



# E-NEWS



Every Month From Aeronautical Society of India

VOLUME - 12

SEPTEMBER- 2017

RELEASE - 09

Current Affairs

Technology

Business

Advertisements

## TECHNOLOGY



For the first time, Jaguar fighter plane flies with advanced radar

DRDO Has developed India's First Unmanned Tank And It's Awesome



### Publisher

Journal of Aerospace Sciences  
And Technologies  
Aeronautical Society of India  
Bangalore Branch Building  
New Thippasandra Post  
Bangalore 560 075  
Karnataka, INDIA  
Telefax: +91 80 25273851  
Email: editoraesi@yahoo.com

### Publication Team

Dr R Balasubramaniam  
Dr S Kishore Kumar  
Dr P Raghothama Rao  
Dr Satish Chandra  
Mrs Chandrika R Krishnan  
Mr Hemanth Kumar R

### Advertisement – Tariff

A4 – 1 Full Page : Rs. 2000  
Draft Drawn in Favour of  
“Journal Office, The Aeronautical  
Society of India” Payable at  
Bangalore

### Head Quarters

The Aeronautical Society of India  
13-B, Indraprastha Estate  
New Delhi 110 002, India  
Tel: +91 11 23370516  
Fax: +91 11 23370768

### Defence Minister Arun Jaitley launches HAL's light combat helicopter

Defence Minister Mr Arun Jaitley was in Bengaluru to launch HAL designed 5.8 ton category Light Combat Helicopter (LCH) and also to dedicate HAL's role changer design upgrade programme of Hawk-i to the nation. The defence ministry had on November 7, 2016 cleared a Rs 2,911 crore procurement of 15 LCHs for the Army and Air Force. These were limited series production (LSP) orders for the armed forces. These light attack helicopters are being built at HAL's Bengaluru helicopter complex. The Army is committed to buying 114 LCHs and the Air Force another 65. The LCH features a narrow fuselage and tandem configuration for pilot and co-pilot/weapon system operator. It is equipped with 20mm Turret gun, 70mm rocket, air to air missiles, EO-Pod and helmet pointing system. This helicopter can carry out operational roles under extreme weather conditions at different altitude levels. It had demonstrated its capability to land and take off from the Siachen range with considerable loads. Mr Jaitley also dedicated the 100th Hawk advanced jet trainer to the nation. This is the Hawk-i (Hawk-India) that was indigenously converted into a combat-ready platform by HAL. This aircraft is now capable of delivering precise munitions which includes air to ground and close combat weapons. Addressing the gathering at HAL, he said, "In the present geopolitical situation, India is located sensitively. We have had multiple threats in the past. Therefore, preparedness is something India can never compromise on." While congratulating HAL on their achievements, he added that it is necessary for us to come out of a mindset that India is a buyer of defence equipment since, "No country can win battles by being dependent on other countries and being a buyer of defence equipment."



Source: <http://indiatoday.intoday.in/>

# E-NEWS



## CURRENT AFFAIRS

### ISRO to launch a 'back-up' navigation satellite by month-end

Indian Space Research Organisation (ISRO) will launch its navigation satellite IRNSS-1H by the end of this month to augment the existing seven satellites of NavIC constellation, a senior official said. To be launched on board PSLV-C39, IRNSS-1H will be a "back up" navigation satellite for IRNSS-1A, one among the seven satellites in the constellation, as its three rubidium atomic clocks on board had stopped functioning. "IRNSS-1H on board PSLV-C39 will be launched by the end of this month. The exact date will be decided shortly," a senior ISRO official told PTI. He said IRNSS-1H will be a back up for IRNSS-1A, whose three "imported atomic clocks had failed". The Indian Regional Navigation Satellite System (IRNSS) is an independent regional navigation satellite system developed by India on par with US-based GPS. The system that offers services like terrestrial and marine navigation, disaster management, vehicle tracking and fleet management, navigation aide for hikers and travellers, visual and voice navigation for drivers, was named as 'NavIC' (Navigation with Indian Constellation) by Prime Minister Mr Narendra Modi ISRO had launched seven satellites - IRNSS-1G on April 28, 2016, IRNSS-1F (March 10, 2016), IRNSS-1E (January 20, 2016), IRNSS-1D (March 28, 2015), IRNSS-1C (October 16, 2014), IRNSS-1B (April 4, 2014) and IRNSS-1A on July 1, 2013. According to ISRO officials, the total cost of all the seven satellites was Rs 1,420 crore.

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

### ISRO set to launch satellite with corrected clocks

The move became imperative after all three rubidium atomic clocks on IRNSS-1A failed in mid-2016. Indian Space Research Organisation will soon launch a replacement navigation satellite fitted with corrected atomic clocks to make up for the crippled satellite, IRNSS-1A. The upcoming IRNSS-1H will be sent up towards the end of August and a date is yet to be fixed, ISRO Chairman A.S. Kiran Kumar said. Its launch became imperative after all three rubidium atomic clocks on IRNSS-1A failed in mid-2016, Mr. Kumar told *The Hindu*. Three more clocks failed later across the fleet of seven satellites, which together had 21 atomic clocks. "We had problems with all [three] clocks in 1A and needed to bring in the replacement," Mr. Kumar said, adding that the manufacturer had corrected the problem for the clocks in the new spacecraft. An internal committee had identified the cause of 1A's failure. The new clocks are identical to the old ones." The malfunctions [*The Hindu*, January 30, 2017] struck the orbiting satellites even as ISRO completed putting the seventh and last regional navigation spacecraft, 1G, in orbit in April 2016. The first one was put in orbit in July 2013. The 1,420-crore fleet, now called NAVIC or Navigation Indian Constellation, is India's own GPS-like system to give accurate information about location and time of persons or objects — in the same way as the older US Global Positioning System or Russia's GLONASS. Positional details are vital for civil and military aviation, defence needs, ATMs and individual users, besides transport on land, sea or air. European problem The clocks for ISRO's NavIC and the European Space Agency's first 18 Galileo satellites came from the same Swiss company and developed similar problems around the same time. The two agencies had compared their navigation troubles. Mr. Kumar said the hardware solution was also similar for the two agencies. Clarifying that ISRO continues to use all seven satellites, he said the troubled 1A can still send low-powered messages and weather data that are useful to fishermen. "Basically four of these navigation satellites are sufficient for our functions. Within the 1,500 km range it makes no difference" except in the case of satellites put in geostationary orbits, he said. Without the clocks, IRNSS-1A gives a coarse value that cannot be used for functions that need precise data.

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

### VISION 2050: SHAPING INDIAN AVIATION'S FUTURE

As India plans to be a global aviation hub and one of the top three aviation markets worldwide by 2020, experts give us an overview of the this industry According to the French National Institute of Demographic Studies (INED), by the year 2050, India may be the most populous nation with a population of 1.6 billion far ahead of China's 1.3 billion. A report by Knight Frank and Citigroup predicts that, by 2050, the Indian economy may be the world's largest on purchasing power parity basis around \$86 trillion with China at \$80 trillion and USA at \$39 trillion. Given the close relation between the economy and aviation, India is expected to be the third largest aviation market by 2020 and perhaps the largest by 2030. India is one the fastest growing aviation markets and currently the ninth largest civil aviation market in the world. More than 85 international airlines operate to India and five Indian carriers connect over 40 countries. India is one of the

# E-NEWS



least penetrated air markets in the world with 0.04 trips per capita per annum as compared to 0.3 of China and more than two in the USA. India is poised to experience a rapid upswing in the business aviation sector owing to its geographic location, favourable demographics and robust economic growth. Located strategically between the Middle East and Europe on one side and the East Asian economies on the other, India's geography offers a lucrative opportunity for the growth of general and non-scheduled aviation due to the rising demand from the ever growing numbers of high net worth individuals and business houses in the country.

