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A Quarterly International Journal by the Society is now
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List of Newly Elected Members

AeSI Foundation day Celebration



The Aeronautical Society of India was created under the society Registration Act,1860 and was incorporated on 17th November 1948. The Aeronautical Society of India crossed one more milestone as it celebrated its 73rd Foundation Day on 13th December 2021, in AeSI Head Office, Delhi which was a great chance to come together and celebrate our proud history after a long time period.

Dr. V.K. Saraswat, Member NITI Aayog graced the occasion as the Chief Guest, along with Shri A.S. Kiran Kumar, President, AeSI and Dr. G. Satheesh Reddy, President Elect, AeSI. The event helped in bringing together the dignitaries and distinguished Members of the Society. To celebrate the Foundation Day, an Offline and Online gathering was arranged wherein different activities were carried out to make the occasion memorable. The day became more terrific with the unveiling and inauguration of our national pride, the LCA Tejas Aircraft Model along with the Release of AeSI Corporate Video.

It was a special day for the entire Society. This occasion gave us an opportunity to stock of our achievements and to re-dedicate ourselves to face new challenges that lie ahead

- As Received from AeSI Head Quatres, New Delhi



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*Season's Greetings
and
Happy New Year*



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CURRENT AFFAIRS

Commencement of Gaganyaan Mission Specific Crew Training

- Gaganyaan Mission Specific Crew Training has commenced. An Inter-Agency Task Team with members from DRDO, IAF and ISRO had generated the requirements for Crew Training Curriculum. The curriculum was approved by an Apex Committee comprising of senior officials from ISRO and IAF, including Wg Cdr (Retd.) Rakesh Sharma and Air Cmde (Retd.) Ravish Malhotra.
- The three-semester training curriculum will have courses on Human Rated Launch Vehicle, Orbital Module systems, Space Medicine, Launch Complex Procedures, Microgravity Familiarization, Human Rating & Certification, Recovery Operations, Survival Training and related subjects.
- Crew Safety in Gaganyaan mission is one of the important objectives of the training program. Towards this, the crew will be thoroughly trained about the operating environment, risks, warning systems, procedures for nominal and off-nominal situations and emergency escape systems.
- Modern training methods such as Virtual reality simulators, Static Mock-up simulators and health monitoring equipment will be employed during the training. Experienced faculty from Indian Institute of Science, Institute of Aviation Medicine, DRDO and ISRO will be delivering the lectures.

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

India successfully test-fires air version of BrahMos supersonic cruise missile off Odisha coast

India successfully test-fired the air version of the BrahMos supersonic cruise missile from the integrated test range of Chandipur, off the coast of Odisha, sources in the DRDO said. Describing the mission as a "major milestone" in the development of BrahMos, the sources said that the air version of the missile was test-fired from supersonic fighter aircraft Sukhoi 30 MK-I at 10.30 am. The "copy book flight" followed the pre-planned trajectory and met all objectives,

the sources in Defence Research and Development Organisation (DRDO) said. The launch has cleared the way for serial production of air-version BrahMos missiles, they said. Congratulating the teams involved in the flight test, Dr G Satheesh Reddy, the secretary in the department of Defence Research and Development and chairman of DRDO, said various laboratories at the premier agency, academic institutions, public sector undertakings and Indian Air Force (IAF) participated in the testing, production and induction of this complex missile system. Defence Minister Mr Rajnath Singh has praised the DRDO, Indian Air Force and other stakeholders on the success of the mission, the sources added. BrahMos is a joint venture between India (DRDO) and Russia (NPOM) for the development, production and marketing of the supersonic cruise missile. The offensive missile weapon system has been inducted into the Armed Forces. The DRDO had flight-tested the Vertical Launch Short Range Surface to Air Missile, which will boost the capability of Indian Navy.

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

India successfully flight tests VLSRSTA Missile

India successfully flight tested the indigenously developed new Vertical Launch Short Range Surface-to-Air Missile from Odisha coast here, Defence Research and Development Organisation (DRDO) said. The DRDO-developed quick reaction surface-to-air-missile was test-launched from the Integrated Test Range at Chandipur near here at about 3.08 pm, an official of the organisation said. To monitor the missile's trajectories number of tracking instruments were used. The missile has an operational range of 50 to km distance and features mid-course inertial guidance through fiber optic gyroscope and active radar homing in the terminal phase, he said. The DRDO in its official Twitter post said, "Vertical Launch Short Range Surface to Air Missile for @IndianNavy was flight tested from ITR Chandipur. The missile was tested against an electronic target at a low altitude. The weapon is planned for integration onboard naval ships." Defence Minister Rajnath Singh congratulated DRDO, Indian Navy and industry for the successful flight test of VLSRSTA and said the system will enhance the defence capability of Indian naval ships against the aerial threat, RMO (defence minister) India said in its official Twitter post. Ahead of the test firing of the tactical missile, Balasore district administration as a safety measure temporarily shifted more than 4,500 people residing within a 2.5 km radius of launch pad number 3 of the ITR form where the weapon with a dummy payload was positioned and launched. A district revenue official said, "On the request of ITR authority people residing in six hamlets in close proximity to the ITR launch site had to be temporarily shifted to nearby shelter centres with compensation. homes after the DRDO gives the green signal for it."

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

India successfully launches Supersonic Missile Assisted Torpedo System

India successfully launched Supersonic Missile Assisted Torpedo System (SMAT) from Abdul Kalam island, formerly known as Wheeler Island, off the Odisha coast, the Defence Research and Development Organisation (DRDO) said. During the mission, the full range capability of the missile was successfully demonstrated. The system has been designed to enhance anti-submarine warfare capability far beyond the conventional range of the torpedo, the DRDO said. "This was a textbook launch, where the entire trajectory was monitored by the electro optic telemetry system, various range radars, including the down range instrumentation and down range ships. The missile carried a torpedo, parachute delivery system and release mechanisms," said the DRDO statement.

