



**CENTRE FOR AIR POWER STUDIES (CAPS)**

Forum for National Security Studies (FNSS)

# AEROSPACE NEWSLETTER



Indian Air Force's Light Combat Aircraft (LCA) Tejas Mk-I

Image Courtesy: Press Information Bureau

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*“Over the years, we have become more empowered with better technology and achieved new levels of op-exploitation of systems & weapons. Aatmanirbharta in the field of defence R&D and manufacturing is our priority. Concrete steps have been taken to support "Make in India" initiatives by engaging MSMEs, start-ups, individual innovators, professionals, R&D institutes and academia,”<sup>1</sup>*

*- Air Chief Marshal AP Singh PVSM AVSM  
Chief of the Air Staff, Indian Air Force*

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## Opinions and Analysis

### Pakistan may Fly Chinese Stealth Jets in 2 Years: Could it Outpace IAF?

Bhaswar Kumar | 24 December 2024

Source: *Business Standard* | [https://www.business-standard.com/external-affairs-defence-security/news/pakistan-may-fly-chinese-stealth-jets-in-2-years-could-it-outpace-iaf-124122400442\\_1.html](https://www.business-standard.com/external-affairs-defence-security/news/pakistan-may-fly-chinese-stealth-jets-in-2-years-could-it-outpace-iaf-124122400442_1.html)



File photo of a Chinese J-35A stealth fighter jet.  
(Photo: Xinhua)

Pakistan's reported procurement of fifth-generation stealth fighter jets from China raises the possibility that it might outpace India in deploying such advanced aircraft.

Recent reports highlight contrasting strategies between the two nations, with Pakistan opting for external procurement while India focuses on developing its own indigenous solutions.

#### Pakistan's Acquisition of J-35 Jets

According to the South China Morning Post (SCMP), the Pakistan Air Force (PAF) has approved the purchase of 40 J-35 jets from China, with deliveries expected within two years. The J-35, an export-oriented variant of China's J-31 stealth fighter, is designed for both

air superiority and strike missions. Featuring next-generation avionics and advanced stealth technology, the J-35 is said to be smaller than the J-20 but reportedly incorporates improvements for ground and maritime target capabilities.

SCMP reports that this would mark China's first export of fifth-generation fighter jets to a foreign ally, potentially recalibrating regional power dynamics. The stealth fighters are expected to replace Pakistan's ageing fleet of American F-16s and French Mirage fighters.

The move follows earlier developments, including reports from Pakistan's BOL News that PAF pilots began training for the J-35 in China earlier this year. Pakistani Air Chief Marshal Zaheer Ahmed Baber Sidhu also stated in January that the foundation for acquiring the J-35 had already been laid. If the acquisition proceeds, these jets will join the PAF's arsenal, which already includes J-10CE medium multi-role combat aircraft delivered by China two years ago.

#### Strategic Implications

Experts quoted in the SCMP have weighed in on the potential impact of this development. Brendan Mulvaney, director of the US Air Force's China Aerospace Studies Institute, described Pakistan's reported move as "a clear shift away from the West, the US and France to China". He added that this acquisition could place the PAF "ahead of the Indian Air Force (IAF)", though he noted that operational effectiveness would depend on the weaponry and support systems provided by China.

"The jet may be great, but if it doesn't

have the weapons, the sensor suite, and the C4ISR [Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance] to enable it, then it matters far less,” Mulvaney explained.

Retired PAF officer Zia Ul Haque Shamsi told the SCMP that acquiring fifth-generation fighters would give Pakistan a strategic advantage over India for the next 12 to 14 years. However, other analysts offered a more conservative view, suggesting a seven- to eight-year advantage.

### **India's Indigenous Efforts**

Meanwhile, India is progressing with its fifth-generation Advanced Medium Combat Aircraft (AMCA) programme. According to the Parliamentary Standing Committee on Defence's Demands for Grants (2024-25) report, the IAF expects to receive deliveries of the AMCA only in the next decade. Designed to replace the Mirage 2000, MiG-29, and Jaguar jets, the AMCA will feature advanced stealth capabilities, sensors and data fusion.

The significant time and complexity involved in developing such platforms domestically highlight the challenges faced by the Defence Research and Development Organisation (DRDO) in realising the AMCA project.

### **Balancing Regional Power Dynamics**

Speaking to the SCMP, aviation expert Andreas Rupprecht noted that New Delhi might need to consider acquiring existing stealth fighters rather than relying solely on domestic

development. If New Delhi pursues this route, its options are largely confined to the American Lockheed Martin F-35 Lightning II.

Pakistan, on the other hand, is leveraging its close defence ties with China to gain access to advanced technology. Mustafa Hyder Sayed, executive director of the Islamabad-based Pakistan-China Institute, told the SCMP that the J-35 purchase reflects Pakistan's aim to maintain a conventional balance of power and necessary deterrence in the region.

However, critics have raised concerns about Pakistan's economic capability to sustain such acquisitions. Brian Hart, a fellow at the Centre for Strategic and International Studies, pointed out to the SCMP that integrating the J-35 into Pakistan's military would pose additional challenges, including training and operational readiness.

### **The Road Ahead**

As India continues its indigenous efforts and Pakistan reportedly fast-tracks its procurement plans, the race to operationalise stealth fighters highlights the contrasting defence strategies of the two countries. While Pakistan may deploy its J-35s sooner, long-term questions remain about its ability to fully integrate and sustain these advanced platforms.

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## No Runways, No Sorties: Chinese Missiles Threaten US Airpower Plans

Kelly A. Grieco and Hunter Slingbaum |  
17 December 2024

Source: *Defence News* | <https://www.defensenews.com/opinion/2024/12/17/no-runways-no-sorties-chinese-missiles-threaten-us-airpower-plans/>



*Members of Marine Fighter Attack Squadron 242 clear new F-35B aircraft on Marine Corps Air Station Iwakuni, Japan, on May 9, 2021. (Lance Cpl. Bryant Rodriguez/U.S. Marine Corps)*

American air bases “can no longer be considered a sanctuary.” That is the sobering conclusion of the U.S. Air Force’s new Installation Infrastructure Action Plan, released in December.

Unlike the last 30 years, when U.S. air bases were largely safe havens from enemy attacks, the document continues, “adversaries now possess high-end capabilities” that can threaten such installations. This warning is correct, but it understates the threat.

In our new Stimson Center report, “Cratering Effects: Chinese Missile Threats to US Air Bases in the Indo-Pacific,” and co-authored with Jonathan Walker, we conclude that Chinese missile strikes could keep U.S.

military runways and taxiways in Japan, Guam, and other Pacific islands closed in the critical first days — and even weeks — of a war between the United States and China.

Even if the United States undertook massive investments in a mix of active and passive countermeasures, runways and taxiways would remain closed for at least the first several days of any conflict.

Specifically, the United States would not be able to operate fighter aircraft from U.S. air bases in Japan for close to the first two weeks of a conflict, including from Kadena Air Base and Marine Corps Air Station Futenma, located closest to the Taiwan Strait.

These are the only two locations from which U.S. fifth-generation fighters would be able to complete their missions and return to base without requiring aerial refueling. Most importantly, Chinese missiles could keep U.S. military runways in Japan closed to aerial refueling tankers — and the aircraft which depend on them for in-flight fuel — for over a month.

China’s growing reach could also keep U.S. air bases in Guam and other Pacific locations closed to tankers and bombers for at least the first four days of a conflict, and thereafter the United States would face other significant operational problems.

For example, low-flying and slow-moving tankers are already vulnerable to Chinese air-to-air and surface-to-air missiles, but they would be especially easy for China to detect and shoot down when flying predictable flight routes from

Guam and a handful of other Pacific bases.

Unfortunately, no single countermeasure — or even a combination of countermeasures — will be sufficient to counter runway attacks by the People's Liberation Army Rocket Force. Our results validate the Air Force's Agile Combat Employment concept of dispersing U.S. aircraft and personnel more widely across multiple locations.

If the United States were to disperse to civilian airfields in the Pacific, as well as Japan Self Defense Force bases and civilian airfields in Japan, assuming it had the necessary political permissions, the shortest closure time would decline by over 70% in Japan, or three days for fighter operations and nine days for tanker operations. Within the Second Island Chain, closure times would drop only by about 10%, with runways opening on the fourth day.

These results, however, assume all personnel, equipment, and repair materials are available and ready for use at these other operating locations, which is not the case.

Even if Washington and Tokyo made these substantial investments, Chinese missiles would still keep aircraft grounded in the critical first days of a war, when the U.S. Air Force might be expected to quickly set up a combat air patrol or sink Chinese ships in the Taiwan Strait.

Recently, senior Air Force leaders have emphasized the need to protect U.S. air bases in the Indo-Pacific with more robust missile defense capabilities, with Air Force Secretary Frank Kendall going so far as to suggest his

service should take over this mission from the Army. Our findings suggest that even a massive buildup of U.S. missile defense capabilities is likely to fall short, however, even when combined with other countermeasures.

For example, even if the United States grew its Patriot missile defense force — expanding to 20 Patriot batteries and deployed them all to protect runways in Japan — China could still deny the use of these runways by fighters in the first two days of a war, and thereafter fighters would have to operate without any tanker support for another week.

Without tankers, these fighters would have to fly fewer sorties each day. The operational gains hardly seem to justify the costs, especially because China could easily offset these investments by increasing its missile stocks.

Instead, the United States will need to outthink — not outspend — China. Doing so requires the Air Force to prioritize the air denial mission within the First Island Chain, including building an inside air force around large numbers of runway-independent platforms and drones of various types and different ranges.

Over time, as the Chinese missile threat dissipates, the United States could bring forward more traditional crewed aircraft, including advanced fighters and the tankers required to support them, and transition to air superiority and offensive strike missions. To make that happen, however, the Air Force will need to move more rapidly toward uncrewed and autonomous systems, preposition equipment and munition stockpiles, and prepare to prioritize air denial in the initial air war.

## Air Power

### Crippling IAF Gaps Force Government to Set up Panel for New Road Map

Rajat Pandit | 23 December 2024

Source: *Times of India* | <https://timesofindia.indiatimes.com/india/crippling-iaf-gaps-force-government-to-set-up-panel-for-new-road-map/articleshow/116576095.cms>



NEW DELHI: With the IAF grappling with an acute shortage of fighter aircraft as well as force-multipliers, the govt has constituted a high-level committee under defence secretary Rajesh Kumar Singh to chalk out a roadmap to plug the major operational gaps in the force.

