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Current Affairs

Technology

Business

Awards

Obituary

Advertisements

CURRENT AFFAIRS



HAL gearing up to make 16 Tejas LCA a year, says CFO

Indegenous technology tested on BrahMos supersonic missile



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India successfully launches GSAT-6A communication satellite

India successfully launched the GSAT-6A satellite that would provide mobile communication facilities, using its heavy rocket Geosynchronous Satellite Launch Vehicle (GSLV-F08), in a copy book style. The GSLV-MkII rocket slung the satellite in a geosynchronous transfer orbit (GTO) from where it would be taken up to its final geostationary orbit by three orbit raising manoeuvres. ISRO's scientists at the mission control centre were visibly happy, slapping each others' backs and hugging each other once the rocket ejected the satellite into the intended orbit. Precisely at 4.56 p.m., the GSLV rocket ascended into the sky from the second launch pad here at Satish Dhawan Space Centre and the 49.1 metre tall rocket, weighing 415.6 tonne, slung the two tonne satellite into the intended orbit 17.46 minutes into its flight. The purpose of the satellite is to provide mobile communication applications in S-band in five spot beams and C-band in one beam during its 10-year life span. The Indian Space Research Organisation (ISRO) said that the GSAT-6A was similar to the GSAT-6 put into orbit in 2015. The GSLV is a three stage/ engine rocket. The core of first stage is fired with solid fuel while the four strap-on motors by liquid fuel. The second stage is the liquid fuel-propelled and the third is the cryogenic engine. According to ISRO, two improvements — induction of high-thrust Vikas engine and electromechanical actuation system — have been made in the rocket's second stage this time around. One of the crucial rocket engines is the cryogenic engine, designed and developed by ISRO, and more efficient than the other two variants as it provides more thrust for every kilogram of propellant burnt. With this successful launch, India established the performance of its GSLV-MkII rocket which in future may fetch orders from third parties for launching their satellites. India puts into orbit foreign satellites for a fee using its lighter rocket - the Polar Satellite Launch Vehicle (PSLV) as their weight is not much. Revenue for launching satellites depends on weight of the satellite - higher the weight, higher will be the revenue. According to the latest Economic Survey, foreign exchange earnings of India from export of satellite launch services increased noticeably in 2015-16 and 2016-17 to Rs 394 crore and Rs 275 crore from Rs 149 crore in 2014-15.



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

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CURRENT AFFAIRS

India, Jordan ink 12 pacts to boost defence ties

India and Jordan signed a framework defence agreement which envisages a whole range of possibilities from defence acquisitions by Jordan to defence exercises and closer security cooperation. India and Jordan signed 12 agreements after the high level talks, covering areas as diverse as mass media, health, culture and tourism. But the area of interest for both countries is clearly defence and security. King Mr Abdullah, who is himself a trained para-trooper and a Sandhurst alumni, inspected the Indian-made Advanced Light Helicopter (ALH) at Palam, and reviewed an anti-terrorism demonstration by NSG at Manesar. During the discussions, both countries reiterated their support for the Palestine cause, officials said. India and Jordan started a cyber security dialogue in July 2017, and want to take it further. Briefing journalists, secretary (ER) TS Mr. Tirumurti said, "This is a framework defence agreement, where several areas of cooperation are delineated. We are exploring different areas of cooperation. So while nothing specific was discussed, we are exploring possibilities." He said while the King surveyed the ALH, there was no talk yet of any sale. King Mr Abdullah addressed the Indian industry and invited Indian companies to utilise Mr Jordan as a gateway to Europe and the US, taking advantage of its free trade agreements with these vast markets. Sources said a number of Bto-B agreements were signed. Mr Jordan has already asked for assistance for its massive refugee population which include 1.3 billion Syrians, as well as Iraqis and Palestinians. Last year, India gave a cash donation of \$2 million, but this year, it will be giving \$5 million in vaccines and medicines to Mr Jordan.

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

India's first heli-taxi service takes flight in Bengaluru

"Exhilarating, epic, absolutely phenomenal," gushed lifestyle blogger Deena Pinto, as India's first heli-taxi service completed its maiden flight between Kempegowda International Airport (KIA) and Electronics City here in less than 15 minutes. Operated by the Kochi-based Thumbay Aviation, the six-seater Bell 407 helicopter had just clocked a travel record, bypassing the city's notoriously congested roads in a jiffy. Taking off at 10.30 am from a helipad on KIA's land side, the heli-taxi landed at 10.45 am in Electronics City. For Pinto, the first helicopter ride of her life was an aerial experience like no other. "I am still on cloud nine from my trip. Although it was very brief, it was amazing to watch Namma Bengaluru from above. Sky taxis are here to say," she told DH. A one-way flight is priced at Rs 4,130 per seat (Rs 3,500 plus GST). Digital marketer Mr Hrish Thota, who also flew the heli-taxi, found it cheaper than the Rs 4,500 charged for a luxury taxi ride on the same route. "The taxi takes 2.5 hours due to the heavy traffic. Heli-taxi makes perfect sense for the corporates, C-level employees and CEOs," Mr Hrish analysed. The last-mile connectivity was another plus. Passengers landing at KIA are picked up right from the airport terminal and driven in an SUV to the helipad. "At Electronics City, too, the helipad in Phase I is within 1.5 km from all the major IT firms. It is very convenient," he explained. Also, a Metro station is coming up in the vicinity. Lined up for the second phase are services between KIA, HAL Airport and the ITC Gardenia hotel near Richmond Circle. Bookings will soon be opened at HAL. Plans are afoot to activate more helipads in the city to make it an intra-city heli-taxi service, said a Thumbay Aviation official. The helipad facility at Electronics City was formally inaugurated in the presence of the CEO and members of the Electronics City Industrial Township Authority (ELCITA). Once demand picks up, a 13-passenger Bell 412 helicopter will be added to the fleet. The airport shuttle is currently operational from 6.30 am to 9.45 am, and from 3.15 pm to 6 pm. For corporates, a special introductory price of Rs 2,500 plus taxes has been offered for 45 days. Services during the remaining daylight hours between 10 am and 3 pm will be open to bookings based on availability and dynamic pricing. This is currently priced at Rs. 35,400 (inclusive of taxes).

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

AirAsia India to begin overseas operations by Jan 2019: MD & CEO Amar Abrol

Budget carrier AirAsia India has charted out expansion plans to connect more tier-II and III cities and set a target to commence flights to overseas destinations by January 2019, a top official said. The airliner last week inducted its 16th aircraft and announced the addition of Nagpur and Indore to its list of destinations. According to AirAsia India, Managing Director and CEO, Mr Amar Abrol, the airliner has planned to commence overseas operation by January 2019 once it has 20 or more planes. "Our strategy is that once we get to 20 planes (operating in domestic operations) we will start flying international. Mostly, it will be to South East Asian countries," he told PTI here. Stating that 27 per

