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> *Air forces can be switched from one objective to another. They are not committed to any one course of action as an army is, by its bulk, complexity, and relatively low mobility. While their action should be concentrated, it can be quickly concentrated afresh against other objectives, not only in a different place, but of a different kind..*
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> *- B.H. Liddell Hart (Thoughts on War, 157)*

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Opinions and Analysis

China Air Force's Behaviour with 3 Countries has a Pattern. India's Air Assets Must Catch Up

Manvendra Singh | 28 July 2022

Source: The Print | https://theprint.in/opinion/china-air-forces-behaviour-with-3-countries-has-a-pattern-indias-air-assets-must-catch-up/1058338/

File photo of Israeli Air Force's F-35 'Adir' fighter jets | Twitter | @IAFsite

India's on-ground problems with China in Ladakh are now extending to the skies above it—Beijing's sending its aircraft is violating the no-fly-zone agreement. These provocations compel India to deploy the next squadron of the 'Growler' S-400 Triumf air defence system on the Ladakh side of the Line of Actual Control. The first of five squadrons have already been slated for deployment in a dual role against China and Pakistan. The theatre-level air defence system can neutralise multiple aerial targets ranging from 40 to 400kms. But China also has similar systems.

India is not the only country confronting aggressive Chinese aerial manoeuvres, but the only difference is the nature of belligerence demonstrated. Taiwan remains the primary military concern for Beijing and is also most frequently on the receiving end of Chinese aerial attention. The repeated nature and scale of incursions are enormous for the small island nation. All air forces know that any threat of intrusion by another country has to be countered, which means it has to send its aircraft and pilots up in the skies countless times and at ungodly hours.

In the long run, the stress on manpower and machinery is enormous. The only option is to have a regulated turnover of assets to assume aerial patrolling duties. But that requires a greater number of air assets for self and allies. In the case of Taiwan, it is covered by an agreement with the United States that has remained a thorn for Beijing. US allies thus operate over areas China claims as its own. As a result of this, they have also been on the receiving end of some rather aggressive buzzing by Chinese Air Force aircraft.

In one of the more bizarre aerial encounters between two belligerent aircraft, an Australian P-8 maritime reconnaissance aircraft was tailed by a Chinese J-16 combat plane. The J-16, essentially a 'plagiarised version' of Russia's Su-27, then proceeded to release chaff or flares into the flight path of the P-8, resulting in engine ingestion. Even Cold War era close encounters didn't produce manoeuvres like this event over the South China Sea. A Canadian CP-140 Aurora patrol aircraft had a hostile interaction with another Chinese J-16 while a United States C-130 aircraft encountered a confrontational Chinese Su-30.

China's Confrontational Pattern

All the aerial encounters involving Chinese aircraft point to a pattern that is emerging in East Asia, where Beijing finds itself confronting an alliance of western and Asian countries. But in the high Himalayas over Ladakh, India doesn't have an ally to share combat air patrol duties, and it also has a declining number of assets that it can deploy to counter the Chinese threats. In

the six years since India announced the purchase of 36 Rafale aircraft with much fanfare, the gap vis-à-vis Chinese air assets in this sector has only increased exponentially. And is growing.

While India has the advantage of deploying combat aircraft from airfields that are lower in altitude, thus allowing greater take-off weight, the sheer difference in the number of air assets is almost three to one. The Chinese military philosophy of mass over class continues to hold sway even as it improves the technology in its arsenal. So it may field a fifth-generation stealth-capable J-20 or J-31, but it will still have almost 600 fourth-generation fighters of similar capabilities as Rafale. This philosophy was the overriding concept in the vintage version of combat in 1962, and it seems to prevail even now in 2022.

The slow cycle of Indian decision-making, as well as the slower production capabilities within the country, create conditions in which the Air Force is now staring at a total combat capable strength of 30 squadrons as against a sanctioned figure of 42. This is obviously wholly inadequate for the overall defence of India, notwithstanding the deployment of Growlers in the front and backyard. Ultimately, just as the principle of 'boots on the ground' prevails when it comes to ensuring domination, the same applies in the skies—as pilots scan and protect the horizons, which means they have to be in the air, constantly.

A round-the-clock capability can only come about with adequate numbers, and no amount of high technology, or still higher tech arguments, compensate for the sheer genius and guts of the human mind. In operational areas such as the high Himalayas, there are moments of split-second decisions that can only be made by a situationally aware mind. Depending on other platforms is inviting a disaster. Such a capability can only come about when there is an adequate number of squadrons to cater for all eventualities, including rest and training, which will only happen when there are adequate wings in the skies.

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Air Power

Indian Air Force Team Concludes Tactical Leadership Programme in Egypt

23 July 2022

Source: The Print | https://theprint.in/world/indian-air-force-team-concludes-tactical-leadership-programme-in-egypt/1051906/

Indian Air Force team concludes Tactical Leadership Programme in Egypt

Cairo [Egypt], July 23 (ANI): Bolstering the defense cooperation, the Indian Air Force contingent deployed to Egypt has successfully completed the Tactical Leadership Programme (TLP) where the participants from both nations shared their knowledge of operational tactics.

Sharing photos of the TLP from Egypt, the Indian Air Force in a tweet wrote, "The IAF contingent deployed to Egypt has successfully completed the Tactical Leadership Programme (TLP). The unique programme saw the participants from both nations sharing their knowledge of operational tactics and best practices."

A team of the Indian Air Force arrived in Egypt

on June 22 to participate in a bilateral 'Tactical Leadership Programme' with the Egyptian Air Force.

Taking to Twitter, the Indian Air Force had said that the aim of the exercise is to understand and assimilate the best practices.

"A team of IAF Air Warriors landed in Egypt on 22 Jun 2022 to participate in a bilateral Tactical Leadership Programme with Egyptian Air Force. Participating with the Su-30 MkI aircraft, the aim of the exercise is to understand and assimilate the best practices," Indian Air Force tweeted.

Earlier in November, last year, Chief of Air Staff Chief Marshal VR Chaudhari went to Egypt for his five-day visit to attend the Air Power Symposium and Defence Exposition (EDEX) in Cairo.

This event was scheduled from November 28 to December 2.

The year 2022 is of particular significance since it marks the 75th anniversary of diplomatic relations between India and Egypt.

Egypt and India also enjoy cordial defense relations. There was close cooperation between the Air Forces, with efforts at jointly developing a fighter aircraft in the 1960s. IAF pilots had also trained Egyptian pilots from the 1960s until 1984. In the recent past, since 2015, there have been several high-level exchanges of visits by defense delegations.

On Saturday, Egypt is also celebrating its National Day. Marking the occasion, the Indian External Affairs Minister S Jaishankar congratulated the people of Egypt on their National Day and exuded confidence in the "long-standing partnership" between the nations.

In a Tweet, Jaishankar wrote, "Greetings and best wishes to Foreign Minister Sameh Shoukry and the Government and people of Egypt on their National Day. Our long-standing partnership continues to grow."

India and Egypt, two of the world's oldest civilizations, have enjoyed a history of close contact from ancient times. Both countries share a close political understanding based on a long history of contact and cooperation in bilateral, regional, and global issues. (ANI)

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MQ-9 Makes its Debut at RIMPAC SINKEX 2022

20 July 2022

Source: American Navy | https://www.navy.mil/Press-Office/News-Stories/Article/3098742/mq-9-makes-its-debut-at-rimpac-sinkex-2022/fs/e/s/mq-9-makes-its-debut-at-rimpac-sinkex-2022/

Participating in the SINKEX provided an opportunity for units from Australia, Canada, Malaysia and the U.S. to test weapons and systems in a simulated environment, working against opposing forces and eventually culminating in the explosion of a decommissioned naval vessel and marked a significant development in maritime warfighting capability.

