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Successful test of air-to-surface cruise missile Brahmos gives IAF stand-off capability

The Brahmos air-to-surface cruise missile tested by the defence establishment afternoon is designed to arm India's military with the capability to fire stand-off weapons, rockets that can target the positions of an adversary from outside it's defensive shield.



India's defence establishment has claimed a technological feat after a Sukhoi 30 Mki fighter aircraft of the Indian Air Force "gravity-dropped" a Brahmos from its fuselage. Footage released by the IAF, and shot from an escort plane, showed the missile in free fall before its engine firing and propelling it towards a target. The objective was a Battle Practice Target (BPT) set up by the Indian Navy in the Bay of Bengal. A BPT for such tests is usually a screen attached to a floating pontoon. The screen is made up of wire-mesh with diamond-shaped metal plates to reflect radar signatures. IAF sources claimed the missile hit bull's-eye. But the range from which it was fired was not spelt out. The Sukhoi had taken-off from Kalaikunda air-force station in West Bengal. The air-launched Brahmos is capable of a range of more than 400 kms, said a source in the Defence Research and Development Organisation (DRDO). The Brahmos, originally developed as a surface-launched anti-ship missile was first tested by the navy in 2003. It has now evolved into an air-launched variant. In its surface-launched version the missile was first developed for a range of 290-kilometres. Defence Minister Mrs Nirmala Sitharaman congratulated DRDO and BrahMos.

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

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CURRENT AFFAIRS

Drones may be allowed to make home deliveries

Drones may soon be doing doorstep delivery of packages you ordered on e-commerce sites. The government on Wednesday proposed to allow commercial use of drones, said aviation secretary Mr R N Choubey. The ministry released draft rules for drone use which, on the one hand allow children to fly small drones (weighing less than 250 grams) without registering them or requiring a license for them. And on the other, says aviation minister Mr Jayant Sinha, permit “air rickshaws” when that technology is available. However, the draft rules list out some areas where drone flying by private individuals is prohibited due to aviation safety and security reasons. These are: within 5-km radius of an airport; within 50 km from international border and beyond 500 metres into sea along coastline; within 5-km radius of Vijay Chowk in Delhi; from a moving vehicle, ship or aircraft; over densely populated areas and places where emergency operations are underway. The draft rules divide drones into five categories, based on weight. The lightest are below 250 grams and called Nano drones. And there are four categories above this: 250 gram to 2 kg; 2-25 kg; 25-150 kg and above 150 kg. Except Nano and those operated by government security agencies, all other categories of drones will need to be registered with the DGCA which will give each of them a unique identification number. And except for the lightest two categories, people operating heavier drones will need an “unmanned aircraft operator permit.” All drones will need to be flown below 200 feet.

Source: <https://timesofindia.indiatimes.com/>

ISRO detects high energy X-ray black hole emissions

Astrosat – India’s first astronomy satellite – has, for the very first time, observed rapid oscillations of high energy X-ray emission coming from a black hole. A black hole is an area in space with such high gravity pulls that even light cannot escape, and therefore it is invisible. Earlier, NASA’s Rossi X-ray Timing Experiment (RXTE) had detected similar oscillations in low energy X-rays. However, there was no data on high energy X-rays to be able to understand the physics of emissions of both low and high X-ray energies from a black hole system. Now, the indigenously built Large Area X-ray Proportional Counter (LAXPC) — the most sensitive detector on Astrosat - by the Tata Institute of Fundamental Research (TIFR) recorded the X-rays oscillations on a time-scale of a few hundred milliseconds from a black hole system GRS 1915+105. “For astronomy, this finding is very important. There are massive black holes in the centre of each galaxy, and these control the dynamics of the whole galaxy. So understanding black holes is very important to understand the galaxy,” said professor JS Yadav, who was responsible in the building of LAXPC. With an effective area four to five times more than that used by the RXTE mission between 1996 and 2012, scientists said LAXPC measured the arrival time difference between the high and low energy X-rays (which is of the order of tens of milli-seconds) providing direct clues to the geometry and dynamic behaviour of the gas swirling round a spinning black hole. Scientists said Astrosat made this observation of GRS 1915+105 in just nine orbits – or a few hours. “Observing the phenomenon in high energy X-rays is critical since higher energy photons (fundamental particle of visible light) are expected to be emitted closer to the black hole than low energy photons,” said Mr Yadav. “No other observatory at present (or earlier) is capable of achieving these results.” In black hole systems, said scientists, the mass from a regular star gets stripped off and falls towards the black hole forming a disk around the black hole. The temperature of the disk is more than ten million degrees and hence the black hole system emits X-rays. The total power from these systems is often more than 10,000 times that of the sun. The findings, by TIFR scientists, and astronomers from the Pune-based Inter-University Centre for Astronomy and Astrophysics, University of Mumbai and the Raman Research Institute (RRI), will be published in the Astrophysical Journal.

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

Long-range cruise missile ‘Nirbhay’ test-fired

India today conducted a flight test of its indigenously designed and developed long-range sub-sonic cruise missile ‘Nirbhay’, which can carry warheads of up to 300 kg from a test range at Chandipur along the Odisha coast. This was the fifth experimental test of the home grown missile system. Defence scientists are hopeful of a flawless trial this time. Out of four earlier trials since its maiden launch in 2013, only one was successful. The state-of-the-art sleek cruise missile took off from a specially designed launcher from launch complex-3 of the Integrated Test Range (ITR) at Chandipur, near here, at about 11.20 am, Defence Research and Development Organisation (DRDO) sources said. All initial critical operations of the trial such as blast of the sophisticated missile were successful as it moved up in its trajectory, a DRDO scientist said soon after the launch of the missile. The data is being retrieved from tracking

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systems for a detailed assessment, he said. Powered by a solid rocket motor booster developed by the Advanced Systems Laboratory (ASL), the missile has an operational range of 1,000 km. The 'Nirbhay' missile can travel with a turbofan or turbojet engine and is guided by a highly advanced inertial navigation system indigenously developed by the Research Centre Imarat (RCI), the DRDO sources said. After the missile achieves its designated altitude and velocity, the booster motor is separated and the engine automatically switches on taking further propulsion, said a DRDO scientist associated with the project. He said "mid-way in its flight, the missile's wing opens up by the commands generated by the sophisticated on-board computer for stabilising the flight path." All along its trajectories from lift-off to splash down, the missile is to be tracked with the help of ground-based radars and IAF aircraft. The health parameters of the vehicle are being monitored by indigenous telemetry stations by a team of professionals from DRDO's ITR and LRDE (Electronics and Radar Development Establishment). The two-stage missile is 6 metre long, 0.52 metre wide with a wing span of 2.7 metre. It can carry a warhead of 200 kg to 300 kg at a speed of 0.6 to 0.7 Mach. Its launch weight is about 1,500 kg, the sources said. A senior scientist hoped the missile would deliver the desired result this time. "After a thorough review some changes have been incorporated in the missile system and we hope it will deliver the desired result," said the senior scientist. The maiden test flight of 'Nirbhay' held on March 12, 2013 had to be terminated midway for safety reasons due to malfunction of a component. However, the second launch on October 17, 2014 was successful, he said. In the next trial conducted on October 16, 2015, the missile deviated from its path after covering 128 km. The last test flight held on December 21, 2016 had to be aborted after 700 seconds of its test flight as it deviated from its designated path. All these trials were conducted from the same base at Chandipur ITR.

