



# E-NEWS



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HAL test-files Hawk-i with indigenous real-times OS



## TECHNOLOGY



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## 225th Meeting of the Governing Council of The Aeronautical Society of India held at AeSI, Head Office, New Delhi



The Aeronautical Society of India appreciates the UDAN initiative and focuses on aviation safety, MRO, Science & Technology. The 225th meeting of Governing Council of the Aeronautical Society of India was held at New Delhi on 27th February, 2018. The Council was appreciative of the recent UDAN initiatives by the Ministry of Civil Aviation and also deliberated on various policy initiatives in the direction of air safety, MRO facilities and S&T/R&D activities which needs to be undertaken in the country. Various chapters of AeSI spread all over India have already conducted various theme meetings/seminars in the areas related to sustainable aviation - Green Taxi Solutions, Design in India for Make in India, emerging trends in repair, reclamation and life extension technologies etc. The Aeronautical Society of India was formed in the year 1948 and this year it is celebrating 70 years of its contribution to the country in the area of aerospace and aeronautics. While addressing the Governing Council, Dr. R.K. Tyagi, President of the AeSI called upon all the 13000 professional members of the Society spread over 18 work centres to rededicate ourselves for the cause of stronger India by contributing in the emerging areas of aerospace, aeronautics and defense.

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## CURRENT AFFAIRS

### Cannot disclose Rafale deal details due to secrecy pact with France: Sitharaman

Details of the Rafale fighter jet deal cannot be revealed in Parliament due to a secrecy pact with France, the government has said after several questions were raised on the pricing of the combat aircraft. Defence minister Mrs Nirmala Sitharaman told the Rajya Sabha that details like the per-aircraft cost cannot be shared, as India has a secrecy pact that applies to the deal. "As per 'Article-10' of the Inter-Governmental Agreement (IGA) between Government of India and Government of France on the purchase of Rafale aircraft, the protection of the classified information and material exchanged under IGA is governed by the provisions of the Security Agreement signed between the two nations in 2008," the minister said in reply to a question raised in Rajya Sabha. The Rafale deal courted controversy after the Congress raised allegations that it was overpriced, and that Reliance Defence, owned by Mr Anil Ambani, was favoured by the government. These allegations have been strongly denied by both the BJP and Reliance Defence. As reported by ThePrint, months before it signed the deal to buy 36 Rafale fighter jets from France in 2016, the NDA government passed over another European offer that promised deliveries of the Eurofighter Typhoon combat aircraft, which was ₹59 million per unit cheaper than the French planes. The offer – made at the top level of the Indian government – involved diverting deliveries of Eurofighter Typhoon jets from Britain, Italy and Germany to meet urgent Indian requirements. The Eurofighter Typhoon had been offered at a total cost of ₹17.5 billion for 126 fighters, or ₹138 million per plane. The Rafale deal cost India ₹7.1 billion for 36 jets, which translates to ₹197 million per jet. Even if the ₹353 million performance-based logistics cost – the money to maintain and fly the fighters for five years – is deducted, the Rafale jets cost India ₹187 million per fighter. India is due to get 36 Rafale jets by the end of 2019 – a much needed addition to the Air Force that is desperate for cutting edge fighters. The Air Force is also keen to add to this fleet with more orders, given the unreliability of the existing Russian fleet and delays in inducting the indigenous Tejas.

Source: <https://theprint.in/>

### Aerial mapping of Bengaluru's solar energy potential takes off

Laser mapping technology — where aerial light pulses are directed at the ground from an aircraft — recently helped archaeologists discover an ancient Mayan city under the jungles in Guatemala. In Bengaluru, the same technology — light detection and ranging (LiDAR) — is being used, but for a different reason. Over the fortnight, a helicopter armed with LiDAR system will fly across the city, mapping its potential to generate rooftop solar energy. The initiative, which is based on a 2016 agreement of Bangalore Electricity Supply Company (Bescom) with the Centre for Study of Science, Technology and Policy (CSTEP) and Karnataka **Renewable Energy** Development Ltd. (KREDL), finally took flight at Jakkur aerodrome. Bescom has commissioned the mapping in a bid to meet its target of generation of 1,000 MW of rooftop solar energy by 2022 from Bengaluru alone. The aircraft will cover an approximate area of 1,100 sq. km, generating high resolution images of rooftops of buildings in the city. The mapping will be carried out by CSTEP and the data generated will be submitted to the Energy Department. The LiDAR technology will send pulsed laser light on to the rooftop of a building and translate the reflected light into data points. Based on objects such as trees surrounding the rooftop, shadow-free area available for solar power generation will be calculated and an estimate will be arrived at as to the capacity of solar generation of each building in the city, said officials. The data mapping will continue for a fortnight for about two hours every day. Mr Saptak Ghosh, research scientist, CSTEP, said they had to take permission from six government departments and ensure that they were not capturing data of sensitive installations. 1,100 sq. km to 1,200 sq. km. Around 100 sq. km of sensitive building were blotted out by the Ministry of Defence. As soon as we collect the data, we will send it to the MoD for vetting. We are likely to get back that vetted data in three months. Later, developing the tool based on this data will take another two months," he said. A senior official from the KREDL has been designated as the security officer to oversee that the aircraft flies only in permitted area.

#### What happens next

Once the data is collated and presented to the Energy Department, residents of the city will be able to check the capacity of solar power generation of the rooftops of their respective buildings, when they log in to the Bescom website to pay electricity bill. The system will send an OTP to the user to cross verify whether the particular rooftop belongs to the property owner.

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

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## **Works in 3 airports in state cost Rs 128.92cr since 2016: Centre**

Karnataka is among top three states in terms of money spent on improving runways and other infrastructure in airports. Out of the Rs 797.21 crore spent in the past three fiscal years in the country, Kerala accounted for Rs 182.34 crore followed by Rajasthan (Rs 134.1 crore) and Karnataka (Rs 128.92 crore). In a written answer in the Rajya Sabha last week, the Ministry of Civil Aviation said runways in Hubballi, Belagavi and Mangaluru airports were expanded and other infrastructure was strengthened between August 2016 and November 2017. In Hubballi, Rs 59.48 crore was spent on the expansion of the runway, construction of taxiway, apron, isolation bay and other ancillary works. The works were finished by August 2016. The Belagavi airport saw Rs 40.52 crore spent by November 2017 on similar works. In Mangaluru, Rs 28.92 crore was spent by October last year on the construction of the part parallel taxi track for the new runway 06/24 on both sides. Emphasising that no airport could be termed unsafe for operations, the ministry said the improvement/modernisation/expansion of runways was a continuous process and was undertaken by the Airports Authority of India or the operator concerned from time to time depending upon commercial viability, traffic demand and availability of land.

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

## **Rajeev Chandrasekhar gifts Dakota aircraft to IAF**

Rajya Sabha MP Mr Rajeev Chandrasekhar has gifted a DC3 Dakota aircraft, bearing the tail number VP 905 and called Parashurama, to the Indian Air Force (IAF) to be part of its Vintage fleet. The gift deed was signed between Chief of the Air Staff of the IAF Air Chief Marshal Mr Birender Singh Dhanoa, and Air Commodore (retd) Mr M.K. Chandrasekhar, who is also Mr Rajeev Chandrasekhar's father, and a Dakota pilot himself. The MP gifted the restored WW2 Dakota aircraft's papers and deed to Chief of Air Staff on behalf of his father. This tail number (VP-905) is the same as the first Dakota aircraft which transported troops of a Sikh regiment to Srinagar on 27 October 1947 in the Jammu & Kashmir operations. On that day, three Dakotas of No. 12 Sqn took off from Wellington airfield (Safdarjung) for Srinagar signalling the start of the IAF operations in the 1947-48 Indo-Pak war. Before the end of the day, 28 Dakota sorties were flown (including six civilian sorties). The first Dakota aircraft to take off and land at Srinagar, was piloted by Wing Commander K.L. Bhatia. It carried the first batch of troops of one Sikh Regiment under command of Lt. Col. Dewan Ranjit Rai. Speaking on the occasion, Rajeev Chandrasekhar said: "The Dakota (Dak) was also part of my childhood memories as my father flew it all over India. I am fulfilling my dream of helping my father donate it to the Indian Air Force." Retired Air Commodore M.K. Chandrasekhar, said: "This aircraft is dedicated to all air warriors and their families who served and flew the Dakota in various IAF operations in the remotest parts of India from 1947-1971."

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

## **14 A320neos in India have 1 'faulty' engine**

After IndiGo last week grounded 3 A320neo (new engine option) aircraft in the wake of the European aviation regulator's order that all such aircraft in which both Pratt and Whitney (PW) engines were of a certain faulty category be grounded immediately, it has emerged that India has at least 11 A320neos where one engine is flawed. Airbus 320neos are two-engine aircraft. TOI had reported this alarming development. Airbus said in response to a query that India has 14 A320neo aircraft in all where either both PW engines or one is of the said category of PW1100 engines. If one engine fails, a twin-engine aircraft can safely land with the other operative engine. But aviation experts said an aircraft that starts off with one engine that's unreliable was not their idea of air safety. A senior commander said: "On a three- or four-engine aircraft, having one unreliable engine is ok. But not on a two-engine aircraft like A320neo." As of now, 113 PW-powered A320neo aircraft are flying with 18 operators around the world, said Airbus. Statistics from Indian carriers show 45 out of these are in India. IndiGo is the lead operator with 29 (excluding the 3 grounded A320neos), followed by GoAir with 13. Last, the European Aviation Safety Agency (EASA) issued an emergency directive following several occurrences of engine failure reported on A320neos fitted with a certain category of PW engines. The directive said this category of PW engines was more susceptible to failure and so A320 neos with both engines belonging to this category should be grounded. But A320 neos in which only one engine was of this category have been allowed to operate. Whether the 14 aircraft mentioned by Airbus include the 3 grounded by IndiGo is not clear. Currently, how many A320 neos are being operated by IndiGo and GoAir in which one of two PW engines is faulty is not known. PW said 43 engines installed on 32 A320neo aircraft worldwide come under the affected category. Of this, 21 aircraft have one faulty engine from the faulty category, and 11 aircraft have two. It did not specify how many of these are in India.

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Capt Mohan Ranganathan, an air safety expert said, “Knowing that there are many obstacles, especially in Mumbai, that are higher than permitted, flights with unreliable engine raise a big question mark.” When told that EASA had okayed operation of A320neos with one faulty engine, Capt Ranganathan said, “This is fine in a perfect system where rules and standards are conformed to and not in a case where reliability of one of two engines is questionable.”

