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TECHNOLOGY



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HAL Delivers Chetak Helicopter to Indian Navy Ahead of Schedule

HAL delivered a Chetak helicopter ahead of schedule to Indian Navy. The documents were handed over by Mr S. Anbuvelan, General Manager of Helicopter Division-HAL to Commodore Vikram Menon, VSM, CSO(Air), HQNA in an event held at HAL facilities here, today. HAL entered into a contract with the Indian Navy in August 2017 for supply of eight Chetak helicopters with the delivery schedule of first two in August 2019 and balance in August 2020. These helicopters are



fitted with latest communication and navigation systems developed by HAL and the Company is committed to provide continuous support to the Chetak fleet, says Mr R Madhavan, CMD-HAL. Speaking on the occasion, Commodore Menon said, “It is an honour to accept the first production helicopter one month ahead of schedule. We are aware of the vital role played by Chetak helicopters in Indian Naval aviation for the past five decades. HAL and Indian Navy have shared a long fruitful relationship. We appreciate HAL’s commitment and look for continued support in future”. Mr GVS Bhaskar, CEO-Helicopter Complex said, “HAL has successfully restarted the Chetak helicopter production line after incorporating latest technologies. We are committed to deliver the remaining seven helicopters as per the delivery schedule”, he added. HAL is producing the Chetak Helicopters for last five decades under license from Eurocopter, France (now Airbus Helicopters) and the first Chetak helicopter to the Indian Navy was delivered way back in February 1966. These helicopters are used by Navy for communication duties (Passenger transport), Cargo/ Material transport, Casualty evacuation, Search & Rescue, Areal survey & Patrolling, Emergency medical services, electronic news gathering, Anti hijacking, Off shore operation and Under-slung operation. HAL has so far produced more than 350 Chetak helicopters and delivered around 80 to the Indian Navy. Presently, 51 helicopters are flying with Navy and the serviceability has always remained high. HAL is supporting Navy for periodical servicing of these helicopters, clearance of spares, deputation of teams for defect rectification and any other requirement for maintainability of these helicopters.