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

ISRO launches rocket from Bengaluru

The Indian Space Research Organization (ISRO) launched a rocket with a difference. While the premier space agency is used to putting satellites in space, they launched a water rocket in the middle of a school field to mark the launch of a competition which saw participation from several countries. As a part of an outreach event organized by ISRO, the Japanese Aerospace Exploration Agency (JAXA) and the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT), the rocket launch event saw participation by 11 teams from countries like Cambodia, Thailand, Japan, Colombia and other south-east Asian and Pacific region countries. Water rockets are built using two large plastic bottles, the kind used by soft drink companies and other materials like PVC sheets, insulation tapes and model clay. The rockets are filled with a little water and pressurized before being launched. With the right elevation and angle, these can easily travel over 100 metres and clear the height of a five-storeyed building. Residents around the K V School in Indiranagar saw the mechanics of science first hand as these rockets soared into the sky and tried to land within the target zone marked. A lot of them even managed to clear the school field and fell into the trees as the students adjusted the angles during a trial run. Organized under the umbrella of Asia Pacific Regional Space Agency Forum (APRSAF), the competition is aimed at teaching rocket science to students. "ISRO has made water rocket launchers an integral part of its student outreach programme," a statement from ISRO said.

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

PSUs, CSIR labs now actively backing start-ups, says IIT-Madras report

A number of PSUs and CSIR (Council of Scientific and Industrial Research) labs are now actively supporting start-ups, according to 'Indian Venture Capital and Private Equity Report 2017', prepared by IIT-Madras. Released at TIECON Chennai 2017, the report, 9th in its series, analysed the policy framework and support provided to start-ups by the Central and State governments and various governmental agencies. Since 2016, at least 10 PSUs have launched start-up support programmes with a total initial outlay in the region of ₹ 1 400 crore. CSIR expects to incubate 100 ventures in five labs, by this year-end. "Five years ago, it was unthinkable that a PSU would create infrastructure or allocate funds for start-up ventures. But today, several PSUs and CSIR labs are aligning themselves with government's policies on start-ups," Mr Thillai Rajan, Professor, Department of Management Studies, IIT-M, and Associate Professor at Harvard Kennedy School, Harvard University, told a select group of reporters after the release of the report. At least 30 PSFIs (public sector financial institutions) have contributed in excess of ₹ 7,000 crore to the corpus of VC (venture capital) funds. The average round size of venture funds in which PSFIs have invested was \$12 million and the average stake acquired was 22 per cent, implying a post-money valuation of about \$50 million. Mr Rajan, who has edited and co-authored the report since its inception, explained that cash-rich PSUs such as ONGC, GAIL and BPCL are partnering with incubators such as IIT-M and other top institutions. The 2017 report analysed policy robustness for start-ups

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among States. Seven States — Kerala, Karnataka, Telangana, Andhra Pradesh, Maharashtra, Punjab and Haryana — were found to have comprehensive policy frameworks for start-ups. Out of the 29 States, 22 have come out with start-up policies in the last three years. Cumulatively, State governments envisage the creation of incubation space of 5.1 million square feet, 48,000 start-ups and 1 34,000 crore of venture funding by 2022, the report said.

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

FIGHT OF THE PHOENIX

Amidst reports that the Indian Air Force (IAF) is looking to dump Light Combat Aircraft (LCA) Tejas and instead opt for single engine fighter jets, the Hindustan Aeronautics Limited (HAL) has scaled up production to manufacture more aircraft at its Bangalore Complex. The defence PSU which has an order to manufacture 83 Tejas MK -1A aircraft has scaled up the production to manufacture 15 aircrafts annually from the earlier eight aircrafts at the Bangalore Complex. It has also set up a second assembly line to meet the target. "We are on schedule to meet the order to manufacture 83 Tejas MK -1A aircraft and have already started to speed up the production of the aircrafts from 8 to 15 per year. A second assembly line has already been set up for this where the existing Hawk trainer aircraft hangars would be used for the Tejas' production," an HAL official told Bangalore Mirror. The official added that HAL has already manufactured and delivered the Hawk aircraft to the IAF and the Indian Navy. The PSU had a total order of 123 Hawks from the IAF and Indian Navy in addition to 22 aircraft for the Surya Kiran aerobatic team. The LCA project is one of the most delayed indigenous defence projects with the Ministry of Defence initiating the project way back 1980s to replace the ageing MiG-21s. However, Tejas has been delayed for several years and, only in July 2016, was it inducted in the IAF. Only five aircrafts have been inducted into the IAF's No 45 Squadron so far and the LCA has only attained the Initial Operational Clearance (IOC). The IOC aircraft are armed with Close Combat Air-to-Air Missiles, Helmet Mounted Displays and Precision Guided Weapons like Laser Guided Bombs. These aircraft are also capable of dropping unguided bombs with much higher accuracy due to highly advanced indigenous mission computer. The LCA is yet to get Final Operational Clearance (FOC). The FOC aircraft would incorporate Beyond Visual Range (BVR) missiles, improved and better stand-off weapons and air to air refuelling capability. IAF is also pitching for additional LCA Mk 1A which would incorporate new generation Active Electronically Scanned Array (AESA) Radar with simultaneous air-to-air and air-to-ground capability, an integrated advanced Electronic Warfare Suite, advanced versions of air-to-air and air-to-ground weapons and maintainability improvements. HAL said that the FOC is planned only by the end of 2018. An HAL official said that the PSU, which also operated the HAL airport where 45 Squadron is based out of, has been provided with a new tarmac for carrying out day and night operations and further enhance the capabilities of the aircraft before it attains FOC. Meanwhile, the IAF is said to soon issue a Request for Information (RFI) for acquiring 114 fighter jets. The IAF is said to prefer these jets instead of the advanced version of the Tejas due to its limited capabilities.

THE LCA JOURNEY

Aug 1983 '560-crore sanctioned for Project Definition

June 16, 1984 Establishment of ADA, the nodal agency for the LCA programme

Mid-1985 ADA begins full-fledged functioning 1988 Project Definition completed & proposal sent for project clearance

June 23, 1993 ' 2,188-cr including ' 560-cr sanctioned earlier

Jan 4, 2001 First Flight of LCA. Prime minister Atal Bihari Vajpayee renames LCA as Tejas.

April 25, 2007 First flight of Limited Series Production (LSP) aircraft

July 6, 2010 LCA Naval prototype rolls out .

Jan 10, 2011 First Initial Operational Clearance (IOC)

April 27, 2012 The maiden flight of the Naval variant of the LCA

Dec 20, 2013 Second IOC

Jan 17, 2015 MoD hands over first series production LCA made by HAL to the IAF.

Jan 20, 2016 LCA flies out of India for the first time to participate in the Bahrain International Airshow

May 17, 2016 Air Chief Marshal Arup Raha becomes the first chief of air staff to fly LCA.

July 1, 2016 LCA joins IAF Squadron

Source: <http://bangaloremirror.indiatimes.com/>

TOP IAF OFFICIAL FLIES LCA TEJAS, SAYS 'ALL IS WELL'

Amidst speculation that the Indian Air Force (IAF) will dump Light Combat Aircraft (LCA) Tejas advanced version and instead opt for single-engine fighter jets, a senior air officer flew the aircraft here. Air Marshal RKS Bhadauria, Air

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Officer Commanding in Chief, Southern Air Command, took to the skies in a solo flight which lasted about 30 minutes. Following the sortie by Bhadauria, the Ministry of Defence stated that the induction and operationalisation of the indigenous fighter jet Tejas into the IAF attained a fresh impetus. Bhadauria has in the past been a test pilot of the Tejas aircraft with over 100 test flights to his credit. "Ever since he took over the reins of the Southern Air Command of IAF in March this year, Bhadauria has been pushing both Aeronautical Development Agency (ADA) as designer and Hindustan Aeronautics Limited (HAL) as manufacturer of Tejas for early operationalisation of the fleet," the ministry said. The ministry also said that the LCA's Squadron, the Flying Daggers, is expected to move to its permanent location at Suler near Coimbatore next year and that it is presently involved in training of air and ground crew, formulation of procedures and realisation of the operational potential of the aircraft. As reported earlier, with the induction of an additional assembly line, HAL is all set to ramp-up the production rate in order to make good the promised delivery schedules. The ministry also said that the design activities on the improved version, Tejas Mk IA, are already underway. Meanwhile, HAL said that it is ramping up the production capacity of eight LCAs per annum to 16. The ramping-up cost is being shared equally by HAL, IAF and Navy.