The committee will examine the IAF's overall capability development through several indigenous design and development as well as direct acquisition projects. "Among the three Services, IAF has the most critical capability voids. The committee will submit its report by the end of Jan," a source said.

DRDO chief Samir V Kamat, Secretary (Defence Production) Sanjeev Kumar and IAF deputy chief Air Marshal Tejinder Singh, among others, are the members of the committee.

The need to fast-track projects has been

reinforced by the way the Chinese Air Force has deployed additional fighters, bombers, reconnaissance aircraft and drones at all its airbases facing India, like Hotan, Kashgar, Gargunsa, Shigatse, Bangda, Nyingchi and Hoping, after upgrading them with new runways, hardened shelters, fuel and ammunition storage facilities.

With the IAF currently making do with just 30 fighter squadrons when 42.5 are authorised to tackle the threat from China and Pakistan, one of the major challenges before the committee will be to break the logjam over the long-pending project to manufacture 114 new 4.5 Generation fighters, at an initial estimate of Rs 1.25 lakh crore, with foreign collaboration. "Some jets will be directly acquired, while the bulk will be produced in India," a source said.

Then, there is also the induction of indigenous Tejas Mark-1A fighters, which has taken a hit primarily because of the continuing delay in supply of engines by US major General Electric.

Hindustan Aeronautics Limited (HAL) will be able to deliver only two to three Tejas Mark-1A fighters instead of 16 promised to the IAF in the 2024-25 fiscal, under the Rs 46,898 crore deal for 83 such single-engine jets inked in Feb 2021. The order for another 97 Tejas Mark-1A fighters for Rs 67,000 crore is also in the pipeline.

Meanwhile, GE has promised to begin the deliveries of the contracted 99 GE-F404 turbofan jet engines by March 2025 now, around two years behind schedule.

HAL and GE, of course, are now also conducting the final techno-commercial negotiations for co-production of the more powerful GE-F414 aero-engines in India for the planned induction of at least 108 Tejas Mark-II fighters, with 80% transfer of technology for around \$1 billion.

Induction of Force-Multipliers is also crucial. IAF, for instance, has just six IL-78 mid-air refuelers, inducted in 2003-04, when it requires at least 18 such aircraft to extend the operational range of its fighter jets.

In the "eyes in the sky" arena, India is even behind Pakistan, let alone China. IAF has just three indigenous 'Netra' airborne early-warning and control (AEW&C) aircraft, apart from the three Israeli Phalcon AWACS inducted in 2009-11. Consequently, the plan to develop six Mark-1A and six Mark-2 versions of the Netra aircraft also needs to be fast-tracked.

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## Not just IAF, Defence Ministry Undertakes Critical Review of Tri-Service Priorities & Solutions

*Snehash Alex Philip | 23 December 2024*

*Source: The Print | <https://theprint.in/defence/not-just-iaf-defence-ministry-undertakes-critical-review-of-tri-service-priorities-solutions/2416225/>*



*File photo of Defence Minister Rajnath Singh at the IAF Commanders' Conference in New Delhi | X/@rajnathsingh*

New Delhi: The Ministry of Defence is carrying out an elaborate internal study with the three armed services to understand what their priorities are when it comes to procurements over the next 8-10 years and to identify the roadblocks faced along with their solutions, ThePrint has learnt.

One such internal meeting was held at the Indian Air Force (IAF)-level recently. However, it is learnt that a similar process is on a larger scale.

Sources in the defence and security establishment told ThePrint that the trigger for this exercise being undertaken by the new Defence Secretary Rajesh Kumar Singh was the IAF Commanders' Conference held in November.

It is learnt that instead of Defence Minister Rajnath Singh addressing the Commanders with

a customary speech, he started to talk to them wanting to know their side of how and what should be procured on priority.

“It was a free and frank discussion. The Defence Minister was there along with the Defence Secretary, CDS, the DRDO chief and the Secretary of Defence Production and the brainstorming session took some time,” a source said.

Following this, Singh has directed the Defence Secretary to work with others to come out with a list of priorities, problems, and solutions.

It is learnt the IAF has sought time till 26 January to finalise the list of priorities and the way forward. Similar work is being done along with other services too; the process is expected to take at least till mid-February to be completed.

The IAF is facing a critical shortage in its fighter strength as well as refuelers and even early warning aircraft, besides in several other areas.

The IAF fighter strength is down to a mere 31 squadrons, and that too on paper, against a sanctioned strength of 42. The much touted delivery of the Tejas MK 1A has been delayed by over a year with the delay in delivery of the GE engines among others.

The IAF has been wanting to go in for a 114 Multi-Role Fighter Aircraft (MRFA) since 2016 but eight years on, nothing has moved forward.

Incidentally, the MRFA came about because the previous bid to acquire 126 Medium Multi Role Combat Aircraft (MMRCA), in works since 2004, ended up in a lock jam. Later, the government went for an emergency

procurement of 36 Rafale fighters. Back then, the hope was that parallelly, India will go in for 114 MRFA under the 'Buy and Make' route even as indigenous Tejas fighters were being built.

In October, The Print reported as to why the officials and the government had failed to move ahead with the MRFA deal. The sources had then said that there were two main issues the government, civil servants and IAF officers were trying to find a solution to and break the “logjam”.

“Last time, the government came out with a solution to the MMRCA tender, stuck for years, by going in for a government-to-government contract for 36 Rafale. But a political slugfest erupted,” a source had said, explaining the logjam.

“Officers presented themselves in the Supreme Court and documents concerning vital national interest had to be shared. It became a political hot potato,” another government source said.

The controversy, according to the sources back then, was behind officers and officials, along with the government, playing safe.

The other issue, they had said, was about how much indigenous content the MRFA should have and how much would be manufactured in India.

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## Pakistan's Stealth Move: 40 Chinese J-35A Jets in 2 Years Amid IAF Fleet Woes

Pradip R. Sagar | 24 December 2024

Source: *India Today* | <https://www.indiatoday.in/india-today-insight/story/pakistans-stealth-move-40-chinese-j-35a-jets-in-2-years-amid-iaf-fleet-woes-2654788-2024-12-24>



*The J-35 Shenyang multirole stealth fighter. (Getty Images)*

Indian Navy chief Admiral Dinesh Kumar Tripathi, earlier this month, raised alarm over Pakistan's China-backed rapid naval modernisation, remarking that Islamabad had prioritised "weapons over welfare" of its people. Now, adding to the Indian defence establishment's concerns are reports that Pakistan is set to acquire 40 Chinese J-35A stealth fighter jets over the next two years.

The cutting-edge multirole stealth fighter, built by China's Shenyang Aircraft Corporation, can execute missions on both land and sea fronts, bolstering Pakistan's air combat capabilities at a time the Indian Air Force (IAF), despite being ranked third globally in air power, is grappling with a shrinking combat fleet.

With no immediate beef-up in sight, the IAF is left to 'fight with whatever they have' and focus on maintaining existing assets. Pakistan's

move to equip itself with advanced stealth jets points to a potential strategic imbalance that poses significant challenges for India's air dominance in the region.

The ministry of defence has constituted a high-level committee, under Defence Secretary Rajesh Kumar Singh, to chalk out a roadmap to plug major operational gaps in the IAF. With squadron numbers dropping from a peak of 41 in 1996 to just 30, which is even lower than what it was during the 1965 India-Pakistan war, the IAF faces the daunting task of defending the Indian skies amidst continuing border tensions with China and Pakistan.

At the heart of the crisis in the IAF is the phasing out of outdated Soviet-era MiG aircraft and no immediate replacements in sight due to the significant delays in key indigenous projects, such as the LCA (Light Combat Aircraft) Tejas Mk-1A. Originally set for delivery by March this year, the Tejas Mk-1A programme has hit production delays, supply chain disruptions at GE Aerospace, which will provide the engines, and unfinished system certifications.

At the same time, the Tejas Mk2 and the Advanced Medium Combat Aircraft (AMCA), India's fifth-generation stealth fighter jet, are stuck in the design phase, leaving the IAF in wait of much-needed upgrades. Also, the highly-anticipated \$20 billion Multi-Role Fighter Aircraft (MRFA) programme for 114 foreign jets is nowhere close to sight.

Though there is no official word from Beijing or Islamabad about their J-35A deal, observers claim the development could be an outcome of top PLA (People's Liberation Army) General

Zhang Youxia's Pakistan visit last month, in which discussions were held with Pakistan army Chief Gen. Asim Munir and some top officials of the Pakistan military. The meeting assumes great significance since Gen. Zhang Youxia is vice-chairman of the all-powerful Central Military Commission (CMC), which oversees the Chinese military.

Pakistan's air power is continually improving with Chinese help. Islamabad is manufacturing the JF-17 Thunder fighter jet through transfer of technology from Beijing. Pakistan claims the JF-17 Thunder is a lightweight, all-weather, day-or-night multirole fighter aircraft that possesses air-to-air and air-to-surface combat capabilities.

However, Indian military planners claim there is no comparison between the LCA-Mk1A and the JF-17, adding that even the existing final operational clearance (FOC) variant of the LCA is superior to the JF-17.

China is also supplying the Pakistan Air Force J-10 fighter jets. Of the 25 jets ordered, 15 have been delivered. The J-10C, also known as the J-10CE, is considered to be the Pakistan Air Force's most sophisticated platform till date.

According to military aviation experts, the J-35A, also referred to as the Shen Fei J-35 or FC-31 Gyr Falcon, is designed for both export and domestic military use, potentially serving as a carrier-based fighter for the People's Liberation Army Navy. The J-35A is the second fifth-generation stealth fighter China has developed after the J-20.

On the naval front, Pakistan has unveiled its ambition to build a 50-ship navy, besides bolstering advanced underwater and surface combat capabilities, all of which could disturb the maritime balance of the region. In 2015, Pakistan signed a \$5 billion contract with China to acquire eight Hangor-class submarines, an export variant of the Type 039A/041 Yuan-class AIP (air-independent propulsion) submarines. Four submarines are being constructed in China, with the rest to be assembled at the Karachi Shipyard and Engineering Works. The first submarine was launched in April this year, indicating Beijing's growing role in Pakistan's maritime build-up.