Source: <https://hal-india.co.in/>

CURRENT AFFAIRS

GSLV MkIII-M1 Successfully Launches Chandrayaan-2 spacecraft

India's Geosynchronous Satellite Launch Vehicle GSLV MkIII-M1, successfully launched the 3840 kg Chandrayaan-2 spacecraft into an earth orbit today (July 22, 2019). The spacecraft is now revolving round the earth with a perigee (nearest point to Earth) of 169.7 km and an apogee (farthest point to Earth) of 45,475 km. Today's flight marks the first operational flight of the GSLV Mk III. After a smooth countdown lasting 20 hours, GSLV MkIII-M1 vehicle majestically lifted off from the Second Launch Pad at the Satish Dhawan Space Centre SHAR (SDSC SHAR), Sriharikota at the scheduled launch time of 1443Hrs (2:43 pm) Indian Standard Time (IST) with the ignition of its two S200 solid strap-on motors. All the subsequent flight events occurred as scheduled. About 16 minutes 14 seconds after lift-off, the vehicle injected Chandrayaan-2 spacecraft into an elliptical earth orbit. Immediately after spacecraft separation from the vehicle, the solar array of the spacecraft automatically got deployed and ISRO Telemetry, Tracking and Command Network (ISTRAC), Bengaluru successfully took control of the spacecraft. ISRO Chairman Dr K Sivan congratulated the launch vehicle and satellite teams involved in this challenging mission. "Today is a historical day for Space Science and Technology in India. I am extremely happy to announce that GSLV MkIII-M1 successfully injected Chandrayaan-2 into an orbit of 6000 Km more than the intended orbit and is better." "Today is the beginning of the historical journey of India towards Moon and to land at a place near south pole to carry out scientific experiments to explore the unexplored. On July 15, 2019 ISRO intelligently observed a technical snag, Team ISRO worked out, fixed and corrected the snag within 24 hours. For the next one and a half day, the required tests were conducted to ensure that corrections made were proper and in right direction. Today ISRO bounced back with flying colours." Dr. Sivan said. In the coming days, a series of orbit manoeuvres will be carried out using Chandrayaan-2's onboard propulsion system. This will raise the spacecraft orbit in steps and then place it in the Lunar Transfer Trajectory to enable the spacecraft to travel to the vicinity of the Moon. GSLV Mk III is a three-stage launch vehicle developed by ISRO. The vehicle has two solid strap-ons, a core liquid booster and a cryogenic upper stage. The vehicle is designed to carry 4 ton class of satellites into Geosynchronous Transfer Orbit (GTO) or about 10 tons to Low Earth Orbit (LEO). Chandrayaan-2 is India's second mission to the moon. It comprises a fully indigenous Orbiter, Lander (Vikram) and Rover (Pragyan). The Rover Pragyan is housed inside Vikram lander. The mission objective of Chandrayaan-2 is to develop and demonstrate the key technologies for end-to-end lunar mission capability, including soft-landing and roving on the lunar surface. On the science front, this mission aims to further expand our knowledge about the Moon through a detailed study of its topography, mineralogy, surface chemical composition, thermo-physical characteristics and atmosphere leading to a better understanding of the origin and evolution of the Moon. After leaving earth orbit and on entering Moon's sphere of influence, the on-board propulsion system of Chandrayaan-2 will be fired to slow down the spacecraft. This will enable it to be captured into a preliminary orbit around the Moon. Later, through a set of manoeuvres, the orbit of Chandrayaan-2 around the moon will be circularised at 100 km height from the lunar surface. Subsequently, the lander will separate from the Orbiter and enters into a 100 km X 30 km orbit around the Moon. Then, it will perform a series of complex braking manoeuvres to soft land in the South Polar Region of the Moon on September 7, 2019. Following this, the Rover will roll out from the lander and carries out experiments on the lunar surface for a period of 1 lunar day, which is equal to 14 Earth days. The mission life of the lander is also 1 lunar day. The Orbiter will continue its mission for a duration of one year. The orbiter had a lift-off weight of about 2,369 kg, while the lander and rover weighed 1,477 kg and 26 kg respectively. The rover can travel up to 500 m (half a kilometre) and relies on electric power generated by its solar panel for functioning. Chandrayaan-2 has several science payloads to facilitate a more detailed understanding of the origin and evolution of the Moon. The Orbiter carries eight payloads, the lander carries three, and the rover carries two. Besides, a passive experiment is included on the lander. The Orbiter payloads will conduct remote-sensing observations from a 100 km orbit while the Lander and Rover payloads will perform in-situ measurements near the landing site. The ground facilities constitute the third vital element of Chandrayaan-2 mission. They perform the important task of receiving the health information as well as the scientific data from the spacecraft. They also transmit the radio commands to the spacecraft. The Ground Segment of Chandrayaan-2 consists of Indian Deep Space Network, Spacecraft Control Centre and Indian Space Science Data Centre. Today's successful launch of Chandrayaan-2 is a significant milestone in this challenging mission. A total number of 7500 visitors witnessed the launch live from the Viewer's Gallery at Sriharikota.

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

First Meeting of Gaganyaan National Advisory Council

Today, June 8, 2019, the first meeting of Gaganyaan National Advisory Council was held at ISRO Headquarters, Bengaluru chaired by Dr. K Sivan, Secretary, Department of Space. The meeting was attended by Dr K Kasturirangan, Honorary Distinguished Advisor, ISRO, Prof K VijayRaghavan, Principal Scientific Advisor to Government of India, Dr B N Suresh, Honorary Distinguished Professor, ISRO, Prof Ashutosh Sharma, Secretary, Department of Science and Technology, Dr G Satheesh Reddy, Secretary Defence R&D, Chairman, DRDO, Dr Shekhar C Mande, Secretary DSIR, Director General, Council of Scientific and Industrial Research (CSIR), Prof Anurag Kumar, Director, Indian Institute of Science (IISc), Shri R Madhavan, Chairman and Managing Director, Hindustan Aeronautics Ltd., Wing Cdr. (Rtd) Rakesh Sharma, Former Indian Astronaut, Air Vice Marshal R G K Kapoor, Assistant Chief of Air Staff Operations (Space), Rear Admiral D S Gujarl, Asst Chief of Naval Staff, Indian Navy, Inspector General KR Suresh TM, Deputy Director General (Operations and Coastal Security) Indian Coast Guard. During the meeting, Dr Unnikrishnan Nair, Director, Human Space Flight Centre (HSFC), ISRO, made a presentation on the overall project status of Gaganyaan, covering technical details as well as collaboration with various national stake holders. The council deliberated in detail on various aspects of Gaganyaan and appreciated the efforts made in this regard in the fast track mode and Institutional mechanisms put in place by ISRO. It stressed the need for setting priorities at various National Institutions including Industries to accomplish Gaganyaan. Many essential aspects of Gaganyaan, especially the life support systems and crew selection and training, were discussed in detail. In the end, the council emphasised the urgent need for further accelerating the efforts to realise Gaganyaan in a very demanding time frame of December 2021 amidst formidable challenges.