The first-ever use of a U.S. Air Force MQ-9A Reaper, a remotely piloted aircraft, during a Rim of the Pacific (RIMPAC) 2022 sinking exercise (SINKEX).

The presence of the MQ-9A's at the world's largest international maritime exercise provides an opportunity for combined and joint-force collaboration.

"They need us and we need them," said

U.S. Air National Guard Capt. Phillip West, the RIMPAC MQ-9 maritime force integration lead. "That's where RIMPAC comes into play."

He said the Air Force and the Navy speak different languages, each using their own distinct jargon. Working together on exercises like RIMPAC and the SINKEX promotes smooth communication between the branches. This ensures sharpened combat readiness, increased strategic impact, and strengthened deterrence efforts by providing tactical proficiency to MQ-9A aircrews.

"Participation in the RIMPAC exercise is helping us evolve," said Col. Steven Beattie, 49th Operations Group commander. "We're developing maritime and Pacific (area of responsibility) expertise for our aircrew, maintenance, and support personnel."

With the MQ-9 flying over the ocean as opposed to routine training in remote land locations, the main objective for the SINKEX was the gathering of practical data about operating in a maritime environment as opposed to a desert environment.

"The data that we have in a simulator feeds off of real-world engagements like SINKEX," West said. "With what's called the new Smart Sensor, they're trying to build a database of what ships look like. They need us to actually do it so that they can build a database, and then they can fit it into a simulator so we can practice it and have more efficient training."

The SINKEX is one of the many unique training opportunities RIMPAC provides to the U.S. military, its allies, and partner nations. With it, we can foster and sustain cooperative relationships that are critical to ensuring the safety of sea lanes and security on the world's interconnected oceans.

This year is historic not only because of the MQ-9A but because it marks a return to a full-scale exercise not seen since before the COVID-19 pandemic. The 2020 iteration of RIMPAC was reduced in scale to be conducted with less face-to-face contact. The return to a full-scale exercise demonstrates capable, adaptive partners working together to increase the interoperability, resiliency, and agility needed by the joint and combined force.

Twenty-six nations, 38 ships, four submarines, more than 170 aircraft and 25,000 personnel are participating in RIMPAC from June 29 to Aug. 4 in and around the Hawaiian Islands and Southern California. The world's largest international maritime exercise, RIMPAC provides a unique training opportunity while fostering and sustaining cooperative relationships among participants critical to ensuring the safety of sea lanes and security on the world's oceans. RIMPAC 2022 is the 28th exercise in the series that began in 1971.

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India to Deploy 2nd S-400 Squadron at China Front as PLA Jets Buzz Near LAC

Rajat Pandit | 25 July 2022

Source: The Times of India | https://timesofindia.indiatimes.com/india/india-to-deploy-2nd-s-400-squadron-at-china-front-as-pla-jets-buzz-near-lac/articleshow/93096672.cms

NEW DELHI: India's capability to detect and destroy hostilefighters, strategic bombers, missiles and drones at longranges will get another major boost when a new squadronof the S-400 Triumf surface-to-air missile systems becomesoperational along the northern borders with China in thenext two to three months.

Sources say deliveries of the second operational S-400squadron through ships and aircraft are now underway from, the first since the Russia-Ukraine war erupted onFebruary 24.

The new S-400 deliveries come at a time when China hascranked up its air activity across eastern Ladakh, withChinese fighters often flying close to the Line of ActualControl (LAC) in violation of the 10-km no-fly zoneconfidence building measure between the two sides.

The first S-400 squadron, which was delivered throughthousands of containers last December, is already deployedin northwest India to cater for aerial threats from bothPakistan and China.

The IAF also got simulators and other equipment for a 'S-400 training squadron' in April-May this year. The secondoperational S-400 squadron, in turn, will be positioned for airdefence specifically on the China front.

"Chinese fighter deployments and sorties have gone upalong the 3,488-km LAC since mid-June, especially acrossLadakh but also in other sectors like Arunachal Pradesh. There are often two-three Chinese fighter sorties near the LAC in a day," a source said.

A Chinese jet had even flown over Indian troop positions at a friction point in eastern Ladakh on June 28, which led IAF to scramble its own jets and later raise the matter with China, amidst the over two-year-long military confrontation, as was reported by TOI.

China has systematically upgraded all its major air bases facing India like Hotan, Kashgar, Gargunsa and Shigatse, with extended runways, hardened shelters and fuel storage facilities for additional fighters, bombers and reconnaissance aircraft, over the last two years. It has also deployed two Russian-origin S-400 batteries and several other anti-aircraft systems to tackle any air strikes by India.

Apart from matching the military deployments, India till now has also managed to stave off sanctions under the US law called CAATSA (Countering America's Adversaries through Sanctions Act), which seeks to prevent countries from buying Russian weapons.

India has scrapped a long-pending deal for 48 additional Mi-17 V5 medium-lift helicopters as well as "deferred" the acquisition of 21 more MiG-29 and 12 Sukhoi-30MKI fighters from Russia. But India has told the US that the S-400 systems, the acquisition process for which began before CAATSA was enacted in 2017, are an

"urgent national security requirement" to counter its hostile neighbours.

The US, incidentally, had earlier slapped sanctions on China and Turkey for inducting S-400 systems. IAF is slated to get all the five operational squadrons of the highly-automated S-400 systems, contracted under the $5.43 billion (Rs 40,000 crore) contract with Russia in October 2018, by end-2023. Each squadron has two missile batteries with 128 missiles each, with interception ranges with interception ranges of 120, 200, 250 and 380-km, as well as long-range acquisition and engagement radars and all-terrain transporter-erector vehicles.

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House Authorizes Training for Ukrainian Pilots to Use US aircraft

Bryant Harris | 16 July 2022

Source: Defense News | https://www.defensenews.com/congress/2022/07/15/house-authorizes-training-for-ukrainian-pilots-to-use-us-aircraft/

A Ukrainian Sukhoi Su-27 Flanker flies over the flightline during the opening ceremony of exercise Clear Sky 18 at Starokostiantyniv Air Base, Ukraine, Oct. 8, 2018. Clear Sky 18 promotes regional stability and security, while strengthening partner capabilities and fostering trust. (Airman 1st Class Christopher S. Sparks/U.S. Air Force photo)

WASHINGTON — The House approved $100 million in funding to train Ukrainian pilots to use U.S. aircraft as part of the National Defense Authorization Act it passed 329-101 this week.

Ukrainian President Volodymyr Zelenskyy has asked since March for American-made F-15 and F-16 fighter jets. But Ukrainian pilots accustomed to aging Soviet-era MiG-29s and Sukhoi planes have not been trained to use U.S. fighter jets, a process that could take months.

Rep. Adam Kinzinger, R-Ill., told Defense News he has been in touch with the Kyiv on the matter and that he added the $100 million for training as an amendment to the defense authorization bill this week in order to facilitate an eventual shift of Ukraine's military hardware away from Soviet-era technology.

"What we want to do is obviously send a message to authorize the process," Kinzinger told Defense News. "There is no doubt to me that when this war ends, Ukraine is going to have to be outfitted with western military equipment. Plus, there's just no more MiGs left and no more MiG supplies."