Pakistan is also acquiring two more Type 054 A/P frigates from China. These frigates, equipped with advanced systems like the HHQ-16 surface-to-air missiles and P-282/CM-401 supersonic anti-ship missiles, will significantly enhance surface combat capabilities. Observers point to the conversion of two Embraer Lineage 1000 jets into maritime patrol aircraft, fitted with sophisticated sensors and weapons, further strengthening Pakistan's maritime surveillance and strike reach.

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## Fog of War: The US Navy's Red Sea Super Hornet Shootdown is this Fight's 2nd Friendly-Fire Incident

Jake Epstein | 24 December 2024

Source: [Business Insider](https://www.businessinsider.com/navy-fighter-jet-downing-another-red-sea-friendly-fire-incident-2024-12) | <https://www.businessinsider.com/navy-fighter-jet-downing-another-red-sea-friendly-fire-incident-2024-12>



- A US Navy warship accidentally shot down an American fighter jet over the Red Sea on Sunday.
- The crew members survived, but it marks the second friendly-fire incident of the Houthi conflict.
- These incidents highlight the complex operating environment in which NATO forces have engaged.

Though there are still a lot of unanswered questions, the accidental downing of a US Navy fighter jet by an American warship in the Red Sea over the weekend underscores the risks and complexity of intense combat in a high-tempo operating environment.

The shootdown marks the second known friendly-fire incident for American and allied forces this year as they continue to battle the Houthi rebels in Yemen. In February, a German

warship mistakenly targeted an American military drone, but a malfunction spared the uncrewed aircraft from getting hit.

Early Sunday morning local time, the guided-missile cruiser USS Gettysburg mistakenly fired on an F/A-18 Super Hornet flying above the Red Sea, downing the carrier-based fighter in what the US military said was "an apparent case of friendly fire."

US Central Command said that two naval aviators ejected safely from the aircraft and were recovered by the Navy. It added that an initial assessment suggests one of the crew members sustained minor injuries. A two-seater F/A-18 typically has a pilot and weapons officer.

CENTCOM, which oversees US forces in the Middle East, said the incident "was not the result of hostile fire, and a full investigation is underway." It did not respond to Business Insider's requests for more information.

Friendly-fire engagements aren't uncommon occurrences in combat, especially high-intensity fights.

During the Gulf War, for instance, an A-10 Warthog killed nine British soldiers when the ground-attack aircraft opened fire on their armored personnel carriers, mistaking them for Iraqi vehicles. A few years later, F-15s shot down two Black Hawks on a humanitarian mission, killing 26 people. The pilots mistook the helicopters for Iraqi targets they thought were violating a "no fly" zone.

There are numerous examples across

military conflicts, a more recent incident being a US airstrike in Afghanistan that killed five American service members in 2014.

Bradley Martin, a retired Navy surface warfare captain, said friendly-fire incidents are "likely to eventually occur in the complicated and rapidly changing environment of air defense." There are a wide range of things that can go wrong.

"Friendly and enemy aircraft can be in the engagement areas. Identification systems can malfunction," Martin, now a senior policy researcher at the RAND Corporation, told BI. "Friendly aircraft profiles can look like threat profiles. And certainly, human error can enter into the equation. Operators may have minutes or even seconds to make a determination and, mistakes occur."

"I think it's important to remember that the Navy has been reacting to intense air attacks now for over a year, with more engagements in a month than we'd seen in decades," Martin said, referring to the Navy's tireless efforts to fend off Houthi missiles and drones.

"These have been largely successful, but with a large number of engagements comes the increased risk of mistakes and malfunctions," he said.

And mistakes have been made, though nothing fatal. In February, a German frigate accidentally targeted an American MQ-9 Reaper drone while it was on a mission in the vicinity of the Red Sea. The missiles never reached the drone, though, thanks to a technical error in the warship's radar system.

The German military said at the time, it engaged a drone that lacked a "friend or foe" identification and coordinated with allies in the area before opening fire. It's unclear where the disconnect occurred, but it almost ended in the destruction of an expensive combat and reconnaissance drone.

The F/A-18 Super Hornet that was shot down was part of the Air Wing attached to the aircraft carrier USS Harry S. Truman. The Truman and its strike group, which consists of the Gettysburg and two destroyers, entered the Middle East region earlier this month, becoming the latest assortment of Navy warships to join the conflict against the Houthis.

The F/A-18 is a multi-role fighter jet made by US defense contractor Boeing that has been in service with the Navy for decades. A single aircraft is estimated to cost around \$60 million.

The military's acknowledgment of the Red Sea friendly-fire incident came shortly after a combat bout between the US and the Houthis. CENTCOM said it carried out strikes against Houthi facilities in Yemen, and during the operation, its forces shot down multiple drones and a cruise missile.

It is unclear if the friendly-fire incident occurred during the operation, which took place at some point on Saturday local time. CENTCOM said that F/A-18s were involved in the mission.

The Houthis said that they launched eight cruise missiles and 17 drones during the battle with the US military. The rebels said this led to the downing of the F/A-18 and ultimately

forced the Truman to withdraw to another part of the Red Sea.

The Houthis have spent the past year launching missiles and drones at military and civilian vessels operating in the Red Sea and Gulf of Aden. The rebels claim they are acting in solidarity with Palestinians in Gaza and have stepped up their long-range attacks on Israel in recent days. US, British, and Israeli forces have carried out extensive strikes on Houthi targets in Yemen.

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## NABH AI: Revolutionizing Aircraft Recognition with Artificial Intelligence

Nihal Kumar | 10 December 2024

[Source: New Indian | https://www.newindian.in/nabh-ai-revolutionizing-aircraft-recognition-with-artificial-intelligence/](https://www.newindian.in/nabh-ai-revolutionizing-aircraft-recognition-with-artificial-intelligence/)



*NABH AI: Revolutionizing aircraft recognition with artificial intelligence.*

NEW DELHI: The Indian Army has taken a major step forward in military technology with the creation of the NABH AI (Next Generation Aircraft Recognition for Bharat by Harnessing AI) system. Designed to solve the critical problem of aircraft misidentification, NABH AI aims to transform air defence operations by

reducing the risk of fratricide and improving the safety and effectiveness of military missions.

Developed by Colonel Prashant Thakur of the Army Air Defence, the NABH AI system works by capturing images of aerial targets and feeding them into an advanced AI program for quick analysis. The system identifies the type of aircraft and determines whether it is friendly or an enemy in just 6-8 seconds. Currently, the system has an accuracy rate of 80%, which is expected to rise to 90% as advanced AI tools are applied.

Radar is the main tool for air defence gunners, but it often labels 70-80% of aerial targets as “Unknown” due to insufficient data. The situation is worsened by the increasing numbers and types of drones. NABH AI solves this problem by using a large database of images, which includes the Aircraft Recognition (ACR) package, open-source data, and images from the Air Force and other services. This system provides real-time identification, helping avoid tragic incidents of misidentification, such as the friendly fire that led to the downing of the Mi-17V5 helicopter by the Indian Air Force in 2019.

The ongoing Russia-Ukraine conflict has further highlighted the dangers of aircraft misidentification, underscoring the need for such a system. NABH AI addresses these challenges by significantly reducing the risk of friendly fire in military operations.

The NABH AI system is primarily intended for the Army Air Defence (AAD) and is set to integrate with various anti-aircraft gun systems, including the Zi-23mm, Zu-23mm,

and upgraded L-70-gun systems. This system will enhance aircraft recognition capabilities and improve operational effectiveness across all branches of the Indian Armed Forces, particularly in countering the rising threat of drones. Colonel Thakur emphasized the growing need for advanced identification systems, noting the 188 drone strikes in Ukraine as a reminder of the importance of UAV recognition in modern warfare.

Currently, the NABH AI database includes more than 1,400 images of 10 different helicopter models, offering a comprehensive solution for identifying both fixed-wing and rotary aircraft. Plans include developing a chip model for integration with existing air defence systems.

Colonel Thakur's work has been widely recognized. Recently, NABH AI was named one of the top 10 innovations at the Inno-Yoddha 2024-25 event, where Colonel Thakur was also awarded Rs. 25,000 by Chief of Army Staff General Upendra Dwivedi. With over 18 years of service in the Army and a Sena Medal for gallantry, Colonel Thakur's commitment to enhancing air defence operations is evident in his year-long effort to develop NABH AI.

Looking ahead, Colonel Thakur plans to expand the project to integrate the system with more advanced platforms, continuing to strengthen India's indigenous defence capabilities.

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## Space

### ISRO and ESA Partner to Support Gaganyaan Communication Systems

Aditya Lenka | 06 December 2024

Source: *Interstellar* | <https://interstellar.news/general/isro-and-esa-sign-ground-tracking-pact-for-human-spaceflight-mission/>



*ISRO and ESA Sign Agreement for Gaganyaan Ground Tracking Support*

On December 4, 2024, the Indian Space Research Organisation (ISRO) and the European Space Agency (ESA) signed a Technical Implementing Plan (TIP) for ground tracking support for India's Gaganyaan missions. This agreement enhances international collaboration in space exploration and ensures robust communication during the mission's critical operations.

#### Key Details of the Agreement

The TIP was signed at the Satish Dhawan Space Centre (SDSC) by Dr Anil Kumar A K, Director of ISTRAC (ISRO Telemetry, Tracking and Command Network), and Mr Dietmar Pilz, ESA's Director of Technology, Engineering & Quality and Director of ESTEC, Netherlands. The event was attended by ISRO Chairman Dr

Somanath S and Mr Didier van der Hasselt, Belgium's Ambassador to India, **About ESA**

The agreement enables ESA to provide ground station support for the Gaganyaan missions, ensuring uninterrupted data flow and reliable communication with the Orbital Module. This support is critical for monitoring and managing orbital operations during the mission.

### **Strengthening a Long-Standing Partnership**

ISRO and ESA share a history of successful collaboration, having supported each other in multiple space missions. The TIP further strengthens this partnership, setting the stage for future cooperation in space technology and exploration.