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

HAL Spearheads Efforts to Boost Private Participation in ALH Civil Manufacturing

HAL organized a workshop of Indian private players to boost manufacturing of upgraded ALH Dhruv (Civil version) under ToT. The workshop was chaired by Dr Ajay Kumar, Secretary, Defence Production in the presence of Mr. R. Madhavan, CMD, HAL here today. HAL is the Design Authority and Original Equipment Manufacturer (OEM) of ALH-Dhruv. The upgraded Dhruv (ALH) Civil helicopter, which is equipped with the latest avionics and glass cockpit, is under production and certification from DGCA. Speaking on the occasion, Dr. Ajay Kumar allayed the concerns over the marketing of ALH Civil Helicopter. He said India offers a huge opportunity and private sector should grab this by collaborating and improvising with positive spirit keeping mind interests of all stake holders. He also urged HAL to consider some of the suggestions proposed by the industry partners. "In fact, I complement HAL for taking this historic step", he added. "Dhruv has a huge potential in domestic and global civil market and with HAL as the OEM and Licensor, the deal will benefit the Indian partners immensely and help develop the aerospace eco-system in India. As of now, India needs at least 600 helicopters in civil sector," said Mr. Madhavan. Earlier in the day, participants gave their feedback and suggestions on HAL's initiative. A Request for Quotation (RFQ) was issued in April 2019. Under this deal, the selected Indian Partner would also be required to provide support to the customers throughout the life of the product (20 years) thereby ensuring long term business relationship. Prospective bidders, various supply chain partners, industry chambers of commerce like ASSOCHAM, FICCI, CII, Society of Indian Defence Manufacturers (SIDM), Karnataka State Development Council and Karnataka UdyogMitra were invited to the workshop.

About ALH Dhruv -The Dhruv, Advanced Light Helicopter (ALH), indigenously designed & developed by HAL, is a multi-role, multi-mission, new generation helicopter in the 5.5 ton weight class. It is being operated by defence and civil customers and has already completed more than 2.4 lakhs flying hours. ALH Mk I version is being operated for civil use for law enforcement, anti-naxalite, VIP movement and ground survey operations by BSF, Govt. of Jharkhand, Pawan Hans Helicopter Ltd, GSI, etc.

Source: <https://hal-india.co.in/>

IndSpaceEx: Tri-Services To Hold First Of Its Kind Two-Day Simulated Space Warfare Exercise From Tomorrow

After the Anti-Satellite (A-SAT) test in March 2019, India will now hold a first-of-its-kind two-day space warfare exercise beginning tomorrow, The New Indian Express has reported. The simulated exercise, named 'IndSpaceEx' will be conducted at the Integrated Defence Headquarters (IDH) in New Delhi with experts from the three services - Army, Air Force and Navy along with DRDO and academia among others coming together for it. The exercise has been planned with an eye on China, which as per experts in the field, is developing an entire array of anti-satellite weapons including

non-kinetic ones like lasers and electro-magnetic pulse weapons. “There is the need to explore effective tactical, operational and strategic exploitation of the final frontier of warfare. We cannot keep twiddling our thumbs while China zooms ahead. We cannot match China but must have capabilities to protect our space assets,” an official said. With the defence arena slowly widening to include cyber and space areas, the significance of military assets in space has increased over the last decades. Recognising this, the Cabinet Committee for Security, had earlier cleared the formation of Defence Space Research to aid the Defence Space Agency under the tri-services. The Defence Space Agency, which will command the A-SAT capabilities among others, has been formed to ensure defence of Indian assets in space along with offensive capabilities. The agency is to be setup in Bengaluru under the tri-services command.