The Biden administration has thus far not transferred the requested U.S. aircraft as part of the billions of dollars in military aid for Ukraine, generating tension with a vocal contingent of lawmakers on Capitol Hill.

The United States also declined to facilitate the transfer of Poland's MiG-29s from Ramstein Air Base in Germany earlier this year after Warsaw made the announcement without consulting Washington.

The Biden administration has remained wary of allowing sensitive U.S. technology to fall into Russian hands on the battlefield and has worried about Moscow's response should Ukrainian forces use high-end American equipment to attack Russian territory. But Kinzinger said the Ukrainians can be trusted with the equipment.

"They've been clear — and they've shown this with the weapons they have — they're not trying to start a war with Russia inside of Russia," said Kinzinger. "They just want to defend their homeland."

He noted the United States is ready to start training Ukrainian pilots at Columbus Air Force Base, Mississippi and possibly in Texas as well. It would take about three months to train the pilots to fly the F-15s and F-16s at a basic level.

The Senate is not expected to vote on its version of the defense authorization bill until September at the earliest, then both chambers must agree on compromise legislation in conference committee. Should Kinzinger's amendment survive conference, the United States could be training Ukrainian pilots here as soon as next year.

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US Air Force Weighing Future of Key Hypersonic Program After Two Successful Tests

Stephen Losey | 17 July 2022

Source: Defense News | https://www.defensenews.com/air/2022/07/17/air-force-still-weighing-future-of-key-hypersonic-program/

A B-52H Stratofortress assigned to the 419th Flight Test Squadron is prepared to conduct flight test of the hypersonic AGM-183A Air-launched Rapid Response Weapon at Edwards Air Force Base, California, Aug. 8, 2020. (Giancarlo Casem/Air Force)

RAF FAIRFORD, England — The Air Force is encouraged by successful back-to-back tests of a key hypersonic weapons program, but hasn't yet decided how to proceed once it moves beyond the middle tier acquisition phase, its top acquisition official said July 16.

At a roundtable with reporters at the Royal International Air Tattoo here, Andrew Hunter said the Air Force is still trying to answer a key question as it develops hypersonic capabilities: What is the mix of weapons it needs for the threats the U.S. faces, particularly China, and how might a hypersonic such as the AGM-183A Air-launched Rapid Response Weapon, or ARRW, fit in?

"Obviously, you wouldn't buy something that doesn't work," Hunter said. "But even if it does work, it's got to be the right contribution to the overall weapons mix and the highest priority targets. That's what's driving [Air Force] decision making."

Last week, the Air Force's second successful test flight in a row of ARRW ended the program's booster test phase and moved it into its next phase of all-up-round testing. That will begin later this year.

Hunter said the Air Force is considering what it will do after ARRW finishes the middle tier acquisition phase — but that it has shown much promise. The Defense Department uses the middle tier acquisition approach to quickly produce prototypes that demonstrate a capability works.

ARRW is already at a "significantly higher level of maturity" than previous hypersonic programs at the Defense Advanced Research Projects Agency, Hunter said.

And when the prototyping work on ARRW is done, he added, he wants the Air Force to be ready to move into production of a usable hypersonic weapon.

Hypersonic weapons can reach speeds of greater than Mach 5 and maneuver midflight, making them capable of penetrating enemy defenses and hard to track and shoot down. China and Russia have focused heavily on researching and developing hypersonics, and some lawmakers have blasted the Defense Department for not doing enough to match their hypersonic capabilities.

The Air Force's ARRW program had a string of three testing failures last year, when the ARRW had problems during launch. The failures and other delays led Congress to cut almost $161 million in the fiscal 2022 budget that would have let the Air Force procure ARRWs; lawmakers moved half that money to the research, development, test and evaluation account for hypersonics.

Air Force Secretary Frank Kendall, who had repeatedly said the service needs to consider what role hypersonics should play in its arsenal, then said at a conference "ARRW still has to prove itself."

But in May, the Air Force announced a successful test of ARRW from a B-52H Stratofortress. Lockheed Martin, which makes the ARRW, said after that test the program is expected to reach early operational capability next year.

Hunter said one of the biggest problems that typically shows up during the all-up-round testing phase are unexpected integration issues — "you know, the easy stuff," he joked.

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IAF Chief Against Air Defence Command Without Offensive Abilities, Calls It 'Ineffective'

Snehesh Alex Philip | 15 July 2022

Source: The Print | https://theprint.in/defence/iaf-chief-against-air-defence-command-without-offensive-abilities-calls-it-ineffective/1040339/

Air Marshal VR Chaudhari | Twitter/@PIB_India

New Delhi: Indian Air Force Air Chief Marshal (ACM) V. R. Chaudhari Friday warned against the creation of an Air Defence (AD) Command, planned under the theaterisation process, without it having offensive capabilities. Chaudhuri said that division of offensive capabilities was "ineffective in design or execution of the joint strategy".

The Air Chief Marshal made it clear that modern 4.5 and 5th generation aircraft have omni-role capability, and to restrict those aircraft to any one role would lead to their underutilisation.

"Flexibility, one of the characteristics of air power, gives a planner the freedom to swing roles depending on the air situation, and this must be capitalised on," he said, while addressing a seminar organised by the Centre for Joint Warfare Studies (CENJOWS).

His comments came at a time when the theaterisation process envisions an Air Defence Command under the Indian Air Force and aviation assets being split into other theatres.

The IAF, which has been supporting jointness, is of the view that there should only be once Command — India Command — with all the three Services working in synergy.

Talking about the topic of the seminar, Air & Missile Defence, Chaudhari said there was a "dichotomy".

"Air Defence encompasses countering all hostile projectiles that travel through the medium of air. Hence, to differentiate between Air and Missile Defence as two separate entities would be like creating additional silos within the Air Defence vertical," he said.

The IAF chief said that while there is a need for close coordination between all elements within the same airspace to ensure aerospace safety, as well as effective air defence, the creation of an AD Command may prove counter-productive.

This was "because, Air Defence operations are inextricably linked to Counter Air Operations and all offensive ops (operations), as the success or failure of one, will dictate the demands on the other. AD and offensive missions are interdependent and if executed in isolation, these would not only be disjointed but also ineffective in design or execution of the joint strategy," he said.

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Space

Second Module Docks at China's Space Station, Large Rocket Stage Tracked In Orbit

Andrew Jones | 24 July 2022

Source: Space News | https://spacenews.com/second-module-docks-at-chinas-space-station-large-rocket-stage-tracked-in-orbit/

Liftoff of the third Long March 5B rocket, carrying the Wentian space station module into orbit on July 24, 2022. Credit: CNSA/Ourspace

HELSINKI — China added a new experiment module to its space station Sunday, following a high-profile launch from the country's coastal spaceport.

The Wentian experiment module launched atop of a Long March 5B rocket at 2:22 a.m. Eastern from the Wenchang spaceport on the southern Chinese island of Hainan, with crowds watching on from nearby public beach areas.

Wentian used its own propulsion system to match orbit with Tianhe, the core module of China's under-construction space station, and completed rendezvous and docking with a

forward docking port at 3:13 p.m. Eastern, July 24, China's human spaceflight agency confirmed.

The Wentian module had a mass at takeoff of 23,000 kilograms and is designed to host a range of science cabinets for on-orbit experiments. It also provides backup life support and propulsion for Tianhe, which launched in April 2021, and provides new working and living quarters and an EVA hatch for astronauts.