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

India successfully flight-tests indigenous Stand-Off Anti-Tank Missile

India successfully flight tested the indigenously designed and developed helicopter launched Stand-Off Anti-Tank (SANT) missile from Pokhran ranges, an official said. The flight test was jointly carried out by Defence Research and

Development Organisation (DRDO), and Indian Air Force (IAF). The flight-test was successful in meeting all its mission objectives. The release mechanism, advanced guidance and tracking algorithms, all avionics with integrated software, performed satisfactorily and tracking systems monitored all mission events, a government release said. The SANT missile is equipped with a state-of-the-art millimetre wave (MMW) seeker which provides high precision strike capability from a safe distance. The weapon can neutralise targets in a range up to 10 km. This is the third in the series of indigenous stand-off weapons to be tested in recent times after long-range bombs and smart anti-airfield weapons for strengthening the arsenal of IAF. The indigenous development of various configurations for different applications with advanced technologies is a firm march towards 'Aatmanirbharta' in defence. Defence Minister Mr Rajnath Singh has congratulated the team associated with the mission, the release said. DRDO Chairman Dr G. Satheesh Reddy said the successful flight test of SANT missile would further bolster the indigenous defence capabilities.

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

Defence Industrial Corridors in Tamil Nadu

As per information received from Government of Tamil Nadu, three proposals have been sent to Government of India concerning Tamil Nadu Defence Industrial Corridor (TNDIC). The details and status of these proposals are as follows: (i) Establishment of testing facilities under Defence Testing Infrastructure Scheme (DTIS) of Ministry of Defence (MoD). The State Government has been directed to participate in the tender process and follow the procedure/ scheme guidelines in this regard. (ii) Leasing of about 160 acres of defence land in taluka Ulundurpettai, Viluppuram district of Tamil Nadu for creation of Aviation Technology Hub. This proposal is outside the identified nodes of TNDIC. (iii) A proposal has been submitted to Airport Authority of India (AAI) for establishment of Aircraft MRO Complex in 50 acres of land at Chennai Airport. The Defence Industrial Corridors including TNDIC have been established to attract investments from public / private industries to develop defence manufacturing ecosystem. As per information received from Government of Tamil Nadu, action has been taken to develop TNDIC and an Aerospace & Defence (A&D) policy for incentivizing investments by the industries in the TNDIC has been notified. They have started land acquisition and taken action to develop defence industrial parks, aerospace parks etc. and signed Memorandum of Understanding (MoUs) with 39 (thirtynine) private/public industries. Against the projected investments worth Rs. 12226.00 Crore as per MoUs with various private/public industries in the TNDIC, investment of more than Rs 2,200 crore have already been made in the last three years. Further, the State Government of Tamil Nadu has also spent Rs. 30 Crore for development of Aerospace park. This information was given by Raksha Rajya Mantri Shri Ajay Bhatt in a written reply to Shri P. Wilson in Rajya Sabha today.

Source: <https://pib.gov.in/PressReleasePage.aspx?PRID=1778461>

Successful flight test of Vertical Launch Short Range Surface to Air Missile

Vertical Launch Short Range Surface to Air Missile was successfully flight tested today by Defence Research & Development Organisation (DRDO) from Integrated Test Range, Chandipur, off the coast of Odisha. The launch was conducted from a vertical launcher against an electronic target at a very low altitude. The flight path of the vehicle along with health parameters were monitored using a number of tracking instruments deployed by ITR, Chandipur. All sub-systems performed as per expectation. Today's launch of the system was conducted to validate integrated operation of all weapon system components including the vertical launcher unit with controller, canisterised flight vehicle, weapon control system etc. required for future launches of the missile from Indian Naval Ships. The test launch was monitored by senior officials from DRDO & Indian Navy. The first trial was conducted on 22 February 2021 and this is confirmatory trial to prove the consistent performance of the configuration and integrated operation. Raksha Mantri, Shri Rajnath Singh has congratulated DRDO, Indian Navy and industry for the successful flight test and stated that this system will further enhance defence capability of Indian Naval Ships against aerial threats. Secretary Department of Defence Research & Development & Chairman DRDO, Dr G Satheesh Reddy has complemented the teams involved in the

successful flight test and said that this has paved the way for integration of weapon system onboard Indian Naval Ships

Source: <https://pib.gov.in/PressReleasePage.aspx?PRID=1778966>

President Kovind witnesses air display at Pune IAF station

Pune: President Ram Nath Kovind visited the Air Force station in Pune, where he witnessed a breathtaking air display comprising a large number of fighter aircraft and helicopters, interacted with air warriors and experienced full mission simulator of SU-30 MKI fighter jet. The President, who is also the supreme commander of the defence forces, flew a 'sortie' in the state of the art SU-30 MKI simulator and was shown the exceptional capabilities of the fighter aircraft, an official release said. Mr. Kovind is on a fourday visit to Maharashtra .He started his tour by visiting the historic Raigad fort near Mumbai by ropeway. The Raigad fort was made the capital of the Maratha kingdom when Chhatrapati Shivaji was coronated as king in 1674. His office, in a tweet, said, "President Ram Nath Kovind visited the Air Force Station, Pune. The President witnessed a vibrant air display and interacted with the air warriors. The President also experienced the SU-30 MKI Full Mission Simulator during his visit." The Press Information Bureau (PIB), in a release, said the President, upon his arrival here, was received by Air Marshal Vikram Singh, Air Officer Commanding in Chief, South Western Air Command, and Dr (Mrs) Arathi Singh, President, Air Force Wives Welfare Association (Regional), South Western Air Command. Thereafter, Mr. Kovind was conducted for a fleet review by Air Commodore H Assudani, Air Officer Commanding, Air Force Station, Pune, it said. The review included SU-30 MKI aircraft and the 'Made in India' Akash missile system. "The hon'ble President witnessed a breathtaking air display, comprising a large number of fighter aircraft and helicopters. The highlight of the air display was a flypast by a large formation of Jaguar aircraft, which painted the skies of Pune with a tattoo of '75', signifying '75 years of India's Independence," said the release. During his visit, Mr. Kovind flew a 'sortie' in the state of the art SU-30 MKI simulator and was shown the exceptional capabilities of the fighter aircraft, it said. Before leaving the airbase in Lohegaon, he interacted with aircrew who participated in the review and the flying display, and also air warriors. Mr. Kovind will present the President's Standard to the Navy's 22nd Missile Vessel Squadron in Mumbai, the Rashtrapati Bhavan earlier said.