Dr Somanath highlighted the significance of such agreements, emphasising their role in advancing the Gaganyaan programme, India's ambitious human spaceflight mission. The ESA's expertise in ground tracking and communication systems will complement ISRO's efforts to achieve mission success.

### **Future Collaboration in Space**

The TIP is a testament to the growing global partnerships in space exploration. With ISRO and ESA committed to continued collaboration, this agreement not only benefits Gaganyaan but also paves the way for future joint initiatives in space technology.

The European Space Agency (ESA), comprising 22 Member States, is an international organization that coordinates the financial and intellectual resources of its members to undertake space programmes and activities that exceed the capabilities of any single European nation. ESA's primary role is to develop and implement a comprehensive European space programme, focusing on understanding Earth, its space environment, the Solar System, and the Universe. It also drives the advancement of satellite-based technologies and services, fostering innovation within European industries. ESA collaborates closely with non-European space organizations and operates under the guiding principle of promoting peaceful cooperation in space research and applications, as outlined in its founding Convention.

ESA's purpose includes establishing a unified European space policy, aligning national and international objectives, and progressively integrating national programmes into its broader framework, particularly in developing application satellites. The organization also devises industrial policies aligned with its programmes and provides recommendations to Member States. ESA's membership includes nations such as France, Germany, Italy, and the United Kingdom, with Associate Members like Slovakia and Latvia, while Canada participates in select projects through a cooperation agreement. Countries like Bulgaria, Croatia, and Malta maintain cooperation agreements with ESA, further extending its collaborative reach.

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## New US Space Force Jammers Aim to Disrupt China's SATCOM Signals

Courtney Albon | 19 December 2024

[Source: News Defense | https://www.defensenews.com/space/2024/12/19/new-us-space-force-jammers-aim-to-disrupt-chinas-satcom-signals/](https://www.defensenews.com/space/2024/12/19/new-us-space-force-jammers-aim-to-disrupt-chinas-satcom-signals/)



*The Space Force's Remote Modular Terminal is designed to jam enemy satellite signals and prevent them from targeting U.S. and allied assets. (Isaac Blancas/US Space Force)*

The U.S. Space Force is on track to field its first batch of a new ground-based satellite communications jammer in the coming months — designed to disrupt signals from enemy spacecraft.

Space Operations Command just approved the Remote Modular Terminals for initial fielding, a spokesperson told Defense News Wednesday, adding that the jammers will be in the hands of military users imminently.

The Space Force plans to field 11 systems as part of the first release, giving units a chance to use the system before it's accepted for operations. The program has funding to build around 160, and the service expects to need as many as 200 in the coming years.

The Space Rapid Capabilities Office, a fast-moving acquisition team based at Kirtland

Air Force Base in New Mexico, is the lead for the RMT program. Space RCO Director Kelly Hammett told reporters last week the small, modular terminals are designed to block adversary communications from satellites that are surveilling U.S. and allies, particularly in the U.S. Indo-Pacific Command.

“We want to be able to disrupt their comms and their kill chains and their targeting links,” Hammett said during a Dec. 11 media briefing at the Spacepower Conference in Orlando, Fla. “That’s what these systems are intended to do: to block reception going either from, say, sensors that are that are looking at our joint forces and reporting up to a satellite and back to a battle management node, or vice versa.”

The U.S. is particularly concerned about surveillance satellites China has launched in recent years. The remote systems, called Yaogan, provide continuous, uninterrupted coverage of the Indo-Pacific theater to identify gaps in U.S. and allied forces. The latest version, Yaogan-41, launched to geostationary orbit late last year and can track car-sized objects, according to a January 2024 report from the Center for Strategic and International Studies.

The RMT jammers will essentially “yell in their ear” so the radars can’t command other systems to attack U.S. assets, according to Hammett.

Hammett declined to say where the first systems will be fielded, but said the initial locations have been identified. Speaking this fall at a separate Space Industry Days conference in Los Angeles, Hammett said operators will be able to control the systems from locations in

the U.S. even as they're deployed around the world.

The Space RCO awarded contracts for the program just 18 months ago, working with a small, Virginia-based company called Northstrat. The firm partnered with a larger company, CACI, to leverage mostly off-the-shelf technology to build the terminals.

The terminals themselves are small, Hammett said, and cost roughly \$1.5 million each.

"As far as space electronic warfare goes, you can't get much better than that," he said.

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## US Plans MTCR Policy Overhaul To Deepen Space Ties With India

*Kuldeep Negi | 18 December 2024*

*Source: Swaraj Yamag | <https://swarajyamag.com/news-brief/us-plans-mtcr-policy-overhaul-to-deepen-space-ties-with-india>*



*The GSLV MKIII rocket (Representative Image) (Pic via ISRO website)*

The outgoing Biden administration is working on a national security memorandum to revise export control policies under the Missile Technology Control Regime (MTCR), aiming to enhance collaboration between Indian and US space companies, the White House said on

Tuesday (17 December).

The goal of updating export control policies under the MTCR is to be able to advance commercial space cooperation even further with close partners like India, said White House principal deputy national security advisor Jon Finer.

"We are continuing to take steps to further knock down barriers to private sector cooperation, and importantly, we are in the process of finalising national security memorandum that will update our own export control policies under the Missile Technology Control Regime (MTCR)," Finer said, news agency PTI reported.

Finer, Deputy Secretary of State Kurt Campbell, and Indian Ambassador Vinay Kwatra visited Houston on Tuesday to meet ISRO astronauts training at NASA's Johnson Space Center for a collaborative International Space Station mission planned for next year.

The MTCR, established by G-7 nations in 1987, is a political framework involving 35 member states to curb missile and missile technology proliferation. India became a member of the group in 2016.

"In practical terms, this would mean that US-based companies would face lower barriers in partnering with Indian companies," Finer said.

Finer noted that India and the US are advancing their national space initiatives while deepening their collaborative space partnership.

"Our task as governments is to create a platform for industries to innovate faster together and at scale," he said.

This goal was at the heart of the Initiative on Critical and Emerging Technologies (ICET) that the Biden administration launched in January 2023.

"As part of our ICET initiative, we committed to expand commercial space collaboration," Finer said.

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## Chinese Astronauts Complete World Record-Breaking Spacewalk at 9 Hours

Ling Xin | 18 December 2024

[Source: SCMP | https://www.scmp.com/news/china/science/article/3291280/china-astronauts-complete-world-record-breaking-spacewalk-9-hours](https://www.scmp.com/news/china/science/article/3291280/china-astronauts-complete-world-record-breaking-spacewalk-9-hours)



Two Chinese astronauts aboard the Tiangong space station have broken the world record for the longest single spacewalk, set more than two decades ago by the US space programme.

At 9.57pm Beijing time on Tuesday, Shenzhou-19 crew members Cai Xuzhe and Song Lingdong completed a nine-hour extravehicular activity (EVA), according to the

China Manned Space Agency (CMSA).

The previous record was set on March 11, 2001, when American astronauts James Voss and Susan Helms spent eight hours and 56 minutes outside the space shuttle Discovery during a mission to the International Space Station, according to Nasa.

The nine-hour EVA also marks a milestone in China's spacewalk history. Earlier this year, Shenzhou-18 astronauts Ye Guangfu and Li Guangsu completed a similar mission, spending eight hours and 23 minutes outside Tiangong.

State broadcaster CCTV reported at the time that the second-generation "Feitian" spacesuits worn by the astronauts during the EVA in May were capable of supporting up to eight hours of external work – double the duration of the first-generation suits.

China's first-ever spacewalk occurred in September 2008, when Zhai Zhigang spent just under 20 minutes outside the Shenzhou-7 spacecraft in the first-generation Feitian suit.

Footage from the Tiangong screened at the Beijing Aerospace Control Centre on Tuesday showed Cai and Song leaving the Wentian lab module, tethered to the station with 2-metre safety cables.

Their work was supported by crewmate Wang Haozhe, who remained inside the station, as well as the Tiangong's robotic arms and ground control teams. The CMSA declared the EVA was a "full success".

The mission was especially significant for Song – a former fighter pilot with the PLA Air Force, who became the first Chinese astronaut born in the 1990s to conduct a spacewalk.

For Cai, the mission commander, the record-breaking spacewalk marked his second EVA at the Tiangong.

In November 2022, as part of the Shenzhou-14 crew, Cai completed a 5½-hour spacewalk, the first of its kind following the completion of Tiangong’s T-shaped configuration in low-Earth orbit, about 380km (236 miles) above Earth.

The Shenzhou-19 mission will include further EVAs, along with a large number of scientific experiments and technical tests, according to the CMSA.

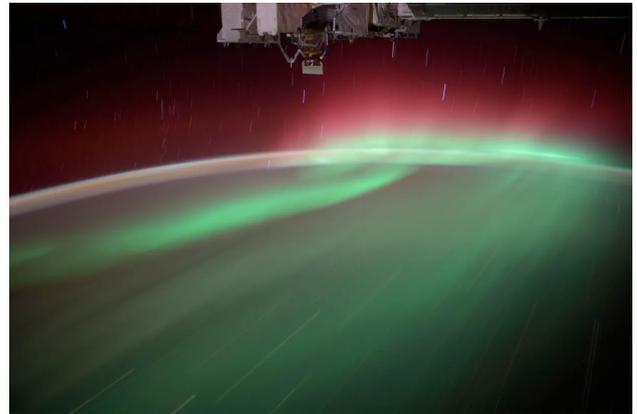
The crew of Shenzhou-19 arrived at Tiangong in late October. They are scheduled to return to Earth in late April or early May 2025, landing at the Dongfeng site in Inner Mongolia.

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## Geomagnetic Storms Cause “Mass Migrations” of Satellites

Jeff Foust | 11 December 2024

Source: [Space News](https://spacenews.com/geomagnetic-storms-cause-mass-migrations-of-satellites/) | <https://spacenews.com/geomagnetic-storms-cause-mass-migrations-of-satellites/>



*An aurora seen from the ISS. Geomagnetic storms that create auroral displays can also affect satellite orbits and, with them, collision avoidance efforts. Credit:*

NASA

WASHINGTON — A pair of major geomagnetic storms this year led to unprecedented “mass migrations” of thousands of satellites in low Earth orbit that create new concerns about space traffic coordination.

