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"To prosecute the land, maritime or air strategy independently will almost certainly lead to failure because the enemy will fight a joint and integrated war,".

- Air Chief Marshal Vivek Ram Chaudhari, PVSM AVSM VM ADC

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Opinions and Analysis

Civil and Military Aircraft Engine Production: Time to get Going India

Air Marshal Anil Chopra
Director General, Centre for Air Power Studies |

12 September 2022

Source: First Post | https://www.firstpost.com/opinion-news-expert-views-news-analysis-firstpost-viewpoint/civil-and-military-aircraft-engine-production-time-to-get-going-india-11231621.html

Making an aircraft engine is a complex process and only few players in the world can make them. Image courtesy News18

There are very few major aero-engine manufacturers in the world. Even countries like China, which have invested huge sums in R&D, have been struggling to build both the military and civil aeroengines. India had a fairly well-established aircraft industry at the time of Independence in 1947. Gas Turbine Research Establishment (GTRE) was set up under Defence Research and Development Organisation (DRDO) in 1959 in Kanpur, and in 1961 moved to Bangalore. It had indigenously developed centrifugal type gas turbine engine of 1,000 kg thrust in 1961. Aero Engines Research and Design Centre (AER&DC) was established within Hindustan Aeronautics Ltd (HAL) in 1960 for design and development of gas-turbine engines. Yet, India failed to manufacture a fighter aircraft engine in the last several decades. India's indigenous light combat aircraft (LCA) Tejas Mark 1 & 2 are powered by the General Electric (GE) engine variants.

India must first get its core engine technologies right, but simultaneously look at next generation engine technologies. Joint Venture is the best way forward for India.

Lack of Success by GTRE

GTRE was established to design and develop gas-turbine engines for military applications. It was also to develop computational, prototype manufacturing and test facilities for components and full-scale engine development. The establishment has nearly 850 personnel drawn from science and engineering fields. In the 1960s, they re-engineered the Russian RD-9F engine for possible use on the HF-24 aircraft. The project was not successful. In the 1970s, GTRE modified the Orpheus 703 Engine with reheat capability. In the 1980s, GTRE designed the GTX series of engines with a flat rating concept.

In 1989, initial sanction was given for the development of the GTX-35-VS "Kaveri" engine. While GTRE did develop nine prototype Kaveri engines, as well as four core engines that undertook 3,217 hours of engine testing, including in Russia, they failed to meet the required parameters to power a fighter. The general arrangement of the Kaveri is very similar to other contemporary combat engines, such as the Eurojet EJ200, General Electric F414 and Snecma M88. Instead of the desired 'wet thrust' of 81 kilo-newton (kN), the Kaveri generated only 70.4 kN.

"GTRE has been unable to deliver an engine that could power the LCA despite a cost overrun of 642 per cent and a delay of about 13 years," the Comptroller and Auditor General (CAG) noted in a sharply worded report released in 2011. GTRE

tried to defend delays and lack of success on non-availability of state-of-the-art wind tunnel in India, and US technology restrictions. The programme was abandoned in 2014. Meanwhile, a 52 kN dry variant of the Kaveri engine may be used for the indigenous "Ghatak' UCAV (Unmanned Combat Aerial Vehicles). The Government of India has cleared the funding. GTRE is also developing a new 4.25 kN thrust turbofan engine to power Nirbhay Cruise missile and future UAVs.

Engine Manufacturing Ecosystem in India

HAL Engine Division was established at Bangalore during 1956 for production of Orpheus Turbo Jet Engines under licence agreement with Rolls Royce. They have collaborated with many other companies. Till date the division has manufactured more than 3,100 engines and repaired and overhauled more than 16,500 engines. They have also exported engine components to foreign engine manufacturers like Safran, Rolls Royce, and Honeywell.

HAL's Engine Division at Koraput was established in 1964 to manufacture MiG-21 R11 engines under licence from the erstwhile USSR. Subsequently they manufactured the R25, R29 and RD33 engines under licence from Russia for MiG-21BIS, MiG-27 and MiG-29 respectively. Till date the division has manufactured more than 1,300 engines and overhauled more than 7,000 aeroengines. They also carry out repairs, refurbishment and overhauls.

DRDO's Defence Metallurgical Research Laboratory (DMRL) has recently established the near isothermal forging technology to produce all the five stages of high-pressure compressors (HPC) discs out of difficult-to-deform titanium alloy using its unique 2000 MT isothermal forge press. It has been working jointly with Mishra Dhatu Nigam Limited (MIDHANI), a defence public sector undertaking and HAL. The HPC discs form a very important part of the jet engine, on which the compressor blades are mounted. The HPC Drum assembly needs frequent replacements.

The Kaveri project has helped India master some critical technologies and the ecosystem is partly in place for basic design, development, testing, assembly and manufacture. Of course, there are capability gaps. It is very important to have the core engine right. GTRE requires better qualified manpower and management.

This Indian DeepTech startup Paninian aerospace, has recently designed a state-of-the-art 4.5 kN turbojet-engine for cruise missiles and Large UAVs. They are working on more engines in the 3-12 kN thrust range. They are using AI and 3D printing technologies to produce the engines.

GE 404 Engine for LCA

India's LCA was originally to be powered by the GTRE GTX-35VS Kaveri engine. However, because of lack of progress within its envisaged timelines it was officially delinked from the Tejas programme in September 2008. Meanwhile GE F404-GE-F2J3 engine had powered the LCA for its first flight in 2001. Later it was decided that LCA will power the first 40 Mk 1 aircraft with the GE engine. In August 2021 HAL placed orders for 99 more advanced F404-GE-IN20 engines and support services till 2029, valued at $716 million. These will power the LCA Mk1A. General Electric F-414 engines power the F-18 variants. The F414-GE-INS6 with a greater 110 kN thrust, has been selected for HAL Tejas Mark 2. As of now, the engine could also be expected to power the initial 5th generation Advanced Medium Combat Aircraft (AMCA) and the Twin Engine

Deck-Based Fighter (TEDBF). The engine thrust would be upgraded to 120-kN by then.

Major Global Jet Engine Players

Aeroengine technologies are much more difficult to master than even space engines. The ability to manufacture combat jet-engines is the true test of a country's military-industrial base. The US, UK, France and Russia are the main countries with aero-engine technologies. Others like Germany, Japan, and Canada have joint ventures. Among the top four aero-engine manufacturers of the world are, the CFM International, a joint venture between GE Aviation and Safran, who made the best-selling aircraft engine of all time, the CFM56, and now the high-bypass turbofan LEAP (Leading Edge Aviation Propulsion) engine. The CFM is now working on the new RISE (Revolutionary Innovation for Sustainable Engines) programme which will produce the next-generation CFM engine by the mid-2030s.

Aircraft engine is one of the most complex systems onboard. It has parts turning at very high rotations per minute (RPM); these have to withstand very high temperatures; operate very efficiently from sea level to near stratosphere; and from zero to high supersonic speeds.

Pratt & Whitney has six variants in its GTF family of engines. They are already developing a hybrid-electric turboprop demonstrator. GE Aviation's GE90 powers the Boeing 777 family. Their next, GEnx, was around 15 per cent more fuel-efficient and powered the Boeing 787 and 747-8. The GE9X is GE's latest engine developed specifically for the Boeing 777X. The engine has the world record for the highest thrust, at 134,300 pounds. GE is also working on the MESTANG (More Electric Systems and Technologies for Aircraft in the Next Generation) technology. Rolls Royce has been famous for its high-bypass Trent turbofans. They have announced that they are working on building the world's largest jet engine called the UltraFan demonstrator.

For long, China has been using Russian engines for all its fighter aircraft, and Western engines for their airliners. China's fifth-generation J-20 fighter was initially equipped with the Russian AL31F engine, and later switched to Chinese WS-10 Taihang which is essentially derived from CFM-56II engines. They are now being replaced with the more powerful and modern WS-15, but still way behind the Western engines in maintainability, power and fuel consumption.

Defence Aeroengine Requirements

The Ministry of Defence (MoD) estimates that India's military aeroengine market will amount to Rs 3,50,000 crore over the next two decades which means around Rs 17,500 crore per year. Currently this market is with original engine manufacturers (OEM). The repair and overhaul in most cases is with HAL. Engine maintenance constitutes 35 per cent of the overall cost of aircraft maintenance. More than two-thirds of engine maintenance costs are incurred on components, with labour accounting for another 22 percent. There is great scope for Maintenance, Repair and Overhaul (MRO) being set up by private players with Original Equipment Manufacturers (OEM). Lot of engine parts can be manufactured in India to give a boost to the overall ecosystem.

Civil Jet Engine Requirements

India is the world's third-largest civil aviation market and among the fastest growing. Indian carriers flew 12 million passengers on domestic routes in May 2022. Indian airlines operate close to 700 aircraft currently. The Government of

India's UDAN-RCS scheme launched in 2016 has increased the number of operational airports and flying destinations considerably. The FDI limit for the sector has been raised to 100 per cent. As per the Ministry of Civil Aviation "Vision 2040" the air passenger traffic will increase six fold to 821 million domestic and 303 million international passengers and 17 million tons of air cargo. India will require 2,359 passenger aircraft. There is thus a great scope to set up aero-engine manufacture in India.

Predictions are that engines will also remain the fastest-growing sector of the commercial jet MRO business. The engine MRO market is also dominated by the major aero-engine manufacturers. Nearly 90 per cent of the Indian MRO work is outsourced to countries like Singapore, Dubai, UAE, Sri Lanka and others. Efforts now on to make India a MRO hub. There are currently eight major players in the MRO market in India, AIESL, Air Works, Indamer Private Limited, Deccan Charter, Taj Air, Bird ExecuJet, GMR Aero Technic Limited and Max MRO Private Limited. AIESL, a subsidiary of Air India, is the only player extending a full-fledged engine overhaul facility and Air Works has the second highest share in the market revenue.

Joint Venture Approach Best for India

For long, analysts were suggesting a joint-venture route with a foreign partner for aero-engine development. Snecma, in a tie up with DRDO, had offered to revive and certify the Kaveri engine as part of the offsets deal for 36 Dassault Rafale jets purchased by India. Nothing came of it. By March 2020, over 30 years of Kaveri development, Rs 2,032 crore had been spent, said Minister of State for Defence Shripad Naik in a written reply in the Lok Sabha.

In July 2022, the Safran Group CEO Olivier Andries met Defence Minister Rajnath Singh. The meeting was to discuss transferring the technology for making engines for India's indigenous AMCA that had been promised as part of Rafale offsets contracts. Safran has reportedly submitted a proposal to the MoD in July 2022 to co-develop with GTRE a 110 kN thrust engine for the AMCA. But it is believed that they are asking for a whopping €1 billion to transfer the technology. This is the price one pays for lack of own technology and capabilities. It is understood that the price negotiations may take longer. Meanwhile, the Cabinet Committee on Security (CCS) sanction for the design and prototype development of the AMCA has still to be accorded. HAL and Aeronautical Development Agency (ADA) are still working on the document. Albeit the design working is going in parallel. Of the €7.8 billion Rafale deal, France had committed to investing 50 per cent, or €3.9 billion, in India as offsets.