Source: <https://www.thehindu.com/news/national/president-kovind-witnesses-air-display-at-pune-iafstation/article37887436.ece>

Raksha Mantri lays foundation stone for Defence Technology & Test Centre and BRAHMOS Manufacturing Centre of DRDO in Lucknow

Raksha Mantri Shri Rajnath Singh laid the foundation stone for Defence Technology & Test Centre and BRAHMOS Manufacturing Centre, established by Defence Research & Development Organisation (DRDO) in Lucknow, Uttar Pradesh on December 26, 2021. The foundation for the two units was laid in the presence of Uttar Pradesh Chief Minister Shri Yogi Adityanath. A first of its kind Defence Technologies & Test Centre (DTTC), over approximately 22 acres is being set up to accelerate the growth of the defence and aerospace manufacturing clusters in Uttar Pradesh Defence Industrial Corridor (UP DIC). It will consist of the following six subcentres: 1. Deep-Tech Innovation & Startup Incubation Centre 2. Design & Simulation Centre 3. Testing & Evaluation Centre 4. Centre for Industry 4.0/Digital Manufacturing 5. Skill Development Centre 6. Business Development Centre The BRAHMOS Manufacturing Centre, announced by BrahMos Aerospace, is a modern, state-of-art facility in the Lucknow node of UP DIC. It will cover over 200 acres and produce the new BRAHMOS-NG (Next Generation) variant, which carries forward the lineage of the BRAHMOS weapons system. This new centre would be ready over the next two to three years and will commence production at a rate of 80-100 BRAHMOS-NG missiles per year. Congratulating the scientists and engineers of DRDO & BrahMos Aerospace, Shri Rajnath Singh exuded confidence that the two units will play a pivotal role in bolstering national security, defence production as well as the economy of Uttar Pradesh. He said, the state-of-the-art facilities will prove to be an important milestone in the defence sector. He added that the establishment of these units will

generate revenue; provide employment opportunities to the youth and help in achieving 'Aatmanirbhar Bharat' envisioned by Prime Minister Shri Narendra Modi. He said that the message of Make in India, Make for India and Make for World has been sent out globally. 2 On the 'Defence Technology and Test Centre', the Raksha Mantri said, the Centre will provide the technological base to develop defence products keeping in mind the young innovators and startups in Amausi region of Uttar Pradesh. He added that the Centre will make all endeavours to fulfil the creative energy, capabilities and aspirations of the youth of Uttar Pradesh. It will help in bringing the MSMEs of Uttar Pradesh together and bring the state at the forefront in the field of defence and aerospace manufacturing, he said. He added that the Centre, through skill development, will create direct and indirect employment in the field of defence and aerospace manufacturing. Recalling India's history, Shri Rajnath Singh said "we have never been an aggressor, but are ready to defend our people against any nation with hostile intentions". He added that the purpose of the BRAHMOS supersonic cruise missile system is to act as a deterrent. He said, the system not only reflects the technical cooperation between India and Russia, but also the long standing cultural, political and diplomatic ties. He termed BRAHMOS as the world's best and fastest precision-guided weapon which has strengthened India's credible deterrence in the 21st century. The Raksha Mantri added that BRAHMOS has empowered the Armed Forces and raised India's military stature at the international level. On BRAHMOS-NG, he said, the more advanced missile system, which has proven its firepower in land, water and air will greatly strengthen the modern combat capability of the Indian Army in the coming years. He appreciated that the establishment of UP DIC has opened up new avenues for all-round technological progress of the state, besides providing employment opportunities for the youth of the region. "At the time of its inauguration, we had estimated an investment of Rs 3,732 crore. Investment of more than Rs 1,400 crore has already been received and the process is progressing rapidly," he informed. Shri Rajnath Singh stated that India has attained a respectable position in areas of defence technologies, including the development of state-of-the-art missile systems in the last few years and has made commendable progress in building its defence industrial base. He applauded scientists of DRDO for their crucial role in increasing India's military stature by strengthening the Armed Forces and achieving 'Aatmanirbharta' in the development and production of modern missile systems. Shri Rajnath Singh ended his address by calling on all in attendance to resolve to raise the State of Uttar Pradesh to new heights. The Rajnath Singh expressed confidence that the foundation stone laying of the two units heralds a new chapter in the defence of the nation as well as defence manufacturing and the economy of the state of Uttar Pradesh and the city of Lucknow. He applauded the state government under the leadership of Chief Minister Shri Yogi Adityanath for taking various initiatives for improving infrastructure and the welfare & progress of people from all sections of society. Speaking on the occasion, UP Chief Minister Shri Yogi Adityanath thanked Raksha Mantri Shri Rajnath Singh for the initiatives of Ministry of Defence such as UP DIC, DefExpo-2020 and the establishment of a unit of Bharat Dynamics Limited in Jhansi. He said, the work had started in all six nodes of the UP DIC and that the foundation stone laying of the two units is a fulfilment of the vision of 'Aatmanirbhar Bharat' in the defence sector. The Chief Minister added that the units will provide avenues for employment for youth of the state and expressed confidence that the units will make a significant contribution to the progress of the state as also the nation. Shri Yogi Adityanath highlighted Uttar Pradesh's potential for progress in the defence sector due to the large number of Medium, Small Scale and Micro Enterprises (MSMEs) in the state. He assured all possible support of the state government to defence sector industries coming to the state. In his opening address, Secretary Department of Defence R&D and Chairman DRDO Dr G Satheesh Reddy thanked the Raksha Mantri for making land available for the DTTC in Lucknow. He expressed gratitude to UP Chief Minister for providing 200 acres of land for the BRAHMOS manufacturing centre. He assured all support from DRDO to the industries coming up in the region. The state-of-the-art Defence Technologies & Test Centre is being set up to implement the MoU exchanged between Uttar Pradesh Expressways Industrial Development Authority (UPEIDA) and DRDO during DefExpo-2020 at Lucknow in presence of the Raksha Mantri and the UP Chief 3 Minister. The DTTC, Lucknow will follow the design-build-test-learn cycle for technology consultancy & handholding of the Deep-Tech Startups & industries. It will facilitate industries through establishing a centralized state of the art technology infrastructure which will accelerate the product development and reduce the induction time & the turnaround time for the futuristic systems development through its 6 subcentres. This unique setup will act as a bridge for Industries & Startups to grasp the DRDO's IPRs, Patents & ToTs. It will extend holistic handholding to Industries, Startups & Academia in UP DIC. It will promote the growth of Industries & Startups in UPDIC and Ease of Doing Business and contribute to building an AtmaNirbhar Bharat. The BRAHMOS