Source: <http://epaperbeta.timesofindia.com/>

## Hope Floats for HAL Airport Again

TAILWINDS GATHER BIAL nod for Hosur airport rekindles optimism that HAL airport too could blip on the regional connectivity radar The Civil Aviation Ministry's aggressive promotion of the regional connectivity scheme (UDAN) is providing some hope for Defence airports in Bengaluru and Bidar to resume operations for small passenger aircraft. The recent "no-objection" from the Bangalore International Airport (BIAL) board to the Hosur airport in Tamil Nadu to operate five flights a week is being seen as a positive step in this direction. The HAL airport in the city and the Bidar airport have not been able to benefit from the phenomenal growth in the civil aviation sector in recent years because of a clause in the concession agreement the Civil Aviation Ministry has signed with private airport operators. This clause seeks to protect private investors by barring a second airport for commercial flights within a radius of 150 km. The Fairfax Group-controlled BIAL and the GMR Group-controlled Rajiv Gandhi International Airport in Hyderabad have not allowed HAL and Bidar airports, in that order, to host commercial flights. Industries and infrastructure minister Mr RV Deshpande told ET that he has been pursuing with the Bengaluru and Hyderabad airport operators on the need for regional connectivity at these two airports on certain terms and conditions. "I have told BIAL to look at HAL airport's case in the same way as Hosur airport. I recently met GMR Group chairman Mr GM Rao and told him to help as the north Karnataka region badly needs air connectivity in the backdrop of industrial and other activities." The GMR Group chairman, he said, responded positively and the Rajiv Gandhi International Airport CEO has followed it up with a letter to the Civil Aviation Ministry. The minister said he has also spoken to MoS (Civil Aviation) Mr Jayant Sinha to call a meeting with all airport stakeholders and open the HAL and Bidar airports for regional connectivity. "As far as HAL airport goes, the ball is in BIAL's court. Both BIAL and HAL have to work together to make things happen. That the BIAL Board granting permission for Hosur airport is a good sign and it may pave way for similar treatment for HAL airport too," said Mr DV Prasad, Additional Chief Secretary, Industries Department, and a BIAL board member till recently. HAL, a company spokesperson said, has recently written to the Civil Aviation Ministry requesting inclusion in the list of airports identified for regional connectivity. According to government officials, non-availability of takeoff and landing slots at Bengaluru and Hyderabad international airports may work in favour of HAL and Bidar airports. These metro airports are unlikely to entertain small aircraft deployed for regional connectivity in peak hours. At a recent meeting the Karnataka government convened, airline executives told Mr Deshpande that airlines deploy smaller aircraft such as ATRs for regional connectivity and ATRs usually take more time for takeoff compared to a large aircraft. Metro airports prefer slotting bigger aircraft to turboprops precisely because of this reason. The turboprops too would need peak-hour slots if regional connectivity scheme has to meet passenger needs, they said.

Source: <http://epaperbeta.timesofindia.com/>

## CSIR lab bars scientists from participating in March for Science

Even as scientists across the country participated in a 'March for Science' to demand greater budgets for research and curbs on "pseudo science," researchers from a prominent CSIR lab here were explicitly warned by its director from participating in it. Multiple scientists at the Institute of Genomics and Integrative Biology (IGIB), a prominent CSIR lab here, told *The Hindu* that they were keen on going but didn't join because of a gag order. *The Hindu* saw an email sent out by IGIB director Mr Sanjay Kumar to all scientists. Mr. Kumar told *The Hindu* that the scientists were barred from going because participation posed a potential security risk. "We don't know the size of the mob involved...when government scientists are part of such a demonstration it could lead to problems. So this notice was issued as part of a safety measure," he added. The CSIR, a chain of 39 laboratories across the country and government-funded, is grappling a severe fund crunch. Even though its annual ₹ 4,000 crore budget hasn't been cut, it has barely ₹ 360 crores — as opposed to a typical ₹ 1200 crore — this year to fund research programmes and scientific staff have been asked to aggressively scout externally for funds. This has led to several programmes, including at IGIB, being scrapped for want of funds. The CSIR, as a whole, didn't issue instructions desisting scientists from participating in the march. The India March for Science, according to Mr Vinay Kumar, a mathematics professor at Delhi University, saw about "400

# E-NEWS



scientists” participate in Delhi. It was organised by a group called Break-Through India and was being planned for over a month. Participants demanded, among other things, that India allot at least 3% of GDP to scientific and technological research (India now spends about 0.9%) and to stop propagation of “unscientific, obscurantist ideas and religious intolerance, and develop scientific temper, human values and spirit of enquiry in conformance with Article 51A of the Constitution.” The March for Science in India drew inspiration from similar protests in the United States in April to contest certain policies of the Trump administration. India’s Science and Technology Ministry — apart from funding conventional research — has been asked to consider funding “research” into the therapeutic value of cow urine and cow dung as part of a programme at the Indian Institute of Technology, Delhi. Vignana Bharati — a Rashtriya Swayam Sevak Sangh-linked association of scientists —condemned the March for Science. “We feel that this march is politically motivated, Left-oriented and anti-government,” secretary general Mr A. Jaykumar said in a statement.

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

## **ISRO lines up 21 rockets, to launch 70 satellites in 5 years**

India’s space agency ‘Indian Space Research Organisation’ (ISRO) has lined up over 21 rocket launches, including the second test flight of its heaviest rocket the Geosynchronous satellite launch vehicle (GSLV) MK-III, which will be carried out over a period of the next three-four years.

The outlay is part of the Rs 8,658.74 crore sanctioned by the government for ISRO to build and launch about 31 rockets, including 15 PSLVs, 13 GSLV’s and three GSLV MK-III. So far the space agency has successfully built and launched 10 vehicles under the agreement. “ISRO’s launch vehicles are being used for launching national satellites towards meeting the earth observation, communication, navigation and scientific needs of the country. The excess capacity has been used to launch satellites of other countries,” said Mr Jitendra Singh, Minister of State at the Prime Minister’s office early this week. The Space Commission, which runs ISRO, is under the direct oversight of the Prime Minister. The plan to launch the next 21 rockets comes at a time when India is looking at putting over 70 satellites in space over the next five years. ISRO has also said that 2017 will be the last year India will utilise foreign launch vehicles to hurl its satellites into space, suggesting that its in-house capabilities have been tested and proven enough to carry out such missions. India currently uses the Ariane 5 rocket, of Arianespace, the European Space Agency to launch its heavier communication satellites into space. With GSLV-MK-III, the heavier rocket that can hurl four-tonne communication satellites into space, it can have the capability locally. Mr Jitendra Singh reiterated that ISRO is making efforts to increase industry participation in building these launch vehicles as the need to step up its launch capabilities goes up, adding that no help from any foreign country is being sought in augmenting its capacity. ISRO has already engaged in forming a consortium with industry partners by 2020 to build and launch the PSLV, its workhorse rocket. This would also allow it to focus on building capabilities in heavier rockets that are powered by a semi-cryogenic engine and the reusable launch vehicle that has potential to hurl cargo into space at low costs. At the same time, it has already begun outsourcing the manufacturing of its navigation satellite - Navic to a private consortium and looks to build capability in a satellite in the industry. India is emerging as a hub for development of satellites as well as a launch pad for small satellites globally.