An earlier proposal for collaboration on jet engine technology under the India-US Defence Trade and Technology Initiative (DTTI) was suspended in October 2019 on account of American reluctance to share core or hot engine technology. A joint working group on jet engine technology under the DTTI framework was thereafter disbanded. Of late, the British Rolls-Royce, and the USA's GE have also been making overtures to join India's aero-engine program. The American turnaround is primarily to remain part of this important Indian programme. The revival of the GE bid to co-develop the AMCA engine coincides with the "Enhanced Performance Engine" (EPE) variant of the GE-F414 being developed for the US Navy. It will involve a new core. The thrust will increase nearly 20 per cent

to 120 kN.

Aero-engine is now considered one of the key areas for India's aspirations of achieving self-reliance in the defence sector. Indian private sector players are also likely to be part of the aeroengine programme. The French side also talked of plans to set up a MRO facility in India for overhauling LEAP-1A and LEAP-1B engines for Indian and foreign commercial airlines. Interestingly, the Safran group firm Turbomeca and HAL had earlier co-developed the Shakti engine, which powers India's Dhruv Advanced Light Helicopter (ALH) and Light Combat Helicopters (LCH). 250 of these are already flying.

The future is in new propulsion technologies to burn less fuel, cut CO2 emissions and produce less noise. As they enhance engine efficiencies, they are simultaneously exploring electric and hybrid propulsion systems. Benefits of research and technology in propulsion will shorten engine development cycle, reduce engine weight, increase engine performance, reduce engine fuel consumption, enhance reliability, reduce emissions and noise, increase component life and reduce maintenance requirements. The engines being the most important, and most expensive, aircraft part, their development will shape the airline industry's green transition. India must first get its core engine technologies right, but simultaneously look at next generation engine technologies. Joint Venture is the best way forward for India.

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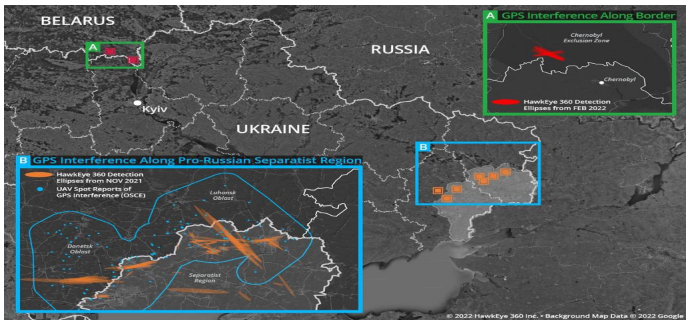
Why isn't Russia doing more to jam GPS in Ukraine?

Dana Goward

Source: C4ISRNET | https://www.c4isrnet.com/opinion/2022/07/22/why-isnt-russia-jamming-gps-harder-in-ukraine/



This sample provided by Hakweye 360 shows what it looks like when systems detect GPS interference. (Hawkeye 360)

Russian forces have been regularly jamming signals from the U.S. Global Positioning System as part of its war on Ukraine. These signals underlie many aspects of modern warfare, from navigating surveillance drones and targeting missiles to enabling mobile radios.

The importance of GPS as a military tool was underscored by Kremlin media in November as troops were massing along the Ukraine border. After Russia demonstrated it could destroy a satellite in space, a television commentator known to be an unofficial mouthpiece of President Vladimir Putin said the nation could "blind NATO" by shooting down all GPS satellites.

Despite this, Russian interference with GPS in Ukraine has not been nearly as aggressive as many observers had expected.

Experts within the GPS/positioning, navigation, and timing communities have proposed a number of possible reasons for this. Here are the most prevalent, all of which are based entirely on publicly available information:

Russia's Electronic Warfare Capability isn't as good as it was thought to be. Russian forces have a fearsome reputation when it comes to electronic warfare. And they go out of their way to reinforce this. At one point, the state-owned news agency Sputnik proclaimed Russian EW capabilities "render aircraft carriers useless."

The popular wisdom is that they have developed and maintained this capability as a response to superior technology used by Western forces. Electronic warfare can be an inexpensive way to level the playing field.

Since Russian forces have been surprisingly less capable than expected in other aspects of the Ukraine conflict, some think this may be true with their ability to interfere with GPS.

Most observers discount this suggestion, though.

They point out that Russian forces regularly jam GPS signals in northern Norway from locations far across the border. And that in some cases this jamming has been so precise, signals in a nearby frequency band from Russia's GLONASS satellite navigation system have been unaffected.

Russia has clearly demonstrated impressive abilities to spoof GPS over wide areas. Users in downtown Moscow often find their equipment falsely reporting they are at an airport. The same is true in many coastal areas, the Black Sea and other locations where senior government officials are to be found.

A 2016 Moscow Times headline read "The Kremlin eats GPS for Breakfast." The general consensus in the community is that there has been a lot of evidence to support that claim.

The question is then, why is the Kremlin only nibbling at GPS in Ukraine?

Russian forces use and need GPS. Proponents of this idea point to downed Russian fighter jets found to have GPS receivers taped to their dashboards.

Signals from Russia's GLONASS system and terrestrial Chayka electronic navigation system are both available for use in Ukraine. Yet it seems likely there not enough compatible receivers for these systems to equip all Russian forces. As the world's first global navigation satellite system, GPS receivers have become both plentiful and inexpensive. Cheap GPS receivers and some duct tape seems like an interim solution for some poorly equipped Russians.

Also, GPS signals support a wide variety of infrastructure. Telecommunications, the internet, electrical grids and machine-control systems all rely on GPS for timing. Russian forces may wish to protect Ukraine's infrastructure for their own benefit and use. Prolonged and widespread attacks on GPS signals could cause serious infrastructure problems with long-term strategic downsides greater than any temporary tactical gains.

High-Power, Persistent GPS Jammers are Easily Targeted. Any strong and consistent radio frequency transmission can be easily located and attacked. Many militaries have missiles specially designed to home in on and destroy jamming transmitters. Even without such weapons, direction-finding technology can pinpoint a transmitter enabling an artillery attack or an air or ground assault. Russian commanders may be limiting transmission power and time on air to avoid attracting hostile fire.

Ukraine is less Impacted. While Ukraine is increasingly receiving and using more Western weapons, many of which use GPS, it also has huge stockpiles of Soviet-era weapons. These

don't rely on GPS and are likely unaffected by most, if not all, forms of electronic warfare. Also, Ukrainian regular and irregular forces are likely less reliant upon sophisticated command, control and communications systems used by larger militaries. Thus, GPS jamming that could hamper normal operations for the U.S. and NATO may have less impact in Ukraine.

Saving the Best to use Against the U.S. and NATO. Despite the location of the conflict, Ukraine is not the enemy Vladimir Putin is really worried about. His concerns focus on the U.S. and NATO. Deploying Russia's most sophisticated and powerful electronic weapons in Ukraine would enable adversaries to study technologies and tactics. This would lead to the development of countermeasures and make the weapons less effective in future conflicts.

Better for Russia to keep its best tools and tricks for interfering with GPS in reserve, for use later against larger forces and more important targets.

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Air Power

IAF to Fly AN-32 on Blended Biodiesel for 200 hours

Dinakar Peri | 16 September 2022

Source: The Hindu | https://www.thehindu.com/news/national/iaf-to-fly-an-32-aircraft-on-blended-biodiesel-for-200-hours/article65899650.ece

An IAF AN-32 flew on blended biodiesel for the first time in December 2018. | Photo Credit: Special Arrangement

As part of efforts to reduce its carbon footprint, the Indian Air Force (IAF) is looking to fly an AN-32 transport aircraft modified to operate on 10% blended biodiesel for 200 flight hours in the next six months, said Air Vice Marshal S. K. Jain, Assistant Chief of Air Force (maintenance plans).

The IAF AN-32 took flight on biodiesel blended with aviation turbine fuel (ATF) for the first time in December 2018.

"So far an AN-32 has flown 65 hours with a 10% blend of biofuel and the performance has been very satisfactory," AVM Jain said, speaking a seminar on sustainable aviation biofuels organised by The Aeronautical Society of India on Friday. The target is to fly 200 flight hours, which should happen within the next six months

A second aircraft, a Dornier, is currently undergoing ground tests after which it will undertake its first flight. The Dornier had been cleared by the original engine manufacturer of the engine, Honeywell, for use of 50% biofuel,

AVM Jain said.

The global aviation industry, both civil and military, is one of the biggest emitter of greenhouse gases which cause global warming. It is imperative that the industry finds ways to reduce its carbon footprint for global efforts to achieve 'net zero emissions' to be successful. The annual fuel consumption of the IAF for 2021-22 was 6.2 lakh kilo litres, which contributed around 15 lakh tonnes of carbon dioxide.

On the civil aviation front, an official from aircraft manufacturer Airbus said it had plans to offer 100% sustainable aviation fuel (SAF) compatibility on its commercial aircraft latest by 2030. "We plan to be the first major aircraft manufacturer to offer a climate neutral commercial aircraft by 2035," said Julien Manhes, project leader SAF of Airbus.

Following the maiden flight in December 2018, the AN-32, powered by a blend of biodiesel, flew over the Rajpath during the Republic Day flypast on January 26, 2019.

The biofuel was extracted from Jatropha plant seeds using a technology patented by the Council of Scientific and Industrial Research (CSIR) and the Indian Institute of Petroleum, Dehradun.

The project for the development of blended fuel was conceptualised in January 2018 with CSIR and IIP Dehradun as the development agency. The development order was issued on October 17, 2018, for the delivery of 8,700 litres of blended fuel at a cost of ₹ 5.43 crore, AVM Jain explained.

The plan is eventually to expand the usage of aviation turbine fuel blended with biodesel to all fixed-wing and rotary-wing aircraft through evaluation and certification. Such usage has the dual benefit of reducing carbon footprint as well reducing the usage of fossil fuels, which will also result in savings for the IAF.

However, there are significant challenges in production and supply chain to ensure the IAF gets enough Jatropha and at reasonable rates. Availability of biodiesel in enough quantities was the biggest challenge, one official stated on the sidelines of the seminar.

Commenting on the maiden flight, Group Captain A. Shrivastava, then a Wing Commander and a Research Fellow at the Centre for Air Power Studies, wrote in an article published on the think tank's website then that India has joined a league of select nations to have "developed, tested and certified" a single step hydro-processed renewable jet (HRJ) process to convert non-edible oil into biofuel for use on military aircraft.

Giving an estimate of the challenges involved, the article added that the IAF would require over 3,000 kilo litres of biofuel annually just for operating the AN-32 fleet with a 10% biofuel mix.

The blend of 90% ATF and 10% biodiesel received certification from the Centre for Military Airworthiness and Certification (CEMILAC) valid for two years, up to November 2023.

On the way forward, AVM Jain added that there was scope for increasing the blend ratio to 50-50% and also stressed the need for mass production of biodiesel.