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cent of the people who fly with AirAsia were flying for the first time ever, he said, “So, we are opening up Indian skies. And we are getting lot many more Indians to fly for the first time.” The plan is to connect more and more tier II and III cities in India, wherever A320 can go and also start flying international after crossing 20 aircraft, he said. Elaborating, he said, the company would serve those markets which were already connected by the airliner’s group entities — AirAsia Malaysia, AirAsia Indonesia, AirAsia Thailand. “We will be flying mostly to Malaysia, Indonesia and neighbouring SAARC countries as well. Bangladesh, Nepal and so on and so forth,” he said. Asked whether there would be any competition within the AirAsia Group itself, as AirAsia Malaysia and AirAsia Thailand operate, he replied in the affirmative saying, it will be healthy competition between the airlines. “That is not a problem. I think there is enough demand for AirAsia Malaysia to grow and AirAsia India to grow.” He said the customer would be deciding the flight to a destination, whether it may belong to AirAsia Malaysia or AirAsia India. “For the customer there will not be any difference. Still, it will be an AirAsia plane, AirAsia service. There will not be any difference. Probably there may be (some difference) in the cabin crew,” he said. On pricing, he said, “AirAsia Malaysia is an independent entity, AirAsia India is an independent entity. We will price according to what we feel is right. But, ultimately it is the consumers who will decide which flight they want to take.” Referring to the Centre’s ambitious UDAAN scheme which aims to connect under-served cities, Mr Abrol said, the airliner was not participating (in the scheme) because the flights owned by them were Airbus A320s. The government’s ambitious UDAN (Ude Desh Ke Aam Naagrik) scheme, under which fares are capped at Rs 2,500 for a one-hour flight. It aims at boosting air connectivity to and from unserved and under-served airports and making flying more affordable. “UDAAN scheme is typically meant for 10-seater or 15- seater ATRs. We have big planes. Hence we are not participating in Udan Scheme per se,” Mr Abrol said. Stating that AirAsia was already connecting metros to non-metros other than Bengaluru-Chennai, Bengaluru-New Delhi, he said, the focus will be on tier II and III cities. “Our focus has been on tier II and III cities. Because, we believe that is where quite a lot of demand is,” he said. The company recently introduced flights in the Bhubaneswar-Chennai route. “We are connecting Chennai to Bhubaneswar and we are not necessarily connecting Chennai to New Delhi, because that is a market which is already served very well”, he said. AirAsia India currently flies to 17 destinations with its hubs in Bengaluru, New Delhi and Kolkata. AirAsia India is a joint venture between Tata Sons Limited and AirAsia, with AirAsia Investment Limited. AirAsia India currently flies to 17 destinations with its hubs in Bengaluru, New Delhi and Kolkata. AirAsia India is a joint venture between Tata Sons Limited and AirAsia, with AirAsia Investment Limited. AirAsia India commenced operations in June 2014 and currently flies to several cities in the domestic market.

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

IISc Open Day: Fire, chemicals, drones fascinate visitors

Giving malls and movies a skip, hundreds of students, parents, and children spent their day at the Indian Institute of Science (IISc) to take part in the annual Open Day. Visitors saw fire, chemicals, electricity, drones, and more in action in the many departments of the prestigious institute. At the airfield of the aerospace department, there was a buzz in the air. Not just of the excited crowd but of the unmanned aerial vehicles (UAVs) or drones being displayed. Children watched with excitement as the drones zoomed back and forth in the air. The capabilities of the drones, developed in the UAV Lab, were shown through tasks such as rescuing victims from an obstacle-rich environment and even completing lemon-and-spoon races. Mr Krish Manoj, a Class 5 student, and Mr Samruddhi Pal, a Class 7 student, from Gurukul High, Attibele, were at the institute with their teachers. “We were very excited to see experiments. We loved the helium balloon which can go very high up into the sky. We also saw the drones at the aerospace department,” they said. The Centre for Product Design and Manufacturing (CPDM) had long queues for viewing the projects of students there. People watched with fascination as a student demonstrated a device he developed which could operate a computer by tracking eye movements and hand gestures.

Posters and kids zone

Myths about snake bites were being dispelled at the Centre for Ecological Sciences. “Relatives of killed snakes don’t come seeking vengeance, snakes can’t listen to the charmer’s tune and they don’t have gems in their hoods,” posters declared. For children, there was a special kids zone where they could watch live experiments on basic concepts in science. Lovekush, a first PU student, decided to skip classes for the day and spend time at the institute. “One of my teachers is from the IISc and he always talked about it. So I wanted to check it out. I attended a talk on optic fibres and it was good,” he said. He is interested in studying DNA and would consider joining the institute after Class 12.

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

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Tata Boeing Aerospace facility to produce fuselages for Apache aircraft opened in Hyderabad

The Telangana government has sought the support of the NDA government at the Centre in setting up a defence electronics incubator proposed to be set up in Hyderabad. Telangana minister for IT and urban development Mr K T Rama Rao was speaking after the inauguration of Tata Boeing Aerospace Limited, a joint venture of Boeing and Tata Advanced Systems at Adibatla aerospace special economic zone on the outskirts of Hyderabad. The inaugural ceremony was attended by Union Defence Minister Mrs Nirmala Sitaraman, US Ambassador to India Mr Kenneth I Juster, Tata Emeritus Chairman Mr Ratan Tata, Boeing Executive Vice President Leanne Caret and officials of Tata Advanced Systems Ltd (TASL) and Boeing. The 14,000 square meter facility will employ 350 skilled workers. It will be the sole global producer of fuselages for AH-64 Apache helicopter delivered by Boeing to its global customers including the US Army. The facility, set up in 13 acres at a reported cost of Rs 200 crore, will also make secondary aero-structures and vertical spar boxes of the combat helicopter. Stating that Telangana is leveraging its strength in aerospace and defence, KTR said the state was looking forward to setting up an exclusive centre for innovation in this sector also. "Telangana is a hotbed for innovations, which include the largest defence manufacturing ecosystem and largest technology incubator T-Hub. We are currently focussing on setting up India's largest prototyping facility called T-works," he said. He expressed happiness over Boeing choosing Hyderabad as the preferred destination. He said while the facility would manufacture aero-structures for the Apache helicopters, it would take a step forward and manufacture a full-blown aircraft in the future. Boeing and Tata signed the agreement to develop this facility in 2015, followed by ground breaking ceremony in June 2016.

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

IAF to embark on a long shopping sortie for a jet

It's back to square one for the force as the government has scrapped the MMRCA tender; evaluation and other processes will take at least 2 years. Almost two decades after it began a search for a fighter aircraft, the Indian Air Force is back to square one. The IAF will begin the search again to arrest its falling squadron strength, as the Union government had scrapped the medium multi-role combat aircraft (MMRCA) tender after ordering 36 Rafale fighters from France in flyaway condition. "The Request for Information (RFI) for selecting a new fighter aircraft is expected to be issued before the DefExpo in April. It will be an open tender and not limited to single-engine aircraft,". Earlier, the IAF was looking for a single-engine jet to replace the MiG-21s and MiG-27s. The new jets were to be manufactured in India by the private industry under the Strategic Partnership model. However, the contest is now being opened up. "The contest for single-engine jets has only two contenders and it would end up being a single-vendor situation on technical evaluation. So it has been decided to widen the contest to avoid issues later," the official said. While the Lockheed Martin F-16 and SAAB Gripen are single-engine fighters, the contest will be now open to Boeing F-18, Dassault Rafale, Eurofighter Typhoon and Russian MiG-35, all of which were part of the earlier MMRCA contest. The open tender will essentially be MMRCA all over again. "The IAF has already evaluated all the aircraft in the MMRCA contest. So once the technical evaluation process starts, selection of one aircraft can be completed in two years. After that, it is the contract negotiations. Concluding the contract depends on how fast we can close it," an IAF source said. In 2000, the government decided to procure 126 fighter jets, but it was only in 2007 that the RFI, the first step in the long procurement process, was issued for 126 aircraft under the MMRCA deal expected to cost around \$12 billion. However, with contract negotiations reaching a deadlock, in 2015, Prime Minister Narendra Modi scrapped the deal and announced an Inter-Governmental Agreement with France for 36 Rafales at a cost of ₹7.87 billion, including aircraft, spares, weapons and a maintenance and performance guarantee for five years. Under the new deal, the IAF is looking for over 100 aircraft, and the official said that whether single- or twin-engine, the aircraft were equally competent and the final choice would depend on the extent of technology transfer and price. Another reason for widening the tender is for the selection of a competent Indian partner. In anticipation of a single-engine tender, Lockheed and SAAB had tied up with prospective Indian partners. "The Indian SP partner has to be selected by the government through a competitive evaluation. So it is good to have a wider pool of both OEMs [original equipment manufacturer] and Indian partners to choose from," the official said.

Additional Rafales

One defence official observed that procuring at least two more squadrons of Rafale jets would make economic, operational and logistical sense as India is spending ₹2 billion on IAF-specific customisations and 36 is too small a number. "It makes logical sense and would save us money as the additional aircraft would cost less. But in the current political climate, it is not possible," he said. The IAF has a sanctioned strength of 42 squadrons but is currently down to 31 squadrons and with the planned induction of 36 Rafales between 2019 and 2022, remaining Sukhoi-30MKI and

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some LCA Tejas, the strength will hover at 30 till 2027 and in the subsequent five-year term, will fall to 27. If there are no newer inductions, it is expected to slide further to 19 squadrons by 2042.