"This should be a historic moment. China's largest carrying rocket today successfully launched the heaviest, longest and arguably the most important craft in the country's space history. The mission was well fulfilled, which is very exciting and exhilarating," Li Dong, chief designer of the third March 5B rocket told China Central Television.

The country has now successfully launched eight space station-related missions for the project, including two modules, three cargo spacecraft and three crewed missions. A third module, named Mengtian, is expected to launch around October.

Both Wentian and Mengtian will be transpositioned to lateral docking ports, completing the planned T-shaped Tiangong space station. China intends to operate the station for at least a decade, with crews of three astronauts six-month-missions.

"There are mainly the experimental cabinets of life ecology and biotechnology," Zhao Liping, chief designer of the module, told Chinese state media CGTN. "There are also glove boxes for astronauts to handle samples in orbit, as well as refrigerators with temperatures of minus 80 degrees Celsius, minus 20 degrees Celsius and four degrees Celsius, which will store samples after completing the in-orbit experiments."

Rocket stage reentry

While the launch and docking were successful, attention will also now be on the fate of the large first stage of the Long March 5B rocket, which entered orbit along with Wentian.

U.S. Space Command cataloged two objects in orbit following launch of Wentian, indicating that the large first stage was not actively deorbited following launch.

The two previous Long March 5B launches, which carried a test new generation crew spacecraft prototype and the Tianhe module respectively, notably saw the large first stage of the rocket enter orbit and make uncontrolled reentries.

The rocket stage from the Tianhe launch reentered the atmosphere over the Indian Ocean 10 days after launch. If not actively deorbited, the latest Long March 5B stage will reenter the atmosphere between 41 degrees north and 41 degrees south due to atmospheric drag

Where and when the roughly 21-metric-ton empty will reenter cannot be accurately estimated. The stage will orbit the Earth once every 90 minutes, with the decay of its orbit dependent on atmospheric fluctuations. Variables including solar activity, which can puff up the atmosphere, leading to greater drag at higher altitudes.

"Although the amount of debris that survives reentry isn't simply a function of stage mass, it's nevertheless true that a 21 tonne stage poses a much bigger risk than a typical 1 to 5 tonne upper stage, as the 2020 Ivory Coast incident makes clear," astronomer and spaceflight analyst Jonathan McDowell told SpaceNews.

"So, I congratulate China on the successful launch of Wentian but deplore their failure to redesign the Long March 5B that sets us up for another major uncontrolled reentry."

The first stage of a rocket for an orbital launch cuts its engines off before reaching orbital velocity, falling within a calculated, safe area. Smaller second or further stages do the final work to carry a spacecraft into orbit. In the case of the Long March 5B, the large first stage is also the upper stage.

Chinese foreign ministry spokesperson Wang Wenbin stated last year that it was "common practice across the world for upper stages of rockets to burn up while reentering the atmosphere."

Last year's Long March 5B uncontrolled reentry led to indirect exchanges of commentary from NASA Administrator Bill Nelson and China's Foreign Ministry spokespersons.

The China Academy of Launch Vehicle Technology (CALT), the maker of the Long March 5B, did not comment on the previous incidents. It has however stated that it carries out passivation of spent stages, including venting remaining propellant depleting batteries, to prevent debris-causing explosions in orbit in line with international practices.

The wider issue of uncontrolled rocket body reentries is assessed in a Nature Astronomy paper published July 11. It estimates that, with current practices, there is a 10 percent chance of uncontrolled reentries causing one or more casualties over a decade.

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Saudi Arabia Signs Artemis Accords

Jeff Foust | 16 July 2022

Source: Space News | https://spacenews.com/saudi-arabia-signs-artemis-accords/

Sultan bin Salman Al Saud, a member of the Saudi royal family, flew to space on a shuttle mission in 1985 and is to date the only person from Saudi Arabia to go to space. Credit: NASA

WASHINGTON — Saudi Arabia is the latest nation to sign the Artemis Accords as part of what the White House called "expanding cooperation" with the United States in space.

The signing of the Accords, which outline best practices for safe and sustainable space exploration, took place in a virtual ceremony July 14 featuring officials from NASA, the U.S. State Department, Saudi Space Commission and the countries' embassies.

"Today Saudi Arabia adds its voice to a diverse and growing set of nations," NASA Administrator Bill Nelson said in an agency statement. "Together we can ensure that humanity's rapid expansion into space, toward the moon and destinations beyond, will be done peaceably, safely and in full accordance with international law."

"President Biden welcomed the Kingdom of Saudi Arabia signing the Artemis Accords and reaffirming its commitment to the responsible, peaceful and sustainable exploration and use of outer space," the White House said in a statement July 15.

That statement outlined outcomes from meetings President Biden held that day in Saudi Arabia with King Salman and Crown Prince Mohammed bin Salman. Those meetings were controversial because of the role the U.S. government believes Mohammed bin Salman played in the 2018 murder of Saudi journalist Jamal Khashoggi.

The White House statement indicated additional cooperation is planned between the United States and Saudi Arabia in space: "The U.S. and Saudi Arabia are expanding cooperation in all fields of space exploration, including human spaceflight, Earth observation, commercial and regulatory development, and responsible behavior in outer space." The statement didn't elaborate on what that cooperation would entail.

Saudi Arabia has a modest space program, with only a few domestically built smallsats. Sultan bin Salman Al Saud, a member of the royal family, flew to space in 1985 as a payload specialist on the STS-51-G shuttle mission, and is the only person from the country to go to space to date. He later served as chairman of the Saudi Space Commission. The country is also home to the headquarters of Arabsat, a regional operator of geostationary communications satellites.

Saudi Arabia is the 21st country to join the Artemis Accords, announced by NASA in October 2020 with eight countries as original signatories. The Accords specify best practices for spaceflight that largely build upon the Outer Space Treaty and related agreements.

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Scientists Test AI for an Orbital Carrier to Defend China's Space Assets

Zhang Tong | 13 July 2022

Source: SCMP | https://www.scmp.com/news/china/science/article/3185176/scientists-test-ai-orbital-carrier-defend-chinas-space-assets?module=perpetual_scroll_0&pgtype=article&campaign=3185176

China has alleged that SpaceX Starlink satellites came dangerously close to its new space station twice last year. Photo: Weibo

Algorithm could command four orbital platforms to inspect nine hostile targets in less than a day, according to team.

An orbital carrier controlled by artificial intelligence could be used to patrol and counter attacks in space, according to a new study by Chinese scientists.

They say a large orbital platform carrying hundreds of cubesats – tiny satellites that weigh about 1kg (2.2lbs) – could defend China's space assets with speed and efficiency. But they say it would need help from AI to determine exactly when and where to release the cubesats so they could fend off enemy satellites.

According to the researchers, the complexity of a large and fast space battle would be beyond the human brain – and even beyond some powerful AI algorithms.

Studying the best strategy for AI to control an orbital carrier would have "strong economic and military value", the team said in a paper

published in Chinese Space Science and Technology, a peer-reviewed journal run by the China Academy of Space Technology, on June 25.

The research was led by Zhang Jin, a professor with the College of Aerospace Science and Engineering at the National University of Defence Technology in Changsha.

China has alleged that SpaceX Starlink satellites came dangerously close to the new Chinese space station on two occasions last year, and raised concern that the scale of these unfriendly encounters could increase in the near future.

Months later, Chinese and US satellites had a game of "geostationary orbit cat and mouse", according to a Space News report on June 16, which said such encounters were becoming more frequent.