Source: Times of India

ISRO ties up with Russian agency to select, train Indian astronauts

Almost two months after Indian Space Research Organisation (ISRO) and the Indian Air Force (IAF) signed an agreement to select and train the crew of India’s maiden manned space mission, Gaganyaan-1, the country’s premier space agency has signed a contract with Russia’s Glavkosmos for selection support, medical examination and space training of Indian astronauts. The contract was signed on June 27 2019 by Director of Human Space Flight Centre (HSFC) of ISRO, Dr S Unnikrishnan Nair and First Deputy Director General of Glavkosmos (part of Roscosmos State Corporation of Russia) Natalia Lokteva. As per the contract, Glavkosmos will render services to HSFC in Bengaluru, on consulting support of selection of candidates for Indian astronauts, providing medical examination of the candidates for access to space flight related training programme, and providing space flight related training for Indian astronauts selected on the basis of medical examinations. “Work will be provided with support of the Federal State Budget Organization U A Gagarin Research & Test Cosmonaut Training Center and Institute of Biomedical Problems of the Russian Academy of Sciences,” said a statement posted on Glavkosmos’ website. It is not yet known what role the IAF would play in the selection and training of Indian astronauts, termed ‘vyomanauts’, although it signed an agreement with ISRO on May 28, 2019. The agreement with IAF was signed by Assistant Chief of Air Staff (Space Operations) Air Vice Marshal RGK Kapoor and Gaganyaan project director R Hutton, with ISRO chairman Dr K Sivan being witness to it. As per ISRO’s agreement with IAF, the crew selection and training was to be conducted at ISRO’s Human Space Flight Centre, which was opened on January 31 2019 next to the ISRO headquarters in Bengaluru, to develop life support systems, crew training and planning for future manned space missions under the Gaganyaan project. PM Narendra Modi had announced on August 15, 2018, that ISRO would send three astronauts, including a woman, by December 2022. The Rs 9,023-crore Gaganyaan mission entails a three-member crew being sent in a space capsule on board a heavy-lift rocket to be released in orbit around the Earth at an altitude of 350-400km for about a week. ISRO has planned to send two unmanned missions before the main mission is undertaken sometime in 2021-2022, a senior ISRO scientist said.

Source: <http://www.newindianexpress.com/>

ISRO looks for a name to stamp on lunar surface after Chandrayaan-2 mission lands on Moon

India’s Moon mission Chandrayaan-2 was quite a feat. However, it was a disappointment when India’s Moon mission to the unexplored south polar region of Earth’s natural satellite was called off due to a technical snag. Chandrayaan-2 was supposed to launch early morning on July 15 2019, but a technical glitch forced the Indian Space Research Organisation (ISRO) to call off the launch. Later, it was launched on July 22 2019. Now that the six-wheeled Pragyaan rover and Vikram lander are finally on their way to the Moon, Indian Space Research Organisation is looking for a name to stamp on the Moon after India’s lunar mission lands on the Moon successfully in September, 2019. “We are looking to name the location Vikram lands at. We are selecting a name, we still have time for that,” ISRO chairman Dr K Sivan told. “There is shortlist of names. We are in the process, we will pick a name,” The TOI report also mentioned that Prime Minister Narendra Modi is likely to give the name that will be etched on the landing site. The Chandrayaan-2 mission will help India and world broaden the horizon of human knowledge. Chandrayaan-2 mission will explore the dark side of the Moon after it lands on the cosmic body’s south polar region. Chandrayaan-2 will help expand India’s footprint in space, inspire a future generation of scientists, engineers, and explorers and surpass international aspirations. Chandrayaan-2 is an advanced version of the previous Chandrayaan-1 mission, which was launched about 10 years ago.

Source: <https://www.indiatoday.in/>

Chandrayaan-2 to enter moon's orbit by Aug 20, a week earlier than planned

Indian Space Research Organisation (ISRO) has said that the Chandrayaan-2 spacecraft is scheduled to reach the moon's orbit by August 20, 2019. The GSLV MkIII M1 rocket successfully placed the Chandrayaan-2 spacecraft into a highly elliptical orbit of 170 x 45475 km on July 22, 2019. The first earth-bound orbit raising manoeuvre for the Chandrayaan-2 spacecraft was performed successfully today (July 24, 2019) at 1452 hr as planned, using the on-board propulsion system for a firing duration of 57 seconds. The new orbit will be 230 X 45163 km. The second orbit raising manoeuvre is scheduled on July 26, 2019, at 0109 hr, ISRO said in an update on the Chandrayaan-2 mission. Major activities that lie ahead include Earth-bound manoeuvres, Trans-Lunar Insertion, lunar-bound manoeuvres, Vikram separation and Vikram Touch Down. Earth-bound manoeuvres are planned to be executed from today culminating into Trans-Lunar Insertion scheduled on August 14, 2019, which will send the Chandrayaan-2 spacecraft to moon, said ISRO. The lander Vikram will land on the moon on September 7. Revised schedule As per the original schedule, GSLV-Mk III rocket carrying Chandrayaan-2 spacecraft was supposed to lift-off on July 15 2019 . However, due to a serious technical glitch, the flight was postponed to July 22 2019 . This resulted changes in the mission schedule. As per the original flight schedule, the Chandrayaan-2's earth-bound phase was 17 days, but is now 23 days as per the revised schedule. However, the lunar bound phase, which was for 28 days originally, has been reduced to 13 days. According to the July 15 2019 schedule, Vikram was planned to land on the moon 54 days after the rocket's lift-off, but will now it will take place in 48 days.