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

## **Satellite built by ISRO-industry partnership set for launch**

1,400-kg IRNSS-1H is first step in building closer links with private participants In what is seen as the first move for an independent Indian satellite-building industry, the first of two replacements or spare navigation satellites assembled in partnership with a private industry consortium, was flagged off from Bengaluru. The 1,400-kg IRNSS-1H satellite, is due to be deployed in space from Sriharikota this month-end. It will back up the crippled IRNSS-1A, on which all three rubidium atomic clocks have failed. Until now, public and private sector industries have only supplied satellite parts, hardware or material required by the Indian Space Research Organisation. With 1H, they are being readied to build satellites too. ISRO, which says it has only half the satellites it needs, has been trying in recent years to quickly make more satellites and now wants to prepare domestic industry to produce them, as also its launch vehicles.

### **The first steps**

Early last year, ISRO Satellite Centre (ISAC), which assembles Indian satellites, started one such initiative with two spare navigation (IRNSS or NavIC) satellites. Seven of them, 1A to 1G, are in orbit. Over the last six months, ISAC roped in about 70 personnel from a six-company consortium for assembly, integration and testing. On August 12, the

# E-NEWS



first of the resulting products, 1H, left ISAC for Sriharikota. ISAC Director Mr M. Annadurai credited about 25% of the realisation of 1H to the external team and called it 'a modest beginning.' "1H is the eighth NavIC satellite. The industry team was trained and was an active part of mechanical assembly, electrical integration, testing in various modes and thermovac vibration tests." ISAC used a separate clean room for the job. The external team watched the integration, and was part of the multiple checks. Dr . Annadurai said the industry team would have bigger responsibilities with the next one, IRNSS-1I, that will soon get into assembly. "I am confident that they can do up to 95% of the tasks, but under our supervision. We will change the ratio of work, hand over all hardware and handhold them through a similar cycle."

## Space-grade lessons

Last December, ISAC signed the two-satellite contract with a consortium of six companies led by Alpha Design Technologies Pvt Ltd, Bengaluru. About their work on the first satellite, Colonel H.S. Shankar (retd), chairman and MD, Alpha Technologies, said, "It was a fantastic exposure to space-grade work, the priority given to quality and elaborate tests and documentation they do at every stage to eliminate any error." They would further finetune their work on the second satellite, he said.

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

## Boeing Talks 3D Printing for Aerospace

On the ground floor of 3D printing technology for years, aerospace manufacturers first began adopting the various additive manufacturing (AM) processes for use in prototyping. With each advance in the technology, they have been there as AM was used for the creation of tooling to, most recently, the mass manufacturing of end parts. GE increased its role in the industry dramatically when it acquired two metal 3D printer manufacturers and formed GE Additive. GE, however, isn't the only aerospace company that's taken AM to the skies. Also ahead of the pack is Boeing, which has been flying 3D-printed parts since 2003. As a manufacturer with a leading role in the 3D printing space, Boeing may be able to offer key insight into the various platforms that make up AM and how they are currently being used in aerospace, as well as how they can and will be used in the industry in the future. To gain some of this insight, ENGINEERING.com spoke to Mr Leo Christodoulou, director of Structures and Materials, Enterprise Operations and Technology at Boeing. As the number two federal contractor, behind Lockheed Martin, Boeing was awarded over \$16 billion in taxpayer funds in 2015. Being so closely tied to the federal government has historically given the aerospace manufacturer access to some of the Department of Defense's leading projects. In 2003, for instance, Boeing was a part of a U.S. Air Force Research Laboratory effort to qualify and fly a metal 3D-printed part on the F-15 fighter jet. The project arose when a replacement part was needed, but the lead time for tooling would be too long. Additionally, the part was going to be made from titanium, rather than with aluminium forging, as had been the case in the past. This would reduce corrosion fatigue associated with the aluminium part. To produce the titanium pylon rib, a laser powder feed deposition process, a form of directed energy deposition (DED), was used. The part became the first 3D-printed metal part to qualify and fly on a military aircraft. Almost 14 years later, Boeing now has over 50,000 3D-printed components of various types flying on aircraft today.

## DED in 2017

As if reliving the past, Boeing is turning to DED once again to produce structural components for its 787 Dreamliner. Working with Norsk Titanium and its rapid plasma deposition technology, the company will 3D print what could be the first titanium structural components for an aircraft. Boeing and Norsk have been working together since 2016 to first see if the parts produced by Norsk could meet Boeing's requirements, and then whether they could meet those of the Federal Aviation Administration (FAA) program. The companies are anticipating that additional FAA approval for the material properties and manufacturing process will be obtained this year. DED processes do not offer the same geometric complexity as selective laser melting, but, by 3D printing near-net-shape parts and then machining them to their final shape, it's possible to speed up turnaround time, reduce material waste and reduce costs. Christodoulou explained, "Some technologies offer better complexity than others, but even though some [like DED] don't offer as much complexity, they still provide value in terms of buy-to-fly ratio. If you have an expensive material like titanium, for example, you can reduce the cost of how much you have to machine away and the buy-to-fly ratio tends to be very high. Even with a technique where the processes do not give you the buy-to fly ratio, you can gain a lot of value by not having to buy all the material that you machine away." This may be clearly demonstrated with the 787 Dreamliner. By leveraging plasma deposition from Norsk, Boeing aims to cut costs by \$2 to \$3 million. Other AM Tools in the Toolbox