The country's first mass production bio-ATF plant is being set up by Mangalore Refinery and Petrochemicals Limited (MRPL), a subsidiary of ONGC, fully integrated with its refinery at Mangaluru in Karnataka.

Speaking of the progress, V. Nandakumar,

group general manager (corporate strategy), MRPL, said the Ministry of Petroleum and Natural Gas had advised MRPL to set up a bio-ATF plant integrated with its refinery in September 2020. The MRPL board has approved the project to set up a demo-plant to manufacture 20 KLPD at an approximate cost of ₹300 crore in August 2022 and the plant is expected to be ready in 2025.

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10 Light Combat Helicopters to join IAF

16 September 2022

Source: Asianetnews | https://newsable.asianetnews.com/gallery/india-defence/10-light-combat-helicopters-to-join-iaf-on-october-3-rib117

Days ahead of its 90th raising day, the Indian Air Force will induct the first batch of 10 Made-in-India Light Combat Helicopters at the Jodhpur-based Air Force Station in Rajasthan on October 3, in the presence of Defence Minister Rajnath Singh.

It should be noted that the IAF is still in the process of finalising the number of LCHs to be procured. The first unit, which is being raised at Jodhpur, will have a total of 10 choppers.

These choppers are expected to replace the ageing Russian Mi-25 and Mi-35 attack helicopters.

The first batch of 10 Made-in-India Light Combat Helicopters are expected to replace the ageing Russian Mi-25 and Mi-35 attack helicopters.

In June this year, the Indian Army had inducted the first LCH squadron in Bengaluru, which will be moved to Eastern Command along the Line of Actual Control (LCH) next year. The Army has planned to induct 95 LCHs. About 70 helicopters would be deployed for combat roles in the mountains.

The Prime Minister-headed Cabinet Committee on Security had, in March 2022, given clearances for the procurement of 15 Limited Series Production (LSP) variants of the LCH at the cost of Rs 3,887 crore, along with infrastructure sanctions worth Rs 377 crore. Of these 15 helicopters, ten are for the IAF and five for the Indian Army.

Let's know more about the home-made Light Combat Helicopter

The Light Combat Helicopter is designed, developed and manufactured by the state-owned aircraft maker Hindustan Aeronautics Limited. It is a twin-engine, 5.8-ton class helicopter with a narrow fuselage and tandem configuration for the pilot, co-pilot and Weapon System Operator.

The Light Combat Helicopter has approximately 45 per cent indigenous content by value. The LCH is the only attack helicopter in the world which can land and take off at an altitude of 5000 m (16400 feet) with a considerable load of weapons and fuel, meeting the specific requirements of the Indian armed forces.

The homemade attack helicopter will be fitted with modern technologies and systems compatible with stealth features like reduced visual, aural, radar and infrared signatures and crashworthiness features for better survivability.

The Light Combat Helicopter has been designed to carry out roles, including the destruction of enemy air defence, counterinsurgency, search and rescue, anti-tank, and counter surface force operations, among others.

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IAF Planning to Lease Airborne Early Warning Aircraft to Plug Capability Gaps

Manjeet Negi | 16 September 2022

Source: India Today | https://www.indiatoday.in/india/story/indian-air-force-to-lease-airborne-early-warning-aircraft-drdo-indigenous-aircraft-2000891-2022-09-16

The Indian Air Force plans to lease airborne early warning aircraft to plug capability gaps.

Amid delays in the procurement of airborne early warning systems, the Indian Air Force (IAF) is planning to lease such aircraft to bridge its capability gap.

The Indian Air Force (IAF) plans to lease airborne early warning aircraft to plug capability gaps. The leased aircraft are to be used until the IAF gets new planes from indigenous sources.

The IAF has five airborne warning aircraft, three Israeli-origin Phalcon airborne early warning and control systems and two homegrown Netra AEW&C planes.

"The adversaries, including China and Pakistan, have several such aircraft. Pakistan alone has 12 of these planes acquired from Sweden and China. The Chinese Air Force has a large number of similar planes and can cover their borders with India conveniently," government sources told India Today.

Though India has five systems and other surveillance planes of the Indian Navy, the task of 24x7 surveillance on both fronts is becoming a bit challenging, they said.

The sources said the IAF might try to lease these planes from global manufacturers if someone is willing to, as only a few countries can produce such systems.

The Indian Air Force has got a programme with the Defence Research and Development Organisation (DRDO), which is turning six Airbus 320 planes into AWACS, but the project would take some time to get completed.

Meanwhile, the leased aircraft are planned to be used until the IAF gets new planes and aircraft from indigenous sources.

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Army to Deploy two Heron-Mk2 UAVs in Eastern Sector

Dinakar Peri | 15 September 2022

Source: The Hindu | https://www.thehindu.com/news/national/army-to-deploy-two-heron-mk2-uavs-in-eastern-sector-by-month-end/article65891093.ece/amp/

As reported by The Hindu yesterday, the Army is looking to create a separate cadre of UAV operators. The proposal is currently with the Army Headquarters and once cleared, will be sent to the Defence Ministry for approval. File | Photo Credit: AFP

As part of capability enhancement in Arunachal Pradesh beyond the Tawang sector, the Indian Army is set to deploy two Heron-Mk2 Unmanned Aerial Vehicles (UAVs) or Remotely Piloted Aircraft (RPA), procured on lease, along the Line of Actual Control (LCA) in the Eastern sector by end of September, defence sources said.

"Four SATCOM [satellite communications] enabled UAVs were contracted last year by the Army. Out of these two have been deployed at Leh and two will be inducted in Eastern Command by September end," an Army source said. "This will increase the operational reach manifold."

These four UAVs are on lease from Israel Aircraft Industries and are more capable than the ones in service.

As reported by The Hindu yesterday, the Army is looking to create a separate cadre of UAV operators. The proposal is currently with the Army Headquarters and once cleared, will be sent to the Defence Ministry for approval.

Since the stand-off in Eastern Ladakh, the Army Aviation had seen a quantum jump in the employment of helicopters and UAVs along the Northern and Eastern borders.

The UAVs are carrying out 24-hour surveillance and can look beyond 300 km, a Lieutenant Colonel with an Army Aviation Unit near the Assam-Arunachal Pradesh border said. "They are used to identify personnel, vehicles and even transmissions beyond the border. They can find the electro-magnetic transmissions by enemy like frequency etc.," the officer explained.

In addition, UAVs are also being used in internal security duties to identify hideouts of insurgents and even number of insurgents, another officer said on their employment in counter insurgency role. The video feed is sent live during operations to assist forces on the ground, the officer added.

In August 2021, Army Aviation got control of the Army's UAVs which were earlier under the Artillery. The Army operates over 30 Heron UAVs procured from Israel.

However, a major upgrade plan for weaponisation and facilitation of SATCOM capability for them at an estimated cost of over ₹6,000 crore has been delayed, officials had stated earlier. This is part of a comprehensive upgrade of all Israeli drones with the three Services that is in the works and estimated to cost of ₹21,000 crore.

In addition, with the deal for armed Predator drones from the US stuck, the Army is looking at procuring long range Hermes 900 UAVs from Israel which are manufactured in India by Adani Group.

The Army Aviation has three Brigades at Leh, Missamari and Jodhpur, and operates around 145

indigenous Advanced Light Helicopters (ALH), 75 of which are the weaponised variants (Rudra). Another 25 ALH Mk-III are on order which will be inducted within two years. It has begun inducting the indigenous Light Combat Helicopter (LCH) and will receive AH-64E Apache attack helicopters in early 2024.

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Women Pilots to Now Run IAF's Chinook Sorties

17 September 2022

Source: Deccan Herald | https://www.deccanherald.com/national/women-pilots-to-now-run-iafs-chinook-sorties-1145919.html

Air Marshal VR Chaudhari | Twitter/@PIB_India

New For the first time in India, women combat pilots have been assigned Indian Air Force's frontline Chinook helicopter unit. Pilots Parul Bharadwaj and Swati Rathore had been flying Russian-origin Mi-17V5 helicopters prior to their latest endeavour.

These helicopters play a crucial role in supporting the Indian Army near the Line of Actual Control(LAC). The multi mission Chinook, costing Rs 650 crore apiece, is the latest addition to the air force fleet that has been imported from the US.

In conversation with Hindustan Times, Air Marshal Anil Chopra said, "Moving from M-17s to Chinooks is a noteworthy development. Women in the air force are moving to the next level in their careers."

Before being assigned the responsibility of Chinook, Parul Bharadwaj captained the Mi-17V5's maiden all women flight in 2019 and Rathore was the first woman helicopter pilot to fly an Mi-17V5 in a four-helicopter formation over the Kartavya Path.

Both Bharadwaj and Rathore have moved to CH-47F Chinook units based in Chandigarh and Assam's Mohanbari respectively.

Not only in the air force, Women in all of India's armed forces have been witnessing several new opportunities in recent times. In another first, women candidates joined the National Defence Academy this year.

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Ukraine has Shot Down 55 Russian Warplanes, U.S. General Says

Paul Mcleary | 19 September 2022

Source: Politico.com | https://www.politico.com/news/2022/09/19/ukraine-has-shot-down-55-russian-warplanes-00057569

A SA-11 launcher is displayed at a military show at the international forum "Technologies in machine building 2010" in Zhukovsky, outside Moscow on June 20, 2010. | Mikhail Metzel/AP Photo

Ukrainian air defenses have shot down at least 55 Russian warplanes since the start of the war in late February, a U.S. general said Monday, saying the huge losses are a major reason Russian fighter planes and bombers have not played much of a

role in the conflict.

Ukrainians took down those planes using older Russian-made air defenses, forcing the Russians to severely limit the sorties they flew near Ukrainian positions. The shootdown also cut Russian ground forces off from the kind of air support they would need to take and hold territory, Air Forces in Europe and Africa commander Gen. James Hecker told reporters at the annual Air Force Association conference.

That lack of protection from the sky has been one of the big surprises of the war, as most analysts expected Russia to quickly establish dominance over Ukraine's airspace in the early days of the invasion. That failure allowed the Ukrainian air force to regroup and survive mostly intact. Hecker estimated that Ukraine retains about 80 percent of its air force, seven months into the war.

At the Ukraine Defense Contact Group meeting at Ramstein Air Base in Germany this month, one of the "big asks" from the Ukrainians was more SA-10 and SA-11 air defense systems in order to fend off Russian drones and aircraft, Hecker said.

The U.S. doesn't produce or use the missiles, so the onus is on European allies to supply them to Kyiv.

One thing that won't likely make its way to Ukraine soon is the U.S.-made F-16 fighter plane, which Hecker said wouldn't arrive for two to three years after any political decision was made to send them, due to training and logistical issues. The general wouldn't count sending F-16s out, however, saying "folks are starting to think more long term" in how to equip Ukraine for a war he said will likely last years, not months. POLITICO reported last week that officials are conducting early discussions over whether to send the jets to Ukraine, along with Patriot missile batteries.