Source: <http://bangaloremirror.indiatimes.com/>

ISRO to assist UN members with space tech

The Indian Space Research Organisation (ISRO) will partner with Canadian company Canerus International to assist the United Nations member countries to develop space technology through centres in India. Announcing this at an event held, Director, UN Office for Outer Space Affairs, Mr Simonetta Di Pippo, said satellite manufacturing facility in Maharashtra and a Centre of Excellence for Space Sciences and Technology in Andhra Pradesh would be set up to enable manufacturing of cost effective satellites and develop space related capabilities. "The year 2018 will mark the 50th anniversary of the first United Nations Conference on the Exploration and Peaceful Uses of Outer Space. Several initiatives have been undertaken by UN member states since then on sustainable development, disaster risk reduction and on climate change. On the 50th anniversary, the international community will develop a global vision named Space2030, based on four pillars - space economy, space society, space accessibility and space diplomacy. This collaboration will facilitate the use of space science, technology and applications as tools for the achievement of sustainable development," she said. The Centre of Excellence will focus on encouraging research activities, developing human resources and establishing links between research institutions, academia and industry. The proposed manufacturing unit in Maharashtra is being built on a Public Private Partnership model with Canerus International.

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

DGCA grants registration certificate to Captain Amol Yadav's aircraft: CMO

Aviation regulator DGCA has granted a registration certificate to Captain Amol Yadav's indigenously made aircraft, the Maharashtra Chief Minister's office said here today. A release issued by the CMO said Capt Yadav met chief minister Devendra Fadnavis today to express his gratitude for personally taking up the issue with Prime Minister Narendra Modi. "The DGCA has provided a registration certificate to pilot Capt Amol Yadav," the statement said. It noted that Capt Yadav built his prototype plane on the rooftop of his house in suburban Kandivli in 2011. "The aircraft was displayed during the Make-in-India week in Mumbai. Capt Yadav, through his company, will build aircraft manufacturing industry in Maharashtra," the release stated. In view of his vision and a strong desire to make aircraft in the country, the state government extended full cooperation to Capt Yadav's company, it added. As Capt Yadav was facing obstacles in getting his prototype aircraft registered with the Directorate General of Civil Aviation, Mr Fadnavis wrote to Mr Modi and also discussed the issue with the prime minister, the CMO said.

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

HAL celebrates Brahmos flight test

Bengaluru HAL celebrates the historic feat of Brahmos Flight test from IAF's Su-30MKI fighter aircraft. Hindustan Aeronautics Limited (HAL) in Bengaluru celebrated after the Brahmos emerged to be the world's fastest supersonic cruise missile test for the first time from Indian Air Force's (IAF) frontline fighter aircraft Sukhoi-30MKI against a sea based target in the bay of Bengal. HAL sources in Bengaluru said that they carried out the challenging part of missile integration and modification that was necessary to make Sukhoi-30MKI more a deadly weapon. The process was going on continuously since many days and it turned out to be reality with the efforts of many

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agencies. As soon as the news successful test news broke, the employees at HAL celebrated the feat, sources said. Two aircrafts were given by the IAF for the initial launch trials. The first Su030MKI fighter aircraft modified for Brahmos supersonic cruise missile was handed over to HAL on 19 February 2015 at Aero India show at Bengaluru.

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

Successful test of air-to-surface cruise missile Brahmos gives IAF stand-off capability

The Brahmos air-to-surface cruise missile tested by the defence establishment afternoon is designed to arm India's military with the capability to fire stand-off weapons, rockets that can target the positions of an adversary from outside it's defensive shield. India's defence establishment has claimed a technological feat after a Sukhoi 30 Mki fighter aircraft of the Indian Air Force "gravity-dropped" a Brahmos from its fuselage. Footage released by the IAF, and shot from an escort plane, showed the missile in free fall before its engine firing and propelling it towards a target. The objective was a Battle Practice Target (BPT) set up by the Indian Navy in the Bay of Bengal. A BPT for such tests is usually a screen attached to a floating pontoon. The screen is made up of wire-mesh with diamond-shaped metal plates to reflect radar signatures. IAF sources claimed the missile hit bull's-eye. But the range from which it was fired was not spelt out. The Sukhoi had taken-off from Kalaikunda air-force station in West Bengal. The air-launched Brahmos is capable of a range of more than 400 kms, said a source in the Defence Research and Development Organisation (DRDO). The Brahmos, originally developed as a surface-launched anti-ship missile was first tested by the navy in 2003. It has now evolved into an air-launched variant. In its surface-launched version the missile was first developed for a range of 290-kilometres. The technological feat for the air-launched variant required the missile to be miniaturized and designed for firing from a platform, the Sukhoi 30Mki, that was not originally developed for such a weapon. Among the strategic gains that defence planners count are the fact the Brahmos is a joint venture between India and Russia and can now be fired from a Russian-origin fighter of the IAF. This makes India less dependent on western powers that have a history of imposing sanctions through a technology-denial regime. The Brahmos is said to be supersonic, unlike the US-made Tomahawk that is also a cruise missile but is sub-sonic. Pakistan and China also have Air Launched Cruise Missiles (ALCMs) being developed. The joint India-Russia makers claim the Brahmos to be the world's fastest. Unlike a ballistic missile that mostly flies straight from the launch to the target, a cruise missile can be guided. The air-launched version that was tested for the first time today, two years behind schedule, will require more tests before it is inducted. But, theoretically, it will give the air force the strategic depth to conceal India's responses to a hostile situation away from the borders. In other words it can equip the IAF with the ability to launch "aerial surgical strikes". For example, in one scenario, a Sukhoi 30 MKi taking off from Hyderabad – that is beyond the reach of an adversary's radars — armed with a Brahmos can fly near the western or northern borders and launch the missile at pre-designated targets without crossing into adversarial airspace. The Sukhoi is capable of flying at a maximum speed that is twice the speed of sound (mach 2). The Brahmos' maximum speed is 2.8, nearly three times the speed of sound. "The successful maiden test firing of the Brahmos Air Launched Cruise Missile (ALCM) from Su-30MKI will significantly bolster the IAF's air combat operations capability from stand-off ranges. Brahmos ALCM weighing 2.5 ton is the heaviest weapon to be deployed on India's Su-30 fighter aircraft modified by HAL to carry weapons. Brahmos, the world-class weapon with multi-platform, multi-mission role is now capable of being launched from Land, Sea and Air, completing the tactical cruise missile triad for India. Brahmos is a joint venture between DRDO of India and NPOM of Russia," said the statement. A Sukhoi 30Mki is capable of carrying payloads (bombs and missiles) up to 8 tonnes. Defence Minister Mrs Nirmala Sitharaman congratulated DRDO and BrahMos.

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

BrahMos missile: Here is all you need to know

The Indian Armed Forces attained the supersonic cruise missile triad with the successful test launch of the BrahMos missile from an Indian Air Force Sukhoi Su-30 MKI frontline fighter aircraft. This is a multi-platform, multi-mission weapon that can be launched from land, water and air. Here is all you need to know about the missile:

Where does BrahMos missile derive its name from?

The missile has been named after two rivers– the Brahmaputra and the Moskva. The latter is a river in western Russia.

What kind of a missile is BrahMos?