# E-NEWS



Although DED may have been one of the first technologies that Boeing leveraged for the production of an end part, it has become just one of many within the company's repertoire, according to Christodoulou. "AM for us is a toolbox in a toolbox. AM is not really one single technology. It's a range of technologies. These technologies are applied differently in polymeric systems, composites, metals, and potentially ceramics. Different classes of material employ different processes, and each material class has multiple processes that one might consider," Christodoulou said. "The largest toolbox is the whole manufacturing or production system," Christodoulou continued. "That production system has all of the traditional processes that we currently use, whether it's fiber placement machines or machining of aluminium, whether it's casting, forging, rolling, resin infusion—AM is one part of an entire manufacturing system. It's never going to replace them all. It might not replace any of them." Among the other AM tools in Boeing's toolbox is fused deposition modeling from Stratasys. The company has been working with Stratasys to develop its Infinite Build technology, which has a hypothetically infinite build direction on the horizontal axis. "If you talk about AM, people think of a 3D printer somewhere in a box. What we did when we worked with Stratasys was we worked to take AM out of the box, creating a system by which we could remove parts and, in a sense, make them infinitely long," Christodoulou said. "We're not constrained by the volume now of a box, but our ability to have a stable process that will work for maybe three weeks, 24/7, nonstop. It's all about that stability of the process." The aim for using a technology that is capable of producing such large components may not be for 3D printing end parts necessarily, but also manufacturing aids. Last year, Boeing and Oak Ridge National Laboratory (ORNL) won a Guinness World Record for producing the largest solid 3D-printed item. It wasn't an aircraft wing that the partners printed, but a large piece of tooling used to secure the 777X composite wing skin for drilling and machining. Christodoulou said, "That part doesn't have any mechanical requirements for flight, but it has very strict requirements in terms of dimensional control because it's the tool on which we build parts that do fly." 3D Printing That Meets Boeing's Standards The machine used to produce the part was the Big Area Additive Manufacturing (BAAM) system from Cincinnati Inc. Although the BAAM is relatively new, Boeing doesn't just use any new 3D printer to make parts for the sheer novelty and marketability of it. According to Christodoulou, every technology and part goes through a rigorous quality control process. "The adoption of a given technology is commensurate with its maturity. Some technology is more mature than others, so it's more likely to meet our requirements than others," Christodoulou explained. "We have full intention to capture the benefits of new technologies as they come along, but our implementation is based on using technologies and processes that are stable so that they are reproducible." One of the key elements in Boeing's development and adoption programs is the ability to demonstrate reproducibility. This holds true not just for AM, but for all of its manufacturing tools. Christodoulou said that Boeing has very stringent process specifications for how to build a given part and the settings on the machines. Once stability has been demonstrated across processes on multiple machines and in multiple installations across the globe, the company develops a database compiling the properties of parts. This enables Boeing to have data that supports the use of a particular process to manufacture a specific component. This is true not just for processes, but for materials as well. Among the most recent materials Boeing is experimenting with OXPEKK, a form of laser sintered polyetherketoneketone developed by Oxford Performance Materials (OPM). OPM will be supplying over 600 parts for the Boeing Crew Space Transportation (CST)-100 Starliner spacecraft, which is meant to carry up to seven passengers—or a combination of crew and cargo—to low-Earth orbit destinations like the International Space Station. And while Boeing is qualifying processes on the production front, one of the biggest challenges according to Christodoulou is in the culture of manufacturing and design. This is because industry has become accustomed to designing for existing production technologies. 3D printing, however, opens up the ability to produce parts that were impossible to make with traditional techniques, such as complex geometries with internal structures.

## Boeing's AM Strategy

Unlike other aerospace companies adopting AM technology, Boeing doesn't rely entirely on in-house production, Christodoulou pointed out. Instead, Boeing tries to strike a balance between in-house work and leveraging its supply chain. "65 percent of our work is done outside of Boeing by our suppliers," Christodoulou said. We have 20 sites within our walls that perform some form of AM—from Puget Sound to St Louis to Mesa to overseas, in the UK and Germany—but we have to balance between our internal activities and our supply chain. In many cases, the value proposition for us is to work collaboratively with our supply base and exploit their expertise and their capital investment. For example, Norsk has made a lot of capital investments in its technology that we don't necessarily want to duplicate. I would rather work collaboratively with them. We value and appreciate the contributions of our suppliers." Additionally, Boeing is not a machine manufacturer, like GE. So, while it may make sense for GE to acquire 3D printer manufacturers like Arcam and Concept Laser, Boeing does not plan to build and sell AM machines. Christodoulou drove home the point that, for Boeing, AM adoption is not a marketing strategy. "We are very deliberate and thoughtful in our use of AM," he said. "I personally—and the whole company—we don't buy into all of the hype. We use AM where it best

# E-NEWS



makes sense for performance reasons, for schedule reasons, for cost reasons. We will not put a part on an aircraft just because it's by AM."

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

## **India to Have Public-Private Aerospace Consortium to Conquer Global Industry**

ISRO chief Mr A.S. Kiran Kumar has said that the agency is hopeful of roping in private players to build a consortium that would primarily build launch vehicles. The focus of such consortium would be to capture the global market for satellite launching. Breaking a record set by Russia, ISRO earlier this year launched 104 satellites using a single Polar Satellite Launch Vehicle (PSLV), the agency's most trusted launcher. With a consortium, ISRO plans to raise the number of PSLVs so that the frequency of launches can match the number of launch vehicles. The aim is to increase ISRO's annual launches to 24, Mr Kumar said, while also boosting its existing constellation of 42 satellites. ISRO is preparing for inter-planetary missions as well as launching India's second lunar probe mission — Chandrayaan-2. ISRO has invited proposals from the scientific community on the possible programs that could be launched for its inter-planetary missions for Venus, Mars and some of the asteroids. The average annual revenue of the international satellite market over the last three years has been estimated at approximately \$200 billion. ISRO's commercial arm, Antrix reportedly earned approximately \$36 million in 2015-16 through commercial launch services, which is about 0.6 per cent of the global launch service market, according to Mr Jitendra Singh, Minister of State for the Department of Space.

Source: <https://sputniknews.com/>

## **Three-day aerospace conference begins at Institute of Aerospace Medicine**

AT what altitude is additional oxygen required in a fighter jet? What is the extent of load that the human body can take and how can this be maximised during combat? Answers to these questions are some of the outcomes of aeromedical research. The 56th annual three-day conference of the Indian Society of Aerospace Medicine is underway in the city. It is being held at the Institute of Aerospace Medicine (IAM) on Old Airport Road. At the inaugural address, Chief of Air Staff, Air Chief Marshal BS Dhanoa announced that IAM had procured the High performance Human Centrifuge Disorientation Simulators and the latest Ejection Procedure Simulator at the Aeromedical Training Centres. "The progress made in Night Vision Goggle (NVG) training is an example of the support aerospace medicine has made to the evolving flying environment," he was quoted as saying, according to a press statement. IAM provides support to the Indian Aviation Industry. "Grounding of pilots on medical grounds is a tremendous loss to an organisation. Your scientific work may provide hope to aviators who have overcome medical ailments so as to return to active flying duties," Chief of Air Staff, Air Chief Marshal BS Dhanoa, said. The Conference is being attended by service delegates (medical officers and aerospace medicine specialists from the Army, Navy and Air Force), civilian delegates and foreign delegates with 15 scientific sessions where novel research will be presented. Dr Scott Allen Shappell, professor, Department of Human Systems at the Embry Riddle Aeronautical University, Florida, will be delivering the Air Marshal Subroto Mukherjee Memorial Oration which is one of the highlights of the conference every year. The Air Vice Marshal Srinagesh Memorial Oration will be delivered by Air Commodore Dr Harish Malik who will speak on Civil Aerospace Medicine in India.