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

And the CSIR award goes to... its chief

The Council of Scientific and Industrial Research (CSIR) has given away one of its prestigious awards to its former director general a month after his retirement, triggering murmurs of protests within the CSIR family. Scientists described it as a probable case of 'conflict of interest' that needs to be probed. In 2018, the council presented its 'CSIR Technology Award' in the category of life sciences to the Institute of Microbial Technology (IMTECH), Chandigarh, for developing a state-of-the-art clot-buster drug known as clot specific streptokinase. Mr Girish Sahni, a scientist who developed the indigenous clot-buster during his long research career at IMTECH, was the director general of CSIR when his pet project was selected for the award. "The streptokinase technology was developed years ago. The CSIR had even signed a commercial agreement with a pharmaceutical company in 2011. Then why was it awarded at a time when Mr Sahni was at the helm of affairs to throw around his influence? The issue of conflict of interest can't be ruled out and the CSIR headquarters must come out clean," a senior CSIR scientist, who didn't wish to be identified, told DH. Mr Sahni retired as a CSIR director general on August 23, 2018. The CSIR awards are presented every year on its foundation day on September 26. But the process of selecting the award by a 14-member jury was carried out when Sahni was in charge of India's oldest research council. A CSIR spokesperson said, "In 2018, the (selection) committee, after deliberations, recommended the nomination 'Clot Busters for Thrombolytic Therapy' submitted by a group of scientists of IMTECH for award. By a coincidence, Sahni was one of the contributing scientists of IMTECH for the nomination." "The nominations for CSIR technology awards are scrutinised in detail, deliberated and selected by respective award selection committee comprising high level external members drawn from various institutions in India. This committee is an independent one; non-members (including director general, CSIR) don't participate in the meeting," the spokesperson said. Mr Sahni responded to DH, countering the charges. "I'm not aware of any personal knowledge or intervention in this matter. To the best of my knowledge, no influence was exercised. For me, it's very difficult to comment more than this. I can say with utmost honesty that I have a clear conscience in this matter. A large group of scientists and students worked on this project for several years and created a strong societal impact," he said. Incidentally, the charges against the former CSIR chief come at a time when India's principal scientific advisor has come out with a draft national policy on academic ethics. In one of the chapters dealing with science administration, it says, "Conflicts of interest have to be avoided. When potential conflicts are liable to occur, the official must make this known to the concerned colleagues."

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

PMKVY to launch skills programmes on aerospace, agriculture

The Skill Development Ministry will launch training programmes on two new sectors – aerospace engineering and smart agriculture – on July 15, to coincide with the World Youth Skills Day. With the modernisation of the air force and the growth in the aviation sector, there is an increased need for trained workers in the sector. A Government owned ITI

in Nagpur will look at this programme that will also be implemented by institutes in Chennai and Coimbatore, which are two major manufacturing centres. Likewise, there is a growing demand for trained workers in smart agriculture, where the emphasis will be on using data on soil testing, controlled irrigation, controlled delivery of inputs and agriculture services that use information technology. Mahendra Nath Pandey, Union Minister for Skill Development and Entrepreneurship, told journalists here that the Ministry will launch a programme under the Pradhan Mantri Kaushal Vikas Yojana (PMKVY) for dak sevaks in the India Post Payments Bank to help them carry out various functions, such as a banking business correspondent. Two other programmes that launched on July 15 2019 are a BCom and a BBA on applied logistics, where one half of the three-year courses will be classroom based and the other half, hands-on curriculum-based training in logistics companies. The fastest growing demand for training under the PMKVY is from the beauty and wellness sector and for yoga therapists, where yoga is taught not only for fitness but also for curative purposes. Launched in July 2015, the PMKVY was revamped and a Version 2.0 introduced in July 2016 with an outlay of about Rs 12,000 crore. The PMKVY 2.0 ends in 2020 and the Ministry is now appraising the progress. The flagship skill development programme will be restructured based on the progress made in the last four years. One proposal is to give a greater role for the States in the skills training programme. Nearly 90 per cent of the need for skills upgradation is in the unorganised sector and the Skills Development Ministry feels that the States may be better placed to implement and monitor the programme than the Centre. For instance, the State governments could work with, say, an association of local automobile workshop owners and train their workers in various skills relating to handling automobile repairs.