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

ISRO confirms that India's second mission to the Moon Chandrayaan – 2

The Indian Space Research Organisation said on 12 January that the Chandrayaan-2 mission is on schedule and flight models are going through various tests. In Chandrayaan-2, the country's second mission to the Moon, **ISRO** is planning to rover to explore the lunar surface "It is on schedule. We have to find out whether it is in March or not," ISRO Chairman A S Kiran Kumar told in a response to a question. Speaking after the successful orbiting of 31 satellites, including weather observation Cartosat-2 Series craft, by the PSLV-C40, he said the Chandrayaan-II satellite was getting ready at the ISRO Satellite Centre. The flight models were going through various levels of tests, he added. It would comprise an orbiter, lander and six-wheeled rover which would move around the landing site and instruments on it would send back data that would be useful in analysing the lunar soil. After reaching the lunar orbit, the Lander housing the rover will separate from the orbiter. After a controlled descent, the lander will soft land on the lunar surface at a specified site and deploy the rover. Director of ISRO's Liquid Propulsion Systems Centre at Mahendragiri in Tamil Nadu Mr S Somanath said tests related to Chandrayaan-II were underway at the centre also. "What we are trying to do is to prove the ability to do a soft landing (the rover). Tests are on to demonstrate soft landing in a simulated way," he said. Terming it as a "wonderful task", he said "we are trying to complete it in a short span of time and that is going on right now". To a query on whether there was possibility of ISRO carrying out manned space mission, Mr Kumar said, "The possibility was always there for taking up such a mission but the government has to decide by giving resources." On the future launches to be taken up by ISRO in 2018, Mr Kumar said the next launch will be a communication satellite. The GSLV-MkII first stage had been assembled and already completed integration. "They are going through process and it is targeted sometime next month (for launch)," he said. Beyond that, there would be MkIII and another PSLV which will carry navigation satellite IRNSS-11. "We also have a number of launches almost every month one launch and we are going to work towards that", Mr Kumar, who is retiring later this month, said. "We are trying to push the launch envelope to such an extent so that we have three of GSLV category and nine of PSLV category (this year). It is still quite a tough task", he said. Referring to the unsuccessful launch of IRNSS-1H on 31 August last year, he said it was a peculiar case. "Very marginal deviation created a problem. Notwithstanding that what we did is we went through a rigorous process of analysing and have made the system more robust", the ISRO chief said. Mr Kumar said to identify the cause of the incident, a team was formed which carried out various simulations and review process were taken up by the scientists. "Each time you encounter a problem you come out of it. You need not worry about the failure. If you have not failed it means, you have not tried hard enough. So, we need not worry about set backs", he said. Kumar said launch vehicle technology was a very complex thing and in spite of hundreds of successes, there can still be a failure. "That is why it is called as risky business. So what we need to clearly understand is that each time make the system more and more robust, learn the deficiency and keep improving", he added. Vikram Sarabhai Space Centre (VSSC) Director Mr K Sivan, who has been named the successor to Kumar, termed as 'excellent' today's launch and credited the entire ISRO team for the success. He also noted that many international customers approached the ISRO for the launch immediately after the PSLV-C39 failure and it showed the confidence that they have in the agency's workhorse launch vehicle. "We will be definitely meeting their expectations in the future also. This mission is definitely showing the green flag for the exciting high profile missions in 2018 such as the Chandrayaan 2, GSLV mk 3 then GSAT-11," he said. Director of Satish Dhawan Space Centre Mr P Kunhikrishnan lauded ISRO scientists for opening the year with a success. This mission proved the effectiveness of all corrective measures taken in PSLV C-40 "making the vehicle more robust and reliable," he said. Multiple projects were underway at the spaceport to ramp up ISRO's launch capabilities, he said. He said the second vehicle assembly building project was in the final phase of completion and it would meet the future launch requirements from the second launch pad.

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

DGCA grounds 11 A320 neos with P&W engines

With three incidents of mid-air engine failures in less than a month, the Directorate General of Civil Aviation (DGCA) ordered the immediate grounding of 11 A320 neo planes of IndiGo and GoAir that are powered with Pratt & Whitney engines. With this, 14 A320 neo aircraft fitted with specific series of engines — 11 are operated by IndiGo and 3 by

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GoAir — have now been grounded in the past one month. The DGCA action came soon after engine failure forcing emergency landing of an IndiGo flight at Ahmedabad airport. The grounding of these flights is expected to have an effect on the operations of both IndiGo and GoAir. According to an official statement, “keeping in mind the safety of aircraft operations, A320 neos fitted with PW1100 engines beyond ESN 450 have been grounded with immediate effect. Both IndiGo and GoAir have been told not to refit these engines, which are spare with them in their inventory.” Pratt and Whitney’s spokesperson said the firm was working closely with customers to minimise disruption. “The corrective action has been approved and we have already begun to deliver production engines with the upgraded configuration. We are working to mitigate the Aircraft on Ground (AOG) situation by the end of the second quarter. The DGCA said it will be in “touch with stakeholders and review the situation in due course and when the issue is addressed by European regulator EASA and P&W”. According to the DGCA, the P&W “in its latest communication has also not given any firm commitment” as to when the issue on the engine post serial number 450 would be resolved. P&W has also said that “all the affected engines will be replaced by early June 2018”, the DGCA said. However, there is “no concrete proposal in place at this stage to address the issue”, it added.

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

Sea Harrier to come up close to TU 142

Close to the TU 142 Aircraft Museum on the Beach Road, a decommissioned Sea Harrier jet fighter would be installed in the same premises to become part of the TU complex, said VUDA Vice-Chairman Mr P. Basanth Kumar here. The Sea Harrier, a fighter, reconnaissance and attack craft was operated from the aircraft carrier INS Viraat. They were inducted into the Navy in 1983 and decommissioned after 33 years of service in 2016. The Ministry of Defence offered the craft to the AP Tourism. It would be brought to Visakhapatnam from the Naval Air Station INS Hansa. A VUDA engineering team would go to Goa towards the week-end to see how it could be brought here, said Mr. Basanth Kumar. After dismantling, it could be transported in two trucks. The team with an architect would prepare estimates and work out other details. Whether its equipment could be showcased in the museum would also be known after the visit, he told reporters. The craft would be displayed on pillars and would have no walk-through facility. Dakamarri sites The allotment of housing plots at the Daakamarri joint venture would also be taken up. After the auction of plots, applications were invited for allotment to weaker sections. The allotment had been hanging fire for a long time now with the difference in price proving a hurdle. Though the VUDA at one point of time announced that it would be allotted Rs. 6,000 a square yard, the market rate now had gone up to Rs. 9,000. “Now we intend to take it up again and it will go to the Anomalies Committee as there is a variation in the price,” the Vice-Chairman said.

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

HAL gearing up to make 16 Tejas LCA a year, says CFO

Hindustan Aeronautics Limited (HAL) is enhancing its capacities to make improved versions of light combat aircraft (LCA), also known as Tejas, according to a top company official. The Centre had issued a request for proposal (RFP) for 83 LCA in December, setting the ball rolling for finalising the contract for the deal worth about 1 50,000 crore. In addition to the 83 Mk-1A to be ordered, there are 40 aircraft of earlier variants on order. “We are enhancing our facilities to build 16 Tejas a year from eight now. All the Tejas [units] will be delivered in the next five years,” C.V. Ramana Rao, director (finance) and CFO, HAL. However, while the current production rate is eight aircraft per year, only six aircraft have been delivered to the IAF in the last two years, sources said. HAL is building the improved version of Tejas after getting feedback from the Indian Air Force. “The improvised version of Tejas would have an advanced active electronically scanned array (AESA) radar system, a new electronic warfare sensor suite and a new external refuelling capability,” according to Mr M. Mazhar Ali, executive director in-charge of planning and projects, HAL. The final contract for the procurement of 83 LCA is expected to be signed soon, according to sources. To take advantage of the government’s UDAN or regional connectivity scheme, HAL was in negotiations with airlines to sell the civilian version of Dornier 228 transport aircraft, the sources added.

