deeply respectful of HAL and its stature in India’s military aviation. “This is the kind of legacy company that has the spirit for disruption in its DNA,” says Gp Capt Harsh Vardhan Thakur. The CTP takes me to divisions under his supervision. There are strokes of sandal paste and vermilion on the doors we pass before we reach the library, where bulky box files hold the history of some of HAL’s show-piece projects. There are stories Venugopal narrates, about the evolution of the PSU — “some of the airplanes I fly are older than me” — over six decades. They include one from the fledgling 1960s when German aeronautical engineer Kurt Tank was brought in to design the HF-24 Marut, India’s only homemade fighter. Venugopal has just finished a long meeting. The scheduled flying for the day is over but this is no downtime for the lead pilot of HAL’s prestigious Light Combat Aircraft (LCA) AF Mk 1 A programme. He also leads an expansive project-to-product cycle, from research to design to marketing. Venugopal has over 4,500 flying hours on 26 aircraft types behind him; he has performed the first flight of at least four prototypes. During one of his initial tests on the Hindustan Turbo Trainer 40 (HTT-40), the aircraft entered a ‘flat spin’ — it lost forward speed and spun towards the ground. “I had read about it and as a matter of preparation, revised the situation when it happened, it was a challenge. The motion was fast and the aircraft took longer than usual to recover,” he says. The CTP’s day starts at 8 am, with breakfast and briefings — “a deeply cultural” routine with military aviators — that assess the weather and status of the airfield, navigation aids, and support systems. Flying tasks are finalised. Meetings follow. He flies four or five times a week, mostly in development flight tests. Over the last five years, most of his flying has been with the HTT-40, the experimental test pilot and the flight test engineer has expanded exponentially with time. It has increasingly involved additional competencies that include marketing ones. Venugopal says test pilots in India have been, by nature, a “low-key creed”, largely away from attention. Does he miss being on the frontline? “I’m 54 now and barring combat, I fly almost everything. Not many of my contemporaries in active service can say that. Besides, the greatest motivation is that whatever I’m doing at HAL is still in service of the armed forces,” says Venugopal who has been the CTP at HAL since 2017.

## **Sonic boom**

HAL is switching from the licensed production regime to indigenisation and innovations like the under-development Combat Aircraft Teaming System, where a manned fighter leads a swarm of combat drones in action. “For a company like HAL, being our own OEM (original equipment manufacturer) becomes critical to our aspirations as a truly independent producer. The HLFT-42 (HAL’s next-generation supersonic trainer) is a programme that will take us closer to these capabilities,” says Gp Capt N S C Murthy. The pilots tell me about meeting deadlines in the face of operational delays, about the bosses who soak in boardroom pressure for the team, “like M S Dhoni”. The CTP, a Bengalurean, makes the most of his Sundays — HAL has six-day work weeks — with golf and visits to his organic farm in Gubbi, near Tumakuru. Social media is, usually, for professional interaction but he does track the chatter when loud, mysterious sounds that capture the city’s imagination are attributed to his team. “The sonic boom is usually the handiwork of test pilots, at least in Bengaluru,” he says. The pilots and engineers manage a work-life balance. I hear conversations among the pilots about the new ‘Ponniyin Selvan’ film. As we sit down to watch a corporate film, one of them says, chuckling, “I feel like ordering popcorn”.

**Source:** <https://www.deccanherald.com>

## **GSLV-F12/NVS-01 Mission**

GSLV-F12/NVS-01 mission is accomplished successfully, May 29, 2023. This Geosynchronous Satellite Launch Vehicle (GSLV) mission deployed NVS-01 navigation satellite, weighing about 2232 kg, into a Geosynchronous Transfer Orbit. The vehicle lifted off at 10:42 hours IST from the second launch pad at SDSC-SHAR, Sriharikota and injected the satellite after about 19 minutes of flight.

NVS-01 is the first of the second-generation satellites envisaged for the Navigation with Indian Constellation (NavIC) services. NVS series of satellites will sustain and augment the NavIC with enhanced features. This series incorporates L1 band signals additionally to widen the services. For the first time, an indigenous atomic clock will be flown in NVS-01.

**Source:** <https://www.isro.gov.in/>

## **ISRO Offers Space science and Technology Awareness Training (START) for the Post-Graduate and Final Year Undergraduate Students**

ISRO has launched a new introductory-level online training programme called 'Space Science and Technology Awareness Training (START)' aimed at post-graduate and final-year undergraduate students of physical sciences and technology. The programme will cover various domains of space science, including Astronomy & Astrophysics, Heliophysics & Sun-Earth interaction, Instrumentation, and Aeronomy. It will be delivered by the scientists from Indian academia and ISRO centres. The START programme is part of ISRO's efforts to enable Indian students to become professionals in space science and technology, as the organization's space science exploration program continues to expand into new domains. The programme is intended to provide students with an introductory-level training in space science and technology, giving them an overview of different facets of the field, research opportunities, and career options. The training will also emphasize the cross-disciplinary nature of space science, giving students insights into how their individual aptitudes can be applied to the field. The programme is expected to help build a human capacity that will lead space science and research in the future. The lectures will also cover topics on the Indian space science exploration programme and research opportunities in space science and technologies. The student community will be benefited from this training programme, as they will receive an overview of the different facets of space science and technology, exposure to the research ongoing in different Indian institutes, insight into how their individual aptitude would suit some of the facets of space science and technology, appreciate the cross-disciplinary nature of the subject, and accordingly choose their career path.