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

TECHNOLOGY

First prototype of Brahmos-NG to be ready by 2024

The first prototype of the Brahmos-NG, a lighter sleeker variant of the Indo-Russian cruise missile, will be fielded in 2024. A top official of the Brahmos Aerospace, the Indo-Russian joint venture company which manufactures the missile, told India Today TV that the missile was currently under development between NPO Mashinostroyeniya and Defence Research and Development Organisation (DRDO). The NG or next generation will mark a quantum jump in the offensive abilities of the Indian armed forces. The five-metre-long, 50-centimetre-thick, and 1.5 ton Brahmos-NG is half the dimensions of the Brahmos missiles currently in service today with the Indian Air Force (IAF), Army, and the Navy. The Brahmos-NG's significant weight and size reductions mean that it can be carried by many more platforms including the conventional submarines and the fighter aircraft. It will, however, have the same speed, range and lethality of the first generation Brahmos which flies at three times the speed of sound. The Su-30MKI which carries one Brahmos presently, carries one Brahmos-NG, will be able to carry five Brahmos-NGs. We can put it on the MiG-29 and on the indigenous LCA Tejas, Praveen Pathak, Chief General Manager (Marketing Promotions and Export) Brahmos Aerospace International Maritime at the Defence Show (IMDS), said. The Indo-Russian Brahmos joint venture was formed in 1998 and is the oldest military joint venture between India and Russia.

Source: <https://www.indiatoday.in>

India's First Indigenous Aircraft Carrier to Conduct Basin Trials in 2020

India's first domestically built aircraft carrier, the future INS Vikrant, designated IAC-1, is slated to commence basin trials sometime in February or March next year, according to a senior Indian naval official. "IAC-1 is presently moving at a very, very brisk pace and the plans are to go in for basin trials sometime in February-March next year," Indian Navy Vice Admiral A. K. Saxena, the controller of Warship Production and Acquisition, was quoted as saying on July 9. Basin trials precede sea trials and test a ship in floating condition in calm waters. "That will be followed with a series of Contract of Sea trials and ultimately culminate in to delivery of the ship sometime in early 2021. Towards this, a hectic activity is going on board the ship," the vice admiral added. The carrier is lead ship of the Indian Navy's Vikrant-class, the first carrier class to be designed and built in India under Indigenous Aircraft Carrier (IAC) program, which in turn is part of the Indian Ministry of Defense's (MoD) Maritime Capability Perspective Plan. Construction of the carrier began in 2009. The new flattop was officially launched in August 2013 and relaunched in June 2015. The head of the Indian Navy, Admiral Sunil Lanba, announced in December 2018 that sea trials of the new carrier were slated to commence in 2020. Originally, the carrier was scheduled to be delivery to the Navy in 2014 and commissioned in 2016. The commissioning was then pushed back to 2018 with sea trials to take place in 2017. There are multiple reasons for the delay, as I explained previously: Construction of the carrier was delayed multiple times over the last few years

primarily due to hold-ups in procurement including contractual disputes with Russia's Rosoboronexport over the construction of the carrier's aviation complex. The program has also been plagued by cost overruns with the carrier, as of now, costing as much as \$4 billion more than originally budgeted. Indian Prime Minister Narendra Modi allocated an extra \$3 billion to the IAC program in 2014 to speed up construction of the Vikrant. The 40,000-ton Vikrant operates a ski-jump assisted Short Take-Off But Arrested Recovery (STOBAR) launch systems for launching aircraft. Asked about the start of flight trials aboard the carrier, Saxena said: "Flight trials are to start after the delivery. There will be some activity prior to the delivery, which is aviation facility complex and making the ships ready for flight trials thereafter." The new carrier will be able to accommodate up to 40 aircraft

Source: <https://icast.org.in/news/2019/jul19/11julTD.pdf>

BUSINESS

Space cooperation MoU Signed between India and Tunisia

Memorandum of Understanding between the Government of the Republic of India and the Government of the Republic of Tunisia on cooperation in the exploration and use of outer space for peaceful purposes" was signed today (June 11, 2019) at ISRO Headquarters. Mr. Nejmeddine Lakhal, Ambassador of Tunisia to India and Dr. B. Bala Bhaskar, Joint Secretary, West Asia & North Africa (WANA) Division of MEA were present during this occasion.