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

## **Three more UDAN flights to begin from Karnataka from March**

Three more flights under Regional Connectivity Scheme or UDAN are likely to start operations from Karnataka from March. Two-way flights from Vidyanagar and Salem to Bengaluru and Chennai to Mysuru is scheduled to start operations from March, officials said. These services were allotted during the first round of UDAN bidding in March 2017. The Bengaluru-Vidyanagar-Bengaluru flight will be operated by Trujet which will commence its service from March. Officials said the Salem-Bengaluru-Salem and Mysuru-Chennai-Mysuru has been awarded to Air Odisha and it is also likely to start operation from March. According to the scheme, up to 40 seats in such flights would have a cap of Rs 2,500 per seat/hour. Altogether, 97 UDAN services awarded in the first round of bidding are likely to commence services this March; of which 51 are confirmed. Thirty-one services of Air Odisha, eight of Deccan Air and seven of Trujet are likely to commence operations in March. Deccan Air will start its operations from Shillong to other north-eastern destinations like Imphal, Dimapur, Aizwal and Agartala next month. In the south, among others, the services that will be operational from March are routes like Vijayawada-Kadapa, Kadapa-Chennai and Chennai-Salem. The second round of bidding, results of which was announced last month, saw five airlines winning bids to operate services from Koppal and Hubballi to ten destinations under UDAN. IndiGo, SpiceJet, Air Alliance, Turbo Aviation and Ghodawat won these routes in the second round of bidding under UDAN scheme. Airlines are in the process of operating services on these routes and expected to start it soon, officials said. The routes include flights from Baldota/Koppal to Bengaluru, Goa and Hyderabad and Hubballi to Ahmedabad, Chennai, Kochi, Goa, Hindon, Hyderabad, Kannur, Pune and Tirupati.

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

## **HAL CHOPPER PLAN GETS ‘GREEN’ NOD**

The official green clearance has been given to Hindustan Aeronautics Limited (HAL) to embark on its Make-in India helicopter programme in Tumakuru by the Ministry of Environment, Forest and Climate Change. The official nod for the project came on December 4, 2017. The defence PSU had sought the ministry to grant environmental clearance in June last year and subsequently the proposal for grant of environmental clearance to the proposed project was considered by the Expert Appraisal Committee (Infra-2) in its meetings held on August 21-24, 2017. The foundation stone for the new manufacturing facility at Biderehalla Kaval, Gubbi Taluk, Tumakuru, about 100 km from Bengaluru, had been laid two years ago by Prime Minister Narendra Modi during which he said that he expected the indigenous helicopter under Make-in-India, to fly-out by 2018. The facility will have production, testing facilities and manufacturing capabilities of a wide range of helicopters of 3-tonne to 12-tonne class. The proposed integrated infrastructure facilities are conceptualized with an eco-friendly design and will have mainly buildings heli runways, landscaping etc to produce initially Light Utility Helicopter (LUH) and ultimately with futuristic helicopters of new generation. The LUH is 3-tonne Class new generation helicopter being developed by HAL to meet the requirements of both military and civil operators. As per documents submitted by HAL the proposed site is sparsely vegetated arid land admeasuring about 615 acre has been allotted by Government of Karnataka to set-up an integrated infrastructure facilities for HAL new helicopter factory and township. It also added that the initial man power requirement will be to the tune of 1009 and will ultimately reach 4000 personnel progressively when full production is achieved. A township is planned in an area of 123 acre of land. Township will have 2,200 married accommodations 100 bachelors and 30 single living accommodation for officers along with other amenities which also include a 50-bedded hospital and primary school.

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

## **Air India operating profit more than doubles to Rs 298 crore in FY17**

Air India has been “consistently improving” its overall performance and more than doubled its operating profit to Rs 298.03 crore in the last financial year, according to the government. The net loss of the state-owned airline however widened to Rs 5,765.16 crore in 2016-17. The divestment-bound national carrier had an operating profit of Rs 105 crore

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in 2015-16. "Air India has been consistently improving its overall financial and operational performance since the implementation of the turnaround plan by the government," Minister of State for Civil Aviation Mr [Jayant Sinha](#) said in a written reply to the Lok Sabha today. In 2015-16, Air India had an operating profit of Rs 105 crore while net loss stood at Rs 3,836.77 crore. The previous UPA government, in 2012, had approved a turnaround plan under which Air India is to receive a total equity infusion worth Rs 30,231 crore up to 2021 subject to meeting certain performance thresholds. Out of the total amount, Rs 26,545.21 crore has already been infused into the airline till now. As part of the turnaround plan, Air India has been taking various measures, including rationalisation of routes and enhanced utilisation of aircraft. The airline's total loans amounted to Rs 48,447.37 crore in 2016-17. This includes aircraft and working capital loans of Rs 17,359.61 crore and Rs 31,087.76 crore, respectively. Sinha said the draft expression of interest document inviting proposal for the airline's disinvestment is yet to be finalised by the Air India Specific Alternative Mechanism (AISAM). "Formal proposals from prospective bidders would be received thereafter only. Any unsolicited expressions of interest at this stage are not relevant," he said. In June 2016, the [Cabinet Committee on Economic Affairs](#) (CCEA) had given its in-principle approval for considering strategic disinvestment of Air India and its five subsidiaries. It also constituted the AISAM, which is headed by Finance Minister Mr [Arun Jaitley](#). The panel would decide on hiving off certain assets to a shell company, the entities to be offered for sale during the bidding process, the quantum of disinvestment and the universe of bidders, Mr Sinha said in a separate reply. To another reply, he said the Air India Museum project has been put on hold due to the ongoing disinvestment process. There was a proposal to set up a museum of arts and crafts in Mumbai to showcase the collection of Air India.

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

## India successfully test-fires nuclear capable Prithvi-II

India successfully test-fired its indigenously developed nuclear capable Prithvi-II missile as part of a user trial by the Army from a test range in Odisha, **Defence** sources said. The trial of the surface-to-surface missile, which has a strike range of 350 km, was carried out from a mobile launcher from launch complex-3 of the Integrated Test Range at Chandipur near Balasore at around 11.35 a.m., they said. Describing the trial as a complete success, they said all mission objectives were met during the test launch. The perfect test launch came after successful trial of Agni-5 on January 18 and Agni-1 missile conducted from Abdul Kalam Island off Odisha coast on February 6. Prithvi-II is capable of carrying 500-1,000 kilogram of warheads and is thrusted by liquid propulsion twin engines. The state-of-the-art missile uses advanced inertial guidance system with manoeuvring trajectory to hit its target, they said. The missile was randomly chosen from the production stock and the entire launch activities were carried out by the specially formed Strategic Force Command (SFC) of the Army and monitored by the scientists of Defence Research and Development Organisation (DRDO) as part of training exercise, they said. "The missile trajectory was tracked by radars, electro-optical tracking systems and telemetry stations by the DRDO along the coast of Odisha," the sources said. The downrange teams onboard the ship deployed near the designated impact point in the Bay of Bengal monitored the terminal events and splashdown. In salvo mode, on November 21, 2016, two missiles were successfully test fired in quick succession from the same base and the last trial was successful on June 2, 2017 from the same base. Inducted into the Armed forces of the country in 2003, the nine-metre-tall, single-stage liquid-fuelled Prithvi-II is the first missile to have been developed by the DRDO under the Integrated Guided Missile Development Programme (IGMDP), sources said.

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

## Agni 1 test-fired off the Odisha coast

India successfully test-fired its short-range nuclear capable ballistic missile Agni-1 with a strike range of over 700 km from a test range off the Odisha coast, Defence sources said. The indigenously developed surface-to-surface missile was launched as a part of a periodic training activity by the Strategic Forces Command (SFC) of the Army to consolidate operational readiness, they said. The state-of-the-art missile was launched around 8.30 a.m. from a mobile launcher at Pad 4 of the Integrated Test Range (ITR) at the Dr. Abdul Kalam Island, formerly known as Wheeler Island, the sources said. Describing the trial a "complete success", they said that all the mission objectives were met during the test. The sophisticated Agni-I missile is propelled by a solid rocket propellant system and is equipped with a specialised navigation system that ensures it reaches the target with a high degree of precision.

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

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## **In 24 hours, Mumbai airport handles 969 flights; sets new world record**

Creating a new world record for single-runway operations, Mumbai airport handled 969 take-offs and landings in 24 hours. It broke its own record of 935, said a Mumbai International Airport Ltd spokesperson (MIAL). Mega cities such as New York, London, Dubai and Delhi have airports with two or more runways that operate simultaneously. Though Mumbai has two runways, they criss-cross each other, so only one runway is used at a time. Technically this puts Mumbai in the single-runway airport category. So it's in the league of busy single-runway secondary airports of cities like London (Gatwick, Stansted airports), Istanbul (Sabiha Gokcen airport) and major airports of smaller cities like San Diego (US), Fukuoka (Japan) and Xiamen (China). Mumbai handles over 900 airline flights per day. The record high air traffic movement (take-offs and landings) happen on days when the number of unscheduled flights-charter aircraft, private aircraft-go up, like it did. These flights are banned during the morning and evening peak hours, so when the load goes up during non-peak hours, new records are set. "We hope to cross 1,000 aircraft movements per day soon," the MIAL official said. In civil aviation, the norm is to record time in UTC (Coordinated Universal Time, same as GMT) and Indian Standard Time is five-and-a-half hours ahead of UTC. The feat was achieved from 5.30am to 5.30am. Mumbai's demand for air travel coupled with land-shortage (which means it will never have a parallel runways) has forced the private airport operator, the government-run air traffic control and airline pilots to eke out every second worth of efficiency from the 12,008 feet long main runway 27. The runway has a declared capacity to handle 46 take-offs and departure in an hour. Twice -once in the morning and once in the evening-the runway handled 50 movements in 60 minutes. "The second a landing aircraft crosses the beginning of the runway to the second when it exits the runway is recorded. Similarly, take-offs too are recorded and the data is shared with airlines on a weekly basis," an airport official. Every upgrade of the runway and taxiway infrastructure, change in operational practices aims to reduce the runway occupancy time (ROT). Kapil Kaul of Centre for Asia Pacific Aviation (CAPA), a global aviation consultancy firm, says: "Gatwick is the only single-runway airport in the world that routinely handles more than 50 flight movements in a given hour. All others are 42 or less. Mumbai has the second highest as it crosses 50." A senior air traffic controller said: "Mumbai main runway's best so far is 52 arrivals or take-offs in 60 minutes." Gatwick has touched 55-56, he adds. "But there are times when we get the right mix of aircraft and weather conditions and we have handled 10 take offs or landings in 10 minutes," he says. A "right mix" is when the wind speed and visibility is good, all the aircraft involved are either A320s or B737s (similar speed and weight aircraft, that is), all are manned by pilots who are well-versed with the layout of Mumbai airport. Also, the departures should be such that they are in left-right-left pattern, which means one departure to north, followed by one to South, then to North and vice-versa. That's because departures to North turn right after lift off, those to South turn left and so adequate spacing between aircraft is automatically maintained.