supersonic cruise missile system is one of the most successful missile programmes in the world. India has undertaken jointly in partnership with its closest strategic ally Russia. As the world's best and fastest precision-guided weapon, BRAHMOS has fortified India's deterrence power in 21st century. Designed and developed by India-Russia JV entity BrahMos Aerospace, supersonic cruise missile BRAHMOS has continued to evolve as the most versatile weapon in its genre. To carry forward this excellent lineage, BrahMos Aerospace has initiated work on a new, more advanced variant of the missile - BRAHMOS-NG. This new missile, having smaller, lighter and smarter dimensions, would be designed for deployment on a wider number of modern military platforms, including land, sea, underwater and air. It will hugely bolster Indian military's modern combat capability and flexibility in the next few years. Union Minister of State for Housing & Urban Affairs Shri Kaushal Kishore, UP Industrial Development Minister Shri Satish Mahana; other Ministers of the state government; MPs, MLAs and public representatives from the state; officials of Ministry of Defence, DRDO and the state government were present on the occasion.

Source: <https://pib.gov.in/PressReleasePage.aspx?PRID=1785316>

TECHNOLOGY

'In national interest': India defends S-400 buy as curbs loom

New Delhi: As the threat of US sanctions looms over India's purchase of S-400 system from Russia, India reiterated that it follows an independent foreign policy and its defence acquisitions will continue to be guided by "national security interests". The remark by MEA spokesperson Arindam Bagchi was in response to a question on whether or not the US was likely to impose the dreaded CAATSA sanctions on India for acquiring the missile defence system. He reiterated that India and the US have a comprehensive strategic partnership and India has a special and privileged strategic partnership with Russia. His remarks came ahead of President Vladimir Putin's visit next week for the annual summit. The government said the 21st India-Russia summit in Delhi on December 6 will offer an opportunity to the two leaders to exchange views on regional, multilateral and international issues of mutual interests. Giving details of the engagements between the two sides on December 6, Mr Bagchi said defence minister Mr Rajnath Singh will hold a meeting with his Russian counterpart Sergey Shoygu IndiaRussia under the framework of the India-Russia Inter-Governmental Commission on Military Technical Cooperation. Separately, external affairs minister Mr S Jaishankar will hold talks with his Russian counterpart Sergey Lavrov. Following the two meetings, the foreign and defence ministers of the two countries will hold the inaugural '2+2' ministerial dialogue that is expected to discuss bilateral, regional and international issues.

Source: <https://timesofindia.indiatimes.com/india/in-national-interest-india-defends-s-400-buy-as-curbsloom/articleshow/88059959.cms>

The arms race towards hypersonic weapons

The story so far: In October, The Financial Times had reported that China tested a nuclearcapable hypersonic missile in August that circled the globe before speeding towards its target, demonstrating an advanced space capability that caught U.S. intelligence by surprise. This was later confirmed by U.S. military officer Gen Mark Milley, Chairman of the joint Chiefs of Staff. However, China has denied that it was nuclear capable. This and other recent developments have put the spotlight on hypersonic weapons development, especially the advancements made by China and Russia. What are hypersonic weapons? They are manoeuvrable weapons that can fly at speeds in excess of Mach 5, five times the speed of sound. The speed of sound is Mach 1, and speeds upto Mach 5 are supersonic and speeds above Mach 5 are hypersonic. Ballistic missiles, though much faster, follow a fixed trajectory and travel outside the atmosphere to re-enter only near impact. On the contrary, hypersonic weapons travel within the atmosphere and can manoeuvre