Military researchers in May called for a plan to disable or destroy SpaceX's Starlink satellites if they threatened China's national security.

Zhang and his team said an orbital platform carrying cubesats could be used to patrol and defend against any organised and continuous attack in space.

They say studying the best strategy for AI to control an orbital carrier will have 'strong economic and military value'.

They proposed using AI for mission planning by using it to answer key questions such as the direction of orbit transfer, when the cubesats should be released, and the timing of encounters with other satellites.

The researchers came up with a way to do this, built on a simulation model. Their "multi-round greedy search" method is an algorithm designed to command four orbital platforms to inspect nine hostile targets in less than a day.

They put it to the test under a high-precision orbit model and also compared it with a hybrid encoding genetic algorithm – one of the most popular optimisation methods.

Their algorithm was found to be 227 times faster than the genetic algorithm – in 20 rounds of testing, it found the best result in four minutes. The genetic algorithm found rough solutions in 200 minutes, and better results took 900 minutes.

The scientists said this all came down to a key difference in strategies – theirs was more focused on the big picture while the genetic algorithm spent a lot of time and resources on the finer details.

The greedy algorithm deals with multiple constraints but uses low-precision parameters at first, and when it finds an acceptable solution it skips the higher precision calculations. Zhang said this was found to be a more efficient approach than traditional optimisation methods.

The AI could also give humans a choice of approaches to take. According to the paper, the algorithm was able to plot a mission that used the least fuel, offering a route that would cost 96kg (212lbs) of fuel and take 68 hours; it also suggested the shortest mission time that would cost 950kg of fuel and take 18 hours.

"In the future, we will add randomness to the search strategy to overcome the limitations of the greedy algorithm and obtain global optimal results," Zhang said in the paper.

They said an orbital carrier using AI could also be used for other purposes, such as in-orbit

refuelling and maintenance.

In April, another team of scientists in China said they had developed AI that could use tactics like deception to hunt satellites.

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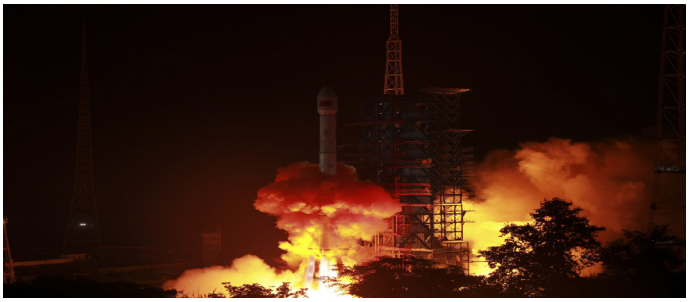
China: New Satellite Series Adds Capabilities

Zhao Lei | 14 July 2022

Source: China Daily | https://www.chinadaily.com.cn/a/202207/14/WS62cf6fd7a310fd2b29e6c455.html



The Tianlian II-03 satellite is launched by a Long March 3B carrier rocket at the Xichang Satellite Launch Center in Southwest China's Sichuan province, on July 13, 2022. [Photo/Xinhua]

Now Planet-Wide Relay Network To Improve Country's Space Coverage

China launched a Tianlian II series satellite early on Wednesday morning to form a global-covering network of the country's second-generation relay satellites.

A Long March 3B carrier rocket blasted off at 12:30 am at the Xichang Satellite Launch Center in southwestern China's Sichuan province and then placed the Tianlian II-03 satellite into a geostationary orbit, according to China Aerospace Science and Technology Corp, the country's leading space contractor.

The State-owned conglomerate said in a news release that the spacecraft will form a network with its two predecessors - the Tianlian II-01 and Tianlian II-02.The service of the second-generation relay system is expected to extensively improve the nation's space-based control, tracking and data relay capabilities, it said.

The launch marked the 426th flight mission of the Long March series rockets.

China began to establish its own relay satellite system in April 2008 when the first satellite in the Tianlian I series was launched from Xichang.

In July 2012, China became the second country, after the United States, possessing non-stop relay capability for its space-based infrastructure after the Tianlian I-03 was deployed that month to complete a basic system with global coverage.

In March 2019, China launched Tianlian II-01, the first of its second-generation data relay satellite.

Currently, eight Tianlian satellites - five of the Tianlian I and three in the Tianlian II series - have been launched and seven of them, except the Tianlian I-01, are in service.

Compared with the first-generation model, Tianlian II satellites feature stronger capabilities, heavier carrying capacity and longer life spans, according to satellite designers at the China Academy of Space Technology.

"Tianlian II satellites were built on the DFH-4 platform, which is better than the DFH-3 used by the Tianlian I craft," said Wang Jiasheng, chief engineer of the Tianlian II series.

"The new generation is able to serve more spacecraft and has a larger operational radius."

The Tianlian family is playing a key role in China's space programs and has served a variety of functions such as assisting with the rendezvous and docking between spaceships and

the Tiangong space station and transmitting data for Earth observation, weather and other low-orbit satellites.

Without them, it will be very difficult to carry out communications and video links with astronauts, designers said.

So far, China has carried out 21 space launch missions this year. The country plans to conduct more than 60 launches in 2022.

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Navy Warships to Get Indigenous SATCOM Terminals

10 July 2022

Source: Tribure | https://www.tribuneindia.com/news/nation/navy-warships-to-get-indigenous-satcom-terminals-410979

The Ministry of Defence (MoD) has okayed a programme for indigenous development of satellite communication (SATCOM) terminals that are housed on warships, submarines and naval planes.

The SATCOM terminals connect the Navy's sea-going platforms with the naval satellite, GSAT-7 (Rukmini), which is connected to ground stations and relays the real-time information and data. Originally sourced from Israel, the SATCOMs are being maintained by Bharat Electronics Limited, a public sector undertaking.

Most of these SATCOMs are now more than 10-12 years old, hence the field units have reported problems pertaining to product support and slowness in data transfer.

The Navy is looking at SATCOM terminals that have C-band and Ku-band compatibility with greater speeds of data and communication.

The MoD has granted in principle approval to manufacture these in India under the 'Make-II' category of the Defence Acquisition Procedure. 'Make—II' implies the industry will fund the development of the project, including prototype for which no government funding will be provided.

Once a product is okayed for testing, the Navy will examine it to see if it withstands humidity and vagaries of the sea. It will be followed by material testing that will include checking downlink and uplink speeds.

Weighing nearly 2,650 kg, the GSAT-7 satellite was launched in August 2013 for the exclusive use of the Navy and it provides seamless communication with its 3,500-km wide footprint across the Indian Ocean.

It was the first military communication satellite developed by the Indian Space Research Organisation for the defence forces. It has allowed the Navy to monitor the sea better.

Connect ships to ground stations

- The SATCOM terminals connect Navy ships with the naval satellite GSAT-7
- The satellite relays the real-time information and data to ground stations
- The SATCOMs were originally sourced from Israel

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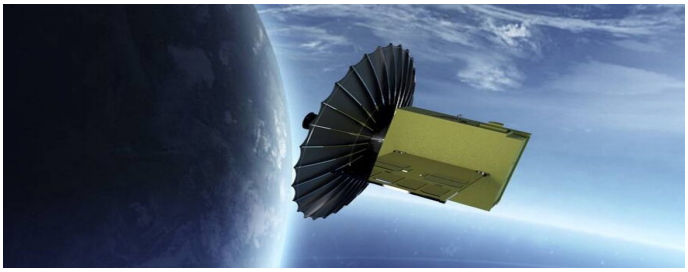
UAE Announces Plans for Radar Satellite Constellation and Space Fund

Jeff Foust | 18 July 2022

Source: Space News | https://spacenews.com/uae-announces-plans-for-radar-satellite-constellation-and-space-fund



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

WASHINGTON — The United Arab Emirates will develop a radar satellite constellation as part of a new fund worth more than $800 million to support the country's space sector.