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

Delhi plans to purchase rocket engines from Moscow: DPM Yury Borisov

Delhi has plans to purchase rocket engines from Moscow for its growing national space program, Russia's deputy prime minister has said coinciding with Chandrayaan-2 launch. Deputy Prime Minister Mr Yury Borisov told reporters here about the planned rocket sales, and recognized India's achievement in its latest mission to explore the Moon, according to the RIA news agency. "Today we congratulated our Indian colleagues on the successful launch of the lunar program," Mr Borisov said, adding that the two countries would work together on manned space flights in the future. He did not provide further details about the rocket engine sales. Earlier this month when NSA Mr A K Doval met DG Roscosmos (Russian Space Agency) and former Deputy PM Dmitry Rogozin here, it was decided that Russia will transfer critical technology for Gaganyaan project besides other futuristic space programmes and partner Delhi for joint collaborations including presence at the prestigious International Space Station (ISS). This including cooperation in futuristic technologies including new space systems, rocket engines, propellants and propulsion systems, spacecrafts and launch vehicle technology were discussed at Doval-Rogozin meet. There have been frequent contacts between the two space agencies to finalise the details of the Gaganyaan Mission, which will carry Indian astronaut to space in 2022, to coincide with India's 75th anniversary of Independence. Russia has promised all assistance for India's Human Space Flight Mission Gaganyaan. Details regarding cooperation for the Gaganyaan Mission were discussed at the Doval-Rogozin meet. Russia had earlier decided to train Indian astronauts for the prestigious Gaganyaan project. "Russia is today a world leader in space program and technology. Russian firm Energia has even supplied engines to USA. America is also a partner with Russia in the International Space Station. And during NSA-Rogozin meet the Russian side stated that they would like to see India participate in the International Space Station," a source informed. The ISS is a space station, or a habitable artificial satellite, in low Earth orbit. The ISS programme is a joint project between five participating space agencies: NASA, Roscosmos, JAXA (Japan), ESA (Europe), and CSA (Canada). The ownership and use of the space station is established by intergovernmental treaties and agreements. The station is divided into two sections, the Russian Orbital Segment (ROS) and the United States Orbital Segment (USOS). Cooperation in space has emerged as a key area of cooperation in the high technology sector between India and Russia. India's rapidly growing capabilities in outer space is being acknowledged and Russia sees India as a key partner for promoting peaceful uses of outer space, one of the persons familiar with the issue informed. Delhi share an old association with Moscow in space sector that includes Rakesh Sharma's space flight and supply of cryogenic engines to India. Both sides have agreed to take a strategic approach to elevate bilateral cooperation to the next level keeping in mind the special and privileged partnership and India's priorities such as Make in India programme.

Source : [Economic Times](#)

IIT Delhi signs MoU with five CSIR laboratories to promote cooperative research

Indian Institute of Technology Delhi, recognised by the Govt of India as an Institution of Eminence, has entered into an agreement with five of the renowned National Laboratories of CSIR Viz CSIR-Advanced Materials and Processes Research Institute, CSIR-Central Scientific Instruments Organisation, CSIR-Central Electronics Engineering Research Institute, CSIR-Institute of Minerals & Materials Technology, CSIR-National Physical Laboratory of India by signing an MoU. The MoU was signed by the Directors of above five laboratories and Prof V. Ramgopal Rao, Director, IIT Delhi on 16th July 2019 in the presence of Dr Shekhar C. Mande, DG, CSIR. Prof. V. Ramgopal Rao, Director, IIT Delhi in his opening remarks said that IIT Delhi has been pioneering in providing its students and faculty with world class infrastructure and conducive environment for research. He specially spoke about the collaborations of IIT Delhi with scientists of other institutes. It is planned to initiate about 60 Interdisciplinary Research projects with the five CSIR laboratories this year. Welcoming the partnership, Dr. Shekhar C. Mande, Director General, CSIR said that the CSIR laboratories can benefit immensely with such collaborations that are in the mutual interest areas of research and together it can participate more proactively in solving nation's persisting problem in the areas of science and technology, healthcare. Such collaboration will have profound impact on nation's growth in totality. Prof B.R. Mehta, Dean R&D, IIT Delhi mentioned that there is a large scope for interaction and collaboration with CSIR Laboratories in the areas of devices, materials and industry scale and reference materials processes. As a part of MoU, IIT Delhi plans to promote collaborative research, exchange of ideas, development of knowledge, enhancing high quality research throughput. IIT Delhi also aspires to leverage the expertise of the CSIR laboratories not only to contribute to the socio economic needs of the country but also to serve the greater vision of serving the nation. The MoU would also serve as a platform to students, faculty and other research scholars equally to contribute towards research and development growth of nation and fuelling its growth. The research activities undertaken through this MoU will make best utilisation of already existing Infrastructure, expertise and vast experience of IIT Delhi and the participating CSIR laboratories.