midway which combined with their high speeds makes their detection and interception extremely difficult. This means that radars and air defences cannot detect them till they are very close and little time to react. According to the latest memo of the Congressional Research Service (CRS), 'Hypersonic Weapons: Background and Issues for Congress' of October 2021, there are two classes of hypersonic weapons, hypersonic glide vehicles (HGV) and hypersonic cruise missiles (HCM). HGVs are launched from a rocket before gliding to a target while HCMs are powered by high-speed, air-breathing engines, or scramjets, after acquiring their target. Hypersonic missiles are a new class of threat because they are capable both of manoeuvring and of flying faster than 5,000 kms per hour, which would enable such missiles to penetrate most missile defences and to further compress the timelines for response by a nation under attack, says a 2017 book Hypersonic Missile Nonproliferation published by the RAND Corporation. What is the status of Chinese and Russian programmes and where does the U.S. stand? In addition to the Chinese test, early October, Russia announced that it had successfully test launched a Tsirkon hypersonic cruise missile from a Severodvinsk submarine deployed in the Barents Sea which hit a target 350 kms away. Talking of the test in November, Russian President Vladimir Putin declared that the tests were almost complete and the Russian Navy would start receiving them in 2022. "Now, it is especially important to develop and implement the technologies necessary to create new hypersonic weapons systems, high-powered lasers and robotic systems that will be able to effectively counter potential military threats," he said. While the U.S. has active hypersonic development programmes, the CRS memo said it was lagging behind China and Russia because "most U.S. hypersonic weapons, in contrast to those in Russia and China, are not being designed for use with a nuclear warhead." "As a result, U.S. Take-off: The Defence Research and Development Organisation (DRDO) successfully demonstrated the hypersonic air-breathing scramjet technology with the flight test of Hypersonic Technology Demonstration Vehicle (HSTDV) from Dr APJ Abdul Kalam Launch Complex in Odisha on September 7, 2020. | Photo Credit: PTI 6 hypersonic weapons will likely require greater accuracy and will be more technically challenging to develop than nuclear-armed Chinese and Russian systems," it stated. The U.S. is now looking to accelerate its own programmes, though it is unlikely to field an operational system before 2023. The Pentagon's budget request for hypersonic research for financial year 2022 is \$3.8 billion, up from the \$3.2 billion it requested a year earlier. The Missile Defence Agency additionally requested \$247.9 million for hypersonic defence. However, as stated by the U.S. Principal Director for Hypersonics Mike White, the Department of Defence has not yet made a decision to acquire hypersonic weapons and is instead developing prototypes to assist in the evaluation of potential weapon system concepts and mission sets. Debunking some of the claims surrounding hypersonic weapons, Physicists David Wright and Cameron Tracy wrote in the Scientific American dated August 1, 2021 that their studies indicate that hypersonic weapons "may have advantages in certain scenarios, but by no means do they constitute a revolution." "Many of the claims about them are exaggerated or simply false. And yet the widespread perception that hypersonic weapons are a game-changer has increased tensions among the U.S., Russia and China, driving a new arms race and escalating the chances of conflict," they wrote in the article 'The Physics and Hype of Hypersonic Weapons'. What is the status of development by other countries? The CRS Memo noted that a number of other countries - including Australia, India, France, Germany, and Japan—are also developing hypersonic weapons technology. India operates approximately 12 hypersonic wind tunnels and is capable of testing speeds of up to Mach 13, according to CRS. "Reportedly, India is also developing an indigenous, dual-capable hypersonic cruise missile as part of its Hypersonic Technology Demonstrator Vehicle (HSTDV) program and successfully tested a Mach 6 scramjet in June 2019 and September 2020," the memo stated. This test was carried out by the Defence Research and Development Organisation (DRDO) and demonstrated the scramjet engine technology, a major breakthrough. In a scramjet engine, air goes inside the engine at supersonic speed and comes out at hypersonic speeds. DRDO had said after the test in 2020, many critical technologies such as aerodynamic configuration for hypersonic manoeuvres, use of scramjet propulsion for ignition and sustained combustion at hypersonic flow, thermo-structural characterisation of high temperature materials, separation mechanism at hypersonic velocities have been validated. Given the rising tensions between the U.S., China and Russia as also the worsening geopolitical situation worldwide, the focus for hypersonic weapons is only set to accelerate more countries to invest significant resources in their design and development.

Source: <https://www.thehindu.com/sci-tech/technology/explained-the-arms-race-towards-hypersonicweapons/article37874968.ece>

Need to quickly think about development of hypersonic cruise missiles: Rajnath

New Delhi: Ballistic missile defences were getting “robust” day by day and to maintain a minimum credible deterrence, India should quickly think about developing hypersonic cruise missiles, Defence Minister Rajnath Singh said. He pointed to the fast-changing battlefield landscape with the emergence of new technologies. “Our effort should be to make India the leader in defence technology. Those technologies which we have already developed are already ours, but along with that we should also acquire those technologies which today are only with a handful of countries,” he stated at an event of the Defence Research and Development Organisation (DRDO). “For example, ballistic missile defence are getting robust day by day. So, in order to maintain our minimum credible deterrence, we should quickly think about developing hypersonic cruise missiles,” he noted. Hypersonic weapons are manoeuvrable weapons that can fly at speeds of at least Mach 5, five times the speed of sound. Several countries, including India, are currently developing them. In 1998, India conducted nuclear tests under Phokran-II and in 2003, declared its nuclear doctrine based on credible minimum deterrence and a No-First-Use (NFU) policy. The concept of maintaining a minimum credible deterrence and a nuclear triad for delivery of nuclear weapons based on aircraft, missiles and nuclear submarines flow from that. At the event, Mr. Singh handed over five technologies developed by the DRDO to the three Services and Home Ministry as part of ‘Azadi Ka Amrit Mahotsav’. He also handed over six Transfer of Technology (ToT) agreements for the technologies developed by the DRDO to seven public and private sector companies. Emphasising on emerging technologies, he stressed that developments such as cyber, space, IT, robotics, Artificial Intelligence and big data analysis were adding news facets on the battlefield. Some of the products being developed by the DRDO were not just futuristic but also the first of the kind, he pointed out. Technologies handed over The technologies handed over by Mr. Singh include an anti-drone system for the three Services, a modular bridge for the Army, smart anti-airfield weapon and Chaff variants for the Air Force and a lightweight firefighting suit to the Home Ministry. The ToT documents handed over comprise coastal surveillance radar, automatic chemical agent detection and alarm and chemical agent monitor, unit maintenance vehicle, unit repair vehicle, fused silica based ceramic core technology and fire suppressing gel.