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

Saras is about to connect India on its own wings – linking smaller towns for an aviation market set to boom

India is laying claim to the club of aviation manufacturers. The aviation industry in India is still in its infancy, though Hindustan Aeronautics Limited has been working on smaller aircraft mainly for defence requirements – like Dhruv, the

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advanced light combat helicopter and Tejas, the light combat aircraft. These, though, are just kids on the block with lots to prove. India over the last 70 years has never taken aviation manufacturing seriously – though a country as vast as ours should have an indigenous, dependable aircraft manufacturing facility to cater to burgeoning domestic transportation requirements. The first attempt to design and develop a multi-role light transport aircraft began in 1999, with then Prime Minister Mr Atal Bihari Vajpayee giving green signal to a project by National Aerospace Laboratories (NAL) under the Council for Scientific & Industrial Research (CSIR). With no prior experience, NAL designed and developed the first prototype from scratch, which took to skies on May 29, 2004. Saras was the first indigenous civil aircraft programme in the country. So naturally, NAL faced many challenges in design and manufacturing of airworthy aircraft grade components, assemblies, tooling and certification for test flying. The UPA government flagged down the project, after an accident involving an improved version of Saras in March 2009, though the accident was not due to any design flaws. When I took charge of the ministry of science & technology and met the technologists at NAL, I could read their disappointment. As a medical professional I knew that science is an art of balancing imponderables. You reach success only after several failures and if you stop, you will never innovate. So I decided to convince the government that NAL and other agencies involved in the design and development of Saras should get another chance. It worked. A team of 40 young and enthusiastic scientists at CSIR-NAL have started working on various modifications like high power engine, new nacelle, enhanced rudder, linear flap tracks, improved environmental and flight control systems and digital avionics to overcome deficiencies observed during earlier flight testing. The upgraded Saras took to the sky in a record period of 14 months on January 24 this year and then again on February 21 – both to textbook precision. By 2022 it will be ready for induction, first into the Indian Air Force and later for civilian use. Saras Mk2 will have speeds in excess of 500 kmph, range in excess of 700 km with full pay load, and lower operational/ acquisition cost compared to contemporary aircraft of this class. The cost of the aircraft, with more than 70% indigenous content, will be around Rs 40-45 crore as against Rs 60-70 crore for an imported one. India has the potential to be among the top three nations in the world in terms of domestic and international passenger traffic. It has an ideal geographical location between the eastern and western hemisphere, a strong middle class of about 30 crore Indians and a rapidly growing economy. Despite these advantages, the Indian aviation sector has not achieved the position it should have and is at present ranked 10th in the world in number of passengers. But it is expected to grow at a faster pace, which will create demand for new aircraft, air aviation service technologies and increased infrastructure. Looking at the present civil aviation policy scenario, India needs a 19-seater commuter transport aircraft like Saras for remote and tier 2 and 3 cities. It is estimated that the potential demand for small civil and military aircraft is to the tune of 120 to 160 in the next 10 years. India, being a powerhouse of talents in almost all disciplines, should allow our experts to find solutions to our national problems, instead of continuing with our colonial mindset of depending on foreign sources to meet our critical requirements. While scientists and technologists of Indian origin contribute to high technology evolution of several foreign countries, we have so far not encouraged and given them the required space. Science does not emerge from vacuum; even a conjecture should not be left without probing the possibility. Like Vasco da Gama, you would either land up in America or India – but let us first venture out.

The Writer is Union Minister for Science and Technology

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

Arjun Mark-2 tank set to see light of day

In an important move, the 'Made in India' Arjun Mark-2 tank project is set to see the light of the day. Chairman of the Defence Research and Development Organisation (DRDO) Dr S Christopher in an interview said, "We have had a meeting with the Vice-Chief of the Indian Army where it was agreed on accepting Mark-2. Modalities are being worked out". Once done, the acceptance of necessity (AON) for 118 will be revived, he added. The AON is decided by the Defence Acquisition Council headed by the Defence Minister. A total of 93 modifications have been done on the first version of Arjun — 124 were inducted — in 2010-2011. On being asked if the Army was okay with the weight of the tank, the DRDO boss said: "The weight (the tank is almost 68 tonnes) has been accepted; that is a major change". Most modern European tanks are of the same weight, and tank-transporters (specialised trucks) for Arjun are available. The DRDO has promised to set up a system to maintain the Arjun Mark-2 within India. It will be an annual maintenance contract with the Bharat Earth Movers Limited (BEML) as a possible agency, Dr Christopher said. On the trials, he said, "These have done 4,000 kms of run, the upgrades will be tested." On artillery guns, Dr Christopher said the Advanced Towed Artillery Gun Systems (ATAGS), of which the Army has agreed to accept 40 pieces to start with, will get a more powerful engine to enable rapid movement. The guns designed by DRDO have been made by two private companies under the transfer of technology. The DRDO is keen to get a slice of the 1,580 towed guns the Army is looking to buy. "Both companies (Tata Power SED and Bharat Forge) are gearing up produce more. We need an order for 200-300 guns to tie up logistics," he said. Talking about the next version of the Tejas, called

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'Mark1-A', Dr Christopher said: "The design other than the AESA radar and the jammer pod is complete." Hindustan Aeronautics Limited is looking to import the AESA radar even as DRDO made a radar that will be tested next month. The IAF is looking at 83 'Mark1-A', with 59 improvements over the existing Tejas. The Indian Air Force has projected a need for 324 fighter jets over 15 years and has officially indicated that it needs the 'Tejas Mark 2' (medium combat aircraft). It will carry a more powerful engine and weigh almost 20 per cent heavier than Tejas.

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

Indigenous artillery gun passes high-altitude winter test in Sikkim

The month-long winter trials of the indigenously-developed 155mm/52 calibre Advanced Towed Artillery Gun System (ATAGS) have achieved the desired results, an official from the Defence Research and Development Organisation has said. The weapon system is a joint effort by the DRDO and the private sector. The trials were conducted by a group of scientists from the city-based Armament Research and Development Establishment (ARDE) and army officers at an elevation of 11,000 feet in Sikkim. "Scientists and soldiers tested the gun in extremely cold conditions. It delivered positive firing results even in -20 degree Celsius," the DRDO official said. The official said the gun's mobility, a crucial factor in high-altitude warfare, was favourable too. "All mobility parameters were checked during the trials," the official said. Last year, the gun's desert trials were held from August 24 to September 7. Results from these trials were positive too. The ATAGS has an all electric drive, which is better than traditional hydraulic drives of other towed guns. The electric drives of the ATAGS allows better control while opening and closing of the breech mechanism and while ramming the next round into the firing chamber. Sources added that the gun is expected to become a part of the Indian Army by the year 2020.