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BrahMos is a supersonic cruise missile developed in a joint-venture between India and Russia. It is a self-propelled guided missile that sustains flight through aerodynamic lift. Cruise missiles fly within the earth's atmosphere and use a variety of propulsion methods.

How fast does the BrahMos fly?

The BrahMos is a two-stage missile. A solid fuel propellant booster engine pushes the missile to supersonic speeds and separates. Then the second stage kicks in where a liquid fuel ramjet engine takes it to speeds up to mach 3 (three times the speed of sound) when it covers nearly 1-km distance in a second. It is the fastest known versatile supersonic cruise missile.

How effective is BrahMos?

The developers say the BrahMos has a strike accuracy rate of 99.99 per cent. Also, it follows a variety of trajectories like high, high-low, low, surface-skim etc. Unlike ballistic missiles that follow ellipsoidal trajectories and are powered only through part of the journey, ballistic missiles are powered till the time it hits the target and kinetic energy is a big factor in its destructive capacity. The unpredictable nature of the trajectory it takes is also what makes it more difficult to defend against.

Who has developed the missile?

The missiles are developed and manufactured by BrahMos Aerospace Private Limited that is a joint venture between the India's Defence Research and Development Organisation (DRDO) and Russia's Reutov-based rocket and missile developers NPO Mashinostroyeniya (NPOM).

Will the missile be developed further?

Newer versions of the missile are being developed right now. BrahMos Aerospace is in the process of trying to come up with the next line of BrahMos missiles that could reach targets up to 800 km away. The new versions are also being developed with scramjet engines that will help propel the missile to hypersonic speeds of up to mach 6 (six times the speed of sound). The kinetic energy impact of such an upgrade will be huge. For instance, the destruction caused by the missile due to kinetic energy at mach 6 will be 36 times than the destruction caused if the missile hit the target at mach 1. Submarine-launched versions as well as miniature versions of the missile are also in the pipeline.

Where is the BrahMos missile made in India?

The BrahMos headquarters is located in New Delhi where it houses the design centre, simulation and interface development department, application software development and aerospace knowledge centre (also at Hyderabad). A facility in Thiruvananthapuram manufactures components for BrahMos as well as ISRO and DRDO. BrahMos Aerospace also has a world-class production facility called the BrahMos Integration Complex of BrahMos Aerospace. This centre is where the actual missile takes shape. All the components and subsystems that are manufactured across India and Russia are sent to the BIC and then assembled into the final product.

How much of the missile is Indian-made?

In March 2016, Defence Minister Mr Manohar Parrikar said in a written reply to Parliament that 65 per cent of the missile components were imported. Out of the major components provided by Russia, the main are the booster, the ramjet engine, target seeker, homing device and the canister that stows the missile.

Source: <http://indianexpress.com>

AICTE boon: Tech courses, degrees of Institution of Engineers restored

Degrees and diplomas in engineering and technology granted by various professional bodies, including the Institution of Engineers (India), to thousands of students till May 31, 2013, are valid "for all purpose" ranging from employment in the government sector and higher education. The All India Council for Technical Education (AICTE) has restored its recognition about five years after the Human Resource Development (HRD) Ministry withdrew recognition and equivalence of the programmes offered by these professional bodies, following complaints of irregularities. "All those students who were enrolled with these institutions with permanent recognition up to May 31, 2013, stand recognized," an AICTE

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official said. The decision to restore recognition and equivalence of the degree and diploma courses conducted by these professional bodies was taken at a recent “emergent meeting” of the Council. “The matter was reviewed and it was decided at the meeting to recognize equivalence, for all purposes including higher education and employment, of the technical courses conducted by the professional bodies and institutions which were duly recognized by HRD Ministry with permanent recognition up to May 31, 2013,” the official added. The AICTE’s decision would bring cheer to thousands of students whose future had been at stake since the HRD Ministry de-recognised the technical programmes conducted by the Institution of Engineers (India), Institution of Civil Engineers, Institute of Mechanical Engineers (India), Institution of Surveyors, College of Military Engineering, Aeronautical Society of India and others in December 2012. Representations Later, the Ministry directed the AICTE to conduct a review of the programmes offered by these professional bodies and take a decision on restoring their recognition. However, the AICTE sat on the file. In April this year, the technical education regulator initiated a move to decide the fate of the technical programmes and degrees awarded by these professional bodies to May 31, 2013 “The matter came to our notice after we received representations from some of these professional bodies. We decided to conduct a review of their courses and resolve this long-pending issue,” a senior official of the council told DH.

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

IAF banks on Tejas, new fighter to bolster fleet

It has a sanctioned strength of 42 squadrons and a projected requirement of 45 to face the threat of a two-front war The Indian Air Force (IAF) is looking at the indigenous Light Combat Aircraft (LCA) Tejas and the soon-to-be-procured single-engine fighter jet to arrest a dramatic fall in its squadron strength as the deal for 36 Rafale jets lands in the middle of political maelstrom. “The rate of decommissioning is way higher than the planned and even proposed inductions. Light Combat Aircraft (LCA) Tejas is a good aircraft and 123 LCAs will be inducted in the force as planned. But the numbers are not coming fast enough and the requirement is much beyond that in other categories,” a Defence Ministry source said. The IAF has a sanctioned strength of 42 squadrons and a projected requirement of 45 to face the anticipated threat of a two-front war. As on date the IAF has 33 squadrons and by the end of next month it will be down to 31 squadrons. With the planned induction of 36 Rafales between 2019 and 2022, the remaining Sukhoi-30MKIs and some LCAs (Tejas) the strength will hover at 30 till 2027 and in the subsequent five-year term will fall to 27 squadrons. If there are no newer inductions it will slide further to 19 squadrons by 2042. “IAF is upgrading most of the aircraft in its inventory. But from 2025 onwards most of those aircraft such as the Jaguars and the MiG-29s will start going out,” the source said. In a month, the IAF is expected to issue the Request for Information (RFI) for over a 100 single-engine fighter aircraft under the Strategic Partnership model. Lockheed F-16 and Saab Gripen are in the race for the order and have already tied up with TATA and Adani, respectively, to build the jets locally with technology transfer. The IAF has placed orders for 40 jets in two batches of which the first 20 are in the Initial Operational Configuration (IOC) while the remaining 20 are in the Final Operational Configuration (FOC).

Source: <http://www.indiandefensenews.in/>

TECHNOLOGY

India-made Falcon will fly in 2022, says Reliance Group

The Reliance Group’s joint venture with Dassault Aviation to manufacture components for Rafale fighter aircraft is much talked about. However, the group is also harbouring ambitions to fly out business jets and passenger planes made entirely in India, the first private sector company that may end up doing so. Reliance, in a joint venture with the \$3.6 billion Dassault Aviation, will start making the business jet Falcon from January 2018 at the Dassault Reliance Aviation Limited (DRAL) facility in Mihan, Nagpur and the first Falcon is expected to fly out of Mihan as early as 2022 for the global markets. Falcons play in the wide-cabin, long-range aircraft segment as they can fly distances between 6000-12000 km, covering a range of travel needs. Confirming the development, Rajesh Dhingra, CEO, Reliance Defence told , “We will start with assembly in January 2018. The nose, cockpit and doors will be done [here] in the next two years. Initially, wings will come from outside and the entire body will be assembled here. Flight testing will start in the fourth year and the locally-made Falcon will be ready for flying out of Mihan in the fifth year, say by 2022.” The company expects to make 20 Falcons a year, with 2,500 Falcons delivered in the last 50 years of which 2,100 Falcons are operational in 80 countries.