Source: <http://www.iitd.ac.in/>

Expanding India's share in global space economy.

What is the issue?

The Indian space industry is in need of some serious revolutions as it is lagging behind in the global space industry with its share in it being very minimal.

What is India's share in the global space economy?

- Today, the value of the global space industry is estimated to be \$350 billion and is likely to exceed \$550 billion by 2025.
- **India's share** is estimated as just **2%** of the global market.
- Globally, 17,000 small satellites are expected to be launched between now and 2030.

What is the current stance?

- Today, Indian Space Research Organisation's (ISRO) annual budget has crossed ¹ 10,000 crore, growing steadily from ¹ 6,000 crore five years ago.
- However, **demand** for space-based services in India **is far greater** than what ISRO can supply.
- So, **private sector investment** is critical.
- There is a **need for national legislation** to ensure overall growth of the space sector.

What are ISRO's thrust areas?

- **Satellite communication** – With INSAT and GSAT as backbone, it addresses the national needs for telecommunication, broadcasting and broadband infrastructure, disaster management services, etc.,
- **Earth observation** – By the usage of space-based imagery for a slew of national demands, like weather forecasting, disaster management and national resource mapping and planning. It is done using,
 1. Geographical Information Systems' (GIS) applications
 2. Indian Remote Sensing (IRS), RISAT, Cartosat and Resourcesat series.
- **Satellite-aided navigation** – The GPS-aided GEO augmented navigation (GAGAN) has civil aviation applications and is used for air traffic management over Indian airspace.
- Indian Regional Navigation Satellite System (IRNSS) or Navigation with Indian Constellation (NavIC) provides accurate positioning service for civilian and military use.

What are some missions of ISRO?

- The **Chandrayaan** and the **Mangalyaan** missions, with a manned space mission, **Gaganyaan** planned for its first test flight in 2021.

- None of this would have been possible without **mastering the launch-vehicle technologies** which includes,
 1. Satellite Launch Vehicle (SLV) and
 2. Augmented Satellite Launch Vehicle (ASLV),
 3. Polar Satellite Launch Vehicle (PSLV) which has an enviable record.
 4. Geosynchronous Satellite Launch Vehicle (GSLV) which is still developing.
- Over the years, ISRO built a strong association with the industry, particularly with Public Sector Undertakings (PSUs) but most of the private sector players are Tier-2/Tier-3 vendors.

What 'New Space' start-ups are up to?

- **New Space entrepreneurship has emerged in India** who are not enamoured of the traditional vendor/supplier model.
- They see value in exploring **end-to-end services** in the Business-to-Business and Business-to-Consumer segments.
- Developments in Artificial Intelligence (AI) and big data analytics has led to their emergence.
- They see a role as a **data-app builder between the data seller (ISRO/Antrix) and the end user** by taking advantage of the talent pool, innovation competence and technology know-how.
- They are yet to take off in the **absence of regulatory clarity**.

What changes should be made in the Indian space industry?

- Clear **rules and regulations** are essential.
- As said above, **Private sector investment is critical**, for which a suitable policy environment needs to be created.
- **A new Space law for India** – With the aim of facilitating growing India's share of global space economy which requires a new kind of partnership between ISRO, the established private sector and the New Space entrepreneurs.
- **ISRO should actively embrace an exclusively civilian identity**, as the Ministry of Defence now setting up a Defence Space Agency and a Defence Space Research Organisation.
- **Small satellite revolution** – ISRO is developing a small satellite launch vehicle (SSLV) expected to be ready in 2019.
- Along with PSLV, it is a prime candidate to be farmed out to the private sector.
- This requires giving it responsibility for Assembly, Integration and Testing (AIT) activities, which is now restricted to ISRO.
- **Village Resource Centres** – Years ago, ISRO launched this to work in collaboration with local panchayats and NGOs.
- Expanding this for rural areas has the potential to transform rural India.

Source: The Hindu

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