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

HAL: Flying into the future

It's been a bit of a bumpy ride for India's locally-built combat aircraft, the Tejas. The government kicked off the process to build the light combat aircraft way back in 1984, but it took more than three decades of technical challenges, U.S. sanctions following India's nuclear tests, and domestic politics before the fighter jet was finally ready for takeoff. After all the ups and downs, the jet's manufacturer, Hindustan Aeronautics Ltd (HAL), handed over the Tejas to the then defence minister, Mr Manohar Parrikar, and then Air Chief Marshal Mr Arup Raha in January 2015. It was showcased at last year's Republic Day parade. Given the fighter jet's long and difficult journey, its handover to the Indian Air Force (IAF) was certainly a champagne-popping moment for the Indian aerospace industry in general—and state-owned HAL in particular. The supersonic fighter jet is likely to replace the ageing Soviet-era MiG-21 jets which the air force plans to phase out eventually because of their spotty safety record. "It has been a great journey... the long years that it took to build a four-and-a-half generation fighter jet that can fly and which is comparable to the F-16 and better than the MiG-21," the chairman and managing director of HAL, Mr T. Suvarna Raju, tells Fortune India. "In aviation, failure is not tolerated because you cannot take a risk with the life of a test pilot. This is primarily the reason why development of an aircraft is such a rigorous process." But HAL might want to hold off on popping the bubbly just yet. The air force might have ordered 123 Tejas jets from the Bengaluru-based company, but defence experts say the aircraft manufacturer doesn't have the production capacity to meet the order. Former Air Vice Marshal Kapil Kak, who retired in 1996, says HAL has only delivered five aircraft so far, and they do not meet air force quality standards. "Although the IAF has put in a request for 123 Tejas and provided funding for 40 aircraft in 2009-10, HAL has only delivered five aircraft till date and that too is awaiting final clearance," he says. "The initial batch had as many as 57 deficiencies as pointed out by the IAF and need to be rectified before they can be made fully operational." Despite the scepticism, the Tejas could be a take-off point for HAL's flight into the future. The air force order could translate into revenues of more than Rs 50,000 crore over the next 10 years, a shot in the arm for the largest public sector defence enterprise, which is already one of the top profit-making state firms in India, going by disclosures in its draft red herring prospectus filed ahead of a proposed public offer. Its net profit grew 31% to Rs 2,624 crore in 2016-17 and it had an order book of Rs 63,333 crore during this period, including fighter, trainer, and transport aircraft, as well as civil and military helicopters. Now, the country's only maker of fighter aircraft is hoping to use lessons learnt from projects like the Tejas to itself. Its strategy is multi-pronged: One, it wants to be a one-stop shop for all defence requirements in the aviation sector. Two, it wants a greater share of the export pie and wants to work alongside the private sector to achieve this goal. It wants to monetise its position as the knowledge hub of aircraft manufacturing in India by signing transfer of technology deals with the private sector. Three, it wants to capture a chunk of the small-sized civil aircraft market which is just starting to grow through the government's regional air connectivity scheme. And, finally, it wants to introduce modern

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manufacturing techniques like robotics to improve efficiency levels. However, HAL faces several challenges in implementing its grand plans. A defence industry consultant, who does not want to be identified, says HAL is a highly inefficient company. The U.S. sanctions on India after the nuclear blasts, for example, are blamed for the delay in the development of the Tejas, but work at other organisations such as the Indian Space Research Organisation (ISRO) did not grind to a halt despite the sanctions. “For years, they have been sitting on large order books, delivering their products late because they don’t outsource enough, and hence force the country to import more,” says the consultant. Mr Bharat Karnad, a national security expert and research professor at the New Delhi based Centre for Policy Research, is even more scathing. “In the absence of competition, it is habituated to a production cost plus profit regime, which has led to very low labour productivity, a bad working milieu, and wasteful production processes,” he says. “Moreover, its manufacturing competence is limited to aircraft and helicopters from imported SKD/CKD kits under licence production, with almost no capacity for technology or process engineering innovation.” To be sure, for decades there was nothing indigenous about HAL’s manufacturing. Most of its initial years were spent assembling—or manufacturing under licence—foreign origin aircraft such as Russian MiG21s, MiG-27s, British Jaguars, and French Alouette helicopters. The Cheetah helicopter is also built under licence. Even non-combat military aircraft such as the Avro are made under licence in India. In many ways, the Tejas is a first for HAL as it is both indigenously designed and manufactured without any outside help, propelling India into an elite club of five countries that can build fighter aircraft including the U.S., Britain, and France. The Tejas can also be a big boost for the government’s “Make in India” programme if HAL succeeds in meeting the air force’s order by 2024-25. But HAL can’t afford to be complacent with the private sector entering the defence sector. Swedish combat aircraft manufacturer SAAB has a tie-up with Adani Group to manufacture Gripen E fighter jets in India and U.S. defence giant Lockheed Martin has a joint venture with Tata Advanced Systems to produce F-16s in India. Both deals are contingent on which fighter jet is procured by the air force. Competing with big private players won’t be easy. Kak is optimistic about HAL’s future but says it needs a lot of reforms like a change in management structure as well as strict delivery schedules and quality standards. Does HAL have the chops to compete with global giants? Its history suggests it does. India’s journey to build its own aircraft began in 1940 when industrialist Walchand Hirachand formed Hindustan Aircraft Company. The company was taken over by the government within five years and ultimately became Hindustan Aeronautics Ltd (HAL). Not many countries have developed a supersonic fighter jet from scratch. India did it back in the 1960s when German aeronautical engineer Mr Kurt Tank helped HAL develop the HF-24 Marut. Inducted into the air force in 1967, the Marut had its moment of glory when it helped India win the 1971 war against Pakistan. After the Marut was retired in 1985, India did not have a locally-developed fighter jet for years—until the Tejas. Although it was conceptualised in 1984, it remained on the drawing board for years as the political establishment doubted HAL’s capabilities. By the time the aircraft’s first technology demonstrator, or TD-1, took to the skies in 2001, India had already been blacklisted by the U.S. for its 1998 nuclear tests. HAL then had to develop modern avionics from scratch. “The fly-by-wire mechanism (a partially computer regulated system for flight controls) took 20 years for Indian scientists to decode and establish,” says Mr Raju, who was director of design and development before taking over as CMD. Of course, HAL had a lot more on its plate over these years. It maintains, repairs, and overhauls not just locally-made aircraft and helicopters, but also those procured by the air force from third parties like the Mirage 2000. It has 11 research and development centres, spends 7% of its revenues on R&D—more than most PSUs—and owns one trademark, seven patents, and 44 copyrights. A lesser known role is that of technical evaluator of all military aircraft procured by the air force. “There is no better technical evaluator of military aircraft than HAL because it is the only institution in the country which has built an aircraft from scratch,” says a defence analyst, who declined to be identified. For all its roles, its biggest achievement—however long it might have been in the making—is still the Tejas. Defence experts believe its technology can be used as a building block for the advanced medium combat aircraft (AMCA). Mr Karnad says the best way is for the Aeronautical Development Agency (ADA)—tasked with the design and development of light combat aircraft in HAL—to transfer the blueprints and technologies of the new variant of the LCA and the next generation of AMCA to private sector companies like Larsen & Toubro and Reliance Defence, not just to grow the competition for HAL, but because there is enough business to go around. Mr Karnad says the limited range and endurance of the Tejas can easily be corrected because it is indigenously designed and all the “intelligence” lies within the country. “The Tejas light combat aircraft MK-1A is more agile and pilot-friendly than any aircraft presently in the Indian Air Force fleet or in the running in the single-engine fighter jet competition,” says Mr Karnad. “There is huge potential for development and growth as an advanced weapons platform.” Former Air Chief Marshal S. Krishnaswamy also believes that it is time for HAL to develop an improved variant of the Tejas. “It would not only give a push to the ‘Make in India’ initiative, but also save the nation billions in importing the Gripen E of Sweden or the 50-year-old F-16 from the U.S. We just don’t have the money to buy as well as manufacture aircraft,” he says. Until then, HAL is looking to spread its wings overseas. Mr Raju says the company will target the export market in partnership with the private sector which is entering the defence manufacturing space. “For us, the private sector is not competition. As India becomes a global power, countries around the region will look to our country for defence equipment supplies,” he says. “When that happens, HAL alone would not be able to meet the demand. We would need the private sector to supplement our production. The thought process is not just to cater

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to Indian demand but also the export demand.” HAL could be well placed for an early mover advantage as India ramps up its defence exports. In 2015-16, defence exports grew 22% to Rs 2,059 crore, according to the government’s Defence Manufacturing Sector Achievements report. The exports to over 28 countries included patrol vessels, helicopters, radars, and small arms. HAL is confident about competing in the global market. “We always have a cost advantage in India because of the rupee versus dollar and rupee versus euro comparison. We can be very competitive commercially,” says Mr Raju. The question now is: Will HAL manage to attract suitors for a 10% stake on the block under the disinvestment programme? After a stuttering start, it is finally gearing up to launch road shows for its listing. Hopefully, there won’t be any turbulence this time.