Employment plans

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“We will directly employ over 700 engineers for the Falcon assembly-line alone, giving indirect employment to 3,000 others. We will have hundreds of Indian and French OEMs setting up bases in DAAP,” said Mr. Dhingra. A Falcon 2000S costs \$30 million-\$40 million, while the Falcon 8X costs upwards of \$60 million. The company expects revenues of ₹ 800 crore a year from the venture. The Falcon aircraft assembled at the DRAL facility will be the first to be manufactured for the export market by an Indian-owned facility. The manufacturing facility at the Dhirubhai Ambani Aerospace Park is located in the Mihan SEZ. It is a 51:49 venture between Reliance Aerostructure and Dassault Aviation.

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

Scientific innovations inspired by nature, says ISRO chairman

Who knew flippers on humpback whales can inspire a more efficient design of wind turbines, airplane wings and boat rudders? At the 6th convocation of the National College in Basavanagudi, A S Kiran Kumar, Secretary, Department of Space and Chairman, Space Commission and Indian Space Research Organisation, spoke about this and several other scientific innovations that are inspired by nature. He asked students to have an eye for detail in the natural creations. Citing Sir Albert Einstein, he said, “Look deep into nature and then you will understand everything better. It won’t be wrong to say that almost all innovations in science and engineering are inspired by something in nature. Engineers in various industries around the world are turning to nature for inspiration as they try to design products with better performance and lower energy consumption.” Among a range of examples he gave was one of owls whose feathers with jagged edges allow it to fly without creating turbulence or noise. “Mechanical engineers have emulated these shapes to design fans and turbines that are nearly silent,” he said. “Flippers on humpback whales have non-smooth leading edges, yet demonstrate superior fluid dynamics compared to the characteristically smooth leading edges of our wings, turbines and other kinds of blades. The whale’s surprising dexterity is primarily due to its non-conventional flippers, which have large irregular looking bumps called tubercles across the leading edges,” he added. “This design can be applied to develop more efficient wind turbines, hydroelectric turbines, airplane wings etc,” he said. The nasal surfaces of a camel help conserve water when the camel is dehydrated by cooling and extracting water from exhaled air. “During hot desert days, this nasal heat exchange mechanism also helps protect the camel’s brain from overheating. For controlling evaporation from open storage ponds, designing more efficient irrigation systems, recapturing water used in industrial processes, etc, one can get inspiration from this species,” he said.

INSPIRED THINKING

Owls’ feathers allow them to fly without creating turbulence or noise. Mechanical engineers have emulated these shapes to design fans and turbines that are nearly silent. The whale’s surprising dexterity is due to its non-conventional flippers, which have large irregular looking bumps across the leading edges. This design can be applied to develop more efficient wind turbines, hydroelectric turbines, ceiling fans, airplane wings, underwater vehicles, boat rudders, etc. In aviation industry, the A380 aircraft design is inspired by the wing tips of eagles. The East Gate building in Harare (Zimbabwe) imitates termite infrastructure and the air exchange system and only uses 10 per cent of the energy of conventional buildings of the same size.

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

STARTUP DEVELOPS ECO-FRIENDLY SATELLITE PROPULSION SYSTEM

In an attempt to make satellite launches more environment friendly, a city-based startup which is incubated at the Indian Institute of Science (IISc) is developing green monopropellant thrusters. The startup Bellatrix Aerospace Private Limited which is working in area of satellite propulsion systems with the primary aim to reduce the cost of access to space in collaboration with the IISc’s aerospace engineering department is developing Hydroxyl Ammonium Nitrate (HAN)-based green monopropellant thrusters as a replacement to the toxic hydrazine thrusters which are widely used globally. “In-space propulsion systems are required for attitude correction and orbit keeping of satellites, thus increasing the life of the satellites. The energy required to generate thrust is obtained either by combustion or decomposition of liquid propellants. In Low Earth Orbit, disturbances like drag, Earth’s magnetic field, Earth’s micro gravitation and solar winds would make a satellite to de-orbit, which results in failure of the system. In-space propulsion systems are used in satellites for attitude correction and station keeping applications. Monopropellant systems are widely used due to its simplicity compared to bi-propellant counterpart,” Bellatrix Aerospace CEO and Director, Mr Rohan Mr M Ganapathy,

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told Bangalore Mirror. The Bellatrix Aerospace team comprising nine members which works out of the IISc said that these thrusters, apart from increasing the launch reliability and operational performance, are also more environment friendly than the hydrazine-based thruster. “Hydrazine is highly toxic, difficult to handle and carcinogenic, which paved way for the advent of green propellants. Among these ionic liquids, hydroxyl ammonium nitrate (HAN) fuel blend has received most attention due to its easy handling, higher density and better Specific Impulse (Isp) compared to hydrazine. HAN offers greater performance than hydrazine system, yields 12 per cent increase in Specific Impulse and is 45 per cent denser. HAN is a viable replacement to hydrazine as it gives better performance and a long life,” added Mr Ganapathy. The team has already developed the propellant and is working on the thruster. Being incubated at IISc, the team has access to the institute’s lab facilities and support of its faculty. That apart, the team also has a developmental order with ISRO’s Liquid Propulsion Systems Center for developing micro-thermal thrusters making it one of the first startups to be associated with the space agency. The Bellatrix Aerospace team comprising nine members which works out of the IISc said that these thrusters, apart from increasing the launch reliability and operational performance, are also more environment friendly than the hydrazine-based thruster. “Hydrazine is highly toxic, difficult to handle and carcinogenic, which paved way for the advent of green propellants. Among these ionic liquids, hydroxyl ammonium nitrate (HAN) fuel blend has received most attention due to its easy handling, higher density and better Specific Impulse (Isp) compared to hydrazine. HAN offers greater performance than hydrazine system, yields 12 per cent increase in Specific Impulse and is 45 per cent denser. HAN is a viable replacement to hydrazine as it gives better performance and a long life,” added Mr Ganapathy. The team has already developed the propellant and is working on the thruster. Being incubated at IISc, the team has access to the institute’s lab facilities and support of its faculty. That apart, the team also has a developmental order with ISRO’s Liquid Propulsion Systems Center for developing micro-thermal thrusters making it one of the first startups to be associated with the space agency.

Source: <http://bangaloremirror.indiatimes.com/>

Nasa contracts Uber to build flying taxi air control software

Uber has struck a deal with Nasa to develop software for managing “flying taxi” routes in the air along the lines of ride-hailing services it has pioneered on the ground, the company said. And in this case, it’s working hard to stay on regulators’ good side. Uber said it was the first formal services contract by the US National Aeronautical and Space Administration (NASA) covering low-altitude airspace rather than outer space. Nasa has used such contracts to develop rockets since the late 1950s. Chief product officer Jeff Holden also said Uber would begin testing four-passenger, 200-miles-per-hour (322-km-per-hour) flying taxi services across Los Angeles in 2020, its second test market after Dallas/Fort Worth. Holden is set to reveal the company’s latest air taxi plans at Web Summit, an annual internet conference taking place in Lisbon this week. “There is a reality that Uber has grown up a lot as a company,” Holden said in an interview ahead of his speech. “We are now a major company on the world stage and you can’t do things the same way where you are a large-scale, global company that you can do when you are a small, scrappy startup.” Uber has faced endless regulatory and legal battles around the world since it launched its ride-hailing services earlier this decade, including a recent showdown in London, where it is battling to retain its licence after having been stripped of it by city regulators over safety concerns. The company is looking to speed development of a new industry of electric, on-demand, urban air taxis, Holden said, which customers could order up via smartphone in ways that parallel the ground-based taxi alternatives it has popularised while expanding into more than 600 cities since 2011. The company plans to introduce paid, intra-city flying taxi services from 2023 and is working closely with aviation regulators in the United States and Europe to win regulatory approvals toward that end, a senior Uber executive told *Reuters*. “We are very much embracing the regulatory bodies and starting very early in discussions about this and getting everyone aligned with the vision,” he said of Uber’s plans to introduce what he called “ride-sharing in the sky”. Earlier this year, Uber hired Nasa veterans Mark Moore and Tom Prevot to run, respectively, its aircraft vehicle design team and its air traffic management software programme. During a 32-year career at Nasa, Moore pioneered its electric jet propulsion project which Uber considers to be the core technology for making urban air transportation possible.