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

## **US Air Force chief flies Indian-made Tejas aircraft in Jodhpur, first foreign military chief to do so**

Aiming to strengthen the relationship between the air forces of US and India, Chief of Staff of the US Air Force General David L Goldfein flew the 'Made in India' light combat aircraft Tejas at Air Force Station in Jodhpur. Shortly after he boarded the aircraft, the Indian Air Force (IAF) in a tweet said, "General David L Goldfein, Chief of Staff of the US Air Force, is on an official visit to India. He flew a sortie in 'Made in India' LCA Tejas aircraft at AF Stn Jodhpur today." With this, Goldfein also became the first foreign military chief to fly Tejas aircraft. The US General, who was accompanied by General Terrence O'Shaughnessy, Commander of the US Pacific Air Force is on an official visit to India. The US officials arrived on February 1 and a 'Guard of Honour' was organised on their arrival at Air Force Headquarters in New Delhi. The officials then interacted with Indian counterpart Air Force Chief B S Dhanoa. Overwhelmed with the warm welcome and acknowledging the fact that IAF operates the second largest C-17 fleet, General David L Goldfein in a tweet said, "Grateful for the welcome reception from @IAF\_MCC. We look forward to deepening the relationship between our two air forces." He also tweeted, "I'm also very proud of the strong ongoing relationship forged between the @IAF\_MCC and the Rhode Island Air National Guard's 143rd Airlift Wing."

Source: <http://indianexpress.com/>

## **India's second mission to the moon Chandrayaan-2 likely in April: ISRO**

The Indian Space Research Organisation (ISRO) is planning to launch Chandrayaan-2 Mission around April this year. Chandrayaan-2 is the country's second mission to the moon. The Union Minister of State (Independent Charge) of the Ministry of Development of North Eastern Region (DoNER), MoS PMO, Personnel, Public Grievances & Pensions, Atomic Energy and Space, Dr Jitendra Singh said that Indian Space Research Organisation (ISRO) is planning

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to launch Chandrayan-2 Mission around April this year." Chandrayan-2 is a challenging mission as for the first time we will carry an orbiter, a lander and a rover to the moon" said the Minister. He said that it is a matter of pride that ISRO is launching Chandrayaan-2, which will place India at a new height in space technology. Chairman of ISRO K Sivan said that the total cost of the Chandrayaan 2 mission will be about Rs 8 billion. He added if the mission's launch could not take place in April due to unsuitable weather, the window for launch is open till October this year. ISRO has achieved many milestones in the recent years, which include the launch of 104 satellites in a single mission in February last year and the launch of South Asia Satellite that will boost ties with neighbours. He said that India is a frontline nation in the field of space technology and the scientists need to be complimented for it. The space technology is being utilised by various ministries and departments e.g. in Smart City Mission, preparation of utilisation certificates in Ministry of DoNER etc. He also presented the achievements of Department of Space in the last four years. He said that ISRO has successfully accomplished 48 missions, including 21 Launch Vehicle missions, 24 Satellite missions, and 3 Technology Demonstrators. ISRO Chairman also said that South Asia Satellite is a Common Network for Disaster Management Support, Meteorological Data sharing, connectivity of academic, scientific and research institutions, etc. K Sivan said Chandrayaan-2 Mission includes Orbiter — orbit the Moon from 100 km lunar polar orbit, Lander — soft lands on a pre-determined site on lunar surface and Rover, rolls out of the land after landing. ISRO said that it has launch opportunity between April and October 2018, while it is targeting to launch during April 2018. The Payloads include 6 on Orbiter; 3 on Lander and 2 on Rover. Lander tests in progress and the lander systems realisation initiated. The Orbiter and Rover systems in advanced stage of realisation.

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

## 'China deploys warships in Indian Ocean'

A Chinese naval contingent has been deployed in the East Indian Ocean for more than a week at a time when the **Maldives** is undergoing a political crisis, a Chinese website has reported. The website, [sina.com.cn](http://sina.com.cn), has linked the deployment of the warships, including an amphibious vessel that can transfer troops from sea to land, to the evolving situation in the Maldives. "At present, the Indian Ocean region is not peaceful and the political situation in the Maldives continues to be turbulent," says the post. The article flagged pointed out that the Chinese Navy's 'Blue 2018A' fleet has been training in the East Indian Ocean for a "week or so". However, Indian defence sources denied any movement of Chinese ships near the Indian Ocean island nation. **China** had earlier warned against external intervention in the Maldives after the country's exiled former President Mohamed Nasheed called for New Delhi's intervention to release political prisoners. The Sina report quoted a statement by the Chinese Foreign Ministry "that other countries should not interfere in the internal affairs of the Maldives". The detachment of the People's Liberation Army-Navy comprises two 052D destroyers, a 054A frigate, and a 071 dock landing ship. A supply ship is also part of the flotilla. An Australian website, [news.com.au](http://news.com.au), underscored that the entry of Chinese warships in the Indian Ocean marks a significant shift in regional power. "They're there to keep India away from Beijing's interests in the strife-torn Maldives Islands." "Sending warships to operate off the Maldives is a new and concerning development, because it shows that China is trying to exercise influence over a small state more usually within India's strategic view. New Delhi will read this as a worrying move. It will intensify strategic competition and increase mistrust between China and India," it quoted Mr Peter Jennings of the Australian Policy Institute as saying. The 7500 tonnes Type 052D guided missile destroyer (Luyang-III class) boards a crew of 280 members. Land attack cruise missiles, as well as other projectiles which can target submarines, aircraft and hostile warships provide it credible firepower. The Type 054A frigate (Jiangkai II) has a hard-to-pick stealthy design and good anti-ship and counter-submarine capability. The Type 071 amphibious transport ship is geared for beach landing troops. An array of amphibious landing craft, assault vehicles and two back-up helicopters are used for sea-to-land deployment of around 800 troops, equivalent of an army battalion. "Overall, the Chinese Navy is sending out an amphibious convoy fleet with strong regional air defence, anti-ship and anti-submarine capabilities and the ability to deliver rather large-scale amphibious troops quickly," Mr [Sina](http://sina.com.cn) observed.

### More ships

The post highlighted that two additional naval groups, already deployed for anti-piracy escort missions of commercial ships, beef up the Navy's overall deployment in the Indian Ocean at this time. These include the 27th escort convoy comprising a destroyer, frigate and a replenishment ship that may have entered the south Indian Ocean, having crossed the southern tip of Africa, after completing its mission in the Atlantic more than 10 days ago. It partners with the Navy's third ship contingent in the Indian Ocean — the 28th convoy escort formation in the western Indian Ocean. "Just this time, 11 warships of the three naval formations have appeared in the east, west and south Indian Ocean at the same time. This reaction speed and mobilisation ability can be achieved by the few state navies in the world," the article claimed. **Not near Maldives** Meanwhile, Indian defence sources said no movement of Chinese ships was detected near the Maldivian waters. "The closest the Chinese ships came near Maldives was about 2,500 nautical

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miles away,” a defence source said. A couple of weeks back, a Chinese naval task force has entered the Indian Ocean from the Sunda Strait for exercises in international waters closer to Australia and has since left via the Lombok Strait, the source explained. Indian Navy Spokesperson Capt. D.K. Sharma said without getting into the specifics: “Indian Navy has a robust maritime domain awareness and we have a clear picture of the happenings in the Indian Ocean Region.”

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

## **SARAS completes its second test-flight successfully; India hopes to go for production in 2-3 years**

India's indigenously designed and developed light transport aircraft SARAS test flown successfully for the second time within a month in Bengaluru. Once the design of this prototype version is frozen, it will prepare the country to go for production of a much-awaited 19-seater passenger plane in 2-3 years. The design and development of the aircraft is being done by the CSIR-National Aerospace Laboratories (NAL). The production model design is expected to be ready by June-July. The test flight was the second of the 20 test flights planned for SARAS PT1N, before freezing the production version. The first successful test was carried out on January 24. “It's a prototype version. We have been simultaneously working on the SARAS Mk 2 version whose production will be possible in 2 to 3 years of time”, Jitendra J Jadhav, director of the CSIR-NAL, told TOI. The CSIR-NAL proposes to get the SARAS Mk 2 certified initially for military and subsequently for civil version. The Indian Air Force has already committed to induct 15 aircraft initially. The SARAS will be 20-25% cheaper than any imported aircraft in the same category. The improved version will be a 19-seater aircraft instead of 14-seater. The unit cost of the aircraft, with more than 70% indigenous content, will be around Rs 40-45 crores as against Rs 60-70 crores for imported ones. “The SARAS Mk 2 will be ideal for commuter connectivity under the government of India's UDAAN scheme for a variety of applications like air taxi, aerial search/survey, executive transport, disaster management, border patrol, coast guard, ambulance and other community services,” said Union science & technology minister Harsh Vardhan. He said, “Its successful development will be one of the game changers in the history of civil aviation in India.” The Hindustan Aeronautics Limited (HAL) has been identified as the production agency for the military version of SARAS, while the production of civil version will be given to identified private industries. It is estimated that India needs 120-160 aircraft in this genre – both civil and military versions – in the next 10 years. “The aircraft currently available in the international market are of 1970s technology. They have higher fuel consumption, lower speeds, unpressurised cabin, high operating cost and unsuitable for operations from hot and high-altitude airfields”, said a ministry's statement. The ministry claimed that countries like Russia, China, USA, Indonesia and Poland have launched new programmes for development of next generation 19-seater aircraft after India began its light transport aircraft project. “The project was dumped by the previous government, after an accident during test flight in 2009. Though the Directorate General of Civil Aviation (DGCA) had exonerated the aircraft from any design flaw or poor-quality production, no effort was made to revive the project,” said Harsh Vardhan, who was present during the second test flight of the SARAS in Bengaluru. After the project was revived by the present government, the NAL has incorporated design modifications and improvements on the SARAS PT1 model.