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

HAL to get Tejas key parts from private players

State-owned defence manufacturer Hindustan Aeronautics Ltd is looking to significantly increase the involvement of private companies in manufacturing Tejas combat jets even as readies for an additional order for about 200 units of the latest Tejas model, government officials said. Hindustan Aeronautics Ltd (HAL) has already roped in private players including L&T to make key components for 123 Tejas Mark 1 and 1A light combat aircraft (LCAs) that it is building for Indian Air Force (IAF). In the long run, HAL plans to play the role of a system integrator with private firms doing most of the manufacturing, the sources said. With the private sector participation, HAL’s per year production capacity of Tejas is expected to scale up to 24, officials said. Out of 123 combat jets the company is making for IAF, 40 are Mark 1 version and the remaining 83 are Mark 1A version. In the case of the 83 Tejas Mark 1A jets, HAL intends to make use of L&T’s capabilities for making wings of the aircraft, while Dynamatic Technologies Ltd BSE 1.08 % is expected to make the front fuselage, or main body, VEM Technologies the centre fuselage and AlphaBSE -4.40 % Doca would make the rear fuselage, officials said. “We have placed orders (for the 83 Tejas) with these firms, who will make the parts and if they are successful the parts will be integrated,” one of the sources said. HAL will work with the private sector to make components for the 40 Mark 1 jets as well. “This will ensure that the private sector becomes tier 1 suppliers and can ramp up their supply chain,” the person said. HAL is also looking at bringing the private sector to work on Tejas Mark 2 version. “This will be a game changer for the private sector. In this, HAL is looking at being a systems integrator, while the private firms will be the manufacturers. This will increase production,” one of the sources said.

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

TECHNOLOGY

Translating ideas into solutions: India on the cusp of transformation in science, technology and innovation

The current Economic Survey lays emphasis on the central role of science, technology and innovation (STI) in achieving India’s goal of fast, sustainable economic growth. It calls for boosting innovation by doubling of spending on research and development, greater involvement of younger scientists in decision-making bodies, increase in the number of investigator-led projects, leveraging the scientific diaspora, and greater public engagement of science establishments. Some specific initiatives by the government to nurture the STI ecosystem can further ensure efficient delivery of science and technology led solutions. In spite of spending only 0.8% of its GDP on R&D, India has attained impressive growth both in the number of scientific publications and patents filed. It ranks fifth in the number of such publications, falling behind only the US, China, UK and Germany, and 12th in number of patents filed. The immediate challenge for the Indian STI system is to rapidly transform knowledge and technologies into commercially attractive solutions and build entrepreneurial communities around them. Although there is a great enthusiasm among the scientists to push their ideas and seek grant support, a majority of their proposals do not pass initial scrutiny. For example, in nanotechnology nearly 90% of grant proposals do not clear the initial peer-review evaluation, either due to lack of novelty or poor translational potential. In other areas of cutting-edge technologies, the position is not that different. This constricts bottom up growth. Additionally, knowledge arising out of the supported grants does not pass the translational value filters and most of the patents rarely get used. Much greater efforts for nurturing upstream research and turning it into use inspired outcomes will help utilise the government push for providing downstream support like setting up technology transfer offices, technology parks, incubators, and giving incentives for startups. What are the critical levers for improving output of the Indian STI system? As science gets increasingly multidisciplinary, potential ideas emerge at the intersection of seemingly unrelated disciplines. A collegium needs to be set up in the institutions

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for an inter-disciplinary screening of grants. The collegium needs to be supported by analytical tools and external experts in patent-informatics, product profiling, and market intelligence. Research grant proposals should pass through such a filter at the institutional level before intramural and extramural support is sought. The inclusion of user organisations, patent attorneys, market experts and potential investors in the peer-review team of the government funding agencies will strengthen the value of applied and translational research. These entities should also mentor investigators of rejected ideas so as to encourage them to apply again and again to broaden the base and for the faster turnover of the ideas. At the execution level, scientists can speed up translational projects by outsourcing device fabrication or prototyping and seeking the services of clinical research organisations in order to avoid mundane experiments which otherwise consume a lot of time. Given the resource constraints faced by institutions to procure and maintain mega facilities, advanced instruments for analytics, imaging, genomics, data analytics and animal house and biobank facilities for clinical research should be made available by government-supported startup companies located in a cluster of institutions and managed by trained scientists. A technology and innovation based economy largely depends on working on ideas emanating from the results of fundamental and use-inspired discoveries. Scientists should therefore wean themselves away from dependence on publications to pick up scientific questions and instead think of research problems that have local relevance. Setting up startups in rural areas with an active link to research institutions will allow user-driven product customisation and diffusion of startup culture in the village economy, thereby making innovation policy genuinely inclusive. Necessary flexibility should be introduced in the administrative and legal framework in universities and research/ technology institutions in order to promote the creation of startup companies by principal investigators. Scientists working in universities and research institutions should be allowed to take unpaid leave while trying their ideas in the startup companies. And 'innovation effort' should be one of the performance indicators for academic promotions. Such policy advances can shift the position of large section of scientists from being researchers to being innovators and can thereby significantly enhance the productivity of the Indian STI system.

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

Drones to help department fight forest fires

Recall the February 2017 blaze that reduced hundreds of acres of forest land in Bandipur to ashes and devoured a forest guard? To prevent recurrence of such tragedies this summer, the forest department is all set to press drones into action. The drones which will be procured or hired by the department will hover over Bandipur forests and other fire-prone regions through the day to live-stream the situation inside the woods. A pilot in this regard is already on in a few forest ranges of Bandipur Tiger Reserve. Mr Ambadi Madhav, director of the reserve, said, "We are well-prepared to prevent forest fires. Usage of drones will go a long way in assessing the extent of fires so that men and machinery can be deployed quickly to fight the flames. We conducted a pilot in two ranges of the reserve recently and understood that regular streaming of aerial forest views will help in tackling fire incidents," he added. Mr Madhav said they have also created fire lines across the tiger reserve, covering more than 2,500km. "We have procured motorized fire sprayers, minivans with a 2,000-litre capacity and fire beaters among other things. In addition to drone monitoring, watch towers will be set up at strategic points," he elaborated. Bandipur is spread over 1,027sqkm and 13 ranges. Last February, forest guard Mr Murgesh was charred to death when he along with other staffers was trying to douse the fire in Kalkere range of Bandipur Tiger Reserve. Forest officials say wild growth of lantana weed, which dries during summer, can turn a minor spark into a major forest fire. "We took the help of Nature Conservation Foundation, which assessed the extent of fire damage (through Google Earth Engine) using satellite imagery last year. We are taking their help this year too to identify problem areas and take required measures," he added.

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

ISRO gears up to launch 2 satellites before Chandrayaan-2 mission

Amid intense preparations for its most challenging Chandrayaan-2 mission, Indian Space Research Organisation (ISRO) is gearing up to launch two other satellites before the lunar mission in April. Talking to TOI, ISRO chairman Dr K Sivan said, "The first launch will be of GSLV Mk II carrying Gsat-6A satellite by the end of March. Soon thereafter, we will launch navigation satellite IRNSS-1I that will be lifted off by PSLV C-41 in the first week of April. Preparations for these two launches are currently going on at Sriharikota." IRNSS-1I, on the other hand, is a navigation satellite that is meant to replace the faulty first navsat IRNSS-1A, part of the Indian navigation system or NavIC or desi GPS. The three atomic clocks of the IRNSS-1A that were meant to provide precise locational data had stopped working two years ago. Last year on August 31, ISRO had launched navsat IRNSS-1H to replace the faulty satellite. However, the IRNSS-1H got stuck in the heat shield of the rocket and the mission failed. IRNSS-1I is, therefore, being launched to replace the

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first navsat. Currently, there are seven navsats in the orbit covering India and a region extending 1,500 km around it that provide real-time positioning and timing services. On the Chandrayaan-2 mission, the ISRO chairman said, "Preparations for the mission are in full swing. All the required tests are going on. The right time to launch the mission comes only once in a month. Therefore, we are hoping to launch it at the right time in April," he said. Dr Sivan said, "As ISRO is launching such a complicated mission involving an orbiter, lander and a rover for the first time, we have to take extra precautions. If due to some glitch we are not able to launch in April, then we will try to launch the mission in October-November. If we launch the mission in between, we won't get maximum benefit due to eclipses. To utilise the full lunar day (14 Earth days) for the moon exploration, the best time to launch the mission after April will be after October."