The phenomenon was first seen in May during a major solar event called the Gannon storm. That event is best remembered for creating auroral displays in the northern hemisphere at latitudes much further South than normal.

The storm also increased atmospheric density at low Earth orbit altitudes by up to an order of magnitude, said William Parker of the Massachusetts Institute of Technology during a presentation at the annual meeting of the American Geophysical Union here Dec. 9. That increased density results in more drag, affecting satellite orbits.

The first problem was the low accuracy of forecasts of the timing, magnitude and duration of the storm. “As a result of this low skill in our forecasts, SpaceX saw 20 kilometers of position error in their one-day computations” of the orbits of Starlink satellites, he said. “If we’re uncertain in where our spacecraft are by 20 kilometers, then you can throw collision avoidance out the window.”

The problem was compounded by a lack of knowledge of just how inaccurate the forecasts were at the time. “We were pretty confident in those bad solutions,” he said. “Being confident in the wrong answer fundamentally changes the decisions that we’re making whether or not to maneuver the spacecraft.”

The second issue came shortly after the peak of the storm. The increased drag caused satellites’ orbits to decay to the point where they performed maneuvers, often automated, to raise their orbits to the altitudes they were at before the storm. In the last geomagnetic storm of the same magnitude as the Gannon storm, in 2003, there was an increase by a factor of two to three from the baseline of about 10 satellites a day making orbit-raising maneuvers.

After the Gannon storm there was a far sharper response. In one day after the storm, nearly 5,000 satellites, nearly all Starlink, performed orbit-raising maneuvers, far higher than the baseline of about 300 satellites a day. “This is half of all active satellites deciding to maneuver at one time,” Parker said. “This makes it the largest mass migration in history.”

That record, he added, was broken in October after another geomagnetic storm with

a slightly higher number of satellites moving in one day, the difference being the addition of hundreds of Starlink satellites launched in the months between the two events.

Those mass maneuvers further complicate collision avoidance efforts already hampered by the position errors from the storm. “Then we have no idea when a collision is going to happen. We lose that capability for days at a time,” he said.

That wasn’t appreciated at the time by satellite operators, he said, because of a lack of awareness of the position errors and the mass-migration phenomena. “Lots of operators continued to maneuver as if nothing was wrong, but all of those maneuvers were pointless because they didn’t represent reality.”

That underscores the need, he concluded, for improved space weather models and forecasts. “This is a significant impact,” he said. “This is critical infrastructure to all of our space operations moving forward, and it will only become more important as time goes on.”

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## China Launches New Satellite Group

including all-day, all-weather, and high-resolution Earth observation.

Chethan Kumar | 24 November 2024

Source: [English.Gov.in](https://english.www.gov.cn/news/202412/17/content_WS67610da3c6d0868f4e8ee0c4.html#:~:text=TAIYUAN%2C%20Dec.,entered%20the%20preset%20orbits%20successfully) | [https://english.www.gov.cn/news/202412/17/content\\_WS67610da3c6d0868f4e8ee0c4.html#:~:text=TAIYUAN%2C%20Dec.,entered%20the%20preset%20orbits%20successfully](https://english.www.gov.cn/news/202412/17/content_WS67610da3c6d0868f4e8ee0c4.html#:~:text=TAIYUAN%2C%20Dec.,entered%20the%20preset%20orbits%20successfully)



*A Long March-2D carrier rocket carrying the PIESAT-2 09-12 satellites blasts off from the Taiyuan Satellite Launch Center in north China's Shanxi Province, Dec. 17, 2024. The satellite group was launched at 2:50 a.m. (Beijing Time) on Tuesday and has entered the preset orbits successfully. [Photo/Xinhua]*

TAIYUAN, Dec. 17 - China sent a new group of satellites into space on Tuesday from the Taiyuan Satellite Launch Center in northern Shanxi Province.

Launched at 2:50 a.m. (Beijing Time) aboard a Long March-2D carrier rocket, the satellite group, the PIESAT-2 09-12 satellites, entered the preset orbits successfully.

The launch marks the 553rd flight mission of the Long March carrier rocket series.

The four Synthetic Aperture Radar (SAR) satellites, developed by private satellite maker GalaxySpace, feature superior capabilities,

According to Duan Xiao, chief designer of SAR satellite at GalaxySpace, multiple SAR satellites can improve revisit rates for various network applications, supporting high-resolution imaging, high-frequency observation, and regular global coverage.

This enables millimeter-level deformation measurements of targets like dams and bridges, serving applications such as land resources, earthquake monitoring, disaster prevention and mitigation, basic geographic information acquisition, and forestry, Duan said.

GalaxySpace has been continuously improving the overall development capabilities of SAR satellites, with eight batch-produced SAR satellites delivered so far, Duan added.

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## SpaceX Launches Rapid Response GPS Mission

Courtney Albon | 17 December 2024

[Source: Defense News | https://www.defensenews.com/space/2024/12/17/spacex-launches-rapid-response-gps-mission/?utm\\_source=sailthru&utm\\_medium=email&utm\\_campaign=c4-overmatch](https://www.defensenews.com/space/2024/12/17/spacex-launches-rapid-response-gps-mission/?utm_source=sailthru&utm_medium=email&utm_campaign=c4-overmatch)



*The Space Force and SpaceX launched a rapid response mission on a Falcon 9 rocket Dec. 16 from Cape Canaveral Space Force Station, Florida. (Lockheed Martin)*

SpaceX on Monday night launched a secretive rapid response mission for the Space Force, flying a GPS III satellite aboard a Falcon 9 rocket.

The effort, dubbed Rapid Response Trailblazer, was meant to demonstrate the ability to quickly plan and launch a mission in around six months — a process that normally takes around two years.

“The mission successfully demonstrated a complex integration effort across multiple Space Force organizations to pull an existing GPS III satellite from storage, accelerate integration and launch vehicle readiness, and rapidly process for launch,” the Space Force said in a statement.

The launch lifted off from Cape Canaveral Space Force Station in Florida around 7:52 p.m., and the first-stage booster landed on a drone ship after releasing the GPS payload.

The Space Force has proved through its Tactically Responsive Space program that it can quickly launch small payloads on commercial rockets, but this mission was the first to involve a large National Security Space Launch-class payload.

For Rapid Response Trailblazer, Space Force acquirers at Space Systems Command worked closely with operators at Space Operations Command to prepare and integrate the payload for launch. Walt Lauderdale, mission director for Monday’s launch, said that alignment was key to the successful mission.

“This partnership is an example of new and faster ways we can deliver launch in support of future warfighter needs,” Lauderdale said in a statement. “The Space Force quickly energized multiple organizations, and the joint team delivered a specific, important mission to orbit in record time.”

The GPS III satellite that was launched was built by Lockheed Martin and had been in storage awaiting a ride from United Launch Alliance’s Vulcan rocket, which has faced delays and is not yet certified to fly national security missions. Space News reported that the decision to redirect the satellite to a SpaceX Falcon came earlier this year.

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## Global Aerospace Industry

### Japan Selects the T-6 Texan II as its New Trainer Aircraft

Gordon Arthur | 13 December 2024

Source: [Defense News](https://www.defensenews.com/global/asia-pacific/2024/12/13/japan-selects-the-t-6-texan-ii-as-its-new-trainer-aircraft/?utm_source=sailthru&utm_medium=email&utm_campaign=c4-overmatch) | [https://www.defensenews.com/global/asia-pacific/2024/12/13/japan-selects-the-t-6-texan-ii-as-its-new-trainer-aircraft/?utm\\_source=sailthru&utm\\_medium=email&utm\\_campaign=c4-overmatch](https://www.defensenews.com/global/asia-pacific/2024/12/13/japan-selects-the-t-6-texan-ii-as-its-new-trainer-aircraft/?utm_source=sailthru&utm_medium=email&utm_campaign=c4-overmatch)



*A T-6A Texan II rests under a hangar at Vance Air Force Base, Okla., Nov. 3, 2022. (Second Lt. Jonathan Soferr/Air Force)*

CHRISTCHURCH, New Zealand — The Japanese government has selected a new U.S.-built basic trainer aircraft and associated ground equipment for its air force’s pilot training program.

The Japan Air Self-Defense Force, or J.A.S.D.F., will adopt the Beechcraft T-6 Texan II, officials said in late November. Textron Aviation Defense and Japanese partner Kanematsu Corporation had teamed up to bid in the competition.

Japan invited bids in August, and the T-6 was selected ahead of Subaru’s proffer of the Pilatus PC-7 MKX and Daihyaku Shoji, which had teamed up with Turkish Aerospace to offer the Hürkus trainer. Another entry lodged by the Oct.

15 deadline had been Shintoa Trading, but it was rejected as it did not propose any aircraft.

Japan’s Ministry of Defense (MoD) explained that in the second-stage evaluation the T-6 and related ground training equipment had “the highest evaluation score” and was therefore selected as the J.A.S.D.F.’s next-generation basic trainer. The aircraft will be built in the United States rather than license-produced in Japan.

“The T-6 Integrated Training System (ITS) is a proven, highly capable, best-value system which enables the JASDF to fulfill not only their current training requirements, but can also grow and adapt to keep pace with evolving future requirements,” Tom Webster, vice president of sales at Textron Aviation Defense, said.

Japan’s MoD did not state how many aircraft would be acquired, since a contract has not yet been finalized.

The T-6, presumably the T-6C version aimed at export markets, is due to replace 49 examples of the T-7 in the basic trainer role. However, the quantity of T-6s will likely be less than that given that simulators play an important role in the ITS program.

The T-7, manufactured by Fuji Heavy Industries from 2002 onwards, derived from the Beechcraft T-34 Mentor. The T-7 is due to begin retiring in fiscal 2030.

In its fiscal 2025 budget proposal, released in August, the MoD listed a project to “acquire new primary trainer and ground training

equipment with the aim of operating them integrally...to efficiently and effectively train pilots of advanced fighter aircraft.”

Beechcraft’s Texan II has enjoyed recent success in Asia-Pacific. The company is on top to deliver 12 T-6Cs to Vietnam, with the first trio handed over last month. The sale followed Washington’s lifting of a ban on weapon sales to the Southeast Asian country in 2016.