But the aid is all contingent on decisions made by politicians in Washington and across the capitals of Europe, leading to delays in some weapons the Ukrainians have for months insisted are critical for their survival. There is increasing pressure on Germany in particular to allow third-party countries to send German-made Leopard tanks and artillery systems to Ukraine, something Berlin has so far refused to do.

There's a similar trepidation within the White House, which is declining to send longer-range missiles for the High Mobility Artillery Rocket Systems, for fear Ukraine would begin hitting targets inside Russia. Current missiles can travel about 50 miles, as opposed to the 180 mile range of the missiles Ukraine has been clamoring for.

Those self-imposed curbs on aid have frustrated Kyiv and others who want to more quickly and fully equip Ukraine to hit Russian forces harder. For now at least, "Ukraine has what they need to survive and fight and try to protect their sovereign country without turning this into World War III," Hecker said.

The general did acknowledge that the U.S. is providing Ukraine "time sensitive" intelligence to Ukraine, but insisted that the Americans are not picking targets for them.

Specifically, the U.S. passed on information about the location of Russian supply depots and logistics hubs inside Ukraine, Hecker said. "We would pass on where some of this equipment was, and then it was up to them whether they wanted to target it or not," he said.

In the early days of the war Ukrainian forces were having a hard time hitting those targets,

which were behind the front lines and out of range of much of their artillery. “But then they got HIMARS,” he said.

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Space

Dream Chaser Space Plane Aims to Deliver US Military Cargo Within 3 Hours

Elizabeth Howell | 13 September 2022

Source: Space.com | https://www.space.com/dream-chaser-space-cargo-shipment-military

Sierra Space's Dream Chaser space plane is capable of touching down on any runway that can accommodate a Boeing 737. (Image credit: Sierra Nevada Corp.) Sierra Space's Dream Chaser space plane is capable of touching down on any runway that can accommodate a Boeing 737. (Image credit: Sierra Nevada Corp.)

Dream Chaser is eyeing high-speed shipments for the military through space.

Sierra Space, which is developing the shuttle-shaped Dream Chaser spacecraft for cargo deliveries and potential astronaut flights, signed an agreement with the U.S. Department of Defense (DOD) transportation command for point-to-point space shipments within three hours.

The early-stage cooperative research and development agreement (CRADA) "provides unique capabilities for precise, cost-effective and timely global delivery of [DOD] logistics and personnel," Sierra Space officials said in a Sept. 8 statement(opens in new tab).

The U.S. military has signed several agreements in recent months for future point-to-point transportation needs, including a CRADA with Rocket Lab to use its Electron booster, and a $102 million contract with SpaceX (through the U.S. Air Force) for rocket deliveries of military cargo and humanitarian equipment.

CRADAs allow federal agencies to provide non-funded agreements to private agencies while still offering support through facilities, equipment, expertise and other services. Sierra Space said its agreement would allow the company to create logistics delivery to deal with emergent and high-speed threats in "contested and changing environments" or to supply areas in need of humanitarian relief.

The Dream Chaser spacecraft has performed several test flights as Sierra Space targets cargo shipments for NASA (with which it has an agreement for International Space Station resupply missions), along with other entities.

The U.S. military has been talking about high-speed space deliveries for at least three years, including overcoming key constraints like weight, volume and restrictions in launch operations and recovery, according to a U.S. Air Force (USAF) release from October 2020.

"As industry advances to overcome these challenges as well as increase its pace of launches to decrease costs, a space transportation capability to put a crucial cargo quickly on target at considerable distances makes it an attractive alternative," USAF officials stated(opens in new tab) at the time.

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China Sets Satellite Observation Alliance for Sustainable Development

08 September 2022

Source: CGTN | https://news.cgtn.com/news/2022-09-08/China-sets-satellite-observation-alliance-for-sustainable-development-1d9pzGLj0M8/index.html

The Alliance of Sustainable Development Goals Satellites, composed of seven member institutions with around 60 satellites, is formally established in Beijing, China, September 6, 2022. /Aerospace Information Research Institute of Chinese Academy of Sciences

China established a satellite observation alliance for sustainable development on Tuesday, aiming to give full play to the advantages and potential of Earth observation from space.

The alliance, named the Alliance of Sustainable Development Goals Satellites, includes seven Chinese research institutions as members, with around 60 satellites. It aims to pool wisdom and strength and facilitate data sharing within the alliance.

The huge quantity of data obtained through the observation of Earth from space is of great significance for the monitoring and evaluation of sustainable development goals, as well as related scientific research, according to Guo Huadong, director of the International Research Center of Big Data for Sustainable Development Goals (CBAS).

The alliance, a non-profit, academic group working on scientific research, can provide data services and sci-tech support for the implementation of the UN 2030 Agenda for Sustainable Development.

It was jointly initiated by seven institutions, including CBAS, the Satellite Application Center for Ecology and Environment under the Ministry of Ecology and Environment, and the China Center for Resources Satellite Data and Application, and officially set up at the 2022 International Forum on Big Data for Sustainable Development Goals in Beijing.

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China's Moon Missions Shadow NASA Artemis's Pace

Andrew Jones | 07 September 2022

Source: Spectrum | https://spectrum.ieee.org/china-moon-mission-artemis

China's Long March-5 Y5 rocket is pictured here at the Wenchang Spacecraft Launch Site in South China's Hainan province. XINHUA/GUO CHENG/GETTY IMAGES

This past weekend, NASA scrubbed the Artemis I uncrewed mission to the moon and back. Reportedly, the space agency will try again to launch the inaugural moon mission featuring the gargantuan Space Launch System (SLS) at the end of this month or sometime in October. Meanwhile, half a world away, China is progressing on its own step-by-step program to put both robotic and, eventually, crewed spacecraft on the lunar surface and keep pace with NASA-led achievements.

Asia's rapidly growing space power has already made a number of impressive lunar leaps but will need to build on these in the coming years.

Ambitious sample-return missions, landings at the lunar south pole, testing the ability to 3D print using materials from regolith, and finally sending astronauts on a short-term visit to our celestial neighbor are in the cards before the end of the decade.

The next step, expected around 2024, is Chang'e-6: an unprecedented attempt to collect rock samples from the far side of the moon.

The mission will build on two recent major space achievements. In 2019, China became the first country to safely land a spacecraft on the far side of the moon, a hemisphere which cannot be seen from Earth—as the moon is tidally locked. The mission was made possible by a relay satellite out beyond the moon at Earth-moon Lagrange point 2, where it can bounce signals between Chang'e-4 and ground stations in China.

Chang'e-5 in 2020 performed the first sampling of lunar material in over four decades. The complex, four-spacecraft mission used an orbiter, lander, ascent vehicle, and return capsule to successfully deliver 1.731 grams of lunar rocks to Earth. The automated rendezvous and docking in lunar orbit of the orbiter and ascent spacecraft was also seen as a test of the technology for getting astronauts off the moon and back to Earth.

The country gears up for lunar landings, in situ resources tests, and new huge rockets.

Chang'e-6 will again attempt to collect new samples, this time from the South pole-Aitken basin, a massive and ancient impact crater on the far side of the moon. The science return of such a mission could likewise be huge as its rocks have the potential to answer some significant questions about the moon's geological past, says planetary scientist Katherine Joy of the University of Manchester, in England.

"We think that the basin-formation event was so large that the moon's mantle could have been excavated from tens of kilometers deep," says Joy. Fragments of this mantle material originating from deep in the moon would help us to understand how the Moon differentiated early in its history, the nature of its interior, and how volcanism on the far side of the moon is different or similar to that on the nearside.

Chang'e-7, also scheduled for 2024, will look at a different set of questions geared toward lunar resources. It will target the lunar south pole, a region where NASA's Artemis 3 crewed mission is also looking to land.

The mission will involve a flotilla of spacecraft, including a new relay satellite, an orbiter, lander, rover and a small "hopping" spacecraft designed to inspect permanently shadowed craters which are thought to contain water ice which could be used in the future to provide breathable oxygen, rocket fuel, or drinking water to lunar explorers.

Following this Chang'e-8 is expected to launch around 2027 to test in situ resource utilization and conduct other experiments and technology tests such as oxygen extraction and 3D printing related to building a permanent lunar base—for both robots and crew—in the 2030s, named the International Lunar Research Station (ILRS).

The upcoming Chang'e-6, 7 and 8 missions are expected to launch on China's largest current rocket, the Long March 5. But, as with NASA and Artemis, China will need its own megarockets to make human lunar exploration and ultimately, perhaps, crewed lunar bases a reality.

In part in reaction to the achievements of

SpaceX, the China Aerospace Science and Technology Corporation (CASC), the country's main space contractor, is developing a new rocket specifically for launching astronauts beyond low Earth orbit.

The "new generation crew launch vehicle" will essentially bundle three Long March 5 core stages together (which will be no mean feat of engineering) while also improving the performance of its kerosene engines. The result will be a roughly 90-meter-tall rocket resembling a Long March version of SpaceX's Falcon Heavy, capable of sending 27 tonnes of payload into translunar injection.

Two launches of the rocket will by 2030, according to leading Chinese space officials, be able to put a pair of astronauts on the moon for a 6-hour stay. Such a mission also requires developing a lunar lander and a new spacecraft capable of keeping astronauts safe in deep space.

For building infrastructure on the moon, China is looking to the future Long March 9, an SLS-class rocket capable of sending 50 tonnes into translunar injection. The project will require CASC to make breakthroughs in a number of areas, including manufacturing new, wider rocket bodies of up to 10 meters in diameter, mastering massive, higher-thrust rocket engines, and building a new launch complex at Wenchang, Hainan island, to handle the monster.

Once again NASA is leading humanity's journey to the moon, but China's steady accumulation of capabilities and long-term ambitions means it will likely not be far behind.

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Global Aerospace Industry

Defense, Intelligence Agencies Need a Better Plan to Buy Commercial Satellite Imagery

Sandra Erwin | 07 September 2022

Source: Space News | https://spacenews.com/gao-defense-intelligence-agencies-need-a-better-plan-to-buy-commercial-satellite-imagery/

Satellite image collected by BlackSky over Vasylkiv Air Base, Ukraine, Feb. 28. Credit: BlackSky

WASHINGTON — Despite a growing demand for satellite imagery, U.S. defense and intelligence agencies are not taking advantage of available commercial technology due to slow and cumbersome procurement methods, the Government Accountability Office said in a Sept. 7 report.

The war in Ukraine has drawn attention to how governments are using commercial satellites to track troop movement and the impact of attacks. Meanwhile, the U.S. intelligence community and the Department of Defense continue to do business as usual and are not incorporating emerging commercial capabilities, said the report directed by the House and Senate intelligence committees.

"Until they address this, the U.S. risks losing a technological advantage over emerging competitors, like China," said GAO.

The National Reconnaissance Office, the

agency that operates the nation's classified spy satellites and also is responsible for buying commercial imagery, has for years been working on a strategy to acquire emerging commercial capabilities. But during that time the commercial sector has flourished and the government's procurement strategy is behind the curve, said Brian Mazanec, GAO's director of defense capabilities and management and author of the report.