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

Google's decision to build AI for Pentagon drones divides company.

The US Military is using artificial intelligence software developed by Google in one of its drone programmes, causing internal divisions over how the company should be run. The Department of Defense's Project Maven, commenced last April, utilises the Silicon Valley search giant's TensorFlow AI to analyse the hours of footage shot by unmanned planes. TensorFlow scans the film for objects of interest and flags them for human analysts with a view to further investigation. It has reportedly already been used in the field to survey areas held by Isis in the Middle East but Google stresses the technology is being deployed for "non-offensive uses only." Employees have nevertheless raised concerns about the company's role in defence contracting after it was revealed last week on an internal mailing list, particularly in light of the company's famous founding principle: "Don't be evil." Many have expressed disquiet internally about the software they helped develop being signed over for surveillance. "Military use of machine learning naturally raises valid concerns," Google said in a statement. "We're actively discussing this important topic internally and with others as we continue to develop policies and safeguards around the development and use of our machine learning technologies." The company has worked with the US Military in the past and senior executives including Mr Eric Schmidt and Mr Milo Medin have advised the armed forces on cloud and data systems as part of the Defense Innovation Board. Google also oversaw the development of the BigDog robotic packhorse, built by Boston Dynamics when it was owned by parent corporation Alphabet in 2015. Originally conceived in 2005, the stalking quadruped was repurposed to assist the Marine Corps before ultimately being abandoned on the grounds that it was too noisy for stealth combat manoeuvres. The Pentagon spent \$7.4bn (£5.3bn) on AI and data processing tech in 2017, as global warfare becomes ever more remote and tech-centric.

Source: <https://www.independent.co.uk>

BHEL gets ISRO tech to make Li-ion cells

Indian Space Research Organisation (ISRO) has signed a technology transfer agreement with Bharat Heavy Electricals Ltd. for the manufacture of space grade lithium ion (Li-ion) cells for the space programme and other national requirements. BHEL said it would set up a facility at its Bengaluru unit to make the cells. It would use the technology developed by ISRO's rocketry node, Vikram Sarabhai Space Centre, based in Thiruvananthapuram. Li-ion batteries power various applications on satellites and launch vehicles. An ISRO spokesman said the requirement would go up as the number of space missions is increasing. Currently, BHEL assembles Li-ion batteries using imported cells. "The technology can also be extended for use in the emerging areas of energy storage and e-mobility," the public sector major said. The agreement was signed by Mr S. Somanath, VSSC Director, and Mr S. Biswas, BHEL's Director (Engg., R&D), at the headquarters of ISRO in Bengaluru last in the presence of ISRO Chairman Mr K. Sivan and BHEL CMD Atul Sobti.

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

India joins Europe's satellite data sharing pool

India has joined Europe's mega global arrangement of sharing data from Earth observation satellites, called Copernicus. Data from a band of Indian remote sensing satellites will be available to the European Copernicus programme while designated Indian institutional users will in return get to access free data from Europe's six Sentinel satellites and those of other space agencies that are part of the programme, at their cost. The space-based information will be used

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for forecasting disasters, providing emergency response and rescue of people during disasters; to glean land, ocean data; and for issues of security, agriculture, climate change and atmosphere, according to a statement issued by the European Commission here. The agreement was signed in Bengaluru by Mr Philippe Brunet, Director for Space Policy, Copernicus and Defence, on behalf of the EC and by P.G. Diwakar, Scientific Secretary, Indian Space Research Organisation. The multi-billion-euro Copernicus is Europe's system for monitoring the Earth using satellite data. It is coordinated and managed by the EC.

Wide range

The free and open data policy is said to have a wide range of applications that can attract users in Europe and outside. The Copernicus emergency response mapping system was activated on at least two Indian occasions — during the 2014 floods in Andhra Pradesh in October 2014 and after the 2013 storm in Odisha. “Under this arrangement, the European Commission intends to provide India with free, full and open access to the data from the Copernicus Sentinel family of satellites using high bandwidth connections. Reciprocally the Department of Space will provide the Copernicus programme and its participating states with a free, full and open access to the data from ISRO's land, ocean and atmospheric series of civilian satellites (Oceansat-2, Megha-Tropiques, Scatsat-1, SARAL, INSAT-3D, INSAT-3DR) with the exception of commercial high-resolution satellites data,” EC said. The arrangement includes technical assistance for setting up high bandwidth connections with ISRO sites, mirror servers, data storage and archival facilities.

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

Indigenous technology tested on BrahMos supersonic missile

Supersonic cruise missile BrahMos was successfully flight-tested for the first time with an indigenous seeker. So far, the seeker, a critical technology in missiles, had come from Russia. “Formidable supersonic cruise missile BrahMos was successfully flight tested at 8:42 AM today at Pokhran test range, Rajasthan. The precision strike weapon with Indian-made seeker flew in its designated trajectory and hit the target with pin-point accuracy,” the Defence Ministry said on Twitter. The seeker was developed by Research Centre Imarat (RCI), Hyderabad, in collaboration with other DRDO labs.

Technology, a closely guarded secret

The seeker technology, which determines the accuracy of a missile, is a closely guarded secret. Mastering it is a significant milestone in missile technology and would reduce import dependence. BrahMos is a joint collaboration between India and Russia and the missile is capable of being launched from land, sea, sub-sea and air against surface and sea-based targets. Its range was initially capped at 290 km as per obligations of the Missile Technology Control Regime (MTCR). Since India's entry into the club, the range has been extended to 450 km and the plan is to increase it to 600km. The Army and Navy have already inducted the missile, while the air-launched version was test-fired for the first time last year from a modified Su-30MKI aircraft.

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

India to attain self-reliance in key missile tech by 2020

In a major achievement for the country, India's premier research agency DRDO is now likely to achieve complete self-reliance in developing critical missile technologies by 2020, which will be two years ahead of the schedule. The expertise developed by the DRDO's missile complex in the field of seekers is also going to help the country save at least Rs 15,000 to Rs 20,000 crore in the near future, as the equipment forms 35-40 per cent of the total cost of missiles. Soon after coming to power in 2014, the NDA government had tasked the DRDO to develop critical technologies, such as seekers, by 2022 to achieve self-reliance and end imports. The recent success of the BrahMos land attack cruise missile, with an indigenously-developed seeker, proved the prowess of the indigenous technology development programme for tactical missiles. The DRDO is now moving ahead with this programme, and is likely to achieve self-reliance in tactical missile systems by the year 2020 itself, government sources said. It was for the first time that the BrahMos missile, capable of travelling at speeds of up to Mach 3.0, or three times the speed of sound, was tested with indigenously developed seeker technology. The seeker - developed by the DRDO - determined the accuracy of missile

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by guiding it to the target at a range of 33 km. India is already self-sufficient in the field of strategic long range missile systems, such as the Agni missile series, which can hit targets from ranges between 700 km to 5,500 km. The seeker technology, which helps a missile to hit its target with pinpoint accuracy at close ranges, was till recently not available with India and it was being sought from foreign countries. Under an earlier plan to develop short range surface-to-air missiles, India had committed to spend over Rs 30,000 crore under which it wanted to get the seeker technology from the foreign vendor, but the project got scrapped later. However, the year 2017-18 has seen DRDO's missile complex and other laboratories script a success story in field of seeker technology with Ku Band, X band, and one more type of seeker achieving great success. Government officials said indigenous seekers of various type has already been successfully flight tested in Astra, Nag anti-tank guided missiles, quick reaction surface-to-air missiles and the Akash next generation missiles. The indigenous development of seekers has also helped in improving the accuracy of missiles as well as save at least 30 to 40 percent cost of all the missile projects. As per the plans of the DRDO, all the future missiles in the country's arsenal, including the Akash-Mark1, Nirbhay long-range land attack cruise missile, Anti-Radiation Missiles and air-to-air missiles, will be equipped with indigenous seekers, helping country save billions of dollars, the officials said. The success in seeker and navigation programmes for missiles has also helped the DRDO to take up new futuristic projects which will help in reducing important dependence.