Additionally, Thailand has received 12 T-6TH trainers, and eight AT-6TH Wolverines are in the midst of delivery. An earlier T-6C adopter in the region was New Zealand, which operates 11 examples in the training role.

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## **Defense Bill for 2025 would Delay F-35 Deliveries**

*Stephen Losey | 11 December 2024*

*Source: [Defence Newss](https://www.defensenews.com/air/2024/12/10/defense-bill-would-cut-f-35-purchases-in-2025-delay-deliveries/?utm_source=sailthru&utm_medium=email&utm_campaign=c4-overmatch) | [https://www.defensenews.com/air/2024/12/10/defense-bill-would-cut-f-35-purchases-in-2025-delay-deliveries/?utm\\_source=sailthru&utm\\_medium=email&utm\\_campaign=c4-overmatch](https://www.defensenews.com/air/2024/12/10/defense-bill-would-cut-f-35-purchases-in-2025-delay-deliveries/?utm_source=sailthru&utm_medium=email&utm_campaign=c4-overmatch)*



*Congress is set to cut the number of Lockheed Martin-made F-35s the military wants to buy in 2025 from 68 to 58 under this year’s defense authorization bill. (Airman Belinda Guachun-Chichay/U.S. Air Force)*

Congress is set to allow the military to buy 68 Lockheed Martin-made F-35s in 2025, under this year’s defense authorization

bill — but would prevent the Pentagon from accepting 20 of those jets until it shows how it plans to fix several problems with the Joint Strike Fighter program.

The proposed National Defense Authorization Act for fiscal 2025, which lawmakers released Saturday would allow the Air Force to buy and accept delivery of 30 F-35As. The Marine Corps would get nine F-35Bs, which are the short takeoff and vertical landing variant of the jet, and the Navy and Marine Corps would get nine F-35Cs that can land on an aircraft carrier. The Pentagon’s original budget proposal for 2025, released in March, asked for 42 F-35As, 13 F-35Bs and 13 F-35Cs.

Lawmakers have grown increasingly impatient with the F-35 program, as problems with its Technology Refresh 3 upgrades led to a delivery halt in July 2023 that stretched on for about a year, as newly built jets piled up at Lockheed’s factory in Fort Worth, Texas.

The newest F-35s are now being delivered with an interim version of the TR-3 software and can fly combat training missions, but will not be able to fly in combat until 2025. The military is now withholding about \$5 million per jet in payments to Lockheed until the new F-35s are combat-capable.

A senior staff member for the House Armed Services Committee’s Republican majority told reporters in May that members have “grown frustrated” with the program for the last few years, and cited the delivery halt as a particular

point of displeasure and cause for the delivery reduction. He also said the program needed to fix software and radar problems with the F-35.

A Democratic staffer also told reporters in May that the F-35 program needs to sort out problems with the TR-3 upgrades — which include improved displays, computer memory and processing power — so work on a more expansive set of upgrades known as Block 4 can follow. Block 4 upgrades would include the ability to carry more weapons and better electronic warfare capabilities.

The final 20 deliveries slated for 2025 would only be allowed when the defense secretary tells congressional defense committees how it plans to improve research, development, testing, evaluation, production and sustainment problems across multiple areas in the F-35 program, the NDAA said. And the defense secretary would be required to send Congress annual updates for five years, starting next April, on how the plans to fix the F-35's problems are going.

Rep. Rob Wittman, R-Va., the chairman of the House Armed Services subcommittee on tactical air and land forces, told Defense News on Saturday that the new F-35s are on their way to getting combat capabilities — but that “fencing off” these 20 jets will be necessary to help get the program back on track.

“I’ll give them credit, they have made progress,” Wittman said at the Reagan National Defense Forum in Simi Valley, California. “Now I will say, there is more that needs to be

done, so I want to make sure they maintain the focus there. But I think they have turned the corner in how they have made a meaningful effort to address the [F-35] challenges ... that were just mind-boggling.”

Wittman also said Lockheed Martin’s October decision to put a software engineering specialist, Chauncey McIntosh, in charge of the company’s F-35 operations demonstrates it knows it needs to do better on the jets’ software.

The bill also contains an amendment Wittman proposed earlier this year, which would up the number of developmental test F-35s purchased from six to at least nine.

Congress’ joint explanatory statement for the bill noted Lockheed Martin’s agreement to invest \$350 million of its own money to improve how the F-35 program operates, particularly the development, testing and fielding of new hardware and software capabilities. The statement also encouraged the program’s major subcontractors to consider similarly investing in their F-35 efforts.

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## Cyber Attack on Japan Airlines: A Wake-Up Call for Aviation Security

Elpida Krili | 27 December 2024

[Source: Travelradar | https://travelradar.aero/cyber-attack-on-japan-airlines-a-wake-up-call-for-aviation-security/#google\\_vignette](https://travelradar.aero/cyber-attack-on-japan-airlines-a-wake-up-call-for-aviation-security/#google_vignette)



JA743J Boeing 777-300ER Japan Airlines © John Taggart

In a challenging start of the day, a cyberattack significantly disrupted the operations of Japan's largest airline, Japan Airlines. At 7:24 AM on Thursday, cyber attackers targeted the airline's internal and external systems. This led to a series of malfunctions that ultimately stopped ticket sales for flights departing that day. The cyberattack not only delayed ticketing but also caused more than half an hour's delay for 24 domestic flights by overwhelming JAL's network infrastructure. This event has shaken the global aviation industry highlighting the imperative necessity of rapid measures.

### Cyber Attack on JAL's Network Infrastructure

The attackers launched a distributed Denial-of-Service (DDoS) attack to overwhelm JAL's network infrastructure. They flooded the system with an excessive amount of traffic, hoping to

numb the airline's operational capabilities. Fortunately, they did not cause malware infection or any data breach. This reassured customers that their personal information remained secure. Nevertheless, the impact was significant. It disrupted the travel plans of numerous travellers and posed serious questions about the readiness of airlines to handle such digital threats.

JAL's IT team rapidly responded to mitigate the attack's effects, and they resumed full system operations shortly after. The airline also apologized for the inconvenience caused to passengers and assured that efforts were underway to resolve the issue. Currently, nine flights have been delayed due to the system failures, with further disruptions expected. In addition, JAL posted a statement on the social media platform X (formerly Twitter), confirming the breach.

### Strengthening Defences Against Cyber Threats

The recent cyberattack on Japan Airlines highlights the significant challenges that such incidents pose to the aviation industry. However, the Japanese government swift reaction is noteworthy. Particularly, Chief Cabinet Secretary Yoshimasa Hayashi directed JAL to repair its systems quickly.

This action addressed customer concerns effectively and emphasised the seriousness with which such threats are treated. Interestingly, other major carriers like ANA Holdings and regional airlines such as Skymark Airlines and Star Flyer reported no issues. This highlights that the attack exclusively targeted JAL.

However, the series of malfunctions extended beyond the airline itself. Japan Post Co. confirmed that mail and parcel deliveries were affected due to JAL's flight delays.

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## **Saudi Arabia Considers Purchasing 100 KAAN Fighter Jets from Türkiye**

26 December 2024

*Source: [Turkiye Today](https://www.turkiyetoday.com/turkiye/saudi-arabia-considers-purchasing-100-kaan-fighter-jets-from-turkiye-media-97685/) | <https://www.turkiyetoday.com/turkiye/saudi-arabia-considers-purchasing-100-kaan-fighter-jets-from-turkiye-media-97685/>*



*Türkiye's Kaan fighter jet. (TAI Photo)*

Saudi Arabia is reportedly evaluating the acquisition of 100 KAAN fifth-generation fighter jets from Türkiye, signaling a potential deepening of defense industry cooperation between the two nations.

According to a report by Milliyet, high-level discussions have been held in Istanbul between Turkish and Saudi defense officials, including head of the Presidency of Defense Industries Haluk Gorgun, Saudi Deputy Minister of Defense Khaled Bin Hussein Al Biyari, and Saudi Air Force Commander Turki bin Bandar Al Saud.

## **Strategic talks Centered on KAAN Fighter Jet**

The meetings, which span three days, are aimed at establishing collaboration on large-scale defense projects such as KAAN, Türkiye's indigenous fifth-generation fighter jet.

Saudi Arabia, as part of its Vision 2030 strategy, seeks to bolster domestic defense production capabilities while forming strong international partnerships. The potential acquisition of 100 KAAN aircraft aligns with these objectives, representing a significant investment in advanced military aviation technology.

## **Saudi Interest Grows Following Akinci UCAV Purchase**

This development follows Saudi Arabia's earlier acquisition of Türkiye's Akinci unmanned combat aerial vehicle (UCAV).

If the sale goes through, it could set a record for Türkiye's exports. However, Saudi Arabia may seek joint production and technology transfer for the KAAN, similar to the arrangement made for the Bayraktar Akinci UCAV.

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## India's Aerospace Industry

### Ensure HAL Expedites Production of Tejas Amid Shortage: Parliamentary Panel to MoD

Ajay Banerjee | 13 December 2024

Source: [Tribune India](https://www.tribuneindia.com/news/india/ensure-hal-expedites-production-of-tejas-amid-shortage-parl-panel-to-mod/) | <https://www.tribuneindia.com/news/india/ensure-hal-expedites-production-of-tejas-amid-shortage-parl-panel-to-mod/>



*The IAF requires 42 fighter squadrons to prepare for a two-front war with Pakistan and China but currently operates only 31 active squadrons. file*

The Parliamentary Standing Committee on Defence has called on the Ministry of Defence (MoD) to ensure Hindustan Aeronautics Limited (HAL) accelerates production of Tejas fighter jets to address the Indian Air Force's (IAF) dwindling squadron strength. The committee, headed by BJP MP Radha Mohan Singh, presented its report in Parliament on Tuesday.

Highlighting the urgency of the matter, the committee stated, "The MoD must sensitise HAL to augment Tejas production so that the operational role of the IAF is not compromised due to the depletion in squadron strength." It also urged the ministry to expedite the procurement of contracted fighter aircraft.

The IAF requires 42 fighter squadrons to prepare for a two-front war with Pakistan and China but currently operates only 31 active squadrons, each comprising 16-18 jets. The Parliamentary panel noted that the delay in the delivery of 83 Tejas Mark-1A jets ordered from HAL has further exacerbated the shortfall.