"We found that the current approach faces challenges incorporating the rapidly improving commercial capabilities, both in terms of timeliness and scaling," Mazanec said. "The commercial satellite imagery industry continues to rapidly change so finding ways the government can take advantage of that continuous innovation is difficult."

The IC and DoD for the most part continue to use their standard process for buying products and services, "which isn't fast," he said.

From 2019 through 2021, the report said, the NRO spent some of its commercial imagery budget on emerging capabilities, but those efforts have not generally led to sustained funding. Study contracts with small dollar amounts "limit the ability of vendors to expand and enhance service offerings."

Imagery analysts at the National Geospatial Intelligence Agency (NGA) also face challenges integrating data from commercial satellites, according to the report. "For example, NGA officials reported that, although NRO has a number of study contracts exploring commercial radar capabilities, NGA does not have formal requirements to ingest and process this commercial radar data in their ground systems from these emerging capabilities."

Mazanec noted that NRO spending on commercial imagery for foundational mapping is "quite significant" and has allowed the NRO to focus on other capabilities. However, DoD and the IC "have a really hard time incorporating emerging commercial capabilities at scale and in a timely manner."

GAO director Brian Mazanec: 'Commercial satellite capabilities are increasingly going to be indispensable to the national security enterprise'.

He said GAO investigators spoke with about a dozen commercial vendors. Those that only have research and development contracts "expressed genuine frustration with the long lead time in the process. They also found that the small study contracts rarely translated into larger government commitments."

Lack of Coordination between DoD and IC

GAO also highlighted a lack of coordination between DoD and the IC on imagery requirements. This fragmented approach, said the report, results in overlapping wish lists and procurements.

"We found that the IC and the DoD need to establish clear roles and responsibilities for the acquisition of commercial satellite imagery, and then communicate this to all the relevant stakeholders," said Mazanec.

The NRO and NGA, for example, have written agreements documenting specific responsibilities among their two agencies. "However, once you get outside of NRO and NGA, there's no guidance that addresses organizational roles and responsibilities across the IC and DoD related to commercial satellite imagery. And this is particularly problematic with the U.S. Space Force coming online and developing its service specific mission areas and focus."

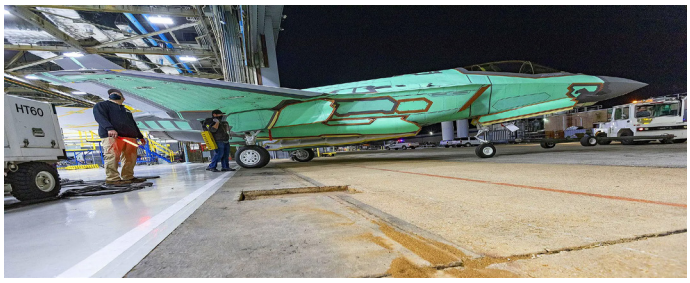
The report has four main recommendations: The IC and DoD should lay down clear roles and responsibilities for acquiring commercial satellite imagery. They should figure out how to scale emerging commercial satellite capabilities into operational support contracts in a timely manner. The third one is to set performance goals and measures towards maximizing the use of commercial satellite imagery. Finally, the IC and DoD should provide better guidance for the use of commercial analytics services that use remote sensing data.

"Our bottom line is that commercial satellite capabilities are increasingly going to be indispensable to the national security enterprise," said Mazanec. "We really believe that if DoD and the IC can develop an effective approach to incorporate and sustain emerging commercial satellite capabilities in a timely manner, the national security enterprise will be better positioned to maintain and grow its technological advantage in space."***

F-35 Deliveries Halted after Chinese Alloy Discovered in Key Component

Howard Altman | 07 September 2022

Source: The Drive | https://www.thedrive.com/the-war-zone/f-35-deliveries-halted-after-chinese-alloy-discovered-in-key-component



The UAE Space agency says Sirb will be a constellation of smallsats with X-band SAR payloads, but disclosed few other details about the constellation. Credit: UAE Space Agency

The delivery of F-35A Lightning II Joint Strike Fighter jets has been placed on hold by the Pentagon after officials learned that a component contained materials produced by the People's Republic of China.

The component, a magnet used in F-35 turbomachine pumps, "does not transmit information or harm the integrity of the aircraft and there are no performance, quality, safety, or security risks associated with this issue," Russell Goemaere, a spokesman for the F-35 Joint Program Office (JPO) said in a statement.

Neither flight operations for the F-35 in-service fleet, nor the production of the aircraft by manufacturer Lockheed Martin have been affected. However, the use of Chinese-made products in the world's most advanced combat jet raised enough concerns for the Pentagon on Aug. 31 to order deliveries of the aircraft temporarily halted for an as-yet-unknown period.

To date, the delivery pause has affected delivery of only three F-35s, Laura F. Siebert, a Lockheed Martin spokesperson, told The War

Zone. She declined to say where those jets were supposed to go.

Investigations are now underway to determine how this happened and how to avoid it from happening in the future.

"On Aug. 19, the Defense Contract Management Agency (DCMA) notified the F-35 Joint Program Office that an alloy in magnets used in F-35 turbomachine pumps is potentially in non-compliance with Defense Federal Acquisition Regulations Supplement (DFARS), as the alloy was produced in the People's Republic of China," Goemaere said. "Defense contractors voluntarily shared information with DCMA. Based on the additional information, the F-35 JPO temporarily paused the acceptance of new F-35 aircraft to ensure the F-35 program's compliance to DFARS pertaining to specialty metals."

The magnet on the F-35 Turbomachine, manufactured by Honeywell, includes cobalt and samarium alloy that was recently determined to be produced in China, according to Lockheed Martin. This alloy is magnetized in the United States.

The alloy was found in Honeywell-built turbomachine pumps that provide critical power functions to the F-35 Joint Strike Fighter.

The turbomachine is part of the Integrated Power Package (IPP) - the primary component of the power and thermal management system, Siebert said. The IPP supplies electrical power to start the engine and supplies conditioned bleed air for cooling aircraft systems.

The turbomachine integrates the functionality of an auxiliary power unit (APU) and an air cycle machine (ACM) into a single piece of equipment. When the turbomachine acts as an APU (combusted mode), it provides electrical power for ground maintenance, main engine start, and emergency power. It also provides compressed air for the thermal management system during ground maintenance.

On Sep. 2, the F-35 JPO received a formal disclosure about the DFARS non-compliance for the alloy used in the magnets, Goemaere said. "Further investigation is underway to understand the causal factors for the non-compliance and to establish corrective action."

Contractors "have found an alternative source for the alloy that will be used in future turbomachines," he said.

"We are working with our partners and DoD to ensure contractual compliance within the supply chain," Siebert, the Lockheed Martin spokesperson, said in a statement. "The magnet has no visibility or access to any sensitive program information. The F-35 remains safe for flight, and we are working with the DoD to resolve the issue as quickly as possible to resume deliveries."

Siebert said that in late August, Honeywell notified Lockheed Martin that alloy sourced from China is used in a magnet in that component.

"Honeywell was informed by their lube pump supplier for the turbomachine, that one of their suppliers has been using alloy sourced from China in their magnets. This supplier is a 3rd tier supplier to Lockheed Martin and the alloy provider is a 5th tier."

Siebert said that "through this investigation, we are doing a thorough analysis, to review places in the supply chain that could also be impacted. Our team is doing everything possible to gather the facts and work through potential courses of

action. We are working with the DoD to resolve the issue as quickly as possible, and our goal is to ensure we are compliant with all applicable laws and contractual requirements."

Honeywell "remains committed to supplying high-quality products that meet or exceed all customer contract requirements," company spokesman Adam Kress said in a statement. "We are working closely with DOD and Lockheed Martin to ensure that we continue to achieve those commitments on products Honeywell supplies for use on the F-35."

While the length of the pause is not yet known, Siebert said that Lockheed Martin remains on schedule to deliver 148 to 153 F-35s this year. The company has delivered 88 this year to date and continues to manufacture and flight test them without pause.

"Completed production aircraft will remain with Lockheed Martin until deliveries resume," Siebert said. "The F-35 is made up of 300,000 parts from more than 1,700 suppliers. All supplier parts on the F-35 are inspected at every stage of production to ensure they meet strict program standards before delivery and present no risks to the F-35 aircraft."

MQ-9B drones expected to improve Air Force's surveillance, reconnaissance capabilities.

This is the second component issue to affect F-35s in recent months.

Back in July, we reported on an ejection seat problem that grounded more than 100 F-35s, among several other airframes.

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Taiwan Inks Deal With US For 4 MQ-9B Seaguardian Drones Worth US$500 Million

Keoni Everington | 31 August 2022

Source: Taiwan News | https://www.taiwannews.com.tw/en/news/4642973

MQ-9B SeaGuardian UAV. (General Atomic Photo)

TAIPEI (Taiwan News) — Taiwan has officially signed a procurement contract with the U.S. to purchase four MQ-9B SeaGuardian unmanned aerial vehicles (UAVs) for NT$16.88 billion (US$555 million).

Democratic Progressive Party (DPP) Legislator Wang Ting-yu (王定宇) on his Facebook page at 9:37 a.m. on Wednesday (Aug. 31) announced that after intensive discussions between the two countries, the Ministry of Defense's latest procurement award announcement states that the Air Force Command Headquarters invited a military delegation from the U.S. to sign a formal procurement contract for four MQ-9B SeaGuardian UAVs at the American Institute in Taiwan.

The contract went into effect on Aug. 24 and will continue to the end of 2029, with the first drone to arrive in Taiwan in 2025. The NT$16.88 billion price tag includes four SeaGardian UAVs and ground control station-related equipment and support systems.

The location listed in the contract where the

drones will be stationed is Hualien County. The total cost for the drones will eventually come to NT$21.7 billion with the remaining costs coming from the construction of related systems in Taiwan, new buildings for ground control stations, support equipment education and training, and procurement operations.

Wang also cited Defense International magazine news editor Chen Kuo-ming (陳國銘) as saying that the Teng Yun 2 "Cloud Rider," which was developed by Taiwan's National Chung-Shan Institute of Science and Technology (NCSIST), has been upgraded by replacing its engines, adding antennas, and adding landing gear to improve flight performance. It already has long-range capabilities and in the future, further breakthroughs are needed in optical guidance, command and control, and other functions.

After being paired with the MQ-9B, the Air Force's long-term surveillance and reconnaissance capabilities in the waters surrounding Taiwan are expected to be greatly improved.

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Indian Aerospace Industry

Indian Startup Galaxeye to Develop World's First Satellite with both SAR, Optical Sensors

Manish Pant | 15 Septmeber 2022

Source: Business Today | https://www.businesstoday.in/technology/story/indian-startup-galaxeye-to-develop-worlds-first-satellite-with-both-sar-optical-sensors-347328-2022-09-15

The new multi-sensor satellite will capture both SAR and optical data from the same satellite to improve the correlation and analytical utility of the data generated. (Photo: Reuters)

The Indian Institute of Technology-Madras (IIT-M) incubated imaging satellite operator GalaxEye has inked an MoU with California-based satellite software provider Antaris to develop the world's first satellite containing both Synthetic Aperture Radar (SAR) and optical sensors. Satellite constellations deployed today capture data at different times from different locations. This often results in consumers wasting a lot of time making sense of data delivered by a multitude of satellites. The new multi-sensor satellite will capture both SAR and optical data from the same satellite to improve the correlation and analytical utility of the data generated.