Source:<https://www.thehindu.com/news/national/need-to-quickly-think-about-development-of-hypersonic-cruisemissiles-rajnath/article37954715.ece>

Rustom-2 indigenous UAV crosses a milestone

New Delhi: The indigenous Medium Altitude Long Endurance (MALE) Unmanned Aerial Vehicle (UAV) development programme by the Defence Research and Development Organisation (DRDO) has crossed a milestone by reaching an altitude of 25,000 feet and an endurance of 10 hours, Secretary R&D and DRDO Chairman Dr. Sateesh Reddy said. Within two months, we will demonstrate an altitude of 30,000 feet and 18 hours endurance meeting the requirements of the Services, said Dr. Tessa Thomas, Director General (Aeronautical Systems), DRDO. It has advanced capabilities and meets the requirements of the three Services, Dr. Thomas said. Once the capabilities are demonstrated in two months, it should be ready to be handed to the Services. A programme for a more capable High Altitude Long Range (HALE) UAV is also in the works, Dr. Thomas said. It technologically matches contemporary UAVs available and will also be cheaper than the imported ones, officials said. With some delays in development, the Rustom-2 last year successfully flew for eight hours at an altitude of 16,000 feet. It has been designed and developed by the Aeronautical Development Establishment (ADE), Bengaluru with production partners being the Hindustan Aeronautics Ltd and the Bharat Electronics Limited. It is being developed to carry out surveillance and reconnaissance (ISR) roles and is capable of carrying different combinations of advanced payload and capable of auto landing among others. High endurance UAVs are a priority requirement for the armed forces especially in the standoff with China in Eastern Ladakh. The armed forces rely heavily on the Israeli Searcher and Heron drones and need more such UAVs. The Services have embarked on a major upgrade project of the Heron UAVs. A separate proposal for 30 armed Predator drones, 10 for each Service, from the U.S. is also at advanced stages. Structural fire-fighting suit, among several systems Defence Minister Rajnath Singh had handed to the Home Ministry over a structural fire-fighting suit developed by DRDO’s Centre for Fire, Explosive and Environment Safety (CFEES), Delhi. File image of Rustom-2 UAV. Photo: Special Arrangement 4 The suit weighing 2.8 kg is an ensemble of several layers, with the outer layer being the most durable and protects against heat, flames, water, chemicals and also against cuts and abrasion, according to the

DRDO. The inner thermal layer provides insulation by creating air cushions and micro climate chambers. Such a suit has been developed for the first time in the country and meets European standards while at the same time lowering import costs, said Dr. Prasun Roy from CFEES who was involved in the development. Dr. Roy said a special “fire entry suit” which can without significant fire for 150 seconds is also in the advanced stages of development. The aim is to reduce the weight of the suit which is present at 25 kg and reduce the import content, he said.

Source:<https://www.thehindu.com/news/national/rustom-2-indigenous-uav-crosses-a-milestone/article37963891.ece>

'Personnel sphere' for 1st desi deep ocean manned mission being developed; ISRO, DRDO provide expertise

Along with the ongoing Gaganayaan programme to send a manned mission to space by 2023, the Centre is also simultaneously working on the country's first manned scientific submersible for deep ocean missions. The project has been named 'Samudrayaan'. National Institute of Ocean Technology, an autonomous institute under the ministry of earth sciences, has developed and tested a 'personnel sphere' for a manned submersible system. The personnel sphere of 2.1m diameter, to be used as a crew module for up to a depth of 500m, has been developed using mild steel and tested by sending it down 600m in the Bay of Bengal using the research vessel Sagar Nidhi in October this year, minister of earth sciences and S&T Jitendra Singh informed Rajya Sabha in a written reply. A titanium alloy personnel sphere for the manned submersible system, for 6,000-metre water depth rating, is under development in association with Isro's Vikram Sarabhai Space Centre at Thiruvananthapuram, Singh said. Under the Rs 6,000-crore deep ocean mission, approved by the cabinet in June this year, the Centre will send a manned submersible with three persons to a depth of 6,000 metre in the ocean with a suite of scientific sensors and tools. The project will enable exploration of ocean resources for drinking water, clean energy and blue economy. It will also make deep space mining and exploration a reality. Once the manned mission is successfully launched, it will put India in the elite club of select countries, including the US, Russia, Japan, France and China, with a capability to launch deep ocean manned missions. Under the MATSYA 6000 plan, three persons — one pilot and two scientists — within the submersible will dive to a depth of 6,000m for a duration of 12 hours and will be able to stay underwater for 16 hours. Isro, IITM and DRDO have been roped in to support the programme. The minister had earlier said sea trials of the 500m-rated shallow water version of the manned submersible were expected to take place in the last quarter of 2022 and the deep water manned submersible would be ready for trials by the second quarter of 2024.

Source:<https://timesofindia.indiatimes.com/india/personnel-sphere-for-1st-desi-deep-ocean-manned-mission-beingdeveloped-isro-drdo-provide-expertise/articleshow/88329174.cms>

DRDO conducts flight demonstration of Controlled Aerial Delivery System

Aerial Delivery Research and Development Establishment (ADRDE), Agra conducted a flight demonstration of Controlled Aerial Delivery System of 500 kg capacity (CADS-500) on December 18, 2021. ADRDE, Agra is an R&D laboratory of Defence Research and Development Organisation (DRDO) and the flight demonstration is part of a series of activities organised towards celebrating 'Azadi Ka Amrit Mahotsav', commemorating 75 years of Independence. The CADS-500 is used for precise delivery of payload upto 500 kgs at predetermined location by making use of manoeuvrable capabilities of Ram Air Parachute (RAP). It uses Global Positioning System for the coordinates, altitude and heading sensors for the heading information during its flight. The CADS, with its onboard electronics unit, autonomously steers its flight path using waypoint navigation towards target location by operating controls. System performance was demonstrated at Drop Zone, Malpura from an altitude of 5000m. The system was para-dropped from AN32 aircraft and then steered to the predesignated landing point in autonomous mode. Eleven paratroopers of Indian Army and Indian Air Force chased the CADS500 in air and landed simultaneously.