The order, worth Rs 48,000 crore, was expected to begin delivery in March, but not a single jet has been delivered to date. HAL has now been directed to increase production capacity. The MoD, which holds a majority stake in HAL, has assured the committee that steps were being taken to address the issue.

The IAF has also initiated the process for acquiring additional 97 Tejas Mark-1A jets, with the Defence Acquisition Council granting preliminary approval. A formal request for proposals has been issued.

Meanwhile, the IAF faces significant challenges with the planned retirement of ageing aircraft. Two squadrons of Soviet-era MiG-21 jets will be phased out over the next year, while the Jaguar, MiG-29 and Mirage 2000 fleets — approximately 250 jets inducted during the 1980s — are set to retire in batches after 2029-30.

The committee was briefed on the Modernisation of Airfields Infrastructure (MAFI) programme, which has equipped 52 airfields with advanced systems. Additionally, a project to build next-generation hardened aircraft shelters at forward airfields is underway to protect critical assets from enemy strikes.

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## HAL to Start Trial of New Tejas Fighter Jet in January Next Year

Rahul Singh | 25 December 2024

*Source: Hindustan Times | <https://www.hindustantimes.com/india-news/hal-to-start-trial-of-new-tejas-fighter-jet-in-january-next-year-101735068257239.html>*



*The first aircraft was to be delivered to the IAF by March 31, 2024. (HT Photo)*

State-run plane maker Hindustan Aeronautics Limited (HAL) is set to begin in January 2025 critical trials on the new Tejas light combat aircraft (LCA Mk-1A), involving the testing of the indigenous Astra beyond-visual-range missile, the aircraft's locally made electronic warfare suite and the Israeli Elta radar, as it now targets a March 31 deadline to deliver the first fighter jet to the Indian Air Force after completing the necessary certification requirements, senior officials aware of the matter said on Tuesday.

Simultaneously, HAL is in talks with US firm GE Aerospace to expedite the delivery of the F404 engines for the new aircraft, with top Indian officials visiting America earlier this month to get a first-hand assessment of the 404 production line that has been restarted at a facility near Boston, the officials said, asking not to be named.

GE has not committed to a delivery schedule for the 99 engines on order, but the US engine maker indicated to the Indian delegation, led by HAL chief DK Sunil, that the production issues have been resolved and the supply of the first units could begin in March 2025, HT has learnt.

The first few LCA Mk-1As are expected to be delivered to the IAF with reserve engines that will be replaced with the F404s as and when GE begins supplying them.

“The upcoming Astra missile firing, the electronic warfare suite testing and the ongoing software updates on the new systems are the final processes before HAL can deliver the first LCA Mk-1A to the IAF, which wants the aircraft to be delivered with a certain capability. The project has been plagued by some delays, but HAL has the capability and capacity to catch-up in production once the F404 engines start coming in,” said one of the officials cited above. The electronic warfare suite consists of the radar warning receiver and the advanced self-protection jammer.

The first aircraft will be delivered to the IAF in the desired configuration by March 31, he added.

The IAF is concerned about the current pace of the LCA Mk-1A programme because of the possible risks a delay in the induction of new fighter planes could pose to the Air Force's combat effectiveness. The Air Force ordered 83 Mk-1A fighters for ₹48,000 crore in February 2021 and plans to buy 97 more Mk-1As at a cost of around ₹67,000 crore.

The first aircraft was to be delivered to the

IAF by March 31, 2024, but that didn't happen due to a combination of factors including delays in some key certifications and GE's inability to supply the engines on time. The US firm should have delivered six engines to HAL in the financial year 2023-24.

"GE had stopped the F-404 production line at Lynn in Massachusetts a few years ago. When they restarted that production line there were some issues related to the certification of parts and components. Those issues have been fixed. HAL officials also held talks with GE's critical vendors earlier this month, and things seem to be on track now," said a second official.

To be sure, there is still no clarity on the final delivery schedule though both GE and HAL are optimistic about the early supply of engines after the latest round of talks. HAL will keep building the planes and delivering them to the IAF with Category B engines (reserve ones), which will be replaced by the F404s when they arrive.

Replacement does not take time, but the numbers that GE can deliver every year will be clear only after the first engine rolls out of the production line in Massachusetts, said the first official.

HAL has set up a new production line in Nashik for LCA Mk-1As to meet IAF's growing needs. The state-run firm says it can build 16 LCA Mk-1As every year in Bengaluru, and the Nashik line will help it ramp up production to 24 jets.

LCA Mk-1A is an advanced variant of the

LCA Mk-1, which has already been inducted by the IAF. LCA is set to emerge as the cornerstone of IAF's combat power in the coming decade and beyond.

IAF, the world's fourth largest Air Force, is expected to operate around 350 LCAs (Mk-1, Mk-1A and the future Mk-2), with a third of those already ordered, some inducted, and the rest figuring prominently on the Air Force's modernisation road map and expected to be contracted in the coming years.

In October, IAF chief Air Chief Marshal AP Singh said HAL must stick to its promise of producing 24 aircraft every year to offset the delay, while stressing that lessons learnt should guide critical future projects, including the LCA Mk-2 and the Advanced Medium Combat Aircraft (AMCA), a stealth fighter.

HAL is also negotiating a deal with GE Aerospace for the joint production of F414 engines in India. The two firms signed a memorandum of understanding in Washington in June 2023 to produce 99 F414 engines for the LCA Mk-2 programme. The deal will involve 80% transfer of technology (ToT) and is estimated to be worth around \$1 billion.

The joint production of the engines will help the country overcome a striking technology gap, lay the foundation for indigenous development of bigger jet engines and possibly open doors to exports.

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## Vietnam, India Close to Finalising BrahMos Deal

Sidhant Sibal | 22 December 2024

*Source: WION | <https://www.wionews.com/world/exclusive-vietnam-india-close-to-finalising-brahmos-deal-786028>*



*Brahmos missile (Representative image)  
Photograph:(Agencies)*

India and Vietnam are closer than ever to signing a USD 700 million BrahMos missile system deal as both sides plug in more procedural details. The deal could be signed as early as in a couple of months, and it is learnt that the initial techno-commercial details have already been shared and discussed by the Vietnamese Defence Ministry. Orders are expected from both the Vietnamese Army and Navy.

BrahMos missile is developed by BrahMos Aerospace, a collaboration between India's Defence Research and Development Organisation (DRDO) and Russia's NPO Mashinostroyeniya.

If this deal materialises, then Vietnam will be the second country after the Philippines to purchase the BrahMos supersonic cruise missiles from India.

Vietnam, it is understood, has been waiting for some time for the draft agreement, which includes the final deal amount, delivery

timeline, payment terms, etc., from BrahMos Aerospace (BAPL).

The development comes at a time when BrahMos's top brass faces leadership challenges over the appointment of new CEO and MD, Dr. Jaiteerth Raghavendra Joshi.

Dr. Sivasubramanyam Nambi Naidu has legally challenged Dr. Jaiteerth R. Joshi's appointment as CEO of BrahMos Aerospace, citing issues of seniority and merit.

The case, filed at the Central Administrative Tribunal in Hyderabad, has its next hearing scheduled in a few days. While talks over BrahMos have taken place, Vietnam in the past procured Bastion-P (K-300P) coastal defence missile systems from Russia, with the first delivery occurring in 2011.

India and Vietnam have been firming up defence ties. Earlier this week, the India Pavilion at Vietnam International Defence Expo VIDE24 was jointly inaugurated by Vietnam's Minister of Public Security, Gen Luong Tam Quang, Indian Secretary-Defence Production, Sanjeev Kumar, and Indian Ambassador to Vietnam, Sandeep Arya.

VIDE24 showcases the latest global defence technologies, including those from India. BrahMos Aerospace from India was one of the exhibitors, along with DRDO, HAL, and Mazagon Dock Shipbuilders.

India's Vice Chief of the Army Staff, Lieutenant General N. S. Raja Subramani, is also on a visit to the country and attended VIDE 2024. During the official visit to Vietnam, Lieutenant

General NS Raja Subramani attended the 80th Anniversary of the Vietnam People's Army (VPA) at the National Convention Centre, Hanoi.

An Army statement said, "This visit further strengthens collaboration between the armies of the two nations, which is grounded in strategic collaboration and trust and is crucial for enhancing security in the Indo-Pacific, thereby ensuring a stable and prosperous region for all."

In 2022, India handed 12 high-speed guard boats to Vietnam, built under India's \$100 million Defence Line of Credit. The following year, India announced the gifting of an indigenously built missile corvette, INS Kirpan, to Vietnam. Both countries have a mutual logistics support agreement that allows use of each other's military bases for repair and replenishment. India has also been training Vietnamese personnel.

A 50-member Indian defence contingent participated in the fourth edition of the VINBAX – 2023 military exercises in Vietnam in December 2023 on UN peacekeeping scenario. Vietnam's navy ship participated in international maritime exercise MILAN in India in February 2024.

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## Manastu Space Hands Over Green Propulsion System to DRDO

11 December 2024

Source: [Deccan Herald](https://www.deccanherald.com/business/manastu-space-hands-over-green-propulsion-system-to-drdo-3313059) | <https://www.deccanherald.com/business/manastu-space-hands-over-green-propulsion-system-to-drdo-3313059>



Mumbai-based deep-tech start-up Manastu Space Technologies on Wednesday handed over its green propulsion technology, used to keep satellites in desired orbits, to DRDO. Credit: X/@DrdoTdf

Mumbai-based deep-tech start-up Manastu Space Technologies on Wednesday handed over its green propulsion technology, used to keep satellites in desired orbits, to DRDO.

Founders of the start-up Tushar Jadhav and Ashtesh Kumar handed over the iBooster Green Propulsion System to Defence Research and Development Organisation Chairman Satish Kamat.

Designed specifically for 100–500 kg satellites, the iBooster system facilitates critical operations such as orbit raising, station-keeping, and deorbiting.

The technology will be tested in space onboard an upcoming mission of the Polar Satellite Launch Vehicle by ISRO to demonstrate the system's capabilities on a global stage.

The proprietary hydrogen peroxide-based fuel ensures enhanced performance, safety, and sustainability compared to conventional toxic fuels and other exorbitantly expensive alternate fuels.