The datasets delivered by the satellite will especially be of immense value to environmental, insurance and defence applications, the company said in a statement shared with Business Today.

Expected to be launched in late 2023, the datasets delivered by the satellite will especially

be of immense value to environmental, insurance and defence applications, the company said in a statement shared with Business Today.

Terming the partnership as a 'milestone' in India's commercial space sector, CEO Suyash Singh said, "We strongly believe that our combined expertise will result in a successful mission of GalaxEye's satellite, which will provide superior geospatial imagery to our customers. This is a unique start-up collaboration in the space sector in India and will be further strengthened through support from ISRO and IN-SPACe."

As part of the arrangement, the internationally certified aerospace master systems integrator, Ananth Technologies, and service provider for satellites, XDLINX Labs, will also be involved in the project.

"The Antaris software platform was specifically designed as an end-to-end solution to help dramatically simplify the design, build and management of satellites. The opportunity to join forces with our friends at Ananth Technologies, GalaxEye and XDLINX to provide a breakthrough solution for a multi-payload satellite imaging constellation is a great example of what our flexible platform was designed to do," said co-founder & CEO of Antaris, Tom Barton.

Under the terms of the agreement, Antaris will provide the software as service (SaaS) technology platform required to design, stimulate, build and manage the earth observation satellite from GalaxEye and its onboard Drishti sensor. Ananth Technologies will provide Assembly, Integration and Test (AIT) services and manufacturing capabilities. XDLINX Labs will be responsible for design of the satellite bus or the main body and supply chain integration services.

Next Batch of One Web Satellites Arrive in India for Launch

Jason Rainbow | 20 September 2022

Source: Space News | https://spacenews.com/next-batch-of-oneweb-satellites-arrive-in-india-for-launch

OneWeb satellites arrived in India via an AN-124 Antonov cargo plane operated by Ukraine-based Antonov Airlines. Credit: OneWeb

TAMPA, Fla. — OneWeb said Sept. 20 its latest batch of 36 broadband satellites has arrived in India ahead of plans to launch them next month on the country's largest rocket.

The British startup anticipates the commercial arm of Indian space agency ISRO will launch the satellites on a GSLV Mark 3 rocket in October, a OneWeb spokesperson said, "and exact details will be released in the coming weeks."

The mission would be the first dedicated commercial launch for ISRO's NewSpace India Limited (NSIL) using GSLV Mark 3.

OneWeb's satellites traveled from their production facility in Florida to the Satish Dhawan Space Centre in India via a Ukrainian Antonov cargo airplane, which until recently had generally been unavailable for transporting satellites amid Russia's war in Ukraine.

Companies were forced to use slower-moving ships to transport satellites overseas as Antonovs that had not been destroyed in the war — or owned by Russian air cargo companies subject to Western sanctions — were used by Ukraine to

support the war effort.

Ukraine-based Antonov Airlines operated the AN-124 Antonov that delivered OneWeb's spacecraft to India, the OneWeb spokesperson added.

OneWeb has been unable to expand its constellation since sanctions on Russia forced Arianespace to suspend Soyuz launches in March.

Arianespace had deployed 428 of OneWeb's planned 648 satellites before hitting the brakes on their 19-launch contract. Arianespace had planned to carry out six more Soyuz missions to complete the constellation, including a launch of spare satellites for network redundancy.

OneWeb pivoted to India and SpaceX to launch the remaining satellites it needs to provide global services, which the operator said will take place across five missions before the end of spring 2023.

One additional launch will take place this year, according to OneWeb, and three more are targeted for early next year to complete the constellation.

Arianespace said Sept. 13 it will support OneWeb's upcoming launches, including satellite dispenser services for the two missions that NewSpace India Limited is conducting.

The French company said it has reached a settlement deal that could revive its launch services agreement with OneWeb, which is plotting a second-generation constellation.

The GSLV Mark 3, which last launched in 2019, can lift about 9,000 kilograms to LEO, comparable with the Soyuz rockets that deployed 34-36 OneWeb satellites at a time.

SpaceX's Falcon 9 rocket can send about 22,800 kilograms to LEO.

OneWeb has not disclosed what SpaceX rocket it plans to use, how many satellites could launch per mission, or a specific timeframe for these missions.

OneWeb's satellites are built by a joint venture between the operator and Airbus called OneWeb Satellites.

In an interview Sept. 14 during World Satellite Business Week in Paris, Airbus Defence and Space head of space Jean-Marc Nasr said all satellites OneWeb needs to complete its constellation have been produced and are awaiting deployment.

Following sanctions, he said, OneWeb Satellites has pivoted from electric propulsion systems imported from Russia's Fakel to thrusters from U.S.-based Busek Co.

A batch of 36 OneWeb satellites that Arianespace had been preparing to launch from Kazakhstan in March was stranded in the country after the mission was scrapped.

OneWeb recently said it took a $229 million charge this year linked to these satellites and the terminated Soyuz launch contract.

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HAL-L&T Wins Rs 860 Crore Deal from NSIL to Entirely Build 5 PSLV Rockets

04 September 2022

Source: Financial Express | https://www.financialexpress.com/lifestyle/science/hal-lampt-wins-rs-860-crore-deal-from-nsil-to-entirely-build-5-pslv-rockets/2654628/

The contract is for manufacturing five PSLV rockets, the versatile workhorse launch vehicle of India, sources told PTI.

The The Hindustan Aeronautics Limited-L&T consortium has won a Rs 860 crore deal from NewSpace India Limited to build five rockets, marking industry's maiden foray into end-to-end production of Polar Satellite Launch Vehicles (PSLVs). The contract is for manufacturing five PSLV rockets, the versatile workhorse launch vehicle of India, sources told PTI.

After the techno-commercial evaluation of three bids, HAL-L&T consortium had emerged as the technically qualified and the L1 bidder to undertake end-to-end production of PSLV.

After the techno-commercial evaluation of three bids, HAL-L&T consortium had emerged as the technically qualified and the L1 bidder to undertake end-to-end production of PSLV.

"We have now signed the service level agreement with the industry for production," an official of NSIL, a central public sector enterprise under the Department of Space (DoS) and commercial arm of the Indian Space Research Organisation (ISRO), said.

"May be in less than two years, we (the 52:48 HAL-L&T consortium) will be able to deliver the first rocket from the industry consortium, fully built by the industry, with appropriate hand-holding from ISRO," the official said.

According to the official, about 80 per cent of mechanical systems and 60 per cent of electronic systems of PSLV, the third generation launch vehicle of India, at present come from the industry. However, the remaining percentages in both the areas are highly complex.

The consortium will now be responsible for producing, assembling and integrating the launcher by making use of the existing ISRO facilities under GOCO (Government Owned, Contractor Operated) model. Sources said the NSIL also has plans to realise an entirely-built GSLV-Mk III rocket from Indian industry partners.

In June this year, the Union Cabinet approved the transfer of 10 in-orbit communication satellites from Government of India to NSIL. The government had also approved increasing the authorised share capital of NSIL from Rs 1,000 crore to Rs 7,500 crore.

The space sector reforms mandated NSIL to undertake end-to-end commercial space activities and function as a full-fledged satellite operator, according to DoS officials. In 2020-21, NSIL achieved a revenue from operations of Rs 432.67 crore and a profit after tax of 121.84 crore.

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DRDO Targets 2027 to Complete Development and Flight Testing of LCA-Mk2

Dinakar Peri | 03 September 2022

Source: The Hindu | https://www.thehindu.com/news/national/defence-research-and-development-organisation-targets-2027-to-complete-development-and-flight-testing-of-lca-mk2/article65845106.ece

Representational image of India Air Force's Light Combat Aircraft Tejas | Photo Credit: K. Murali Kumar

With the Cabinet Committee on Security (CCS) sanctioning the development of Light Combat Aircraft (LCA)-Mk2, a bigger and more capable fighter than the present one, the Defence Research and Development Organisation (DRDO) is setting a target of 2027 to complete the flight testing, according to Defence officials.

"The CCS sanctioned the project early this week at a total development cost of ₹9000 crore including the ₹2500 crore that has already been spent. The roll out of LCA-Mk2 is planned by 2024 and the target is to complete flight testing by 2027," one official said. Indian Air Force (IAF) has given commitment to procure six squadrons of LCA-MK2, another official said.

The proposal on the indigenous fifth generation fighter, the Advanced Medium Combat Aircraft (AMCA), is currently with the CCS and the approval is expected very soon, officials stated.

The LCA-Mk2 will be a heavier and much more capable aircraft than the current LCA variants and the LCA-Mk1A that is scheduled to be delivered to the IAF by early 2024, 83 of which have been contracted under a ₹48,000 crore deal with Hindustan Aeronautics Limited (HAL). As per schedule, HAL is expected to deliver first three Mk1A aircraft in 2024 and 16 aircraft per year for subsequent five years.

Enhanced Range and Endurance

The Mk2 features enhanced range and endurance, including an Onboard Oxygen Generation System, which is being integrated for the first time, and the ability to carry heavy stand-off weapons of the class of Scalp, Crystal Maze and Spice-2000. The Mk2 is 1350 mm longer, featuring canards and can carry a payload of 6,500 kg compared with the 3,500 kg the LCA can carry.

The Mk2 will be powered by the General Electric GE-414 engine, which will also power the AMCA. A GE-414 produces 98kN thrust compared to 84kN thrust of the GE-404 engine powers the LCA Mk1 and MK1A.

The Indian Air Force (IAF) has one squadron of LCA in Initial Operational Clearance (IOC) and one squadron in the Final Operational Clearance (FOC) configuration. Induction of all IOC standard aircraft is complete, while induction of FOC standard is nearing completion. Manufacturing of the LCA trainer is also underway with deliveries expected to begin this year.

The IAF had earlier placed orders for 20 IOC standard aircraft and 20 FOC standard aircraft, including eight twin seater trainers. Till date, 31 LCA — IOC and FOC combined — have been produced and 26 have been delivered, and few

aircraft in the process of being delivered to the customer, HAL sources said.

HAL has already set-up a second assembly line to ramp up production from eight aircraft per year to 16 aircraft per year. The order for 83 Mk-1A is expected to be completed by 2028-29.

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India Looks To Sell LCA Tejas To 'NAM Ally' Egypt; Expand Military Ties & Compliment QUAD & I2U2 Grouping

Prakash Nanda | 21 September 2022

Source: Eurasian Time | https://eurasiantimes.com/india-looks-to-sell-lca-tejas-to-nam-ally-egypt/

The Indian Air Force Tejas performs at the opening ceremony of the Singapore Air Show on February 15, 2022.

The just concluded visit of Indian Defence Minister Rajnath Singh to Egypt (September 18-20) reflects that India is now prepared to join innovative coalitions to deal with major transnational security issues amid major geopolitical shifts resulting from the rise of China and the Russian invasion of Ukraine.