**Source:** <https://www.isro.gov.in/>

## **TECHNOLOGY**

### **Centre for Space Science and Technology Inaugurated at IIT Roorkee**

A Centre for Space Science and Technology was inaugurated at IIT Roorkee on May 8, 2023. Shri Somanath S, Secretary, Department of Space & Chairman, ISRO inaugurated it along with the office premises for ISRO-IITR Space Technology Cell. He invoked the research scholars and faculty members to work on various opportunities available in the space sector and develop various applications, businesses, and diverse benefits. He emphasized focusing on the applications leading to the capability to manufacture and startups. Shri Somanath S released a compendium '**Research Area in Space 2023**' and the '**Atlas: Exploring Footprints of the Past Heritage Documentation – A Geospatial Approach**', brought out by RESPOND, Capacity Building and Public Outreach Programme Office, ISRO Headquarters and by IIRS, Dehradun. The event was graced by Prof. K. K. Pant, Director, IIT Roorkee; Prof. Apurba Kumar Sharma,



Dean Academics Affairs, IIT Roorkee, Prof. Sanjay H Upadhyay, Head, CSST & Coordinator, ISRO-IITR Space Technology Cell; Shri Sudheer Kumar N, Director, CBPO, ISRO; other dignitaries from ISRO, Alumni who visited IIT Roorkee and students.

**Source:** <https://www.isro.gov.in/>

## **Qualification of Crew Module Propulsion System for Gaganyaan Programme completed**

Today, the final test in a series of tests, was completed to qualify the Crew Module Propulsion System for the Gaganyaan Programme. The test was conducted for a duration of 602.94 s and all the parameters were as expected. With this test, the Crew Module Propulsion System has undergone 14 tests under nominal and off-nominal conditions for a cumulative duration of 3429 seconds. The system, consisting of 12 Nos. of 100 N thrusters and associated flow control components, will provide three-axis control to the Crew Module during re-entry i.e from an altitude of 170 km to 7 km till the deployment of the parachute-based deceleration system. The Crew Module Propulsion System was designed and developed at the Liquid Propulsion Systems Centre of ISRO and the tests were carried out in the test facility at ISRO Propulsion Complex (IPRC), Mahendragiri

**Source:** <https://www.isro.gov.in/>

## **Amateur astronomers in ISRO capture rare celestial event with minimal equipment**

Amateur astronomers in ISRO, Fahd Bin Abdul Hasis, Kiran Mohan, and VishakSasidharan from Liquid Propulsion Systems Centre (LPSC), Valiamala have photographed SN2023ixf using a modest setup consisting of a DSLR camera and basic sky tracking equipment, despite the challenging climatic conditions. The images on May 19, 2020 and May 22, 2023 below showcase the progression of SN2023ixf over time. Comparing two photographs taken. What's truly remarkable about the photograph by the amateur astronomers from ISRO is that the team captured this celestial event using a Nikon Z6 ii camera equipped with a Samyang 135 mm lens at f2.8 and ISO 1000, along with the iOptron SkyGuider pro as their sky tracking device. This simple setup allowed them to record the supernova's evolving appearance in the night sky. The image processing techniques employed by the team involved stacking multiple frames to enhance the details of SN2023ixf.

**Source:** <https://www.isro.gov.in/>

## **Iran Unveils Latest Version of the Khorramshahr Ballistic Missile**

Iran's defence ministry unveiled a new ballistic missile with a range of 2,000 kilometres (1,242 miles) and a capacity to carry warheads weighing over a tonne. The Kheibar missile — the latest version of the Khorramshahr which is Iran's longest-range missile to date — was unveiled alongside a replica of the Al-Aqsa mosque in east Jerusalem, in a live broadcast on state television. Iran's Defence Minister Mohammad-Reza Ashtiani said the missile was unveiled as part of moves to "provide comprehensive support to our friends and countries that are on the path of fighting against the domination system". State news agency IRNA said the Kheibar is "a liquid fuel missile with a range of 2,000 kilometres and a 1,500 kilogrammes warhead". Its name references the ancient town of Khaybar — located in modern-day Saudi Arabia — known for a decisive seventh-century battle in which the army of Prophet Mohammed defeated its thousands of Jewish residents. According to state media, the speed of the high-mobility tactical missile "can reach Mach 16 outside the atmosphere and Mach 8 inside the atmosphere". The unveiling comes amid heightened tensions in the Israeli-Palestinian conflict and just over 10 days into a fragile Gaza ceasefire that ended five days of cross border conflict between Israel and the Iran-backed Palestinian militant group Islamic Jihad. Days after the Khorramshahr was unveiled in 2017, then US president Donald Trump issued a stark warning at Tehran, casting growing uncertainty over whether a nuclear deal clinched with Iran would survive. The 2015 deal formally known as the Joint Comprehensive