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

## **India successfully conducts night trial of indigenously developed nuclear capable Prithvi-II missile**

India successfully conducted a night trial of its indigenously developed nuclear capable Prithvi-II missile with a strike range of 350 km, from a test range in Odisha. The surface-to-surface missile was test-fired from a mobile launcher from launch complex-3 of the Integrated Test Range at Chandipur near here around 8.30 pm, as part of a user trial by the Army, defence sources said. The perfect test launch came after successful trial of the Agni-5 missile on January 18, Agni-1 on February 6 and Agni II yesterday from the Abdul Kalam Island off the Odisha coast. Prithvi II missile was also successfully test fired earlier on February 7 from the ITR at Chandipur. The state-of-the-art Prithvi-II missile is capable of carrying 500 to 1,000 kg of warheads and is thrust by liquid propulsion twin engines. The sophisticated missile, which has a strike range of 350 km, uses advanced inertial guidance system with manoeuvring trajectory to hit its target, they said. The missile was randomly chosen from the production stock and the entire launch activities were carried out by the specially formed Strategic Force Command (SFC) of the Army, and monitored by the scientists of the Defence Research and Development Organisation (DRDO) as part of training exercise, the sources said. “The missile trajectory was tracked by radars, electro-optical tracking systems and telemetry stations by the DRDO along the coast of Odisha,” they said. The downrange teams onboard the ship deployed near the designated impact point in the Bay of Bengal monitored the terminal events and splashdown. In salvo mode, on November 21, 2016, two missiles were successfully test fired in quick succession from the same base and the last trial was successful on June 2, 2017

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from the same base. Inducted into the Armed forces of the country in 2003, the nine-metre-tall, single-stage liquid-fuelled Prithvi-II is the first missile to have been developed by the DRDO under the Integrated Guided Missile Development Programme (IGMDP), the sources added.

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

## **Flying Officer Avani Chaturvedi becomes first Indian woman to fly fighter jet all by herself**

Flying Officer Avani Chaturvedi of Indian Air Force (IAF) flew her first solo sortie in a Russian made MiG-21 fighter creating history. Flying Officer Chaturvedi took off from the Jamnagar Air base in Gujarat and successfully completed her mission. The solo sortie in a fighter is the first step to becoming a fully operational fighter pilot. Prior to her solo-sortie she took off from Jamnagar with her instructor for the last time for the Solo Check. For the last time, the instructor watched her carefully in a MiG-21 Bison Aircraft to ensure Flying Officer Chaturvedi got everything right.

### **SOLO CHECK**

Flying and more so fighter flying is a zero error profession, an IAF pilot said explaining the need for a Solo Check. Soon after, she would roar down the Jamnagar Airbase and get airborne again. Only, this time she didn't have anyone flying with her to help her take those split second decisions on a fighter. Experienced flyers and instructors would, however, be at the Air Traffic control of Jamnagar Airbase and on the run-way to monitor her flight. She is the first Indian woman to fly to a fighter aircraft solo. The solo sortie is a first milestone of any fighter pilot and this reinforces IAF commitment give a level-playing field to both genders, IAF spokesperson and fighter pilot Mrs Anupam Banerjee said.

### **FIRST SORTIE**

The first sortie of Flying Officer Mr Avani Chaturvedi lasted for about 30 minutes in a super-sonic MiG-21 Bison fighter which is also considered to be a difficult aircraft to handle. The Russian made MiG 21 Bison is also the oldest fighter in IAF's stable. In the first sortie you are not expected to carry out very complicated manoeuvres. There are set drills one needs to go through whereby you get a feel of the aircraft, a senior IAF fighter pilot who didn't wanted to named said. "All fighter pilots are most likely to remember their first sortie. You feel powerful like a bird that has taken its first flight, he added. Flying officers Mr Chaturvedi, Mrs Bhavana Kanth and Mr Mohona Singh were the first woman cadets to be admitted into the fighter stream of the IAF in 2016. Till 2016, the IAFs fighter stream was male only domain. Both Flying Officer Mr Chaturvedi and Flying Officer Mr Kanth have been assigned to the MiG-21 squadrons.

### **MORE TRAINING**

While the first solo sortie is a big step forward for the IAF, Mr Chaturvedi still has few steps to walk before she is considered to be fully operational and can be deployed. She will now train for at least another two years before being deployed as a fully operational pilot. For the next six months, Flying Officer Mr Chaturvedi will fly the fighter to learn the intricacies of a fighter. She will then graduate to learn about tactical flying and then how to use an aircraft as a war fighting machine. She will have to learn how to fight during the day. After that she will have to learn how to fly and fight at night all over again, a senior IAF instructor said.

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

## **Aggressive New Plans For India's Nirbhay Cruise Missile**

India's most complicated and troublesome strategic weapon finally delivered after a spate of worrying failures. Worrying, not because such setbacks were uncommon in the testing of weapons. But because the missile's maker had projected highly ambitious timelines to prove and make available the missile to India's strategic ground forces. That morning, teams spread between Hyderabad, Bengaluru and the launch site off India's eastern state of Odisha exhaled for the first time in three years. But in the three months since that make-or-break test, the Nirbhay program has assumed aggressive new proportions hitherto unknown outside the tiny group of weapons scientists mandated with leading the project. A pronounced push on the program has put the Nirbhay front and centre in the raft of India's current weapons projects. In simple terms, it now has **priority status**. **Livefist** was given access to teams and officials overseeing the the expansion of the Nirbhay program beyond its current confines. In the best traditions of the country's strategic laboratories, the plans, to say the least, are big. For starters, in January, the Indian Air Force officially expressed interest in an air-launched version of the Nirbhay, tentatively designated **Nirbhay-A** for the stand-off air to ground role for its Su-30 MKI jet platform, solidifying its support with a stated interest in acquiring at least 40 systems once it is proven. IAF chief Air Chief Marshal B.S. Dhanoa is understood to have designated a Group Captain-rank officer to be embedded with the new effort and help accelerate development of the air-launched Nirbhay for the area attack role. Both the IAF and DRDO have mutually agreed on a target of 2020 for first drop (weapon release) and 2021 for first test launch. In an exclusive interview to **Livefist**, Dr S. Christopher, chief of the Defence R&D Organisation (DRDO) that administers the laboratories developing and testing the Nirbhay, says, "We have begun a study on modifications required on the missile and the aircraft. We will likely remove the booster and a few systems, but largely the weapon

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will remain the same.” The team is currently conducting studies to see if the Nirbhay-A can be slung onto the special pylons developed to carry the BrahMos-A, or if they need to be modified. Weight and dimensions won’t be an immediate issue — the Nirbhay is smaller and lighter than the BrahMos. However, they will be using simulations to see if the lighter system needs a powered ‘push down’ before the booster fires, as a safety mechanism. The team hopes to freeze the list of required modifications this year and begin building a prototype Nirbhay-A. The Indian Air Force recently conducted the first test firing of the BrahMos-A missile from a Su-30 MKI after years in modification delays. The Nirbhay team believes that the heavy-lifting done on the BrahMos will dramatically shorten integration and modification time on the slower, smaller weapon. “Between Russia, HAL, the DRDO and us, the BrahMos integration has been an exhausting and sometimes frustrating experience,” an IAF officer associated with the BrahMos integration tells Livefist. “Thankfully, the effort paid off. We hope the lessons learned there will help speed up the Nirbhay integration. That is the hope, at any rate.” But it’s in the Indian Navy’s requirement for the Nirbhay that the missile will really be pushing the proverbial boat out. Simply put, the navy is significantly hungrier for range and wants a version of the Nirbhay that tops its current 1,000 km figures. An Indian Navy source confirmed this, saying the navy is interested in a Nirbhay variant with a maximum range of at least 1,500 km to ‘account for the various types of strike missions that may need to be undertaken with a stand-off system, including land attack’. At present the navy has pushed interest in a ship-launched version, though interest in a submarine-launched modification may follow. The Indian Navy currently deploys the 290-km range BrahMos supersonic cruise missile from some of its ships and variants of the Harpoon and Klub-S anti-ship/land attack cruise missile from its older submarines and Exocets on its incoming Scorpene-class attack boats. Separately, the navy is in the international market looking to replace its Kh-35 Uran anti-ship missiles with new systems. “We are conducting a range extension study of the Nirbhay for the navy,” Christopher confirms to **Livefist**. “We are looking at this in three major ways — optimising fuel efficiency, a bigger fuel tank, and finally an Indian engine which we are designing to be much more economical than the current Russian engine we are using. We had anticipated this requirement and have already begun work on it. The navy is on board with us.” In its five development tests, the Nirbhay has been powered by Russian NPO Saturn 36MT mini turbofan engines. The DRDO’s engine laboratory GTRE (Gas Turbine Research Establishment) is currently steeped in developing a similar indigenous mini turbofan engine called **Manik** in deep collaboration with the Centre for Propulsion Technology at IIT Chennai and IIT Bombay. Ground runs of the engine are slated to begin this year. “We are developing the three versions of Nirbhay now. The Manik engine should be ready for testing in two years. By the time user trials begin, we hope to be in a position to offer Manik-powered Nirbhay, at which point the system will be over 95% indigenous. This is a major task for us since this is something we have to prove to the world,” Christopher says. The Nirbhay project will finally unfurl into a planned Make in India effort with two companies building the weapon system simultaneously for the three services. “Currently there are ten prototypes, along with work being done by GTRE and the Defence Metallurgical Research Laboratory (DMRL),” Dr Christopher says. “We are also in talks with PTC Lucknow for manufacturing work. We are already in touch with companies in the public and private sector for manufacturing and integration supply work. The whole will be manufactured by an identified agency and they will maintain it for 10-15 years, depending on the service requirement.” Against India’s pantheon of highly successful and proven long-range ballistic missiles — the Agni and Prithvi series — the Nirbhay is a new fish in every possible way. The 1,000 kilometer range cruise missile flies slower than sound and is powered by a turbofan engine, a vastly different species from the rocket motors that India has mastered on its space and nuclear missile programs. Its makers now hope to dodge headwinds from several quarters — not least shifty service requirements and squeezed budgets — to deliver a cost-effective strategic multi-service weapon.