The UAE government announced July 17 plans for a synthetic aperture radar (SAR) satellite constellation called Sirb, Arabic for a flock of birds. The constellation will be developed over six years, with the first satellite scheduled to launch in three years.

The UAE Space Agency offered few details about the Sirb satellites, other than that they will be small satellites will operate in X-band. The agency did not disclose the budget for the system or the number of satellites planned. An illustration released by the agency showed a cubesat-class satellite with a deployable antenna.

"SAR technology leapfrogs traditional imaging satellites, providing more powerful imaging using X-band radar technologies," Sarah Al Amiri, chair of the UAE Space Agency, said in a government statement. "These small-scale satellites are more agile, faster to develop and more powerful, an indicator of the types of new generation systems that technology is now making possible."

The UAE plans to seek bids for at least some aspects of the system. In the statement, the government said it would request proposals for development of satellite components as well as for launch, operations and a commercialization plan. The project will include opportunities for both Emirati and international companies.

The Sirb constellation is the cornerstone of a new National Space Fund also announced July 17, with the government committing to spend 3 billion dirhams ($817 million) on space projects such as Sirb.

"The National Space Fund will encourage global partnerships to establish themselves here in the Emirates, providing new and vital technology platforms and development to answer the needs of the UAE Space Program and other global customers for vital innovation and technologies that answer the needs and possibilities of today's world," Salem Al Qubaisi, director general of the UAE Space Agency, said in a statement.

The government did not announce what other projects are under consideration for support by the new fund or how long the fund will operate. Al Amiri said that the fund "is precisely targeted at building opportunities for international cooperation in building Emirati enterprises."

The UAE government has emphasized space as one area of growth for the country as it works to diversify its economy. Its highest profile initiative in that area is the Emirates Mars Mission, or Hope, a Mars orbiter launched two years ago. The country is now pursuing a "Beyond Mars" mission that would fly by Venus and several

asteroids, with launch planned in 2028.

The country also has a small astronaut corps, with one person who flew on a short-duration Soyuz mission to the International Space Station in 2019. In April, the UAE's Mohammed bin Rashid Space Centre signed a contract with Axiom Space for a long-duration ISS mission launching as soon as the spring of 2023. The Emirati astronaut to fly that mission, yet to be announced, will take a seat that Axiom acquired from NASA as part of a three-way deal with Roscosmos last year to obtain a Soyuz seat for a NASA astronaut.

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Global Aerospace Industry

Korea Signs Massive Arms Deal with Poland

28 July 2022

Source: English.chosun.com | http://english.chosun.com/m/svc/article.html?contid=2022072801328&utm_source=undefined&utm_medium=unknown&utm_campaign=english#

Clockwise from top, the FA-50 light combat fighter jet, K9 self-propelled howitzer and K2 tank

Poland on Wednesday signed a W25 trillion contract to buy K2 tanks, K9 self-propelled howitzers and FA-50 light combat fighter jets from Korea (US$1=W1,313). The weapons will be shipped on three occasions over the next decade, with the first shipment alone worth W10 trillion, making it the biggest arms contract Korea has ever clinched. The two countries' defense ministers met in May and President Yoon Suk-yeol also talked about defense cooperation with his Polish counterpart Andrzej Duda on the sidelines of the NATO summit in Spain in June. Warsaw is to take delivery of 980 K2 tanks, 648 K9 self-propelled howitzers and 48 FA-50 fighter jets.

Polish Defense Minister Mariusz Błaszczak and Armament Agency chief Artur Kuptel met for the signing at the Polish Defense Ministry with

representatives of Korean defense companies. The K2 tanks are made by Hyundai Rotem, the K9 howitzers by Hanwha Defense, and the FA-50 fighters by Korea Aerospace Industries.Poland is eager to fill a shortfall in defense capacity because it supplied huge amounts of arms to help Ukraine defend itself against the Russian invasion. It considered buying U.S. fighter jets and German tanks but finally decided on Korean arms instead. "Due to Poland's support for Ukraine, it was necessary to fill the void in ground and air power. The Korean weapons system was the most suitable considering the technology, price and time of delivery," Błaszczak said.

- Korea to Sell 48 Fighter Jets to Poland
- U.S. Blocks Korean Trainer Jet Sale to Uzbekistan
- Korea Aerospace Picked for Fighter Project
- Seoul Eyeing Export of 24 Fighter Jets to Peru
- Lockheed Martin in Line to Upgrade Korea's Fighter Jets
- BAE Sues Korea for Scrapping Fighter Upgrade Contract
- Lockheed Martin in Frame for Fighter Jet Upgrade Project
- Gov't Cancels Billion-Dollar Fighter Jet Contract with BAE
- Korea Deploys Home-Grown FA-50 Fighter Jets
- Korea Clinches Fighter Jet Sale to Philippines
- Korea to Sell 24 Light Combat Aircraft to Iraq
- Botswana Eyes Korean Jets
- China Asked Korea Not to Sell Jets to Philippines
- Philippines Plans to Buy FA-50 Jets from Korea
- BAE Systems Wins W1.1 Trillion Korean Jet Upgrade Deal
- Korea Hopes to Sell FA-50 Fighter Jets to Philippines

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Eutelsat and Oneweb Agree Multi-Orbit Merger Plan

Jason Rainbow | 25 July 2022

Source: Space News | https://spacenews.com/eutelsat-and-oneweb-discussing-multi-orbit-merger-plan/

Eutelsat headquarters are located in Paris, France. Credit: Simon Lambert/REA

TAMPA, Fla. — Eutelsat and OneWeb said July 26 they have agreed a plan to merge their businesses to create a global multi-orbit satellite broadband operator.

The deal would combine France-based Eutelsat's satellite fleet in geostationary orbit (GEO) with British startup OneWeb's constellation in low Earth orbit (LEO).

Eutelsat already owns 23% of OneWeb and has been building a position in the startup to strengthen connectivity services amid a gradual decline in its satellite TV business.

The combined company would be "the first multi-orbit satellite operator offering integrated GEO and LEO solutions," Eutelsat said, targeting a satellite connectivity market projected to be worth $16 billion by 2030.

It comes amid plans for other multi-orbit combinations that seek synergies from integrating satellites operating in GEO and LEO.

A satellite fixed in GEO can provide more capacity to a specific region than non-geostationary satellites in a megaconstellation that has to serve the entire globe. Constellations closer to the Earth, however, promise low-latency solutions that can integrate with terrestrial infrastructure more effectively.

Eutelsat's European rival SES operates a satellite network in GEO and medium Earth orbit (MEO).

U.S.-based GEO broadband operator Viasat is in the middle of acquiring British satellite fleet operator Inmarsat, which has plans for satellites in LEO and highly elliptical orbit.

Canadian GEO operator Telesat plans to start deploying LEO satellites for its delayed Lightspeed constellation in 2025.

Intelsat had also tried to merge with OneWeb but scrapped the deal in 2017 after failing to win support from debt holders to buy the company.