Plan of Action, or JCPOA, gave Iran relief from international sanctions in return for curbs on its nuclear programme. But the deal collapsed in 2018 after the United States unilaterally withdrew from it and reimposed sanctions, prompting Iran to suspend the implementation of its own commitments to curb nuclear activity including uranium enrichment. In January 2020, Iran launched a missile attack on US forces at the Ain al-Assad military base in Iraq's Anbar province, days after a US drone strike at Baghdad airport killed revered Revolutionary Guard commander Qasem Soleimani and his Iraqi lieutenant Abu Mahdi al-Muhandis.

**Source:** <https://www.deccanherald.com/international/world-news-politics/iran-unveils-latest-version-of-thekhorranshahr-ballistic-missile-1221854.html>

## **HAL to replace key component of Dhruv ALH following recent crashes**

Following three accidents in quick succession, Bengaluru-based Hindustan Aeronautics Limited has decided to replace a key component of the Dhruv Advanced Lightweight Helicopter to enhance the fatigue tolerance of the made-in-India chopper, that serves as the rotary-wing mainstay for the Indian armed forces. The state-owned aviation major, sources said, would replace an aluminium-made control rod in the gear box with a steel made one. This will increase the fatigue tolerance of the copter and better control of the aircraft by the pilots. The decision to make the change, suggested by a regulatory panel, comes close on the heels of three ALH crashes on March 8 (Navy), March 26 (Coast Guard) and May 4 (Army). More than 335 ALH have been produced so far, of which nearly 300 are in service with the three armed forces. The last accident involving an Army Aviation chopper led to the death of one soldier and injury to two persons. The Navy and the Coast Guard had grounded their respective ALH Dhruv fleets in March following two similar incidents involving the platform. The Indian Air Force that operates around 70 ALH is clearing its choppers for flying in batches. The aircraft that have undergone the tests are continuing with operations while the rest will be cleared for flying after completion of the same. Officials at HAL asserted that the ALH had an outstanding safety record as it had flown more than 3,75,000 flying hours in the last two decades and the metallurgical changes in the control rod of the gearbox were being carried out to further improve the aircraft performance. The multi-role, multi-mission 5.5 tonne helicopter has proven its mettle in various utility roles including lifesaving missions during natural calamities in India and abroad. New Delhi pitches it as one of the defence export items.

**Source:** <https://www.deccanherald.com>

## **BUSINESS**

## **DRDO holds interaction with the industry in Hyderabad to understand their concerns & raise awareness about its policies**

A day-long industry interaction and brainstorming session was organised by Defence Research and Development Organisation (DRDO) at Research Centre Imarat (RCI), Hyderabad on May 27, 2023. It was aimed at bringing all defence industries, including MSMEs & start-ups, to one platform for understanding their concerns while increasing awareness on various industry-friendly initiatives and policies of DRDO. More than 180 industries participated in the event. Secretary Department of Defence R&D and Chairman DRDO Dr Samir V Kamat chaired the open brainstorming session 'Chintan'. He assured the industry that DRDO will extend all possible support to them and will play the role of a mentor in building their capabilities to make India a net defence exporter. The DRDO Chairman emphasised the need to undertake such initiatives on a regular basis as these events provide a renewed impetus to boost the Indian defence manufacturing sector to achieve complete self-reliance. Director, Directorate of Industry Interface & Technology Management (DIITM) Shri Arun Chaudhary gave a brief overview on various initiatives and policies of DRDO which support the Indian industries. He explained the process of 'Transfer of Technology' by DRDO to the industry, bringing out the salient features of the Policy. He explained the necessity and process of selection of industries as Development

cum production partners. The highlights of Technology Development Fund (TDF) scheme were aptly explained to industry. He also gave details of DRDO policy and procedures on utilisation of its infrastructure Testing facility and DRDO patents by Indian industry. The DRDO, in collaboration with Quality Council of India (QCI), has developed the 'System for Advanced Manufacturing Assessment and Ranking (SAMAR)' certification, a benchmark to measure the maturity of defence manufacturing enterprises, including MSMEs. During the event, an overview on SAMAR and IT-enabled online model for digitised assessment with geo-tagging and time-stamping were also presented. The DRDO is offering SAMAR to micro and small industries at subsidised cost. Industry partners from MSMEs & large enterprises as well as start-up entrepreneurs gave presentations on their experience of working with DRDO. They gave valuable suggestions to improve the current procedures and policies and recommended ways for doing ease of business. The event provided a unique beginning for Aatmachintan and Manthan during the open brainstorming session and a window of opportunity to the industries to express their challenges, expectations and support needed in the current scenario. Discussions were held to create a redefined framework to further the vision of ease of doing business and facilitate the industry.

**Source:** <https://pib.gov.in/PressReleasePage.aspx?PRID=1927828>

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