Making taxis fly

The contract with Nasa is to solve the problem of operating hundreds or thousands of aircraft over urban areas with the goal of enabling uberAIR services to operate alongside existing air traffic control systems and in and around busy airports. Nasa was not immediately available to comment on the deal. Earlier this month it said it was working with a variety of companies, large and small, to develop the emerging market for what it terms Urban Air Mobility, or UAM. Uber envisions a fleet of electric jet-powered vehicles — part helicopter, part drone and part fixed-wing aircraft — running multiple small rotors capable of both vertical take off and landing and rapid horizontal flight. Two larger rotors used to lift the plane transition during flight into forward-thrusting propellers in newly released designs.

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It plans to build no aircraft itself. Instead, Uber is building the software to manage networks in the sky of flying taxis, while relying on a stable of manufacturers, including Aurora Flight Sciences, which was acquired by Boeing last month. Uber has also signed up Embraer, Mooney, Bell Helicopter — a unit of Textron —, and Pipistrel Aircraft to build new vertical takeoff and landing aircraft. It is also working with real estate developers Sandstone Properties in Los Angeles to build rooftop landing pads on skyscrapers from which it aims to offer its uberAIR services. It plans to start offering services from locations near a downtown sports arena, the international airport, Santa Monica and Sherman Oaks in suburban San Fernando Valley, the company said.

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

ISRO'S OUTREACH PROGRAMME: WHEN A COMPETITION WAS ROCKET SCIENCE

Students try their hand at water rocket launch as part of ISRO's outreach programme About 60 students, teachers and educators from 11 Asia Pacific countries including Colombia took part in the Asia-Pacific Regional Space Agency Forum water rocket competition. At the competition, which was held in the Kendriya Vidyalaya, NAL Campus playground, the competing students demonstrated their rocket launching capability using two soft drink PET bottles. The two-litre PET bottles filled with 400 ML of water which act as a propellant were sealed and pressurised with gas (up to four times the atmospheric pressure), after which they were launched. A target or landing spot was fixed by the organisers and during the competition. While some of them landed near the target point, some others fell short of it or overshot. The winner was decided based on their closest landing spot. The event for the students was jointly organised by ISRO, Japanese Aerospace Exploration Agency (JAXA) and Japan's MEXT. ISRO said that making of water rockets based on sound principles of science and mathematics and launching them provides practical experience to students about the science of rocketry as well as rocket flight. ISRO has made water rocket launchers an integral part of its student outreach programme during the past decade. The city schools that took part were BGS NPS, Whitefield Global School, Sri Chaitanya Techno School, The International School Bangalore, Ekya and Seshadripuram English Primary High School. Winners were Kalana Nimsara of Sri Lanka (1st place), Thing Thang Nguyen of Veitnam (2nd) and Situ Bye Atira of Malaysia.

Source: <http://bangaloremirror.indiatimes.com/>

CHINA'S HYPERSONIC AIRCRAFT CAN REACH US IN 14 MINUTES

China is developing aircraft capable of reaching US shores with nuclear warheads in just 14 minutes, reports suggest. The craft will be capable of hypersonic flight speeds of up to 27,000 miles per hour (43,200 kmh) — 35 times the speed of sound. They will be tested in China's newest military-grade wind tunnel, set to be the world's fastest hypersonic facility when construction is complete "by 2020", experts claim. Currently, the world's most powerful wind tunnel is the US LENX-X facility in Buffalo, New York, which operates at speeds of 22,000 miles per hour (36,000 km/h). The tunnels are being used to develop hypersonic aircraft — those capable reaching five times the speed of sound or more. The vehicles could be used to deliver missiles, including nuclear weapons, to distant targets around the world within minutes of launch. Dr Zhao Wei, a senior scientist working on China's secretive new tunnel, told the South China Morning Post that it will be up and running by 2020. He said the tunnel will help meet the pressing demand of China's hypersonic weapons development programme. Because planes can't fly during laboratory experiments, researchers need a wind tunnel that can generate gusts as fast as the desired speed of the aircraft to simulate a flying environment. "[The new tunnel] will boost the engineering application of hypersonic technology, mostly in military sectors, by duplicating the environment of extreme hypersonic flights, so problems can be discovered and solved on the ground," said Dr Wei, a deputy director of the State Key Laboratory of High Temperature Gas Dynamics at the Chinese Academy of Sciences in Beijing. These ground tests will help researchers iron out issues with the craft before test flights begin. Since 2013, China has conducted seven successful test flights of its hypersonic glider DF-ZF. The vehicle will be capable of speeds of between Mach 5 and Mach 10, or five to 10 times the speed of sound. US officials tested HTV-2 in 2011, an unmanned aircraft capable of Mach 20, but the hypersonic flight lasted just a few minutes before the vehicle crashed. "China and the US have started a hypersonic race," professor Wu Dafang, a researcher at Beihang University in Beijing who specialises in hypersonic heat shields, told the SCMP. A number of state-of-the-art wind tunnels in mainland China have helped its military successfully test hypersonic craft in recent years. One of these facilities, Beijing's JF-12 tunnel, was completed in May 2012 but remains shrouded in mystery." The new tunnel will be one of the most powerful and advanced ground test facilities for hypersonic vehicles in the world," Wu said. The new tunnel will include a test chamber for large craft with wingspans of up to three metres (10 ft).

Source: <http://punemirror.indiatimes.com/>

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Boeing and HAL discuss building F/A-18 fighter