Indian telecom company Bharti Global is OneWeb's largest shareholder. Other shareholders include Japanese internet giant SoftBank, South Korean conglomerate Hanwha, U.S.-based Hughes Network Systems and the British government.

French state-owned investment bank Bpifrance is the largest shareholder in publicly listed Eutelsat.

The Chinese government is Eutelsat's fourth-largest shareholder via sovereign fund China Investment Corp, reported Reuters citing data from financial research firm Refinitiv.

The Deal

Eutelsat and OneWeb signed a Memorandum of Understanding to combine through an all-share transaction that would result in Eutelsat taking over OneWeb, although the British government would continue to hold a share in the British startup with priority voting rights.

OneWeb's shareholders would contribute their stake in the startup to Eutelsat in exchange for newly issued shares in the French company, valuing OneWeb at $3.4 billion.

Eutelsat and OneWeb shareholders would each get 50% of the combined company's shares.

The companies said the transaction has the backing of each of their long-term investors, including Bpifrance and French investment firm Fonds Stratégique de Participations on Eutelsat's side, and Bharti, SoftBank, Hanwha and the British government for OneWeb.

Eutelsat plans to hold a shareholder meeting in the first half of 2023 to vote on the deal. The transaction also requires regulatory approvals, including permission from foreign investment authorities.

OneWeb would continue to operate the LEO business from its headquarters in the U.K. following the deal, and Eutelsat would remain headquartered in France and listed on the Euronext Paris stock exchange.

The combined group's board of directors would comprise 15 members: seven proposed by OneWeb and seven by Eutelsat in addition to its CEO Eva Berneke, who would be CEO for the combined group.

Eutelsat's chair Dominique D'Hinnin is being lined up to take on the same role for the merged

company, while Bharti founder Sunil Bharti Mittal would be co-chair.

The companies expect to complete the merger by the end of the first half of 2023.

Industry shake-up

The proposed transformational deal comes after Eutelsat's board rejected an unsolicited $3.2 billion takeover attempt in September from Patrick Drahi, the billionaire magnate who founded multinational telecommunications firm Altice.

Former CEO Rodolphe Belmer announced plans a month later to leave Eutelsat after six years with the company.

Berneke, a technology and telecoms veteran who previously led Danish IT and software company KMD, took Eutelsat's reins as CEO at the start of 2022.

"This ground-breaking combination will create a powerful global player with the financial strength and technical expertise to accelerate both OneWeb's commercial deployment, and Eutelsat's pivot to Connectivity," Berneke said in a statement.

Eutelsat reported 1.15 billion euros ($1.8 billion) in revenues for the year to the end of June, down 6.7% compared with the period the year before. Its broadcast segment, representing 61% of total revenues, fell 6.9% on a like-for-like basis when adjusted for foreign exchange rates.

Revenues from fixed broadband and mobile connectivity services jumped up 36% and 13%, respectively.

Eutelsat and OneWeb expect their combined company would generate 1.2 billion euros for the year to the end of June 2023.

They forecast revenues to grow at a low double-digit compound annual growth rate (CAGR) over the next decade.

Eutelsat operates 36 satellites in GEO. OneWeb currently has 428 satellites in LEO, about 66% of its planned feet, and has lined up missions with SpaceX and India's space agency to resume launches later this year.

OneWeb has not been able to add satellites to its constellation since Russia's invasion of Ukraine in February forced the company to halt the use of Soyuz vehicles.

The British company expects to have deployed the remaining satellites by the end of 2023 to provide global connectivity services.

Meanwhile, U.S.-based SpaceX has amassed more than 2,700 satellites in LEO for its Starlink broadband constellation as it expands global coverage, according to astronomer and spaceflight analyst Jonathan McDowell.

The latest batch of 53 Starlink satellites launched July 24 on a Falcon 9 rocket from Launch Complex 39A at the Kennedy Space Center, Florida.

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Indian Aerospace Industry

Agnikul Cosmos Opens Facility To Make 3D-Printed Rocket Engines

Sangeetha Kandavel | 13 July 2022

Source: The Hindu | https://www.thehindu.com/news/national/tamil-nadu/agnikul-cosmos-opens-facility-to-make-3d-printed-rocket-engines/article65636496.ece

N. Chandrasekaran, Chairman of Tata Sons and S. Somanath, Chairman, Indian Space Research Organisation, inaugurating the Rocket Factory-1 set up by Agnikul Cosmos in Chennai on Wednesday. | Photo Credit: SPECIAL ARRANGEMENT

'The Start-Up Will Make Two Rockets Per Week'

Chennai-based space tech start-up, Agnikul Cosmos, has opened its rocket making facility — Rocket Factory - 1, which happens to be India's first-ever facility dedicated to 3D printed rocket engines at scale.

Spread over 10,000 sq. ft, the facility is situated at the IIT Madras Research Park and was formally inaugurated by N. Chandrasekaran, Chairman of Tata Sons and S. Somanath, Chairman, Indian Space Research Organisation (ISRO), in presence of Pawan Goenka, chairman of Indian National Space Promotion and Authorization Centre (IN-SPACe).

When asked for the investment that went into this project, Agnikul did not want to divulge details but its co-founder Srinath Ravichandran told The Hindu that to start with this facility, the start-up will make two rocket engines per week. "We are now stepping into scaling and production from R&D and testing," he added.

This facility will house world-class machinery, including a 400mm x 400mm x 400mm metal 3D-printer from EOS, and a host of other machines that will enable end-to-end manufacturing of a rocket engine under one roof.

Agnikul had entered into an agreement with EOS in 2021 as their 3D printing partner for engines. To a query on where these rocket machines would be used, Mr. Ravichandran said, "This is for our own rockets that we are building."

Agnikul is building India's first private small satellite launch vehicle - Agnibaan, a rocket that enables plug-and-play configuration and is capable of carrying up to 100 kg of payload to low Earth orbits. This on-demand rocket can be fully customized to the customer's needs at an affordable cost.

The start-up had earlier said that Agnibaan will be launched in 2022. Mr Ravichandran said, "We are targeting to launch it by end of this year. Work is going on." Agnikul is looking at setting up another facility and is working on the details.

Founded in 2017 by Srinath Ravichandran, Moin SPM and S.R. Chakravarthy (from IIT Madras), Agnikul became the first Indian company to sign an agreement with ISRO in December 2020.

Till date, the Indian Institute of Technology, Madras (IIT-M), has incubated start-up has raised a total funding of ₹105 crore ($15 million) from Mayfield India, pi Ventures, Speciale Invest and a host of other prominent angels like Mahindra Group Chairman Anand Mahindra and Naval Ravikant.

Export Target of Rs 2.6 L Cr, Total Atmanirbharta: Defence Ministry's Big Aims for Vision@2047

Amrita Nayak Dutta & Aman Sharma | 09 July 2022

Source: News18.com | https://www.news18.com/news/india/exclusive-export-target-of-rs-2-6-l-cr-total-atmanirbharta-defence-ministrys-big-aims-for-vision2047-5519011.html

The defence ministry is also working on a defence production and export promotion policy, which is learnt to be in its final stages. (File pic/PTI)

The defence ministry is looking at an export target of Rs 2.6 lakh crore by 2047 when India reaches its 100th year of independence, top sources in the government told News18. The government is also aiming for full indigenisation and self-reliance in the defence sector by that year.