Source: <http://idrw.org>

## **HAL converts jet trainer aircraft into combat-ready Hawk-I**

From a mere trainer, the HAL has upgraded its Hawk jet aircraft into a combat-ready platform. Union Defence Minister Arun Jaitley dedicated HAL's 100th Hawk jet trainer aircraft with a new designation, Hawk-i (Hawk-India) in Bengaluru. He also launched the HAL designed 5.8-ton category Light Combat Helicopter produced by HAL. HAL took up the indigenous role change development program to convert the jet trainer into a Combat-Ready platform. The aircraft is upgraded with indigenously designed avionics hardware, software and system architecture enhancing operational role from a trainer aircraft into a Combat-ready platform. The Hawk-i is equipped with improved quality and depth of training by Large Force Engagement tactics through Electronic Virtual Training System. With the upgrade, Hawk-i is capable of delivering precision Munitions including Air to Ground and close combat weapons, self defence capabilities through Electronic Warfare systems, digital map generator and operational reliability through new Dual Hot stand-by Mission Computer Avionics architecture supported by indigenous high accuracy and high Altitude Radio Altimeter, IFF MKXII,

# E-NEWS



Data Transfer system, CMDS and RWR. Speaking at the launch, Defence Minister Mr Arun Jaitley stressed on the fact that India, considering the geopolitical situation can never compromise on preparedness considering the constant threat. "We have been heavily dependent on the rest of the world for buying, both in terms of equipment and technology. This is ironic because Indians have taken to technology very well. Our ability to throw out people efficient in technology is second to none. Today, from the detailed resume that was given to me, it is clear that we are systematically moving in a direction where we wish to make ourselves a major manufacturing hub, not only for supplying for ourselves but for the rest of the world," he said. "The Light Combat Helicopter and Hawk-i would provide the country extra potential to have additional combat resource and the programs are truly 'Make in India', capable of generating employment opportunities in the country including MSME and Service sectors. These programs ensure public-private industry participation. There will be a significant spin-off in the form of development of an eco-system for manufacture and in meeting the objectives of "Skill India" initiative in Aerospace and Defence in the country," said T Suvarna Raju, CMD, HAL. The aircraft was on display in 2017 Aero India. The integration of indigenous HUD, RLG based INS and Anti Airfield Missile is in the advance stage, according to HAL. The PSU's Rotary Wing R&D Centre designed the LCH whereas Mission & Combat System R&D Centre (MCSRDC) designed the Hawk-i in association with the Aircraft Division. HAL's Light Combat Helicopter launched Arun Jaitley also launched HAL's Light Combat Helicopter whose basic version has been cleared by CEMILAC. The DAC has accorded approval for procurement of 15 LCH from HAL under IDDM category. HAL designed-twin engine Light Combat Helicopter of 5.8 Ton class features narrow fuselage and tandem configuration for pilot and co-pilot or weapon system operator. The helicopter has indigenous state of the art technologies like the integrated dynamic system, bearing less Tail Rotor, anti-resonance vibration isolation system, crash worthy landing gear, smart glass cockpit, hinge less main rotor, Armour Protection and Stealth features from visual, aural, radar and IR signatures. The LCH is equipped with 20mm Turret gun, 70 mm Rocket, Air to Air Missile, EO-Pod and Helmet pointing system. The helicopter can carry out operational roles under extreme weather conditions at different altitudes from sea level, hot weather desert, cold weather and Himalayan altitudes. The LCH has demonstrated the capability to land and take off from Siachen Range with considerable load, fuel and weapons that are beyond any other combat helicopter.

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

## HAL aims to double production of LCA over next three years

### Key Points

- HAL is looking to increase production of the Tejas Light Combat Aircraft from 8 to 16 platforms per year from 2019-20
- The type only entered squadron service in January 2015, 32 years after the LCA programme began

India's state-owned Hindustan Aeronautics Limited (HAL) aims to double production of the indigenously developed Tejas Light Combat Aircraft (LCA) for the Indian Air Force (IAF) from 8 to 16 platforms per year from 2019-20, company officials have said. HAL intends to accomplish this by investing an additional INR12.31 billion (USD191.78 million) in expanding the existing LCA assembly line in Bangalore and establishing a second one by using its BAE Systems Hawk 132 jet trainer licence-building facility. Until then HAL, which has so far delivered just 3 of 20 single-engine LCA Mk1s ordered by the IAF in 2005, will build 8 fighters in 2017-18 and 10 the following year, said company chairman Mr T Suvarna Raju. Thereafter, from 2019-20 onwards, HAL would annually build 16 upgraded Tejas Mk1A variants to meet the IAF's order for 83 LCAs, approved by the Indian Ministry of Defence (MoD) in a November 2016 contract worth INR500.25 billion. "We have created Tier-I suppliers to build parts of Tejas. HAL would be concentrating on integration work, with private aerospace companies supplying major assemblies for Tejas," Mr Raju told *Jane's* on 21 August. Earlier, Mr Raju had told the *Business Standard* newspaper that previously it took HAL 19 months to build one LCA, but that from September onwards the platform construction time would be reduced by more than half, to nine months per aircraft.

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

## ISRO opens up satellite making to industry

The Indian Space Research Organisation has opened the door to domestic entities that can give it up to 18 spacecraft a year starting mid to late 2018. The Bengaluru-based ISRO Satellite Centre (ISAC), which has so far produced about 90 Indian spacecraft, invited single or combined industries to apply for this opportunity. ISAC Director M. Annadurai told *The Hindu* that the centre expected to select five or six contenders from this exercise "if they are found technically suitable."

# E-NEWS



## Three-year contract

ISAC would sign a three-year contract with the finalists, train, handhold and supervise their teams in making its range of satellites at its facility. The Indian Space Research Organisation currently makes four categories of spacecraft — communication, remote sensing, navigation and scientific missions — and in three sizes of 1,000 kg to 4,000 kg. The first lot of spacecraft from this exercise was expected in about six months from the signing of the contracts. This is also roughly the normal time taken to assemble a satellite. Dr. Annadurai said: “The outsourcing of assembly, integration and testing [AIT] in a way covers operational spacecraft, mostly repeat types that ISRO routinely requires. However it will be decided by an in-house committee” which he heads. About the cost of industry-made spacecraft versus those made in-house, he said: “We don’t envisage any cost increase.” Currently, about eight satellites are being produced in a year for national programmes; a 2,000-kg spacecraft costs ISRO about 1 200 crore. The contract mentions milestone payments, assigning of new spacecraft upon delivery; and a possible renewal of contract after three years.

## Benefits for SIRE

How would the exercise benefit ISRO or ISAC which has around 900 engineers versed in different skills related to spacecraft? “Right now, the manpower of ISAC/ISRO is not adequate for meeting both the increased load of making more satellites; and also for the R&D that we need for future satellites. The present bid to outsource our AIT will help us re-deploy our human resources effectively and focus on R&D,” he said. It would also aid self-reliance by way of an independent Indian satellite industry.

## Important missions

Although the goal is to get vendors to realise satellites “end to end”, ISAC would retain important and scientific missions. In the \$ 339-billion global space industry, satellite manufacturing accounts for 8% or \$13.9 billion ( data as per the Satellite Industry Association’s 2017 report). This segment is led by established players from the United States and Europe who supply satellites to their government and commercial users. ISAC’s EoI is seen as a first step towards the making of an Indian space industry.

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

## CSIR ranked 9th public research institution of the world

India’s largest autonomous public research and development organisation Council of Scientific and Industrial Research (CSIR) has been ranked ninth in the world. The ranking is based on a composite indicator that combines research performance, innovation outputs and societal impact measured by their web visibility, so as to reflect scientific, economic and social characteristics of institutions. The institute has been ranked ninth amongst a total of 1,207 government institutions, according to the Scimago Institutions ranking World Report 2017. With this ranking, CSIR comes in the company of globally renowned organisations namely Chinese Academy of Sciences; Centre National de la Recherche Scientifique, France; Helmholtz Gemeinschaft and Max Planck Gesellschaft in Germany; Consejo Superior de Investigaciones Cientificas, Spain; Russian Academy of Sciences; Japan Science and Technology Agency; Consiglio Nazionale delle Ricerche, Italy and Leibniz Gemeinschaft, Germany. “In overall global ranking, CSIR stands at 75th position amongst 5250 institutions world-wide. It is the only Indian organisation which has found place amongst the Top 100 Global Institutions,” CSIR said in a statement here. Scimago Institutions Ranking (SIR) is a science evaluation resource developed by Scimago Labs based on data from Scopus — one of the world’s largest database of peer-reviewed research literature, to assess Worldwide Institutions. Known for its cutting edge research and development (R&D) in science and technology areas, the CSIR has a dynamic network of 38 national laboratories and 38 outreach centres. CSIR covers a wide spectrum of science and technology — from radio and space physics, oceanography, geophysics, chemicals, drugs, genomics, biotechnology and nanotechnology to mining, aeronautics, instrumentation, environmental engineering and information technology. It provides significant technological intervention in many areas with regard to societal efforts which include environment, health, drinking water, food, housing, energy, leather, farm and non-farm sectors.