The Boeing Company (hereafter Boeing), which is vying strongly to supply the Indian Navy with 57 “multi-role carrier borne fighters” (MRCBF), has entered talks with Hindustan Aeronautics (HAL) to explore the co-manufacture of its F/A-18E/F Super Hornet fighter in India, say credible sources in the defence ministry. Along with HAL, Boeing also intends to involve the Mahindra Group in building Super Hornets in India. Boeing and HAL have already held exploratory discussions in Bengaluru in September and are scheduled to meet in Bengaluru for another round of talks. They will also finalise a “non-disclosure agreement” that binds all sides to keep their negotiations confidential. Contacted for comments, a Boeing spokesperson responded: “HAL has been a key partner of Boeing for over two decades and today manufactures components for our commercial and defense platforms, including for the F/A-18 Super Hornet. We are continually exploring ways to expand that relationship. Needless to say, we cannot comment on specific discussions with our partners.” The defence ministry and Mahindras did not respond to requests for comments. Boeing seeks to leverage HAL’s long experience in licence-producing aircraft in India, most recently the Hawk trainer, and Jaguar and Sukhoi-30MKI fighters; and to present the defence ministry with a clear plan for co-producing the Super Hornet in India with a high indigenous content. This would provide the US aerospace giant valuable advantage over rival vendors who partner private sector firms that are novices in aerospace manufacture. Furthermore, Boeing’s partnership with HAL — which already has an airfield and manufacturing hangars in Bengaluru — would significantly reduce the price of each Super Hornet. In contrast, a vendor that partners a private Indian firm would need to factor aerospace infrastructure into its pricing. Boeing has already expressed public reservations about the private sector’s inexperience in aerospace. As Business Standard reported (September 8, Boeing flags inexperience of private sector ‘strategic partners’) Boeing India chief, Mr Pratyush Kumar, stated in New Delhi that the Indian private sector is not yet capable of manufacturing complex military aircraft under transfer of technology (ToT). Urging India to co-opt public and private enterprise, Kumar said he “could not find a single example [of successfully building an aircraft under ToT] where it was just the brand new private enterprise with limited aerospace experience. Look at Turkey, look at Japan, look at Brazil, and look at multiple countries. In all cases there is a fine balancing act of co-opting the capabilities of both public and private enterprise.” Now Boeing is doing exactly that, by seeking to co-opt HAL and the Mahindra Group into co-producing Super Hornets. Boeing’s public-private strategy contrasts with the approach being followed by Lockheed Martin and Saab in a separate procurement of 114 single-engine fighters, which is expected to gather momentum shortly. Since the defence ministry requires the single-engine fighters to be built in India under the “strategic partner” (SP) policy, Lockheed Martin and Saab have both partnered private sector firms — Tata Advanced Systems Ltd (TASL) and the Adani Group respectively — to build in India. In contrast, the “request for information” (RFI) for the MRCBF acquisition, which the navy issued in January, predates the SP Policy that was promulgated only in June. Unlike Lockheed Martin and Saab in the single-engine fighter procurement, Boeing is not restricted to partnering only a private sector company. The RFI for the MRCBF specifies: “Gov (Government of India) is desirous of license production of the aircraft after acquiring ToT in the case (sic).” While this appears to place the procurement in the “Buy and Make” category, the “request for proposals” (RFP) is likely to clarify this issue. Industry experts say the RFP might conceivably shift the acquisition into the SP category. The Super Hornet, which is the US Navy’s main carrier borne fighter, is likely to face competition in India’s MRCBF tender from French company Dassault’s Rafale-M fighter; Swedish company Saab’s Gripen Maritime, and the Russian MiG-29K/KUB that already flies off the navy’s lone carrier, INS Vikramaditya. The India Navy has already bought 45 MiG-29K/KUB fighters from Russia to equip its current aircraft carrier, INS Vikramaditya, and the second aircraft carrier, the indigenously built INS Vikrant, which is expected in service by 2021. A new, more capable MRCBF was envisaged for the second indigenous carrier, INS Vishal, which is expected in service by 2030 or so. However, unacceptably low serviceability rates of the MiG-29K/KUB are making the MRCBF vital for the navy in a much shorter time frame. Furthermore, Boeing is looking at the supply of “Made in India” fighters to the Indian Air Force (IAF) too, beyond the supply of 57 Super Hornets to the navy. The IAF, which is down to 32 squadrons of fighters against its requirement of 42 squadrons, had hoped to procure six-to-nine squadrons of medium multi-role combat aircraft (MMRCA) over the last decade. The Rafale was eventually selected, but then only two squadrons were procured, leaving a void that Boeing hopes to fill by establishing a Super Hornet manufacturing line in India.

Source: <http://www.business-standard.com/>

First privately built rocket to launch by 2021: ISRO chief

In a step towards outsourcing its launch vehicle programme, the Indian Space Research Organisation (ISRO) is planning a joint venture with a consortium of companies where a space rocket will be completely built by the private industry. Speaking exclusively to TOI on the sidelines of an international seminar on ‘Indian Space Programme’ here,

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ISRO chairman A S Kiran Kumar said, "The target for such a (fully privately built) launch vehicle is 2020-21. ISRO will be part of the JV. Work is in progress to put the mechanism in place." Till now, ISRO was the only manufacturer of the Polar Satellite Launch Vehicle (PSLV). In the two decades since PSLV's debut launch, ISRO has launched 39 consecutive successful missions. While commenting on a recent report that China is planning to reduce the cost of launching satellites to woo foreign customers, the ISRO chief said, "We will continue to improve our cost-effectiveness. It (launch cost) is not linked to what someone else is doing. It's not possible to change your activities at such a pace." On increasing the number of satellites, Kiran Kumar said, "Currently, there are 42 satellites in orbit. These satellites are being used for earth observation, navigation and communication purposes. Still, we are significantly short of communication satellites. Therefore, ISRO will double its launch frequency from 8-10 launches (per annum) to about 20 from 2018 onwards. We are targeting to launch 60 satellites in the next five years ." He said, "We want to maximise launches with the existing launch pads. We are also working on a plan to get the third launch pad at Sriharikota to increase our launch capabilities." Stating that the space agency is currently engaged with over 500 industries, the ISRO chief said making use of all the sections of society and its talent is required to enhance the capabilities. ISRO is going to resume satellite launches from mid-December after a lull of three months. On August 31, the launch of replacement navigation satellite IRNSS-1H failed because the spacecraft got stuck in the heat shield during the launch. On the safety steps being taken after the unsuccessful launch, Kiran Kumar said, "Reasons (for the failure) have been identified and corrective measures are being taken for all future launches."

Source: <https://timesofindia.indiatimes.com/>

ISRO's plan: A rocket that can be made in 3 days

In a development that will revolutionise the satellite launch system in the country, Indian Space Research Organisation (ISRO) is developing a small launch vehicle that can be assembled in just three days as compared to 30-40 days for a normal-sized PSLV and can be built at a cost which will be just one-tenth the original manufacturing cost of a PSLV. The manufacturing cost of a launch vehicle is generally in the range of Rs 150 crore to Rs 500 crore across the world. Dr K Sivan, director of Thiruvananthapuram-based Vikram Sarabhai Space Centre (VSSC), on the sidelines of an international seminar on 'Indian Space Programme' told TOI, "ISRO is busy developing a small launch vehicle which is likely to be ready for launch probably by 2018-end or early-2019. The cost of this vehicle will get drastically reduced by one-tenth of the manufacturing cost of a normal PSLV. However, this rocket will have the total payload capacity of 500 to 700 kg and can launch satellites only up to the polar sun-synchronous orbit or near-earth orbit (500-700 km in altitude)." India has a slew of satellites in the near-earth orbit that are used for the purpose of earth imaging, weather tracking and reconnaissance. "The weight of this mini-PSLV will be just 100 tonnes as compared to 300 tonnes of the normal-sized launch vehicle," Dr Sivan said. The "cost-effective" vehicle programme is in line with ISRO chairman Mr A S Kiran Kumar's recent statement that the space agency has been striving to "reduce the cost of access to space" and so that more and more of space technologies can be used for the benefit of the common man. Explaining the advantage, Dr K Sivan said, "The amount of money used in building a normal-size PSLV rocket can actually be used to manufacture multiple numbers of such mini-PSLVs, which, in turn, can launch several satellites. So, ISRO will be able to launch several satellites in less money." Like a normal PSLV, he said, "Such small vehicles will too be capable of launching multiple nano satellites." ISRO has started working on the idea of building this small rocket keeping in mind the emerging market of nano satellites. Till now, satellites of foreign customers are accommodated in launch vehicles only as secondary passengers. With ISRO eyeing to capture the market of nano satellites, the small vehicle can be a boon for foreign satellite customers as the rocket can be readied in just three days on demand. On February 15 this year, ISRO's workhorse PSLV C37 had launched 104 satellites, mostly of foreign customers, in one go. Likewise on June 23, the agency had launched 30 small satellites of foreign companies along with the primary satellite Cartosat-2.