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

## Govt scraps single-engine fighter plan, asks IAF to go for wider competition

The government has scrapped its two-year-old plan to produce 114 single-engine fighters with foreign collaboration under the “Make in India” framework, at an estimated cost of Rs 1.15 lakh crore (almost \$18 billion), amid the political over the Rs 59,000 crore contract for 36 French Rafale jets. Top sources said the defence ministry (MoD) has directed IAF, down to just 31 fighter squadrons (each with 18 jets) now when at least 42 are required for the “collusive threat” from Pakistan and China, to come up with a new proposal that will take both single and twin-engine fighters into account. “The original plan placed an unnecessary restriction on only single-engine fighters, which limited the competition to just two jets (American F-16 and Swedish Gripen-E). The aim is to increase the contenders and avoid needless allegations later,” said a source. Incidentally, F-16 manufacturer Lockheed Martin had joined hands with Tata Advance Defence Systems Ltd, while Swedish aviation major SAAB tied-up with the Adani Group in anticipation of the mega project to produce the fighters in India under MoD’s ‘strategic partnership’ policy. Faced with a further two-year delay now, which will ensure the beleaguered force will not be able to reach its sanctioned strength of 42 squadrons even by 2032 as projected earlier, the IAF is now scrambling to finalize the new plan based on its operational requirements, the

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required transfer of technology and other aspects. It was the then defence minister Manohar Parrikar who had advised IAF to go in for the single-engine production line because he said the country could afford only 36 of the twin-engine Rafales for meeting its “critical operational necessity” immediately. Single-engine fighters, of course, have a lower acquisition and operating cost even if there is a slight compromise in capability. The 36 Rafales, ordered in “flyaway condition” by the NDA government after scrapping the original MMRCA (medium multi-role combat aircraft) project for 126 jets initiated by the previous UPA regime, will be delivered in 2019-2022 under the 7.8 billion Euros contract inked in September 2016. But they alone will not make up the numbers. With all the 10 existing squadrons of old MiG-21s and MiG-27s slated for retirement by 2022, it’s projected the number of squadrons will go down to 19 by 2027, and may further reduce to 16 by 2032, given the long delays in the indigenous Tejas fighter. The new project to include both single and twin-engine fighters will, in effect, be a repeat of the MMRCA project first proposed by the IAF in 2001-2002. The formal tender or RFP (request for proposal) for the MMRCA project, under which the first 18 jets were to come in flyaway condition and the rest 108 being licensed produced by defence PSU Hindustan Aeronautics, was floated in 2007. While the F-16 and Gripen-E as well as the twin-engine Russian MiG-35 and American F/A-18 were rejected after exhaustive field trials, the Rafale in 2012 had emerged the winner over Eurofighter Typhoon after commercial evaluation. But the final negotiations were deadlocked for long before being scrapped in June 2015 by the NDA government.

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

## Rustom-2 UAV takes to the skies

The Defence Research and Development Organisation (DRDO) carried out a test-flight of the unmanned aerial vehicle Rustom-2. “This flight assumes significance because of the fact that this is the first flight in user configuration with a higher power engine. All parameters were normal,” the DRDO said in a statement. The flight was conducted at its Aeronautical Test Range in Chitradurga of Karnataka. Rustom-2 belongs to a family of UAVs under development, besides Rustom-1 and Rustom-H. It is a medium-altitude long-endurance drone (MALE) and will fill a critical capability gap in the inventory of the armed forces. It can fly up to an altitude of 22,000 feet and has an endurance of over 20 hours. It is capable of carrying payloads for electronic and signal intelligence missions. Currently, the three services employ hundreds of Israeli drones and have projected a requirement of hundreds of more UAVs, including armed variants, in the near future. The DRDO is also developing other drones in different categories.

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

## TECHNOLOGY

## Have tech to configure launch vehicle that can carry 50-tonne payload: ISRO chairman

Like Elon Musk’s Space X, Indian Space Research Organisation (ISRO) has the capability and technology to “configure a launch vehicle that has the lifting capability of over 50-60 tonnes”. ISRO chairman Dr K Sivan told I, “A super heavy lift vehicle is on the drawing board as part of our R&D. We are doing a lot of preliminary research. However, our foremost priority is to increase the carrying capability of GSLV MK III from 4 tonnes to 6 tonnes. Once that is achieved, we will work on enhancing the propulsion capability by working on different combinations of solid, liquid, semicryogenic and cryogenic engines. With these combinations of engines and different modes of strap-ons, we can configure a launch vehicle that has the lifting capability of over 50-60 tonnes.” Space X’s Falcon Heavy, the world’s most powerful rocket that was launched from the Kennedy Space Center on February 7, has lifting capability of 63 tonnes, which is equivalent to a 737 airliner fully loaded with crew, passengers, luggage and fuel. Propelled by 27 rocket engines and three boosters, the rocket carried a dummy payload and Elon Musk’s red cherry Tesla Roadster sports car to Mars. It packed more than 5 million pounds of thrust at the launch. On the development of a mini launcher that can be assembled in three days, the ISRO chief said, “This small launch vehicle is being developed to fulfill ISRO’s requirements of launching small satellites (with weight not more than 500 kg) at short notice. Once we develop this technology after some tests, we will transfer this to the private Indian industry so that they can launch small vehicles.” Dr Sivan is popularly known as ‘Rocket Man’ for his contribution to the development of cryogenic engines and launch vehicles PSLV and GSLV. Currently, India holds less than 1% of share of the global launch services market, which is estimated to be approximately Rs 40,000 crore. Till date, ISRO has launched 237 foreign satellites of 28 different countries. On

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February 15 last year, ISRO made history when it launched 104 satellites, including 101 satellites of foreign countries, in a single mission. On the other hand, US space company SpaceX, with 45% share, is now the biggest player in the commercial launch market.

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

## **NASA spacecraft captures farthest images away from Earth**

NASA's New Horizons probe has captured the farthest images from Earth by a spacecraft, surpassing Voyager 1's record of clicking a picture when it was 6.06 billion kilometres away from our planet. The routine calibration frame of the "Wishing Well" galactic open star cluster, made by the Long Range Reconnaissance Imager (LORRI) on December 5 last year, was taken when New Horizons was 6.12 billion kilometres from Earth, NASA has said. That picture was part of a composite of 60 images looking back at the solar system, on February 14, 1990, when Voyager was 6.06 billion kilometres from Earth. Voyager 1's cameras were turned off shortly after that portrait, leaving its distance record unchallenged for more than 27 years. "LORRI broke its own record just two hours later with images of Kuiper Belt objects 2012 HZ84 and 2012 HE85 - further demonstrating how nothing stands still when you are covering more than 1.1 million kilometres of space each day," researchers have said. Kuiper Belt is a disc-shaped region beyond Neptune that extends from about 30 to 55 astronomical units from the Sun. New Horizons is the fifth spacecraft to speed beyond the outer planets and so many of its activities have set distance records, NASA has said. On December 9, it carried out the most-distant course-correction manoeuvre ever, as the mission team guided the spacecraft towards a close encounter with a Kuiper Belt object (KBO) named 2014 MU69 on January 1, 2019. That New Year's flight past MU69 will be the farthest planetary encounter in history, happening one billion miles beyond the Pluto system - which New Horizons famously explored in July 2015, according to NASA.

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

## **Dubai to launch driverless flying cars by this summer**

Dubai skies are set to be abuzz with driverless flying cars within months, the emirate's Roads and Transport Authority (RTA) announced, in what will mark another world's first for the city. The RTA, in collaboration with the Chinese firm Ehang, has carried out the first test run of an autonomous aerial vehicle (AAV) capable of carrying a human, the Ehang 184, and the authority said it is set to launch operations very soon. The flying car was exhibited at the World Government Summit in Dubai this week and the chief of the RTA said a summer start date for flights is envisioned. "The AAV exhibited at the summit is not just a model; it is a real version that we have already experimented the vehicle in a flight in Dubai sky. The RTA is making every effort to start the operation of the AAV in July 2017," said Mr Mattar Al Tayer, the director general and chairman of the RTA. The Ehang 184 is fitted with a touchscreen to the front of the passenger seat displaying a map of all destinations in the form of dots. It has preset routes and the passenger selects the intended destination. The vehicle will then start automatic operation, take off and cruise to the set destination before descending and landing in a specific spot. A ground-based centre will monitor and control the entire operation. "The trial run of the first AAV is in implementation of the directives of Mr Sheikh Mohammed bin Rashid Al Maktoum, Vice-President and Prime Minister of the UAE and Ruler of Dubai, to transform Dubai into the smartest city in the world," said Mr Al Tayer. "It is also part of the RTA's endeavours to provide self-driving transport through engaging in the technological tests of self-driving vehicles in a Dubai environment. "It replicates Dubai Self-driving Transport Strategy aimed at transforming 25 per cent of total individual trips in Dubai into self-driving trips using various modes of transport by 2030," Mr Al Tayer added. "The step would also enhance the integration between public transport modes and people happiness through the provision of smooth, quick and innovative mobility. "We have addressed the highest levels of security in the designing and manufacturing of the Ehang184. The vehicle is fitted with eight main propellers," Mr Al Tayer said. "In case of any failure in the first propeller, there would be seven other propellers ready to complete the flight and a smooth landing, while mitigating the impact of the fault sustained by the first propeller." The AAV is fitted with numerous basic systems all in operation at the same time, although independently. "In case of any malfunctioning in one of these systems, the standby system would be capable of controlling and safely steering the AAV to the programmed landing point," Mr Al Tayer said. The AAV is designed to fly for maximum of 30 minutes at a maximum cruising speed of 160kph, and the standard speed in Dubai is likely to be set at 100kph. The ascending/descending speed is about 6 metres per second and the landing speed is 4m/s. The vehicle is 3.9 metres in length, 4.m wide and 1.6m high. It weighs about 250kg empty and about 360kg with an average passenger. The maximum cruising height is 3,000 feet

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and the battery charging time is one to two hours. “The AAV is designed to operate under all climatic conditions unless there is a thunderstorm. The vehicle is fitted with highly accurate sensors with a very low-error threshold and can resist vibrations and extreme temperatures,” said Mr Al Tayer. “Dubai Civil Aviation Authority was a partner in our trials defining the safety criteria required, issuing the permits for trial and inspecting the vehicle, RTA appreciates their contribution. Etisalat had contributed as well to the success of the test run of the AAV in its capacity as a prime network provider, Mr Al Tayer added. “The 4G data network is used in communication between the AAV and the ground control center. The company had also provided the support needed to ensure the continued communication between the AAV and the control centre through M2M and LTE technologies,” he explained. Mr Al Tayer said the successful operation of AAV is considered a big step towards innovative and smart mobility solutions for reducing city traffic congestion. For residents, the chance to beat the traffic jams in a flying car is probably something many have dreamed about. And now it looks set to become a reality.