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

# E-NEWS



## India's HAL begins 5.8t light combat helicopter production

India-based Hindustan Aeronautics Limited (HAL) has commenced the production of a 5.8t light combat helicopter (LCH) for the Indian military. The twin engine LCH has been designed with narrow fuselage and tandem configuration for the pilot and co-pilot/weapon system operators. The helicopter is equipped with an indigenously developed integrated dynamic system, bearingless tail rotor, and anti-resonance vibration isolation system. It also includes crashworthy landing gear, a smart glass cockpit, and hingeless main rotor. Armed with a 20mm turret gun, 70mm rocket, air-to-air missile, EO-Pod, and helmet pointing system, the LCH can be operated under extreme weather conditions at different altitudes from sea level, hot weather desert, cold weather, and Himalayan altitudes. The LCH has demonstrated its capability to land and take off from Siachen Range with considerable load, fuel and weapons, HAL stated. HAL's Rotary Wing R&D Centre designed the LCH and the basic version has been cleared by Center for Military Airworthiness and Certification (CEMILAC). The Defence Acquisition Council (DAC) has approved the procurement of 15 LCHs from HAL. HAL also launched a programme to upgrade Hawk-i from a trainer aircraft into a combat-ready platform. The Hawk-i is capable of delivering precision munitions, including air-to-ground and close combat weapons, self-defence capabilities through electronic warfare (EW) systems, digital map generator, and operational reliability, HAL stated. The aircraft's new dual hot standby mission computer avionics architecture is supported by indigenous high-accuracy and high-altitude radio altimeter, IFF MKXII, data transfer system, CMDS, and RWR.

Source: <http://www.airforce-technology.com/>

### TECHNOLOGY

## DRDO Has developed India's First Unmanned Tank And It's Awesome

We all know that how military tankers help in war situations. They are used to carry heavy weapons to the war field which cannot be carried by soldiers and it has many other benefits. All the military tankers were manned and were needed to be manually handled and driven until now, when India has successfully created some unmanned tanks recently. It is also called as Unmanned Ground Vehicle (UGV), these vehicles or tankers operate without on board human presence. They are extremely useful where it is inconvenient for humans to operate. Where there is extreme danger or impossible for a human to operate in a particular area, these tanks can be sent to get the work done as it won't harm any human life. They are decorated with some sensors which are used to detect the useful information and get back. The details about one of our very first such kind of creations are given below. Defence Research and Development Organisation (DRDO) has recently developed India's first unmanned tank 'Muntra', which is just been passed out of the Chennai Lab. It is called **Mission UNmanned TRACKed**.

The unmanned tank muntra has three alternatives:

- Surveillance
- Mine detection
- Investigation of areas with nuclear and bio threats.

The tank will not only be used by the army, but also by the nasal hit areas of India. Even though the tank has been developed and tested for the army by Combat Vehicles Research and Development Establishment (CVRDE) in Avadi, paramilitary has requested for it's use in naxal hit areas as well. Coming back to the three alternatives of Muntra:

- Muntra -S has been developed for the unmanned surveillance mission.
- Muntra -M is built for detecting mines.
- Muntra-N is created to detect nuclear radiations or bio weapon risks in the suspected areas.

The testing and validation of the tanks has been done at Mahajan field firing range in Rajasthan, where temperatures touch 52 degrees and is very dusty. The Muntra tank has an integrated camera along with laser range finder and surveillance radar. The integrated camera and the laser range finder will help in spying on ground targets about 15 kilometers away ranging from crawling men or heavy vehicles. Two of these remote operated vehicles were on display at the exhibition namely, 'Science of Soldiers' which was organized by DRDO. IT was a tribute to our former President Dr APJ Abdul Kalam.at CVRDE n Avadi. With this new addition to the weapons, Indian military is going to develop huge benefits from these tanks.

Source: <http://defencelover.in/drdo-developed-indias-first-unmanned-tank-awesome/>

# E-NEWS



## **ISRO to develop full-fledged hyperspectral imaging satellite**

'Hypex' imaging will enable distinct identification of objects from space. A new set of future satellites called hyperspectral imaging satellites is set to add teeth to the way India is gleaned from about 600 km in space. The Indian Space Research Organisation (ISRO) says it plans to launch a full-fledged niche Earth observation (EO) satellite — called the Hyperspectral Imaging Satellite or HySIS — using a critical chip it has developed. There is no specific time-frame yet for its launch, an ISRO spokesman said, adding that meanwhile, the new chip, technically called an "optical imaging detector array," that they have created for it would be tested and perfected. "ISRO is endeavouring to enter the domain of operational hyperspectral imaging from earth orbit" with a satellite that can see in 55 spectral or colour bands from 630 km above ground," the space organisation has said. It said it decided to develop the chip that suited Indian requirements. Hyperspectral or hypex imaging is said to be an EO trend that is being experimented globally. Adding a new dimension to plain-vanilla optical imagers, it can be used for a range of activities from monitoring the environment, crops, looking for oil and minerals all the way up to military surveillance — all of which need images that show a high level of differentiation of the object or scene. About a decade ago, ISRO added another EO niche with microwave or radar imaging satellites RISAT-1 and 2 that could 'see' through clouds and the dark — an important feature useful for the military and security agencies. 'Hypex' imaging is said to enable distinct identification of objects, materials or processes on Earth by reading the spectrum for each pixel of a scene from space. Another official described it as "another important development by ISRO in its quest for better and diverse Earth observation technologies." ISRO first tried it out in an 83-kg IMS-1 experimental satellite in May 2008. The same year, a hyperspectral camera was put on Chandrayaan-1 and used to map lunar mineral resources. Very few space agencies have such a satellite; a German environmental satellite called EnMAP is due to be launched on an Indian booster in 2018. The payloads development centre, Space Applications Centre, Ahmedabad, designed the architecture of the chip which was made at ISRO's electronics arm, the Semi-Conductor Laboratory, Chandigarh. The result was a detector array that could read 1000 x 66 pixels. According to an EO expert who called it the 'CATSCAN' equivalent of Earth from space, hypex technology was still an evolving science. It came with many challenges and, as such, space agencies were still ironing out its issues after many years.