Source: <https://pib.gov.in/PressReleasePage.aspx?PRID=1783168>

How Tejas Mark 2 is evolving into a bigger, powerful fighter

With the Indian Air Force (IAF) having ordered 123 Tejas fighters (six squadrons) and foreign air forces evaluating India's home-grown light combat aircraft (LCA) for acquisition, the Tejas Mark 1 is evolving from a light fighter to a bigger and more powerful medium fighter that could be a clear notch above its possible adversaries in South Asia. On November 15, the IAF signed off on a comprehensive design review (CDR) of the Tejas Mark 2, clearing the construction of a new prototype of the LCA for construction and testing. A CDR is a critical step in designing and developing a new aircraft. It allows the customer air force to examine the proposed blueprints in detail to be sure the aircraft design is viable, ready for fabrication and testing and that it would achieve its stipulated performance within the laid down cost, schedule and risk. The IAF's acceptance of the CDR allows Hindustan Aeronautics Ltd (HAL) to start releasing drawings of the Mark 2's first prototype and producing them. The Tejas Mark 2 is no longer an LCA, but a significantly larger and more capable Medium Combat Aircraft (MCA), with a higher thrust engine and a 1.5-metre increase in length. While there is no change in the size of the wings, they have been pushed outwards, effectively increasing the fighter's wingspan by 300 mm. Replacing the 1980s appearance of the Tejas Mark 1, the Mark 2 has a 21st century look. Ahead of the wings, a canard has been added, creating a resemblance with contemporary fighters such as the Rafale, Eurofighter or the Sukhoi-30MKI. The canard provides an additional control surface that creates a vortex, increasing the lifting capability and agility of the aircraft. The key change in the Tejas Mark 2 is its significantly more powerful General Electric (GE) F-414 engine, which will replace the current GE F-404 power pack. For close-in dog fighting against enemy fighters, which involves sudden acceleration, sharp climbing and sustained turning, the F-404 engines' peak thrust of 83 KiloNewtons (kN) is considered inadequate. For that reason, the Aeronautical Development Agency (ADA) has decided to power the Mark 2 with a GE F-414 engine that will deliver 98 kN of peak power. The new engine will enable the Mark 2 to take off with a maximum all-up weight of 16.5 tonnes, which will include the 10-tonne weight of the fighter and 6.5 tonnes of external payload. The increased carriage creates a wealth of options for mission planners. The Tejas Mark 2 can carry 3.5 tonnes of fuel in external drop tanks, in addition to 3.3 tonnes in its internal fuel tanks, while still carrying three tonnes of weapons and sensors.

Weapons carriage

The Tejas Mark 2's increased payload capacity will enable it to integrate significantly more weapons and sensors than the Mark 1 fighter. For air-to-air combat, the Mark 2 will carry the indigenous Astra Mark 1 and Mark 2 missiles. It would also carry Rudram anti-radiation missiles, developed by the DRDO's Defence R&D Laboratory (DRDL) Hyderabad, and tested on October 9. Meanwhile, the DRDO's Armament Research & Development Establishment is developing a range of bombs for the Tejas Mark 2, such as the Tara (high speed, low drag) bomb that is mounted on the pylons. It will also have the option of carrying laser guided bombs (LGBs), fitted with laser-guidance kits. While there are no plans to integrate the game-changing Meteor beyond visual range (BVR) air-to-air missile, the Tejas Mark 2 may be integrated with the SCALP missile that has been procured along with the Rafale fighters. To carry this payload, the Tejas Mark 2 will have 11 hard points, including one on each wingtip for the ASRAAM air-to-air missile. There will be three under-wing pylons on each side, one wet station on each side for fuel drop tanks, while the other three hard points are for long-range missiles such as the Astra and Rudram. Besides a new engine, the Tejas Mark 2 would have its internals rearranged, to make them more accessible and maintenance friendly. While building the Mark 1, these "line replacement units" (LRUs) were positioned randomly, as the need arose. Their optimal rearrangement would improve space utilisation, accessibility, and make maintenance easier and quicker, reducing turn-around time between operational missions. Furthermore, the Tejas Mark 1 is burdened with 300 kilos of ballast — dead weight inserted incrementally while designing the fighter, to correct its centre of gravity. If the internal LRUs are re-arranged and the ballast removed, the Tejas Mark 2 could instead carry 300 kg more of useful payload.

Source: <https://www.ajaishukla.com/>

Eight incredible space missions to look forward to in 2022



BUSINESS

HAL bags ADE-DRDO order for ABHYAS target platform

Hindustan Aeronautics Limited (HAL) has secured an order for the manufacturing, assembly, integration, testing and supply of the High Speed Expendable Aerial Target (HEAT) system known as ABHYAS from Aeronautical Development Establishment, DRDO. Post successful completion of this initial order, HAL would be identified as Development-Production Partner (DcPP) for supply of this target system along with a private firm (50% of the volume). The platform is estimated to have large requirements from the tri-services, DRDO laboratories for evaluation trials of missile programmes. ABHYAS was first successfully flight-tested in May 2019 and subsequent evaluation trials are being conducted by ADE- DRDO. This order would mark the beginning of the series production of ABHYAS. ABHYAS is designed and developed by DRDO's Aeronautical Development Establishment (ADE), Bengaluru. The air vehicle is launched using twin under-slung boosters which provide the initial acceleration to the vehicle. Powered by a gas turbine engine, the machine can sustain a long endurance flight at subsonic speed. The target aircraft is equipped with

Micro Electro Mechanical System (MEMS) based Inertial Navigation System (INS) for navigation along with the Flight Control Computer (FCC) for guidance and control. The vehicle is programmed for fully autonomous flight. The check-out of the air vehicle is done using laptop-based Ground Control Station (GCS).