Source: <https://www.thenational.ae/>

## **Now, jet engines that can spot glitch & fix it**

Jet engines used to be slung under a plane’s wing and then largely forgotten about until they came into the hangar for a check-up. More recently they’ve graduated to data downloads that allow engineers to devise maintenance regimes while aircraft are still flying. The next generation of turbines will be way smarter, according to [Rolls-Royce Holdings Plc](#), communicating with each other to share readings such as weather data so that their blades can be perfectly angled and thrust adjusted to minimise fuel burn — all without any input from the pilot. Further into the future, powerplants may even detect their own ailments via 70 trillion data points and then effectively self-heal, perhaps even deploying an army of robotic worms to crawl around making fixes as they go, [Dominic Horwood](#), Rolls’s director for customers, said. The UK firm aims to apply enhancements from its Intelligent Engine program to the new Ultrafan turbine, slated to enter service by 2025.

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

## **HAL test-flies Hawk-i with indigenous real-time OS**

State-owned aviation major Hindustan Aeronautics Limited (HAL) achieved a milestone with the first flight of the trainer aircraft, Hawk-i, fitted with a real-time operating system (RTOS) indigenously developed by it. This is the first indigenous RTOS developed in the country from scratch, says HAL Chairman and Managing Director, Mr T Suvarna Raju. The RTOS is the system software which provides a standard run-time environment for real-time applications execution in a safe and reliable manner. “The RTOS is a key technology for concurrent execution of multiple applications and optimal use of hardware resources,” adds Raju. Advanced modules like network stack and file system have been co-developed with IIT-Kharagpur. Currently, avionics systems in India are developed using commercial RTOS procured from foreign suppliers. The RTOS performance was validated on the Mission Computer of the Hawk-i trainer aircraft. The complete Operational Flight Program, which includes real-time sensor data processing, navigation algorithm computations, controls and display management and interface management was ported. The RTOS met all its design requirements during the flight, a HAL release said.

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

## **SpaceX launches world’s most powerful rocket toward Mars**

The world’s most powerful rocket, SpaceX’s Falcon Heavy, blasted off today on its highly anticipated maiden test flight, carrying CEO Elon Musk’s cherry red Tesla roadster to an orbit near Mars. Screams and cheers erupted at Cape Canaveral, Florida as the massive rocket fired its 27 engines and rumbled into the blue sky over the same NASA launchpad that served as a base for the US missions to Moon four decades ago. “Wow, did you guys see that? That was awesome,” said SpaceX commentator Lauren Lyons as applause thundered through mission control. Loaded with Musk’s red Tesla and a mannequin in a spacesuit, the monster rocket’s test voyage has captured the world’s imagination. About two minutes into the flight, the two side boosters peeled away and made their way back toward Earth for an upright landing. Both rockets landed side by side in unison on launchpads, live video images showed. “And the Falcons have landed,” Mr Lyons said. The third, centre booster was to attempt a landing on an ocean platform.

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

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## **Chandrayaan-2 mission: Rover to spend 14 days on moon's surface, says ISRO chief**

Gearing up for its most challenging space mission, Indian Space Research Organisation (ISRO) is leaving no stone unturned to make the Chandrayaan-2 (lunar-2) mission a success. Unlike the first lunar mission when a PSLV rocket carried the spacecraft to the moon's orbit, this time heavy-payload lifter GSLV Mk II will launch the spacecraft weighing 3,290kg as the module will carry an orbiter, a rover and a lander to the moon. Giving exclusive details about the mission, ISRO chairman Dr K Sivan told, "Chandrayaan-2 is a challenging mission as for the first time we will carry an orbiter, a lander and a rover to the moon. The launch date schedule is sometime in April. Once the GSLV rocket carrying the spacecraft is launched from Sriharikota, the orbiter will reach the moon's orbit in one to two months. (The moon's orbit is 3,82,000km away from the earth's surface)." Dr Sivan said, "After reaching the moon's orbit, the lander will get detached from the orbiter and do a soft-landing near the south pole of the moon. The 6-wheeled rover fixed within the lander will get detached and move on the lunar surface. The rover has been designed in such a way that it will have power to spend a lunar day or 14 Earth days on the moon's surface and walk up to 150-200 metres. It will do several experiments and on-site chemical analysis of the surface." The ISRO chairman said, "The rover will then send data and images of the lunar surface back to the Earth through the orbiter within 15 minutes. After spending 14 earth days, the rover will go in a sleep mode. We are hoping the rover will again come alive whenever that part of the moon (where the rover will land) gets sunlight and recharges the rover's solar cells. Besides the rover, the orbiter will also capture images of the moon while orbiting it." On testing of lunar components, Dr Sivan said, "All three components of the lunar module are almost ready. Currently, their integration is going on. Once the module is ready, it will have to go through rigorous tests." On fixing launch date, he said, "The launch date will depend on various factors like the moon's relative position with respect to the Earth. Once the GSLV is launched, it will put the spacecraft in the 170 km x 20,000 km elliptical orbit. From the elliptical orbit, the craft will be manoeuvred towards the lunar orbit by firing thrusters. Therefore, we expect it to reach the lunar orbit in two months."

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

## **ISRO plans to launch India's 2nd space observatory**

Indian Space Research Organisation (ISRO) is planning to launch the country's second AstroSat-2 or space observatory. The mission is meant to further the study of astronomy (the study of celestial bodies) and astrophysics. ISRO made the announcement of opportunity on February 3 to seek proposals from all institutions currently involved in astronomy/astrophysics for the development of scientific instruments for astronomy payload and mission. The advantage of having such a space observatory in outer space is that it helps observe distant planets, galaxies and other astronomical objects more clearly than from the Earth. Space telescopes avoid problems of ground-based observatories, such as light pollution and distortion of electromagnetic radiation. The first AstroSat-1 weighing 1,515kg was launched on September 28, 2015. It was successfully placed at an orbit of 650 km altitude and has a life span of five years. It circles around the Earth in 97 minutes and makes 15 rounds a day. The Rs 178-crore AstroSat-1 has five hi-tech cameras (payloads), which cover the energy bands of ultraviolet (near and far), limited optical and X-ray regime (0.3 keV to 100keV). The 2015 launch helped India gain entry into the select club of nations having its own observatory after the US, Japan, Russia and Europe. The key functions of AstroSat-1 are to study binary star system, neutron stars, black holes and star birth regions. One of the unique features of AstroSat mission is that it enables the simultaneous multi-wavelength observations of various astronomical objects with a single satellite. With two more years to go before the first observatory's space life ends, ISRO is planning to send AstroSat-2. AstroSat-1 (1,515 kg) is desi version of Nasa's Hubble Telescope though Hubble (11,110 kg) is around eight times heavier than India's satellite and is a more sophisticated telescope. Besides ISRO, five premier institutes that played a key role in the development of AstroSat-1 are Indian Institute of Astrophysics (IIA), Bengaluru; Physical Research Lab (PRL), Ahmedabad; Raman Research Institute, Bangalore; Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune; and M P Birla Institute of Fundamental Research (IFR), Bangalore. The spacecraft control centre at Mission Operations Complex (MOX) of ISRO Telemetry, Tracking and Command Network (ISTRAC), Bengaluru, manages the satellite. The science data gathered by five payloads of AstroSat are telemetered to the ground station at MOX. The data is then processed, archived and distributed by Indian Space Science Data Centre located at Bylalu near Bengaluru.

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

## **Light combat helicopter flies with desi auto control systems, claims HAL**

Defence PSU Hindustan Aeronautics Limited (HAL) claimed to have carried out the first flight of Light Combat Helicopter-Technology Demonstrator 2 (LCH-TD2) with its own designed and developed Automatic Flight Control System (AFCS)

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for the first time in the country. “The maiden flight was flawless and flew for 20 minutes with the engagement of the system throughout,” a statement issued here read. The AFCS is a digital four-axis flight control system capable of performing control & stability augmentation function and auto-pilot modes of helicopters. Wing Commander (retd) Unni K Pillai, Chief Test Pilot and Group Captain (retd) [Rajesh Verma](#), test pilot were on the controls of LCH. Representatives from certification agencies and senior officers from HAL were present. “HAL has already indigenised the Cockpit Display System on LCH namely the Integrated Architecture Display System (IADS) with the participation of Indian private industries and development flight testing is under progress. The Initial Operational Clearance (IOC) for LCH was accorded on August 26, 2017 in the presence of defence minister,” the statement read.

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

## Mars image provides vista of key sites visited by NASA's Curiosity rover

A panoramic image that NASA's Curiosity rover took from a mountainside ridge on Mars provides a sweeping vista of the key sites visited since the rover's 2012 landing, the US space agency said. The view from “Vera Rubin Ridge” on the north flank of Mount Sharp encompasses much of the 18 kilometre route the rover has driven from its landing site, all inside Gale Crater, NASA said. One hill on the northern horizon is about 85 kilometres away, well outside of the crater, though most of the scene's horizon is the crater's northern rim, roughly one-third that distance away and two kilometres above the rover. Curiosity's Mast Camera, or Mastcam, took the component images of the panorama three months ago while the rover paused on the northern edge of Vera Rubin Ridge. The mission has subsequently approached the southern edge of the ridge and examined several outcrop locations along the way. Last week, the Curiosity team on Earth received copious new images from the rover through a record-setting relay by NASA's MAVEN orbiter – surpassing a gigabit of data during a single relay session from Mars for the first time in history. The team is preparing to resume use of Curiosity's drill for acquiring powdered rock samples to be analysed by laboratory instruments inside the rover, more than a year after the most recent of the 15 times the drill has pulled sample material from Martian rocks, NASA said. “Even though Curiosity has been steadily climbing for five years, this is the first time we could look back and see the whole mission laid out below us,” said Curiosity Project Scientist Mr Ashwin Vasavada of NASA's Jet Propulsion Laboratory. “From our perch on Vera Rubin Ridge, the vast plains of the crater floor stretch out to the spectacular mountain range that forms the northern rim of Gale Crater,” Vasavada said. The rover photographed the scene shortly before northern Mars' winter solstice, a season of clear skies, gaining a sharp view of distant details.