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

## **For the first time, Jaguar fighter plane flies with advanced radar**

Test pilots at defence PSU Hindustan Aeronautics Limited (HAL) flew for the first time an upgraded Jaguar fighter aircraft fitted with an AESA (active electronically scanned array) radar. The Jaguar Darin III, which HAL is upgrading for the Indian Air Force (IAF), will now boast of the state-of-the-art AESA radar and improved features like multi target tracking frequency agility, higher bandwidth of operation, interleaved modes of operation, higher accuracies and resolution. HAL and Israeli firm ELTA, whose radar the defence PSU has fitted the Jaguar with, had completed the ground trials in February. Apart from the AESA radar, the aircraft will also be equipped with 28 new sensors, among other things. With all the new features, the Jaguar Darin III is expected to serve the IAF for at least another decade. The IAF, which has been struggling to keep up its fighter plane strength at the desired level was satisfied with the initial upgrade plan and the aircraft had received the IOC (initial operational clearance) in November 2016. "The upgrade incorporates new state-of-the-art avionics architecture including the Open System Architecture Mission Computer (OSAMC), Engine and Flight Instrument System (EFIS), Fire Control Radar, Inertial Navigation System with GPS and Geodetic height correction, et al," HAL said. It added that the plane will also boast of Solid State Digital Video Recording System (SSDVRS), Solid State Flight Data Recorder (SSFDR), Smart Multi-Function Display (SMD), Radio Altimeter with 20,000 ft range, Autopilot with Alt Select and Identification of Friend or Foe (IFF).

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

## **India's HAL flies first AESA radar-upgraded Jaguar fighter aircraft**

India-based Hindustan Aeronautics Limited (HAL) has reportedly announced the successful flight of the first Jaguar fighter aircraft to be upgraded with an active electronically scanned array (AESA) radar. The aircraft will be capable of tracking multiple targets and communicating in multiple frequencies via high bandwidth using the AESA radar system. HAL's Mission & Combat System Research & Design Centre carried out the upgrade to the Indian Air Force's (IAF) fighter plane, The Hindu reported. Works performed as part of the modernisation included upgrading software and hardware, as well as refurbishing various electrical and mechanical elements of the aircraft. In addition to AESA radar, the Jaguar DARIN III aircraft is being fitted with 28 new sensors, according to media sources. The upgrade includes new advanced avionics architecture such as the open system architecture

# E-NEWS



mission computer, an improved engine and flight instrument system, fire-control radar, inertial navigation system with GPS and Geodetic height correction, The Times of India reported. The aircraft will also feature a solid-state digital video recording system, a solid-state flight data recorder, smart multi-function displays and a radio altimeter with 20,000ft range, as well as autopilot with alt-select and identification of friend or foe capabilities. A total of 50 Jaguar fighter jets are being upgraded from level DARIN I to DARIN III under the project. The Jaguar Darin III achieved initial operational clearance in November 2016.

Source: <http://www.airforce-technology.com/>

## **India's first satellite actively built by private firms to take off**

Fifty-years after India's space programme first test fired a rocket, a new chapter is ready to unfold with the country's first satellite built actively by the private industry all set to enter space. For the first time, private players have been actively involved in building a full satellite. Their role earlier was limited to supplying components-with 70 engineers from a consortium led by Bengaluru-based Alpha Design Technologies having built the satellite and also tested it. "While this is certainly the first time a private industry, for that matter anybody outside ISRO (Indian Space Research Organisation) has been part of building a satellite. But the credit for the project must go to ISRO, whose scientists have helped us in every step of the project," Col HS Shankar, CMD, Alpha Design Technologies told TOI. The consortium has built the eighth satellite to be launched as part of the Indian Regional Navigation Satellite System (IRNSS) programme, a 29-hour countdown to launch which began at 2pm. The 1,425-kg IRNSS-1H satellite is scheduled to be launched at 6.45pm by the PSLV-C39, and sources in the ISRO said that the role of private firms in building the next satellite as part of the programme (IRNSS-1I) will see less participation from ISRO. "We are confident that the engineers from the consortium will be able to do it. That doesn't mean we won't be overseeing the development," a senior ISRO official said. Shankar, who said that consortium has bagged the orders to build IRNSS-1I and that the work on that has already begun, however, said the value of the same could not be disclosed. The IRNSS-1I is scheduled for an April 2018 launch. Further, in another first, crucial part of the development of IRNSS-1H happened at the newly-developed ISRO Space park in whitefield. TOI had first reported about this park in 2016. The park provides private players the infrastructure needed to participate in space projects, which was planned so that they need not worry about spending too much money. Senior ISRO scientists M Annadurai had said "The space park will see a lot of firms already working with ISRO use our infrastructure and become partners. The land belongs to ISRO and even the infrastructure is being provided by the space agency."

## **Replacement Satellite**

The IRNSS-1H is a replacement satellite for IRNSS-1A whose atomic clocks failed rendering it useless. "While we already had plans of IRNSS-1H, to be used a spare orbit satellite as part of the programme, it will now serve as the replacement to IRNSS-1A," an ISRO official said. Further, ISRO officials said that failing of atomic clocks-all three had failed on IRNSS-1A-are not unique to India's programme. Such failures have occurred even in Russia's Glonass and a similar programme of the European Space Agency. The satellite will be launched into a sub Geosynchronous Transfer Orbit (sub-GTO) with a 284 km perigee (nearest point to Earth) and 20,650 km apogee (farthest point to Earth). After injection into this preliminary orbit, the two solar panels of IRNSS-1H are automatically deployed and the Master Control Facility (MCF) at Hassan will take control of the satellite and perform the initial orbit raising manoeuvres, and finally place it in its designated slot. Once fully functional, IRNSS will be useful for the railways, surveying and alignment and providing location-based services. The Indian Air Force (IAF) will replace GPS with IRNSS on its fighter planes.

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

## **BUSINESS**

## **ISRO to sign MoU with CSIR-NPL to make desi GPS a reality soon**

Seeking to make desi GPS - indigenous regional positioning system named as Navigation with Indian Constellation (NavIC) - independent from the US clock system, the Indian Space Research Organisation (ISRO) will sign an MoU with CSIR-National Physical Laboratory (NPL) for time and frequency traceability services. The move will help the desi GPS get formally synchronized with the Indian Standard Time (IST) which is being maintained by the Delhi-based NPL - the timekeeper of India. The step will help in making the desi GPS fully operational in the market for

# E-NEWS



commercial purposes as time synchronisation is essential for all kinds of services - be it financial transactions, stock handling, digital archiving, time stamping, national security or prevention of cyber crimes. "We can't depend for ever on the US-based National Institute of Standards and Technology (NIST). After signing the MoU, the space clocks will be synchronised to that of the Primary National Atomic Clocks at National Physical Laboratory and therefore will have independence," said Mr Dinesh Aswal, director of NPL. Though India can source the IST from the US-based NIST, the accuracy of time may vary. Aswal told TOI, "Though millisecond or microsecond accuracy is sufficient for day-to-day activities, the ISRO needs accuracy up to nanoseconds level for navigation, surveillance and other national missions." The NPL maintains accuracy of  $\pm 20$  nanoseconds and thereby gives the most accurate time which is essential for satellite navigation system. It has the "Primary Reference Clock", which is traceable to the Coordinated Universal Time (UTC) provided by International Bureau of Weights and Measures (BIPM) located in Sevres, France. The UTC consists of a time-scale that combines the output of more than 400 highly precise atomic clocks worldwide, including five at the CSIR-NPL. Another scientist of the NPL explained that time has to be incredibly accurate as light travels 30 centimetres in one nanosecond (or 300 million metres in one second). "Any tiny error in the time signal could put you off course by a very long way," he said. Ahead of signing of the MoU, the government informed the Rajya Sabha about all the measures being taken by ISRO to popularise the desi navigation system at a time when the American GPS dominates the navigation system market across the world. Minister of state for space and atomic energy Mr Jitendra Singh, in his written reply to a question in Parliament, said, "Various types of user receivers are being developed indigenously involving the Indian industry and discussions amongst government departments, user-receiver manufacturers, system integrators and service providers are taking place for the usage of NavIC system." He, however, noted that the NavIC may take couple of years to become fully operational in the market.