Already a key member of the Quad and the Israel-India-United Arab Emirates-United States "I2U2" (India – Israel; United States – United Arab Emirates) grouping, it seems New Delhi will now join hands with a willing Cairo to serve as a geostrategic corridor that connects the Mediterranean to the Indo-Pacific.

With this in mind, India and Egypt now want to boost their defense cooperation.

The Memorandum of Understanding (MoU) that Singh signed with his Egyptian counterpart General Mohamed Zaki on September 20 at Cairo talks of enhanced defense cooperation between the two countries, the conduct of more joint exercises, and exchange of personnel for training, especially in the field of counter-insurgency.

It also favors the identification of proposals for expanding cooperation between the defense industries of India and Egypt in a time-bound manner.

In fact, Egyptian President Abdel Fattah El-Sisi, whom the Indian defense minister had called on, wants New Delhi and Cairo to contribute together towards " peace and stability" in the world in general and "maritime security" in particular.

According to Presidential spokesman Bassam Radi, during Singh's meeting with President El-Sisi, discussions focused on finding ways to enhance military and security cooperation between the two countries, especially with regard to cooperation in joint manufacturing, transfer, and localization of technology, with the aim of exploiting the capabilities and infrastructure available in the two countries, as well as cooperation in the field of training, rehabilitation and joint exercises.

Egypt could buy Indian Weapons

It may be noted here that India is exploring to sell its military products in Egypt. Apparently,

Egypt is considering the purchase of up to 70 Tejas light combat aircraft.

It would also like to consider buying Indian-made missile systems, as well as the Advanced Light Helicopter and Light Combat Helicopter.

On its part, India, concerned over the availability of the spare parts of Russian equipment that it has, is now relying on Cairo to provide these as Egypt also has robust defense ties with Russia and uses Russian military products.

Defense cooperation has been perhaps the most important component in the burgeoning of ties between India and Egypt of late. In July, Egyptian Air Force Chief Mahmoud Foaad Abd El-Gawad was in the Indian capital "to scout for India's defense equipment."

This followed a joint major exercise between both Air Forces of both nations, which was described by the Indian defense ministry as "a unique exercise with Air assets in a Large Force Engagement environment, simulating various conflict scenarios."

This exercise was aimed at enhancing defense cooperation between the two countries and the exchange of best practices.

"In the present geopolitical scenario, this exercise provides a unique opportunity to showcase the reach and capability of the IAF. It will also provide an opportunity to showcase the Su-30 MKI manufactured in India by HAL and our country's expertise for deeper indigenization of spares and components", the Indian Ministry of Defence (MoD) had stated.

In June, the Indian Navy's INS Kochi, deployed in the Red Sea, visited Port Safaga in Egypt. Personnel from both the navies also carried out ship visits. On her departure from Safaga on 30 June, INS Kochi reportedly participated in a Maritime Partnership Exercise with the Egyptian Navy ships ENS Al Zubair and ENS Abu Ubadah (Lurssen Class Offshore Patrol Boats).

Other Major Developments

Since June 2021, seven Indian defense delegations have visited Egypt, the most significant among them being the visit of the Chief of Air Staff, Air Chief Marshal VR Chaudhari, who visited Egypt from 28th November to 2nd December 2021.

Egyptian officers are given training in India, and Indian defense officers train in Egypt.

The first ever IAF-EAF Joint Tactical Air Exercise, Dessert Warrior, was held from 29-31 October 2021. 5 x Mirage-2000s and 1 tanker (IL-78) participated in the exercise from India. The exercise comprised advanced maneuverings, including air-to-air refueling.

Two officers from the Egyptian Navy participated in Multilateral Indian Naval Exercise MILAN-2022 held from 25 Feb-04 Mar 2022.

Indian Navy Ships undertake port calls at Egyptian ports. INS TABAR (a Talwar class guided missile frigate) made a port call in Alexandria port in late-June 2021 and held PASSEX with Egyptian Navy Ship TOUSHKA, which included helo deck-landing operations, replenishment drills, etc.

INS TABAR participated in another PASSEX with ENS ALEXANDRIA in September 2021 as well, in which exercises like cross-deck helicopter landings, joint live firing, maritime interdiction contingencies, vessel boarding, and other advanced maneuvers were conducted.

Ships of the First Training Squadron of Indian Navy (IN Ships Tir, Sujata, and CGS Sarathi) called on the Red Sea Naval port of Safaga, Egypt, from 2nd May to 4th May 2022 as part of their five-nation Overseas Deployment.

The three Indian ships participated in a Maritime Partnership Exercise (MPX) with Egyptian Naval Ships Abu Qir and Zuber Ibn El Awam on 4th May 2022 upon leaving Safaga harbor. During the exercise, the ships undertook communication exercises, different maneuvers along with formations and replenishment approaches to enhance interoperability.

INS TARANGINI, the Indian Navy's sailing training ship, made a port call in Alexandria from 17th to 20th May 2022 as part of LOKAYAN 22.

Egypt regularly provides transit facilities to IAF and IN aircraft ferrying to/ from Russia, Europe, and the USA.

And Egypt does participate in all the major Defence Exhibitions, and Aero shows in India. In fact, Rajnath Singh has invited his Egyptian counterpart to the India-Africa Defence Dialogue and IOR Defence Ministers' Conclave, scheduled to be held as part of the 12th DefExpo in Gandhinagar, Gujarat, between October 18-22.

As noted above, these developments are the results of the ongoing geopolitical shifts. Though India and Egypt are founding members of the so-called Non-Aligned Movement (NAM) and India's first Prime Minister Jawaharlal Nehru and Egypt's President Gamal Abdul Nasser were great friends, their bilateral relations remained stagnated because of Cairo trying to cultivate Pakistan and making it a factor while dealing with India.

Besides, Egypt opting for the US-brokered peace agreement with Israel at a time when New Delhi was circumspect in embracing Tel Aviv fully under the fears that it would strain ties with the Arab sheikhdoms and antagonize a large section of Indian Muslims at home was also a constraining factor.

But now the situation is different. Israel is no longer the inhibiting factor for India. On the contrary, India is having perhaps the best ever relations with Saudi Arabia, the United Arab Emirates, and other Middle Eastern countries. Side by side, Indo-Israeli ties have blossomed too.

And what is more important, the USA-brokered Abrahmic accords between Israel & the UAE and Israel & Bahrain, with Saudi Arabia supporting from behind and India's fascinatingly growing ties with each of these countries, have resulted in a situation in which Egyptian scholar Mohammad Soliman terms as "Indo-Abrahamic transregional order."

He argues that Egypt can now join this group of countries so that the Indo-Pacific could be connected with the eastern Mediterranean.

In fact, Soliman joins Indian scholar C Raja Mohan and French diplomat Pierre Morcos in arguing that France, which is an Indo-Pacific power itself and has great ties with "I2U2" countries as well as Egypt, could add an important new element to this web of overlapping coalitions.

These experts argue that innovative coalitions are emerging to tackle transnational issues, as recently illustrated with the Quad and the "I2U2" grouping.

Cooperation among France, Egypt, and India could add an important new element to this web of overlapping coalitions and ensure a transoceanic

approach that would cover the Mediterranean Sea and the Indo-Pacific.

Reasoning ss Based on Two Main Points

First, a trilateral arrangement among France, Egypt, and India would be part of a larger network of middle-power coalitions across the Indo-Pacific.

These mini formats have proliferated in recent years to overcome the limitations of traditional multilateralism. Compared to large organizations that are often paralyzed by consensus rules and internal divisions, these groupings are flexible and pragmatic enough to ensure quick, tangible results.

Secondly, they should cooperate on securing and even building undersea cables. These critical infrastructure elements carry over 95 percent of international data. Multiple undersea cables pass through the Suez Canal, linking Europe, Africa, the Middle East, and Asia-Pacific.

Given the mounting importance of this infrastructure, France, Cairo, and New Delhi should aim to better protect existing cables and also explore potential new cables to meet the growing bandwidth demand, so runs the argument.

All told, Suez is a major strategic chokepoint for Europe-Asia trade flows, with 12 percent of global trade and 30 percent of global container traffic crossing the canal that runs through Egypt.

Regarding India, it is estimated that an estimated $200 billion of Indian trade passes through the Suez Canal each year, giving India an obvious interest in Egypt's security. All the more so when China has set up a naval base in Djibouti, posing a potential threat to Indian access to Suez.

In other words, there are compelling reasons for enhanced India-Egypt security cooperation, particularly when there exist strong bonds between the defense establishments of both countries.

Defense Minister Rajnath Singh's visit seems to have further consolidated this trend.

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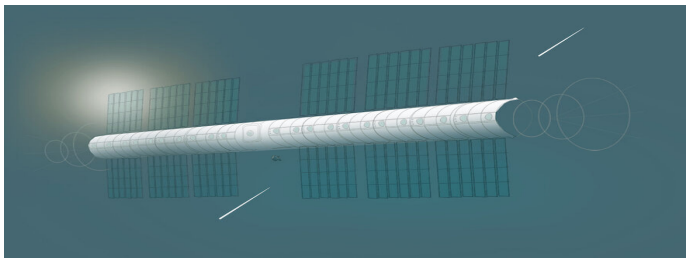
Technology Development

Vast Space to Develop Artificial-Gravity Space Station

Debra Werner | 15 September 2022

Source: Space News | https://spacenews.com/vast-space-intro/



Vast is focused on creating large spinning structure that create a gravity-like pull. Credit: Vast Space artist's concept

PARIS – Vast Space, a Southern California startup founded by cryptocurrency billionaire Jed McCaleb, plans to establish an artificial-gravity space station in low Earth orbit.

McCaleb envisions a future where millions of people are living throughout the solar system. Since other companies are helping to reduce launch costs, McCaleb thinks the next important step will be creating large structures where people can live and work in space.

"Earth has finite resources, but out in the solar system, there is an enormous untapped wealth, both in terms of energy and matter, that could support many 'Earths,'" McCaleb told SpaceNews by email. "Likewise, mankind needs a frontier. Every prosperous civilization has had one to push

off into – nevertheless, we haven't had one for some time. Without a frontier, the world becomes a zero-sum game, which is detrimental to the psyche of a civilization. And in terms of the long-term future of humanity, we will need to live off of the Earth eventually."

McCaleb, whose wealth Forbes pegs at $2.5 billion, initially plans to self-finance Vast's work.

"I've done many software startups and had great success in the crypto world, which gave me enough resources to attempt something ambitious in space," McCaleb said. "Eventually, we hope to have some form of revenue generation. I'd like Vast to have a usable station in space by that time."

Over the long term, Vast is likely to seek outside investment. In the near term, though, the company will "focus on the mission and not become beholden to investors," McCaleb said. "And at some point, we would like to get customers, like NASA or other national programs."

Vast's greatest near-term challenge is "building a world-class engineering team that can attack any problem," McCaleb said. "Vast will live or die on the quality of its engineering team."