Source: <http://indianexpress.com/>

## Chandrayaan-2 mission cheaper than Hollywood film Interstellar

India's upcoming Rs 800-crore Chandrayaan-2 mission will be cheaper than Hollywood's 2014 sci-fi movie 'Interstellar' that cost Rs 1,062 crore (\$165 million). In fact, ISRO's earlier Mars mission (Rs 470 crore) launched in 2013 was also cheaper than another Hollywood space movie 'Gravity' (whose budget was Rs 644 crore or \$100 million) made in the same year. So, what makes [Indian Space Research Organisation's](#) space and interplanetary missions cost-effective? In an exclusive interview with TOI, ISRO chairman [Dr K Sivan](#) explained the frugal nature of their space and interplanetary missions. He said, “Simplifying the system, miniaturising the complex big system, strict quality control and maximising output from a product make our space missions frugal and cost-effective. We keep strict vigil on each and every stage of development of a spacecraft or a rocket and, therefore, we are able to avoid wastage of products, which helps us minimise the mission cost.” ISRO will try to launch the Chandrayaan-2 mission, involving a soft-landing on the moon's surface and rover walk, sometime in April. However, there are various factors like moon's relative position with respect to the Earth that will decide the launch date. Dr Sivan said, “We are trying for a dawn-to-dusk landing and rover walk on the lunar's mission for maximum utilisation of the scientific mission. If we are not able to land in April due to various factors, then the mission will be launched in November. If we launch between April and November we won't get the perfect dawn-to-dusk landing and experiment time due to moon eclipses, therefore, we will avoid the launch in between. The perfect timing for the launch comes only once in a month.” Unlike [Nasa's](#) Apollo and Russia's Luna missions where the rover landed on the equatorial region of the moon, ISRO is planning to land the rover near the south pole. The ISRO chairman said, “We have chosen the landing site near the south pole as it has big rocks that are billions of years old. Analysing these rocks and the surface will help us explore the moon better and enrich our understanding of the universe.” After soft-landing, the six-wheeled rover will get detached from the lander and move 100-200 metre on the moon's surface and analyse content. It will remain active for 14 earth days (one lunar day) and send back data and images to the Earth via the orbiter within 15 minutes. Asked about Russia's initial participation in the Chandrayaan-2 mission, Dr Sivan said, “Earlier, Russia promised us to provide a rover for the mission. However, ISRO scientists wanted their own rover. During that period, Russia's Phobos-Grunt mission for Mars involving the lander failed. Russia

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then wanted to buy time to correct the fault that led to the mission failure. Keeping the circumstances in mind, ISRO then planned to develop own rover and lander. Therefore, it's a completely indigenous programme now." He said simulations tests on different Chandrayaan-2 components had been going on at ISRO centres in Bengaluru, Mahendragiri and Chitradurga, Karnataka. ISRO, in fact, created some artificial 'lunar craters' as part of 'hazard avoidance and landing' tests.

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

## 'Tejas, a best in class aircraft'

Tejas, India's home-grown Light Combat Aircraft (LCA), has emerged among the best in class aircraft, providing flight stability even under extreme unstable conditions says Dr S Christopher, Chairman, Defence Research & Development Organisation (DRDO). This has been achieved through indigenous technology and developments. In addition, Tejas has rules-based Artificial Intelligence incorporated into its Flight Control System (FCS), he said at the third International Federation of Automatic Control (IFAC), International Conference on Advances in Control & Optimisation of Dynamical Systems (ACODS 2018) here. The FCS provides the pilot 'carefree handling'. However, flight limits cannot be exceeded, which at lower speeds on aircraft such as the MiG-23/27 or Jaguar, results in the loss of the aircraft. The Aeronautical Development Establishment, Bengaluru, and HAL have been involved in the development of Tejas. However, it has posed challenges for pilots in controlling its longitudinally unstable airframe, which escalates rapidly any disturbance of even a small magnitude. A major challenge that has resulted in delays and long gestation for the Tejas development programme. Christopher, who is also Secretary, Department of Defence R&D, said to add more features and capabilities, continuous R&D has been taken up in the area of AI. Control systems have wide applications varying from aircraft and submarines to missiles. To meet the growing requirements of aerospace and defence projects, there is a need to develop innovative guidance schemes and control algorithms, he added. Futuristic weapon systems will be smart, intelligent, complex and technologically advanced, he added. More than 500 scientists, academicians, industry partners and students are taking part in the conference being organised by DRDO. In his address, Dr G Satheesh Reddy, Scientific Adviser to the Defence Minister and DG (Missiles & Strategic Systems), said miniaturised avionics and smart sensors will be the backbone for futuristic aerospace and defence systems. Hence, there is an urgent need to create infrastructure and train a resource pool to develop algorithms for control and guidance to take aerospace vehicles such as fighter aircraft, missiles and launch vehicles into the next generation. Mr N.V. Kadam and Mr S.K. Ray, former senior scientists of the Dr APJ Kalam Missile Complex, were felicitated for their lifetime contributions in the field of control and guidance. Frank Allgower, President, IFAC Austria (Stuttgart University, Germany), addressed the inaugural function. Many globally renowned Control and Guidance experts including Mr P.K. Menon, Chairman & CEO, Optimal Synthesis Inc., Mr Reza Moheimani, University of Texas, Sarah Spurgeon, University College of London, and Mr Min-Jea Tahk, Korea Advanced Institute of S&T will be delivering the plenary and invited talks during the international conference.

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

## 'Hot refueling' trial of LCA Tejas successful

Defence PSU Hindustan Aeronautics Limited (HAL) successfully carried out a "hot refueling" procedure on the indigenous Light Combat Aircraft-Tejas. The procedure was followed by a sortie. "The system performance during the refueling session was in-line with design requirements and was satisfactory," HAL said in a statement, adding that the aircraft is now inching closer to the final operational clearance (FOC). HAL claimed that in the history of IAF aircraft, LCA will be the first one to fly with this unique capability of hot refueling and HAL has successfully demonstrated this on LCA Tejas LSP8 aircraft. Hot refueling is a single point pressure refueling of the aircraft with the engine in operation. It is a process by which a fighter aircraft is refueled (in between sorties) while its engine is in operation, thereby cutting down the refueling time by half and turn-around time significantly. "This capability is highly desired in combat situation which basically puts aside the need for the pilot to park the aircraft, power down and exit the cockpit for refueling to begin. Further, with this, a major requirement of LCA Air Force Mk1A has been achieved," HAL said.

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

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## BUSINESS

### Airlines on aggressive buying spree

Domestic airlines will buy 920 planes in the next few years in huge expansion plans worth billions of rupees, as Indian aviation sector is witnessing a growth in the number of fliers. Of this, around 50 aircraft will be inducted into service by various operators by March 2019. The airlines are on a feverish shopping mode as the domestic passenger outlook is looking rosy, as it already crossed the 10 crore-mark last year. The market leader IndiGo has the highest order at 348 aircraft and it is expected to induct these planes in the next seven to eight years. With 147 planes in its fleet, IndiGo has ordered 399 Airbus 320 as well as 49 ATR72-600 planes to cater to its expansion plans in Tier II and III cities. For IndiGo, the order for Airbus 320 will help it in its expansion of international operation as also augmenting and consolidating its numero uno position in domestic operations. SpiceJet, which recovered after being in the woods financially a couple of years ago, too have an order for 157 aircraft that will be delivered by 2023. With 57 aircraft at present, it has ordered 107 Boeing 737-800 as well as 50 Bombardier Q400. GoAir is another big buyer as it has ordered 119 Airbus 320 aircraft to add to its existing 30 planes. The Wadia Group-owned airline expects to induct these aircraft by 2022. The full-service Jet Airways with 106 aircraft in its fleet will add five Boeing 737-8 by this March while another 81 Boeing 737-8 (MAX) between 2018 and 2024. While full-service Vistara, a joint venture of Tata Sons and Singapore Airlines, is expected to add five Airbus 320 this year to its existing fleet of 17, low-cost AirAsia India will add another 60 Airbus 320 to its fleet of 13. The airlines' aggressive expansion plans come at a time the Economic Survey had acknowledged the "considerable progress" in the aviation sector, with India registering a faster growth rate than the United States and China when it comes to the number of domestic fliers. The government is also responding to the fast pace developments in the sector with the Budget unveiling an ambitious 'Nabh Nirman' (Developing Skies) programme to expand airport capacity by more than five times to handle a billion trips a year.

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

### Airline industry hails plan to expand airport infra

The airline industry has welcomed the government's plans to expand airport infrastructure in the country, as also increase flight connectivity. Presenting the Budget 2018-19 in Parliament, Finance Minister Mr Arun Jaitley said, "The Airports Authority of India (AAI) has 124 airports. We propose to expand our airport capacity more than five times to handle a billion trips a year under a new initiative - NABH Nirman. The balance sheet of AAI shall be leveraged to raise more resources for funding this expansion." Hailing this announcement, SpiceJet Managing Director Mr Ajay Singh said, "The FM has proposed an ambitious scheme, NABH Nirman, to expand airport capacity by five times to one billion trips a year. India has about 125 airports today. This number can go up to 700." "This initiative has the potential to transform the Indian aviation sector and make India a global aviation superpower. The initiative will help connect smaller towns and cities, and increase tourism and economic activity like never before," he added. Said Colliers international India National Director (Occupier Consulting & Asia) Mr Amit Oberoi, "The government announces a major push for air travel by working on a passenger-handling capacity of two billion. This is a major upgrade, as the top 10 cities today only handle 225 million passengers per annum. We expect real estate development in land besides Tier II and III airports." Mr Jaitley said that the government's ambitious regional connectivity scheme UDAN (Ude Desh ka Aam Nagrik) initiated by the government last year shall connect 56 unserved airports and 31 unserved helipads across the country. Operations have already started at 16 such airports. "The Budget addresses the aspirations of a modernising nation through initiatives to expand air connectivity under the UDAN scheme," Airbus India President and Managing Director Mr Pierre de Bausset said. Mr Amitabh Khosla, Country Director & India of the International Air Transport Association (IATA) stated, "We welcome the focus on airport infrastructure capacity announced in the Budget. In our 20-year passenger forecasts, IATA anticipates India will become the third largest aviation market by 2024." However, he suggested, "But this is by no means guaranteed. To make this a reality, airport capacity in India needs to be augmented and expanded quickly. IATA has earlier recommended and is supportive of leveraging AAI's balance sheet for infrastructure creation and expansion."