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

## **FLY A JET YOU DON'T OWN**

If owning a business jet seems tough, the other business mode that has worked in the west is fractional jet ownership. A company or individual buys, or leases, a fractional interest in one aircraft just as they might acquire a partial interest in one condo unit. The concept is still new in India. The future of business aviation in India lies in product innovation. With the growth of wealth, wealth generators and HNIs in India customized solutions that create access for more customers to a fleet of aircraft with a good value proposition is a huge opportunity. There is a growth of professionals, sports stars, celebrities and entrepreneurs who need access to business aircraft and may not necessarily want to own one or be able to own one. Corporate aviation, whether by complete or fractional ownership, is a piece that the industry and the government cannot ignore it could be the next big pull for the economy, bringing in revenues from both foreign travellers and increased domestic business efficiency. India plans to be a global aviation hub and one of the top three aviation markets worldwide by 2020. By 2020, passenger traffic at India Airport is expected to increase to 450 million from 159.3 million in 2012-2013. The aviation sector is likely to see investments totalling USD 12.1 billion during 12th Five Year Plan, out of which USD 9.3 billion is expected to come from the private sector. 200 low-cost airports are planned to be built in the next 20 years to connect tier-II and tier-III cities. USD 1.3 billion is planned to be spent on non-metro projects during 2013-17 mainly focusing on the modernisation and up gradation of airports.

Source: <http://epaperbeta.timesofindia.com/>

## **ISRO, NASA to collaborate on space-based sensors, radar systems**

India's space agency, ISRO, and NASA of the US are working on the development of advanced space-based sensors and radar systems that can help sharpen earth observation applications in the future, according to Tapan Misra, Director of the Ahmedabad-based Satellite Application Centre (SAC). One of the focus areas of the joint venture called NISAR (NASA-ISRO Synthetic Aperture Radar) is making sensors in the L&S band. These can help in observations such as deformations in the land surface, details of the coastline and depths of the ocean, to aiding in disaster response. Misra made these observations while delivering a lecture organised by the Aeronautical Society of India (ASI) and the Sensors Research Society of India here. The NISAR project agreement signed between the two agencies aims to launch an earth monitoring satellite by 2021. The SAC will take the lead in the development of C-band radar imaging as well as in microwave and optical sensors, which have a big role to play in the future. The Indian Space Research Organisation is planning missions to gear itself to meet the growing demands for observational studies with multiple applications. "In the quest to connect the benefit of space-based observations to the advantage of the common man, SAC has conceived and launched a spectrum of optical and microwave payloads. In the last two decades, the optical observation capability has improved from 35 m to 60 cm. Sensor technology has changed from electrical

# E-NEWS



transducers to integrated chips & is visible to microwaves,” he said. At present there are 13 operational Earth Observation (EO) satellites. SAC has built specific air-borne electro-optical sensors to meet the exclusive requirements of high resolution and hyperspectral imaging from an aerial platform as well, Mr Misra added. In his address at the technical meet, Dr G Satheesh Reddy, Scientific Adviser to the Defence Minister, said there is a lot of excitement in sensor technology. The world is moving towards wearable and miniaturised wireless sensors. In India also there is a need for focused work on design and development of futuristic sensors with applications in the aerospace and defence sectors. Futuristic defence and aerospace systems and sub-systems will need cutting edge sensor technologies and we need to meet the huge requirements and also should produce the same in numbers to export them in a big way, Dr Reddy, who is the Chairman of the ASI, said. The former Secretary, Defence, R&D and President, Sensor Research Society, Mr Avinash Chander said, “Sensor technology is changing fast with the emergence of embedded monitoring, miniaturised nano sensors, built-in intelligence and IoT connectivity. We expect a revolution in the medical field, space, defence and environment management”. About 500 scientists, engineers, industrialists and professionals from the aerospace and defence sector took part.

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

## **Aircraft Recycling International signs MOU with Honeywell, co-develop used aircraft solutions**

Aircraft Recycling International (ARI), the first full life solutions provider for used aircraft in Asia, is pleased to announce that it has signed a Memorandum of Understanding with Honeywell Aerospace via its wholly-owned subsidiary, China Aircraft Disassembly Centre (Hong Kong) Limited Company, with regards to the parties' strategic cooperation intention for expanding aircraft maintenance and dismantling businesses at ARI's China Aircraft Disassembly Centre located at Harbin. The parties shall collaborate and develop repair and maintenance services at the CADC's facility to support regional demand, and to promote their brand equity. ARI and Honeywell will jointly explore and discuss used aircraft solutions based on the common ground of mutual benefits and complementary resources sharing. Mr Christina Ng, Deputy Chief Executive Officer and Chief Operating Officer of ARI commented, “ARI has accumulated a wealth of experience in used aircraft solutions, including aircraft dismantling technology, aircraft asset management, business operations, and has also gained recognitions from our aviation partners. Together with our two aircraft recycling platforms, namely UAM in the US and CADC in Harbin, ARI will be able to echo the global demand for mid-to-late life aircraft asset management. The alliance with the centennial brand, Honeywell, is going to drive new impetus to the future development of both parties. Equipped with amassed industrial experience, enriched network and resources, as well as distinguished brand equity, Honeywell will be a gilding lily to CADC's business expansion. At the same time, ARI would leverage its competitive strengths to support Honeywell in new trading business establishment, and in marketing and branding.” “There are big opportunities in Asia Pacific's maintenance, repair and overhaul (MRO) market, which is expected to grow at 6 percent per annum,” said Mr Steven Lien, president of Honeywell Aerospace Asia Pacific. “Honeywell's resources span the Americas, Europe Middle East, Africa, Asia and the South Pacific to deliver dedicated 24/7 service support. In the Asia Pacific region only, Honeywell has seven aftermarket service sites. By partnering with strong players like ARI, Honeywell is improving our operating and repair capabilities to provide local customers with better support.” While commercial aircraft fleet in China expand with average age increases, there is a surging demand for fleet maintenance, repair and overhaul (MRO) services, and the trend is expected to continue. With this vision, ARI has been committed to strengthening its capability in fulfilling the global demand for mid-to-old aged aircraft solutions and asset management. Combining with the strong support by UAM (the world's leading global aviation services provider based in the US, which was fully acquired by the Company in March 2017) and CADC (the aircraft recycling centre in Harbin, which is about to commence operation), together with the integrated resources and customer base provided by CALC (ARI's parent company), ARI provides a state-of-art global platform of mid-to-old life aircraft solutions.

Source: <https://eturbonews.com/>

## **ADVERTISEMENTS**

E-news is bringing out an exclusive slot for individuals to advertise for career opportunities. Industries and Institutions can promote advertise at very nominal charges product ranges as well as airline operators to present route and tariff offers.