This was discussed in a meeting chaired by defence minister Rajnath Singh on Friday on targets to be achieved by India by 2047 as part of the Narendra Modi government's Vision@2047. Other major targets discussed at the meeting were increasing the number of micro, small and medium enterprises (MSMEs) in the defence sector to 45,000 from 15,000 at present.

Government sources said what also featured in the discussions with the minister was increasing India's current market share in the space economy to 15 per cent by 2047 from the current two per cent. They added that India is aiming to be a $1 trillion market by 2047, and this will involve a big investment in the space startup ecosystem.

India's defence exports in 2020-21 stood at Rs 13,000 crore, Sanjay Jaju, additional secretary (defence production), said on Friday. The Rs 2.6 lakh crore target by 2047 would hence amount to increasing the exports by nearly 20 times, the top source in the government said.

"Increasing defence exports continues to be the top priority of the government and a target of Rs 35,000 crore to Rs 40,000 crore by 2024-25 has been fixed," the source added. The export of the LCA Tejas of HAL and Brahmos supersonic cruise missiles are the two major focus areas for exports with multiple countries showing interest in them.

The defence ministry is also working on a defence production and export promotion policy, which is learnt to be in its final stages. India is looking at exporting Advanced Light Helicopters Mark III to the Philippines and the Light Combat Aircraft Tejas to Malaysia. The talks between the two countries are at an advanced stage.

India has offered to set up a production line to manufacture LCA and choppers in Egypt, and plans to explore the African market for exports, the source quoted earlier told News18. India also recently inked a $375 million deal for the supply of the BrahMos supersonic cruise missiles to the Philippines. Indonesia is also a potential customer for the Brahmos and talks are ongoing between the two countries.

VISION@2047 EXERCISE

Ten sectoral groups of secretaries (SGoS) spanning all sectors have been working on preparing a set of targets and a roadmap to achieve them by 2047. One of the sectoral groups

is on security and foreign affairs. This is the Modi government's big roadmap for India's 100th year of Independence.

Indian defence exports have grown almost six times from Rs 1,500 crore to Rs 9,000 crore in the past five years, in which the participation of the private sector stands at 90 per cent, as per ministry of defence data. These exports are broadly going to 84 countries. A Stockholm International Peace Research Institute (SIPRI) report of 2020 stated that India stands in the list of the top 25 countries in defence exports.

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IAF Splits $20 Bn Fighter Jet Procurement Into Two Programmes

23 June 2022

Source: IMR India | https://imrmedia.in/iaf-splits-20-bn-fighter-jet-procurement-into-two-programmes/?gr_s=Bh1gzqm&gr_m=Bzbhwd&gr_x=a62b

From left Rafale, MiG_21, Miragew 2000 and below, Surya Kiran team in Hawks

New Delhi: India has emerged as the frontrunner for a Malaysian requirement of light combat aircraft, with a package deal on the table that would include maintenance and spares for the nation's Russian origin Su 30 fighter jets.

The Indian Air Force (IAF) Multi-Role Fighter Aircraft (MRFA) programme is being split into two parts under different procurement models to address the stated requirement of 114 jets, according to high-level military sources.

Under the revised procurement concept, the first part or phase of MRFA will involve the procurement of 54 foreign jets under the Buy Global (Manufacture in India) category of the Defence Acquisition Procedure (DAP), with the contract being awarded to a foreign OEM.

Of these, 18 will be procured in a flyaway condition from the OEM while 36 will be manufactured in India by a local partner selected by the OEM. This partner will be from the private sector.

The IAF is pushing for an early Acceptance of Necessity (AON) for Phase-I from the Defence Acquisition Council, and aims at issuing an RFP by the end of 2022.

Part-II of MRFA is not yet a programme but a concept, sources disclosed. It involves procurement of 60 jets from the Indian production partner selected by the OEM for Part-I. The Part-II procurement model will be Buy Indian, with the Indian production agency being the prime for the issuance of contract.

The IAF has bounced the revised plan off global OEMs interested in the acquisition. Boeing and Lockheed Martin of the US, Dassault of France, the Eurofighter consortium of Europe, Saab of Sweden and Sukhoi and MiG of Russia are in the IAF's selection pool which involves eight fighter aircraft types.

The other significant shift in the MRFA programme is the rejection of the Strategic Partnership (SP) Model by the IAF.

By splitting the requirement, and with ambiguity after Phase-I, India could end up paying many times over for aircraft, reasoned another.

Technology Development

IISC Bengaluru Signs Mou with Indian Navy for Collaborative Research in Aviation

31 July 2022

Source: Indian Express | https://indianexpress.com/article/cities/bangalore/iisc-bengaluru-signs-mou-with-indian-navy-for-collaborative-research-in-aviation-8060668/lite/

The Indian Institute of Science (IISc) in Bengaluru and the Indian Navy signed a Memorandum of Understanding (MoU) Friday to collaborate on aviation research and development and to ramp up self-reliance efforts for the Navy.

"The MoU provides a formal basis for the Indian Navy to interact with relevant faculty members at IISc and will promote joint research programmes in areas of mutual interest," the IISc said in a statement.

The MoU was signed by IISc registrar Captain Sridhar Warrier and Captain P Vinayagam (APP), Indian Navy, in the presence of senior officers of the Navy and the chairs of several departments at the Division of Mechanical Sciences, and the Office of Research Grants at IISc.

"The areas of collaboration under this MoU will fall under the domain of aerospace/ aeronautical engineering, including design and education technology. Specialisations that will be under focus include propulsion and propulsion systems, steel technology, metallurgy and material sciences, and corrosion science; systems and controls, instrumentation and sensors; environmental science and engineering, energy science and engineering; management (technical and logistics), industrial engineering and operational research, nanotechnology and MEMS (microelectromechanical systems), artificial intelligence, data analytics, and machine learning," the IISc said.

"It is a privilege for us to collaborate with the Indian Navy in these important areas of mutual interest. We look forward to the many exciting research and development outcomes that will emerge from this partnership," Captain Warrier said.

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Commentary

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2. Use of Air Power: The Missing Link in Anti-Taliban Operations in Afghanistan - http://mantraya.org/occasional-paper-use-of-air-power-the-missing-link-in-anti-taliban-operations-in-afghanistan/
3. Will Navy Choose Super Hornet or Rafale Marine? - https://www.rediff.com/news/report/will-navy-choose-super-hornet-or-rafale-marine/20220721.htm

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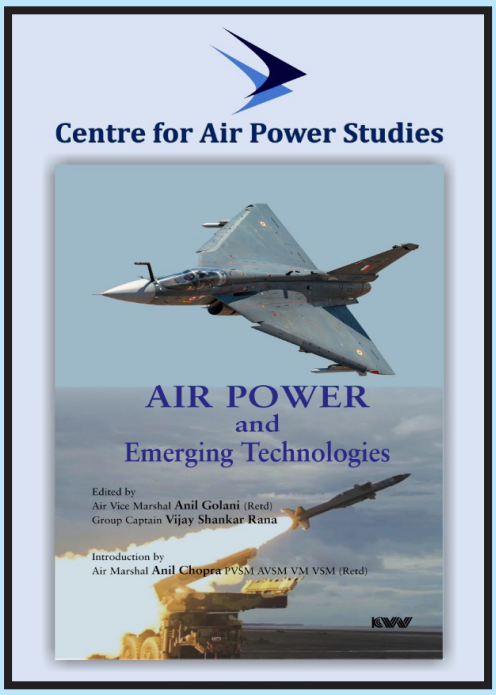

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Chief of the Air Staff, Indian Air Force

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