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

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## HAL invites Indian partner for licence manufacturing of ALH-Civil under ToT

For the first time in Indian history, as a major boost to defense manufacturing and the government's 'Make-in-India' initiative, HAL has offered the indigenous Advanced Light Helicopter (ALH)-Dhruv (Civil version) for manufacturing to potential Indian private companies through transfer of technology (ToT). Accordingly, the company has invited Expression of Interest (EOI) for identification of Indian partner (IP). "Considering the increasing need of helicopters in civil operations of the country, this will be a mega deal from HAL which is the OEM and Licensor," said Mr T. Suvarna Raju, CMD, HAL. HAL is the design authority and original equipment manufacturer (OEM) of ALH-Dhruv. The company is now looking forward to develop a reliable IP to service the potential demand to different customers in the civil sector in a shorter time span. The selected IP would also be required to provide support to the customers throughout the life of the product (20 years) thereby ensuring a long-term business relationship. As a technology provider, HAL will provide transfer of technology through license and transfer of know-how, technical assistance and license rights for production of ALH-Dhruv for the selected business partner. HAL is looking for the IP who has the capability of having five years of experience in engineering/aerospace industry (including manufacturing and assembly), having a net worth of Rs 2000 crores and a minimum turnover of Rs 2500 crores, possessing skilled and qualified manpower, registered in India or having majority holding by Indian stakeholders, and willing to enter strategic collaboration with HAL. ALH Dhruv has successfully proved itself with different customers in varying roles and missions in demanding operational conditions and has bright business prospects. Besides the current orders, Dhruv is envisaged to have potential demands in domestic as well as foreign markets due to its flexibility of configuration for different roles.

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

## HAL Invites firms to make Lightcopters

HAL invites private companies to manufacture 'Dhruv' helicopters. In a bid to push the 'Make in India' initiative, Hindustan Aeronautics Limited (HAL) has invited private sector companies to manufacture the civil version of the indigenous Advanced Light Helicopter (ALH) Dhruv. HAL, the public sector defence major which has designed, developed and manufactures the ALH, issued a notice inviting 'expression of interest' from private firms with relevant experience in the aerospace and engineering industry. "HAL is looking for the Indian Partner, who has the capability of having five years of experience in engineering/aerospace industry (including manufacturing and assembly), having net worth of Rs 2,000 crore and minimum turnover of Rs 2,500 crore, possessing skilled and qualified manpower, registered in India or having majority holding by Indian stakeholders and willing to enter strategic collaboration with HAL," the HAL said in a statement. "Considering the increasing need of helicopters in civil operations of the country, this will be a mega deal from HAL which is the OEM and Licensor," HAL CMD T. Suvarna Raju said. HAL is the Design Authority and Original Equipment Manufacturer (OEM) of ALH-Dhruv. "The company is now looking forward to develop a reliable Indian Partner (IP) to service the potential demand to different customers in civil sector in shorter time span. The selected Indian Partner would also be required to provide support to the customers throughout the life of the product (20 years), thereby ensuring long term business relationship," the statement said. As a technology provider, HAL will provide transfer of technology through license and transfer of know-how, technical assistance and license rights for production of ALH-Dhruv (Civil) for the selected business partner. "ALH Dhruv has proved itself with different customers in varying roles and missions in demanding operational conditions and has bright business prospects. Besides the current orders, Dhruv is envisaged to have potential demands in domestic as well as foreign markets due to flexibility of configuration for different roles," the statement added. The ALH Dhruv has been exported to Nepal, Mauritius, Ecuador and Maldives, apart from being manufactured for the Indian forces. According to a recent reply to the Lok Sabha, HAL presently has contracts worth Rs13,799 crore for 159 ALH helicopters, of which 154 have been produced so far. The annual production capacity of HAL is 24 helicopters.

## PASSENGER TRAFFIC

India's domestic air passenger traffic surged by 19.69 per cent to 1.14 crore in January from 95.79 lakh reported during the corresponding month of last fiscal, official data showed here. "Passengers carried by domestic airlines during January 2018 were 114.65 lakh as against 95.79 lakh during the corresponding period of previous year thereby registering a growth of 19.69 per cent," the Directorate General of Civil Aviation (DGCA) said in its monthly domestic traffic report. According to the data, low-cost carrier SpiceJet had the highest passenger load factor (PLF) - a measure of capacity utilisation of the airline — at 95 per cent during the month under review. "SpiceJet has yet again recorded the highest PLF in the industry and this is the 34th month in a row that we have flown with load factors in excess of 90 per cent," said SpiceJet's Chief Sales and Revenue Officer Ms Shilpa Bhatia. It was followed by budget passenger carriers GoAir with PLF at 90 per cent, and IndiGo and JetLite at 89.7 per cent each. "The passenger load factor in the month of January 2018 has shown increasing trend compared to previous month primarily due to the ongoing tourist season," the

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monthly statistical analysis said. The data showed that IndiGo led the industry with 75.4 per cent punctuality rate (on-time performance) at the four major airports of Bengaluru, New Delhi, Hyderabad and Mumbai.

Source: <http://gulftoday.ae>

## India attracting big aerospace manufacturers

India has caught the attention of major aerospace defence manufacturers with its low production cost and government's strong focus on building manufacturing sector under "Make In India" initiative, aviation industry officials said today. India is also rated among the largest markets by internationally linked small-and-medium-size enterprises (SMEs) which plans to expand supplies to Indian customers or form joint ventures in the country to make their components for exports. "India has the attention of all the big aerospace defence manufacturers and ourselves as well," said Mr Andrew Martin, director of business development and market at Martin-Baker Aircraft Company Ltd. Martin-Baker Aircraft Co Ltd is a British manufacturer of ejection seats and safety-related equipment for aviation. "India is our second largest market for (pilot) ejection seats after the US," added Martin whose family-owned company was rated as the 99th largest aerospace and defence supplier. There are as much as 20 per cent cost savings on parts and components made in India for the global aviation industry, according to Mr Nitin Sananse, regional sales and technical support for Southeast Asia and India at Spectrum Technologies.

### 'Make in India'

Noting that the Indian government's strong emphasis on building manufacturing sector, some producers of high-tech and high-spec products said they were working on being in the Indian market for the long-term. "With the 'Make in India' initiative, we have been very focused on looking for ways to collaborate further with the Indian industry," said Mr Jim Jackalone, Director of Sales and Marketing at Cobham Aerospace Communications, a UK-based global technology and services innovator. Underlining the working relationship with Indian aviation heavyweights such as Tata Industries and Hindustan Aeronautics Ltd for over 70 years, he said, almost all aviation platforms uses some Cobham equipment. According to officials of the aviation and aerospace industries participating in the ongoing Singapore Airshow 2018, there is a growing respect for the Indian market as new innovations and products with advanced technologies are being designed with provision for India's requirements. "India is going through a big modernisation programme and we are proposing our new communications solutions," said Mr David Knight, Global Sales Manager Air Defence at Frequentis UK Ltd, sharing his views of the Indian market. Frequentis UK Ltd is a global supplier of communication and information solutions. London-based QinetiQ, which offers support of testing and evaluation services, expressed their willingness to address the generally perceived lack of product certification, qualification and standardisation of products made in India. "We would like to support with testing and evaluation services," said Mr Sophie Lane, head of strategic engagement at QinetiQ, which qualifies product and services required by the UK Armed Forces.

### Partnership - the key

Some of the established vendors to international manufacturers expressed their keenness to relocate plants to India where global supply chain is in the making for multi- billion dollar domestic and export-oriented industries. The UK-based Vaayu is seeking "a right Indian partner" as it is in the process of setting up representative office in India by end of this year. "India is a big market," said Mr Brue Allison, Sales Director at Vaayu, the supplier and stockist of re-cycled but upgraded material and parts for maintenance, repair and operation of major aircraft companies including Lufthansa and Lockheed Martin.

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

## Boeing to scale up Aerospace manufacturing operations, workforce in India

### Highlights

- Boeing will scale up manufacturing in India by spreading its operations across Hyderabad and other southern cities
- Boeing India president mr Pratyush Kumar has said they are looking forward to ramp up the workforce in India from 1,200 to 3,000 by 2020

Boeing will scale up manufacturing in India by spreading its operations across Hyderabad and other southern cities, said Mr Pratyush Kumar, president, Boeing India.

"Boeing in India is now also focussed on scaling up manufacturing through partnerships and engineering—both internally and through partnerships. When it comes to manufacturing, we have increased our sourcing by four folds

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over the past three years. This year, we expect this number to go beyond \$ 1 billion,” said Kumar, while pointing to Hyderabad and Bangalore as the aerospace hubs in the country. According to Mr Kumar, the company will soon expand its manufacturing and engineering footprint in India. “Today, we have around 1,200 people employed in India and our goal is to have 3,000 engineers in the country by 2020 and we are rapidly moving towards the same. There is a broad engineering capability in India and we will be hiring employees across functions—ranging from high-end aeromechanics engineers to computer science engineers and testing engineers. Our engineering base will be spread across Bangalore, Hyderabad and Chennai since we see growth in all these three areas,” said Mr Kumar. Mr Kumar also pointed out how the Indian army and navy are both now showing a lot of interest in Apache, Chinook helicopters and maritime surveillance aircraft. “The Indian Navy has been operating the P-81 maritime surveillance aircraft quite successfully—they have eight vehicles on board and have ordered four more. The army has also shown a lot of interest in Apache and 22 Apache and 15 Chinook helicopters are on order. We are happy to see that all three branches of defence services in India are using our platform to increase capabilities,” According to Mr Kumar, the Indian army has received clearances, from the Defence Acquisition Council, to purchase six Apaches. While stating that the aerospace industry in India is still in its early stages, Kumar said “For the longest time in India, the aerospace sector was dominated by government-owned PSUs and it is only in the last five or seven years that private players have entered this space. The Indian aerospace industry is expected to find a presence on the global supply chain of global aerospace majors in the future.” Major players in the aerospace sector are today working on the concept of autonomy in avionics—which would enable unpiloted operations of aircraft. “We are always working on next-gen aircraft and emerging technologies— such as autonomy in avionics and next-gen space vehicles and capsules. We are at the cusp of another revolution in aerospace innovation,” said Mr Kumar, who said that India was one of the priority markets for the American aircraft manufacturer.

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

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