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

DRDO develops underwater drone prototype

Even as the Indian Navy's ships and submarines are being equipped with different kinds of sonars, defence scientists are looking at newer technologies to equip services to protect the territorial and the exclusive economic zone waters. Naval research has turned to development of unmanned vehicles for defence applications. "This will be for surveillance purposes. We have developed a low endurance prototype and it has been tested in many waters," said Mr Samir V Kamat, director general, Naval systems and Materials, DRDO. He said that the DRDO management council had given sanction for the project and was likely to commence in a few months. "Countries like the US and China are working on underwater drones which will fire torpedos. As of now, this is our immediate project. But it is not on a mission mode. It is being taken as a technology demonstrator which can then be tailor-made for the navy depending on their needs," he said. The Autonomous Underwater Vehicles (AUV) can be used for different roles including working as a courier between the navy and the submarine, situation assessment for the subsea, surface and air units for coordinated action, defensive and offensive roles etc. The AUV can play an active role in the oil and gas industries for seabed surveys as well as in search and rescue operations. "We are looking at the power and fuelling options," he said. Yet another technology that is being discussed is deploying sensors in the waters, along the coast and the deep sea. With the presence of the Chinese submarines which have become active off the Indian waters, a sensor network has become important. However, the logistics of powering the sensor and its communication with the warships or the ground control is being looked at. The coastal surveillance following the 26/11 attacks is already in place which work as 'eyes' of the sea and help the coastal security agencies in keeping track of events.

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

BUSINESS

IAF commits to 324 Tejas fighters, provided a good Mark-II jet is delivered

After years of being critical of the Tejas fighter, which is still not combat-ready 35 years after the light combat aircraft project was first approved by the government, the IAF has now agreed to induct 324 of the indigenous jets in the long-term to make up for its fast-depleting number of fighter squadrons. IAF has "firmly committed" to 123 Tejas jets at present, which will come at a cost of over Rs 75,000 crore if both developmental and production costs are taken into account. But it wants the next 201 Tejas Mark-II jets to be "entirely new fighters" with much better avionics and radars, enhanced fuel and weapons carrying capacity, and more powerful engines, say top sources. The existing single-engine Tejas has limited "endurance" of just an hour, with a "radius of action" of only 350-400-km, and weapon-carrying capacity of 3-tonne. Other single-engine fighters like Swedish Gripen-E and American F-16 have roughly double the weapon-carrying capacity and triple the endurance. But IAF, down to just 31 fighter squadrons (18 jets in each) when at least 42 are required to tackle the "collusive threat" from China and Pakistan, realises inducting expensive foreign fighters "in large numbers" is simply not an option. The 36 Rafale jets, ordered from France in September 2016, for instance, have cost India Rs 59,000 crore. The total cost, of course, includes a decidedly deadly weapons package, all spares and costs for 75% fleet availability and "performance-based logistics support" for five years. "The Tejas

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Mark-II is still on the drawing board. But if DRDO, Aeronautical Development Agency and Hindustan Aeronautics Ltd deliver the required Mark-II fighter, IAF has agreed to have a total of 18 Tejas squadrons,” said a source. This comes after a flurry of top-level meetings in South Block, with defence minister Mrs Nirmala Sitharaman herself announcing earlier this month that the government is “not ditching” the home-grown Tejas and “putting all its energies” into ensuring the fighter is delivered at a much faster pace. Only six of the 20 Tejas ordered by IAF in their IOC (initial operational clearance) configuration, which basically means the fighter is airworthy, have been delivered by HAL till now under the first Rs 2,813 crore contract inked in March 2006. Another 20 Tejas in their FOC (final operational clearance) or combat-ready configuration were to be delivered by December 2016, as per the second Rs 5,989 crore contract inked in December 2010. But the Tejas will get its FOC only by June at the earliest, with IAF now hoping to begin inducting these 20 jets from 2019 onwards. The contract for 83 Tejas Mark-1A fighters, which will cost around 50,000 crores, is in the process of being finalized now. These jets will have 43 “improvements” to improve maintainability, AESA (active electronically scanned array) radar to replace existing mechanically-steered radar, mid-air refuelling capability, long-range BVR (beyond visual range) missiles and advanced electronic warfare to jam enemy radars and missiles. The delivery of these 83 jets is slated to begin in 2023.

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

Godrej Aerospace bags ¹ 200-cr. Order

Godrej Aerospace, a unit of Godrej & Boyce Mfg. Co. Ltd., has expanded its partnership with Rolls-Royce with the latter awarding contracts worth ¹ 200 crore for manufacturing aero engine components. The contract is for manufacturing products like unison rings, complex fabrication and external brackets commodities, which once in manufacturing, will result in shipment of 600 different parts spread across various Rolls-Royce Civil Aerospace Engine portfolio, Godrej Aerospace said in a statement.

Center of Excellence

Godrej Aerospace also inaugurated its Center of Excellence (CoE) in Mumbai with investment of ¹ 50 crore to enhance its manufacturing capabilities in the aero engine industry. “In line with our vision to expand our footprint and partner with global majors we have established this Center of Excellence. I am confident that this will strengthen and deepen our wonderful partnership with Rolls-Royce and establish Godrej as their preferred partner,” said Mr Jamshyd Godrej, Chairman and Managing Director, Godrej & Boyce. Mr Kishore Jayaraman, president, India and South Asia, Rolls-Royce, said, “The expansion of partnership with Godrej & Boyce for manufacturing of aero engine components showcases our commitment to developing an aerospace ecosystem in the country.”

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

AWARDS

DRDO bags ‘Most Informative Pavilion’ award at the ISC

The Defence Research and Development Organisation (DRDO) has received the “Most Informative Pavilion” award in the Pride of India Expo, according to a statement. The event was organised as part of the 105th Indian Science Congress (ISC) in Manipur, it said. The DRDO participated in the expo showcasing cutting-edge indigenous defence technologies with over 150 exhibits and models from 18 of its laboratories. The DRDO’s pavilion at the expo at the ISC, held between March 16-20, was a big attraction. Visitors, particularly students, got an opportunity to interact with DRDO scientists. The scientists engaged the visitors in discussions on science and technologies. Chairman DRDO Dr S Christopher congratulated the organising team for the award.

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

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Fellow of Aeronautical Society of India Dr Prakash Chand Jain Scientist DRDL Hyderabad wins Homi J Bhabha Award at 105th Indian Science Congress

Honorable Union Minister of Science and Technology Dr Harsh Vardhan conferred Homi J. Bhabha Award to Fellow of Aeronautical Society of India Dr Prakash Chand Jain Scientist DRDL Hyderabad during 105th Session of Indian Science Congress in recognition of his significant contributions towards development of Science and Technology - Specifically in the realm of Aerospace Engineering. Dr Jain an alumnus of IIT Roorkee, IIT Bombay and BOYSCAST (DST) Fellow from Pennsylvania State University USA is specialized in the areas of Aerospace Structures Technologies. He is an Associate Fellow of American Institute of Aeronautics and Astronautics (AIAA) ; also a Fellow of Telangana Akademy of Sciences and Fellow of Institution of Engineers India. In addition to various DRDO awards , Dr Jain is recipient of coveted Dr Biren Roy Space Science and Design award from Aeronautical Society of India conferred by Governor of Karnataka. Dr Jain has made Outstanding contributions in Aero Space Engineering through application to the DRDO's Projects.



OBITUARY

Obituary



**Professor K Rajaiah
(13-10-1939) – (16-02-2018)**

Prof. K Rajaiah Passed away on February, 16 – 2018. He was Fellow of The Aeronautical Society of India, Former Editor, Journal of the Aeronautical Society of India (1987-97); Co-Editor since 1997 and Former President, The Aeronautical Society of India, Bangalore Branch (1986-88).

Prof. K Rajaiah had completed his Ph.D. (Engg) in Indian Institute of Science, Bangalore, 1972. He had over 40 years of Teaching, Research and Development Experience. He retired as Associate Director, ADE (Aeronautical Development Establishment), Bangalore. His service to Aeronautics, the Aeronautical Society of India and the Journal will be remembered by Aeronautical fraternity with gratitude.

He will be surely missed by one and all who knew him.

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