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

HAL signs Rs 2,400-crore deal with BEL for Tejas systems

In what is the biggest-ever order placed with an Indian firm, Hindustan Aeronautics Limited (HAL) has signed a contract with Bharat Electronics Limited (BEL) for the development and supply of 20 different types of systems for the upcoming LCA Tejas LCA Tejas Mark 1A. The Rs 2,400-crore order, which will span five years from 2023 to 2028, was signed and will see BEL supply critical avionic line replaceable units (LRUs). These LRUs are modular systems used on the Tejas aircraft. HAL currently sources 344 LRUs from 76 companies, out of which 49 are international companies supplying 134 LRUs for current versions of the Tejas fighter. This high quantum of imported systems means that the indigenisation quotient of existing machines is 52%. The addition of these 20 indigenous systems could raise the quotient by 6%. Under the new contract, BEL said, it will be supplying LRUs related to digital flight control computers, air data computers, weapon computers, LRUs related to radar warning receiver (RWR) and head up display. These systems were designed and developed by the Aeronautical Development Agency, DRDO labs, the Aeronautical Development Establishment, the Combat Aircraft Systems Development and Integration Centre and the Central Scientific Instruments Organisation. The order for supply of these systems will be executed by two divisions of Bharat Electronics Limited - Bengaluru and Panchkula (Haryana). All the contracted items will be delivered by BEL to HAL in a ready-to-board condition. R Madhavan, CMD of HAL, described the order as a "shot-in-the-arm" for Make-in-India activity. Deliveries under 83 Tejas Mk1A order to IAF will commence from 2023-24.

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

India, UK explore cooperation in outer space domain

India and the UK explored the possibility of cooperation in the outer space domain. The two sides exchanged views over it under the framework of India-UK Space Consultations. "The two sides exchanged information on respective national space priorities, prospects for bilateral collaboration, and deliberations in international forums in the outer space domain," the Ministry of External Affairs (MEA) said. Officials of the MEA, the Department of Space and the Indian Space Research Organisation were part of the Indian delegation. The British side comprised representatives from the UK Space Agency, the Department for Business, Energy and Industrial Strategy, and Foreign, Commonwealth and Development Office.

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

EVENT

Design and Engineering of Lighter-Than-Air Systems - 2022 (DELTAs-2022)

Wednesday 22nd June, 2022 – Sunday 26th June, 2022

Contact

General Queries: deltas2022@aero.iitb.ac.in

For more Information

DELTAs-2022 Website: www.deltas2022.in

LTA System Lab Website : ww.aero.iitb.ac.in/ltasys

List of Newly Elected Members

Sl. No.	Name	Designation	Grade	Member No.	Branch
1	Dr. S. Thanigaiarasu	Professor & Head	Fellow	F-881	Chennai
2	Dr. Rajkumar Sureshchandra Pant	Professor	--do--	F-882	Mumbai
3	Mr. C Kalaivanan	Group Director(Retd)	--do--	F-883	Bangalore
4	Ms. ArularasiJeyaraman	Scientist/Engineer E	Member	M-20715	Bangalore
5	Mr. Arvind Bobby Alphonse	Scientist	--do--	M-20716	Bangalore
6	Mr. Somesh Babu Maddula	Captain	--do--	M-20717	Hyderabad
7	Mr. Kasram Santhosh	Scientist D	--do--	M-20719	Bangalore
8	Mr. VigneshvaranSethuraman	Business Process consultant	--do--	M-20720	Chennai
9	Dr. Raja Joseph D	Associate Professor	--do--	M-20721	Chennai
10	Mr. Mohan Madhukar Savarkar	Vice President	--do--	M-20722	Pune
11	Mr. Manoj Kumar	Scientist	--do--	M-20727	Hyderabad
12	Mr. Robin V T	Scientist/Engineer SF	--do--	M-20730	Trivandrum
13	Mr. Ashish I. Kosambia	Pilot Instructor	--do--	M-20731	Mumbai
14	Dr. M Ramasubramanian	Capt. Officer-in-Charge (Head),	--do--	M-20732	Delhi
15	Dr. Ashwani Khanna	Executive Director	--do--	M-20734	Delhi
16	Dr. Ranjan Kumar Mishra	Scientist G	--do--	M-20735	Bangalore
17	Mr. Hariprasad V	Assistant Professor	Associate Member	AM-7580	Chennai
18	Dr. Ravi Ranjan Kumar	Assistant Professor	--do--	AM-7581	Chennai
19	Mr. Abburu Sai Sailesh	Nil	Graduate	G-13510	Delhi
20	Dr. K Anton Savio Lewise	Lecturer	--do--	G-13511	Trivandrum
21	Mr. LakshayVaid	Research Fellowship Intern	--do--	G-13512	Design Division
22	Mr. Shubham Upadhyay	Research Fellowship Intern	--do--	G-13513	Design Division
23	Mr. Shashankh S	Trainee CAMO	--do--	G-13514	Bangalore
24	Mr. Abhilash Dubey	AeSI Graduate	--do--	G-13515	Delhi
25	Mr. BishwaroopBishi	AeSI Graduate	--do--	G-13516	Delhi
26	Mr. Chimakurthi Sunil Kumar	AeSI Graduate	--do--	G-13517	Hyderabad
27	Mr. Shaik Ameer Shameer	AeSI Graduate	--do--	G-13518	Hyderabad
28	Mr. ShripalPrasanManilal	Managing Director	Associate	A-12647	Mumbai
29	Mr. Adhiraj Mukhopadhyay	-----	Student Member	SM-14391	Kanpur
30	Mr. MachineniJaswanth	-----	--do--	SM-14392	Chennai

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