Currently, the company has about 20 employees, including Kyle Dedmon, former SpaceX vice president for construction and facilities; Tom Hayford, a systems engineer who has worked for Relativity Space and SpaceX; Molly McCormick, a former SpaceX human factors engineer and Honeybee Robotics program manager; and Colin Smith, a former SpaceX propulsion engineer. In addition, former SpaceX vice president Hans Koenigsmann is advising the company.

Like other billionaires investing in ambitious space ventures, McCaleb has a longstanding passion for space.

Years ago, McCaleb jokingly told friends," 'If I ever have a ton of money, I'm going to mine asteroids." After founding three successful cryptocurrency firms, McCaleb is focused on solving problems standing in the way of moving people further into the solar system.

Because the longterm health impacts of microgravity can be serious, Vast is focused on creating a large spinning structure that creates a gravity-like pull.

"Vast's innovations will serve the role of a research platform, which is what the ISS did historically," McCaleb said. "But we also want to be a machine shop where national and private sector astronauts can iterate and prototype things in orbit. Ultimately, our contributions will enable something akin to a way station for human habitation that orbits the moon – maybe even Mars."

McCaleb acknowledged the inherent challenges in creating spinning structures, like managing and controlling momentum. In addition, "docking to a spinning module" and communications will be complicated, he said.

Vast faces additional challenges related to transportation and testing.

"The things we are building aren't road-shippable, so we need access to a seaport or airport for shipping," McCaleb said. "Likewise, it's challenging to test our modules without doing it in space – when testing on Earth, we have to contend with Earth's gravity."

Still, McCaleb remains committed to creating an artificial-gravity station.

"We still crave new frontiers, with many of us spending our lives anticipating the time when space will be unlocked for us," McCaleb said in a statement. "By pushing our frontiers and expanding our habitat into the vastness of space, we may actually preserve Earth for thousands of years and generations to come."

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ISRO Successfully Tests IAD Technology to Land Missions on Mars, Venus

Ayush Devak | 04 September 2022

Source: Brahmastra Space | https://www.brahmastraspace.org/post/isro-successfully-tests-iad-technology-to-land-missions-on-mars-venus

The Indian Air Force Tejas performs at the opening ceremony of the Singapore Air Show on February 15, 2022.

he Indian Space Research Organisation (Isro) has successfully tested the Inflatable Aerodynamic Decelerator (IAD) that will be used for landing payloads on Mars or Venus in the future. The IAD is being developed for aerodynamically decelerating an object descending through the atmosphere.

The technology was folded and kept inside the payload bay of a sounding rocket that was launched from TERLS Thumba. The rocket took the IAD to an altitude of 84 kilometers where it was inflated and descended through the atmosphere with the payload part of the sounding rocket.

Isro said that the main objective of this mission was to demonstrate IAD technology for application in spent stage recovery and planetary entry.

In a brief, Isro revealed that the IAD is kept stowed in the nosecone of the single-stage Rohini-300 (RH300MKII) Sounding Rocket. "At 100 seconds after take-off, the nosecone is separated, followed by the inflation of IAD at 110 s, using compressed Nitrogen stored in a gas bottle. The payload is separated from the motor at 200 seconds after take-off, by using an FLSC separation system," Isro said.

During the test, the IAD systematically reduced the velocity of the payload through aerodynamic drag and followed the predicted trajectory. This is the first time that an IAD is designed specifically for spent stage recovery. "All the objectives of the mission were successfully demonstrated," Isro said.

"This demonstration opens a gateway for cost-effective spent stage recovery using the Inflatable Aerodynamics Decelerator technology and this IAD technology can also be used in ISRO's future missions to Venus and Mars," Isro chief S Somanath, said in a statement.

The IAD is made out of Kevlar fabric, coated with Polychloroprene. Since it is made of fabric, IAD can be packed into a small volume of 15 liters, available in the nosecone of the RH300.

Saturday's mission was a test bed for nine new elements developed in the Vikram Sarabhai Space Centre & LPSC, which includes the following:

- Inflatable Aerodynamic Decelerator & Inflation system
- Micro Video Imaging System

- Software Defined Radio Telemetry-Dual Transmitter (SDRT-DTx)
- Acoustics Processing Unit with mini-IMAS (Indigenous MEMS Acoustic Sensors
- New software for wind compensation for TERLS
- Modified nosecone separation system
- Modified FLSC separation system for RH300
- Improved 1s delay detonator for spin rocket separation
- Thermally conducting and electrically insulatingpottingcompoundATCAP-75-7030

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Commentary

1. TAPAS/Rustom-II: India's High-End Miltary Drone - https://airpowerasia.com/2022/09/20/tapas-rustom-ii-indias-high-end-miltary-drone/

Further Reading

1. Air Force Generals Aren't "Losing Sleep" Over China's J-20 Stealth Fighter - https://www.thedrive.com/the-war-zone/air-force-generals-arent-losing-sleep-over-chinas-j-20-stealth-fighter
2. Should Greenland and Denmark Become Part of NORAD? - https://www.rand.org/blog/2022/09/should-greenland-and-denmark-become-part-of-norad.html
3. Will India get a unified military command under the PMO? - https://www.nationalheraldindia.com/opinion/will-india-get-a-unified-military-command-under-the-pmo
4. Russia's Use of Iranian Kamikaze Drones Creates New Dangers for Ukrainian Troops - https://www.wsj.com/articles/russias-use-of-iranian-kamikaze-drones-creates-new-dangers-for-ukrainian-troops-11663415140
5. Lockheed investing $100M into F-35 controlled combat drones under 'Project Carrera' - https://breakingdefense.com/2022/09/lockheed-investing-100m-into-f-35-controlled-combat-drones-under-project-carrera/

6. China's New Hypersonic Drone Can Be Used To Conduct Suicide Attacks On US F-22, F-35 Stealth Fighters – Military Experts - https://eurasiantimes.com/chinas-new-hypersonic-drone-can-be-used-to-conduct-suicide-attacks/
7. North Korea fires suspected ballistic missile into sea - https://www.bbc.com/news/world-asia-63023889
8. Satellite Radar Start-ups Spar Over Commercial Market Importance - https://spacenews.com/satellite-radar-startups-spar-over-commercial-market-importance/
9. 'Blown out of the sky': Ukraine takes down Iranian-made 'suicide drones' in blow to Russia - https://www.express.co.uk/news/world/1673206/ukraine-takes-down-four-iranian-suicide-drones-two-missiles-russia
10. Ukraine 'Starts Decimating' Iranian Drones; 5 Suicide UAVs Including 'Most Advanced' Mohajer-6 Shot Down – Kiev - https://eurasiantimes.com/ukraine-makes-a-merry-of-iranian-drones-5-suicide-uavs/

"The term 'Aerospace' was introduced in 1958 by the USAF Chief of Staff, General Thomas D White, as a new construct that depicted air and space as a seamless continuum stretching from the Earth's surface to infinity."

The Centre for Air Power Studies (CAPS) is an independent, non-profit think tank that undertakes and promotes policy-related research, study and discussion on defence and military issues, trends and developments in air power and space for civil and military purposes, as also related issues of national security. The Centre is headed by Air Marshal Anil Chopra, PVSM AVSM VM VSM (Retd).

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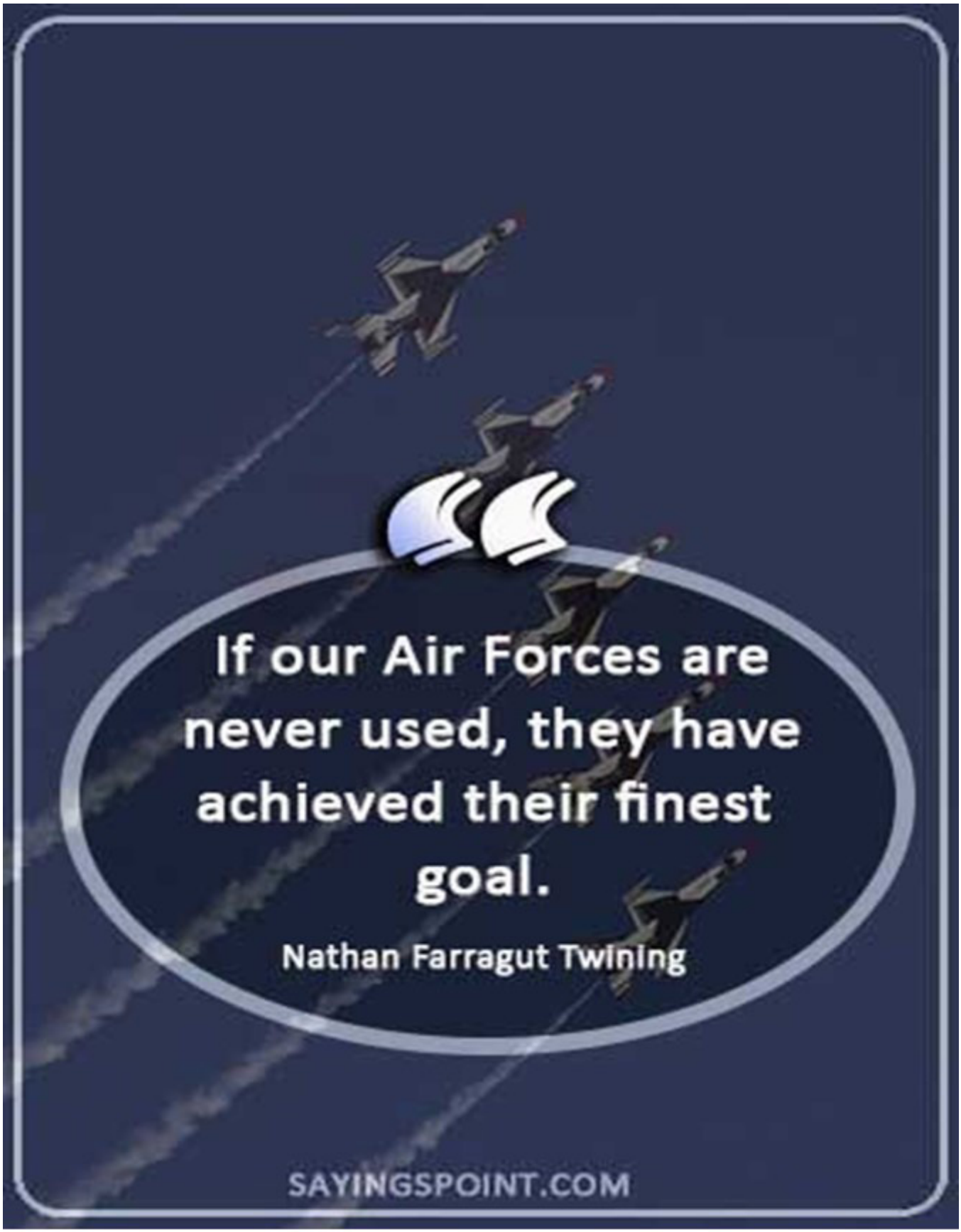
If our Air Forces are never used, they have achieved their finest goal.
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