Source: <https://timesofindia.indiatimes.com/>

Sukhoi manufacturing plant can roll out 5th-gen fighter jet: HAL

The manufacturing facility of the Hindustan Aeronautics Ltd producing Sukhoi fighter jets can be used to build the fifth-generation fighter aircraft if the government decides to go ahead with the proposed Indo-Russian joint venture, Mr T Suvarna Raju, the chief of the aerospace behemoth, has said. Mr Raju said the state-of-the-art facility in Nasik will not require any major investment to reconfigure it to produce the fifth generation fighter aircraft (FGFA). He said there was much in common between the FGFA and the Sukhoi 30MKI jet as both had structural similarities and the plant was well equipped to produce the new generation stealth fighter for which India and Russia have been in negotiations for nearly a decade. "Definitely, it can be used for the FGFA. It will need a little bit of augmentation. We will not need major

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investment,” Mr Raju, the chairman and managing director of HAL, told PTI. The facility at Nasik is set to fall idle after it delivers the last batch of 35 aircraft out of the total order of 222 to the Indian Air Force. In 2007, India and Russia had inked an inter-governmental pact for the FGFA project but no concrete decision has yet been taken on it. Pitching for the FGFA project, Mr Raju said it would be an opportunity for India to acquire high technology which has not been offered to it by any other country except Russia. “I will not comment on the justification on expenditure on the project. But, as a country, if we are looking for fifth generation technology and if somebody has offered it to us, then definitely I would like to go for it regardless of the expenditure,” Mr Raju said. There is a view in the defence establishment that India should not go for the project considering the possible cost which has been roughly estimated at around USD 25 billion (around Rs 1.61 lakh crore). The defence ministry is likely to soon take a call on a report submitted recently by a high-level committee set up by the government to examine various aspects of the project. In December 2010, India had agreed to pay USD 295 million (Rs 1,897 crore) towards the preliminary design of the fighter, which is called the ‘Perspective Multi-role Fighter’ in India. However, the negotiations faced various hurdles in the subsequent years. In February last year, India and Russia revived talks on the project after a clearance from then Defence Minister Mr Manohar Parrikar. Raju said the Nasik plant may be converted to a maintenance facility for the Sukhoi fleet if the FGFA project does not take off. The delivery of the remaining Sukhoi jets is likely to be over by early 2020.

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

BUSINESS

India may agree to buy Japanese US-2i aircraft for \$1.3 b

India may finally agree to buy the Japanese ShinMaywa US-2i amphibious aircraft in a deal worth \$1.30 billion for the Navy during the visit of Japanese Prime Minister Mr Shinzo Abe during September 13-14. The deal, it seems, got finalised during a meeting between former Defence Minister Mr Arun Jaitley and Japanese Minister of Defence Itsunori Onodera during September 5-6 in Tokyo, sources told. According to sources, Mr Jaitley’s meeting with Onodera had been “fruitful” in the backdrop of Japan sweetening the deal by offering 10-15 per cent discount on each of the plan that cost over \$100 million. India plans to buy 12 of this search-and-rescue (SAR) maritime surveillance aircraft which the Indian Navy plans to deploy strategically at the Andaman and Nicobar Islands with the objective of carrying out patrols in the larger Indian Ocean Region (IOR). However, the deal has been stuck for over seven years now due to the high cost of the planes. According to the agreed plan, the Ministry of Defence will be buying 12 planes off the shelf. Subsequently, at a later stage the government will be procuring 18 more that will be built in India under the ‘Make in India’ programme.

Next phase

“Building the plane here will be next phase of the deal. As of now the focus is on procuring the 12 planes in fly-away condition. “This is because having a platform is an absolute necessity for the Navy. And there are few suppliers for this kind of an aircraft. This will be a great asset in protecting our interest in the IOR,” said an official, involved in the deal. The deal, talks for which began around 2010, got a major boost when the Abe government decided to lift the ban on exporting Japanese arms to the world in April 2014. Following this, during the last annual India-Japan Annual Summit in December 2015, both Abe and Prime Minister Mr Narendra Modi agreed to expedite the US-2i programme. “Defence cooperation with Japan remains a priority for us. I cannot prejudge what the outcome will be on US-2i during this visit because the outcome is under works now,” said Mr Pranay Verma, Joint Secretary (East Asia), Ministry of External Affairs. According to the joint statement that was issued post Mr Jaitley’s visit to Japan, progress had been made in the field of defence equipment and technology cooperation including in the framework of the Joint Working Group on Defence Equipment and Technology Cooperation as well as regarding the cooperation on US-2 amphibious aircraft. Mr Rahul Gangal, Partner (Aerospace and Defence), Mr Roland Berger, said: “While cost is one of the factors, there is also a strategic need to acquire these planes. I believe the deal should be expeditiously signed.”

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

ISRO opens doors to private sector

In an attempt to increase the number of satellite launches and build the capacity of the private sector, the Indian Space Research Organisation (ISRO) issued a tender to the private industry for Assembly, Integration and Testing (AIT) of 30-35 satellites. “ISRO has issued a Request For Proposal (RFP) to the private industry to build 30-35 satellites over three years. Under this, 4-5 companies would be selected after evaluation and awarded parallel contracts. They would

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be responsible for the AIT of satellites at ISRO facilities,” said Dr. M Annadurai, Director ISRO satellite centre. He was speaking at the first international seminar on Indian space programme jointly organised by ISRO and the Federation of Indian Chamber of Commerce and Industry. He said ISRO currently launches 3-4 launches per year but the demand is for 16-18 satellites. ISRO expects to get the responses to the RFP by December 5, complete selection of the companies by January 5 and sign contracts by February 5. “The aim is to launch 3-4 satellites in 2018 and improve it further,” Dr. Annadurai said.

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

RUSSIA'S CHOPPERS MADE IN INDIA MAY BE EXPORTED

In what could give a major boost to Make in India and a leg up to India's defence exports Russian made Kamov Ka-226T military helicopters assembled in India could be exported to third countries in future. Under the Indo-Russian bilateral deal for 200 Kamov helicopters the first 60 will be manufactured in Russia & delivered to India and the remaining 140 will be assembled in India. Subsequently plans are in pipeline for additional Kamov helicopters in India and export to third countries, according to senior officials. An Indo-Russian joint venture has been set up to implement the project of the Ka-226T production in India. Further on, the JV will decide on the rate of production and the volume of deliveries and will look for new clients, officials indicated. “We have an order for 200 helicopters: the first 60 rotorcraft will be manufactured in Russia and the subsequent 140 will be assembled in India at an increasing rate of local production. Further on, the sides may make a decision that the Ka-226Ts may be also assembled in India for third countries,” Rostec Corporation Director for International Cooperation and Regional Policy Viktor Kladov was quoted as saying by Russian news agency TASS earlier this week. “The joint venture has no limitations. They have a firm order from the Indian government but after fulfilling it they may supply these products to third countries and I hope that the market will be good, interesting and big,” Kladov said. The Indo-Russian agreement on cooperation in helicopter production was signed in 2015. In October 2016, the sides signed an agreement on establishing a joint venture on the Ka-226T production. The Russian-Indian joint venture on the production of Ka-226T helicopters was established in India in May 2017. The JV was founded by India's Hindustan Aeronautics Limited, Russian Helicopters Group and Russia's state arms seller Rosoboronexport. India and Russia are working on Request for Proposal (RFP) for Kamov helicopters. About a week ago, a meeting was held between India and Russia for the RFP. The RFP is likely to be issued within three to four months with deliberations between the army, IAF and MOD. The Indian army will get about 130 to 140 of these helicopters to replace its ageing Cheetahs, while the Indian Air Force will get the remaining. Russia is also planning to build a Maintenance, Repair and Overhaul (MRO) plant for the Kamov helicopters in India. The Indo-Russian Inter Governmental Agreement also mentions that the helicopters will be exported from India to third countries. “But this will only happen after the first 200 helicopters are delivered to India. So it will take another eight to nine years to be able to export these platforms,” explained officials. Recently in what was a shot in arm for BrahMos jointly developed by India and Russia – Brazil, Kazakhstan and Indonesia showed interest to buy the missiles at the Dubai air show. The interest has primarily been in the air version of the Brahmos missile. The agreement between India and Russia for development of the advanced BrahMos system allows the use of the missile in both countries' armed forces and export to other friendly countries. And the BrahMos supersonic cruise missile was tested onboard Indian Air Force's (IAF) Sukhoi 30-MKI aircraft off the Bay of Bengal.

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