This unique propulsion system offers unmatched efficiency and reliability, in supporting DRDO's satellite missions to enhance India's defense, it said.

The four-year research was supported by DRDO's Technology Development Fund (TDF), and showcased the growing role of Indian startups in advancing national defense and space capabilities.

The proprietary innovations include use of hydrogen peroxide-based fuel, which is safer and eco-friendly, an optimized thruster design for efficiency and precision and a high-temperature catalyst, ensuring seamless ignition and endurance in space.

"Delivering this technology to DRDO is a proud milestone for us. It reflects our commitment to creating greener, safer, and highly efficient solutions for space exploration," Tushar Jadhav, co-founder of Manastu Space said.

Jadhav said the collaboration with DRDO highlighted the strength of innovation and collaboration in advancing India's aerospace capabilities.

Founded in 2017 by Jadhav and Kumar, Manastu Space Technologies is a pioneer in sustainable space innovation.

It specializes in propulsion systems and satellite technology, the company addresses critical challenges in space safety and sustainability.

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## India Signs Rs 13,500 Crore Deal for Advanced Indigenous Su-30MKI Jets

Shivani Sharma | 13 December 2024

*Source: India Today | <https://www.indiatoday.in/india/story/india-signs-rs-13500-crore-deal-for-advanced-indigenous-su-30mki-jets-2649248-2024-12-13>*



*An order worth USD 1.3 billion for the manufacture of 12 new Sukhoi Su-30MKI fighter jets was approved in September, 2023. (File photo)*

In a major push to strengthen its air power, India has inked a Rs 13,500 crore deal with Hindustan Aeronautics Limited (HAL) for 12 indigenous Su-30MKI fighter jets.

The agreement, signed on December 12, 2024, marks a significant step towards self-reliance under the Aatmanirbhar Bharat initiative and bolsters the Indian Air Force's (IAF) operational capabilities.

The new Su-30MKIs, featuring 62.6% indigenous content, will be produced at HAL's Nasik division, with key components supplied by Indian defence industry partners.

These jets are part of a broader modernisation plan that includes upgrading 84 Su-30MKIs under the "Super Sukhoi" project. The upgrades aim to maintain the aircraft as a formidable force in modern warfare by enhancing their combat capabilities with cutting-edge technology.

### Key Features of the Upgraded Su-30MKI Include:

- Next-generation AESA radar for superior target tracking, electronic warfare, and enhanced situational awareness.
- Advanced avionics and digital cockpit systems for better mission processing and integration with modern air defence networks.
- Enhanced weaponry, including the BrahMos - A cruise missile, Astra BVR missiles, and precision-guided munitions, making the aircraft versatile for diverse missions.
- State-of-the-art electronic warfare suite for robust protection against radar and missile threats.
- Upgraded AL-31FP engines for improved thrust, fuel efficiency, and enhanced high-altitude performance.
- Advanced data link systems to enable real-time coordination with other platforms like drones, AWACS, and ground stations.
- Indigenous systems such as mission computers and flight controls, reducing dependency on imports and boosting

domestic defence manufacturing.

The acquisition comes at a critical time for the IAF, which is addressing a depleting squadron strength. Defence experts have hailed the move as a vital investment in India's long-term strategic preparedness.

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## Adani Group Expands Aviation Reach with ₹400 Crore Acquisition of Air Works Group

23 December 2024

Source: *Economics Times* | [https://economictimes.indiatimes.com/industry/transportation/airlines/-aviation/adani-group-expands-aviation-reach-with-400-crore-acquisition-of-air-works-group/articleshow/116598031.cms?utm\\_source=contentofinterest&utm\\_medium=text&utm\\_campaign=cppst](https://economictimes.indiatimes.com/industry/transportation/airlines/-aviation/adani-group-expands-aviation-reach-with-400-crore-acquisition-of-air-works-group/articleshow/116598031.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst)



The Adani Group announced on Monday its acquisition of Air Works, India's largest private aviation maintenance, repair, and overhaul (MRO) services firm, for an enterprise value of ₹400 crore. The deal, executed through Adani Defence Systems & Technologies Ltd (ADSTL), includes an 85.8% shareholding in the company.

Air Works, with operations in 35 cities and a workforce of over 1,300 professionals, brings expertise in servicing fixed-wing and rotary-wing aircraft. The acquisition enhances Adani's capabilities in both civil and defense aviation MRO, marking a critical step in the group's expansion into integrated aviation services.

Air Works provides comprehensive aviation services, including line maintenance, heavy checks, avionics, aircraft painting, interior refurbishment, and redelivery checks for both Indian and global clients. It conducts base maintenance for narrow body, turboprop, and rotary aircraft from its facilities in Hosur, Mumbai, and Kochi. The company also holds regulatory approvals from aviation authorities in over 20 countries, further solidifying its position as a leader in the sector.

Adani Airports Director Jeet Adani emphasized the transformative growth in India's aviation industry, now the third-largest globally, with plans to induct over 1,500 aircraft in the coming years. "This acquisition aligns with our vision to create an integrated aviation services ecosystem that strengthens India's aviation infrastructure. Together, we aim to shape the future of India's skies," he said.

Air Works has also built significant defense MRO capabilities, supporting the Indian Navy's P-8I aircraft and the Indian Air Force's 737 VVIP fleet. The acquisition is expected to bolster domestic MRO capabilities, aligning with the government's Aatmanirbhar Bharat initiative.

Ashish Rajvanshi, CEO of Adani Defence & Aerospace, noted the strategic importance

of the deal. "This landmark acquisition is a commitment to scaling domestic capabilities and delivering full-spectrum MRO services for commercial and defense sectors," he said.

Adani Defence & Aerospace, a division of the Adani Group, specializes in designing and manufacturing advanced defense systems. With the Air Works acquisition, the group aims to strengthen India's aviation infrastructure and build a robust ecosystem for both civil and defense aviation.

The move marks a significant milestone in Adani's journey to becoming a key player in India's aviation and defense sectors, ensuring the nation's skies are secure and its aviation services globally competitive.

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## Aviation Hazards

### Fog, Fuel, and GNSS Disruptions: The Tragic Azerbaijan Airlines Plane Crash and Lessons for the Aviation Industry

Group Capt MJ Augustine Vinod | 26 December  
2024

Source: First Post | <https://www.firstpost.com/opinion/fog-fuel-and-gnss-disruptions-the-tragic-azerbaijan-airlines-plane-crash-and-lessons-for-aviation-industry-13847559.html>



*In this photo taken from a video released by the administration of Mangystau region, the wreckage of Azerbaijan Airlines Embraer 190 lies on the ground near the airport of Aktau, Kazakhstan, Wednesday, December 25, 2024. AP*

The crash of Azerbaijan Airlines Flight J28243, an Embraer 190, serves as a grim reminder of the complexities and vulnerabilities of modern aviation. Scheduled to fly from Baku, Azerbaijan, to Grozny, Russia, the flight ended in tragedy when it was forced to divert to Aktau, Kazakhstan, after a series of compounding failures. Among the key factors in this disaster were adverse weather conditions, specifically dense fog at Grozny, fuel mismanagement, and GNSS (Global Navigation Satellite Systems) disruptions. The combination of these elements created a fatal chain of events, leaving critical lessons for the aviation industry.

### The Flight's Fatal Journey

Flight J28243 began its journey as a routine operation but quickly descended into chaos. Grozny Airport, the intended destination, was shrouded in dense fog, rendering visibility inadequate for a safe landing. Fog is one of the most challenging weather phenomena for pilots, as it severely restricts visibility and requires precision navigation and decision-making.

Faced with this situation, the flight crew decided to divert to Aktau, Kazakhstan. However, reports suggest that the aircraft encountered GNSS disruptions en route to Grozny, including GPS jamming and spoofing. These disruptions likely caused deviations from the intended flight path, resulting in additional fuel consumption as the crew worked to regain control. By the time the diversion to Aktau was initiated, the aircraft's fuel reserves were critically low. This delay proved fatal, as the aircraft ran out of fuel before reaching the alternate airport, crashing in unforgiving terrain.

### Fog: The First Domino

The dense fog at Grozny was the initial and most significant factor in this chain of events. Modern airports equipped with Instrument Landing Systems (ILS) can handle low-visibility conditions, but such operations require CAT I or better weather minima and pilots trained for such approaches. In this case, Grozny's visibility conditions exceeded safe limits, forcing the crew to abandon their landing attempt. The presence of fog highlights the importance of robust alternate airport planning and timely diversion decisions.

## Aircraft Hit: Second Domino

Possibility of a hit on the aircraft by either a bird or a weapon of sorts also cannot be ruled out. Did that cause fuel leak/crash remains to be seen. That's the second domino.

## Role of GNSS Disruptions

Adding to the complexity of the situation was the reported GPS jamming and spoofing encountered by the flight. These forms of GNSS disruption are particularly dangerous in poor visibility conditions, where reliance on accurate navigation data is paramount.

**Jamming:** GNSS jamming blocks satellite signals, rendering navigation systems ineffective. Without these systems, pilots are forced to rely on manual navigation or less accurate backup systems.

**Spoofing:** GPS spoofing introduces false signals, causing navigation systems to display incorrect positions. This can lead to significant deviations from planned routes and increased fuel consumption.

For Flight J28243, these disruptions likely caused the aircraft to stray off course en route to Grozny. The resulting course corrections consumed precious fuel, leaving the aircraft with insufficient reserves to reach its alternate destination.

## Fuel Exhaustion: The Final Blow

Fuel management is critical during irregular operations (IROPS), particularly in adverse weather conditions. Diversions must be initiated

promptly to preserve fuel reserves, and alternate airports must be carefully selected to ensure suitability. In this case, the delayed decision to divert, combined with the additional fuel burn caused by GNSS disruptions, left the aircraft with no margin for error.

As the aircraft approached Aktau, its engines flamed out due to fuel exhaustion. The crew attempted a glide landing, but the terrain near Aktau was unforgiving. Without favourable terrain or sufficient altitude, the aircraft crashed, resulting in a tragic loss of life.

## Lessons from the J28243 Crash

The crash of Flight J28243 highlights several critical lessons for the aviation industry:

- 1. Weather Preparedness and Alternate Planning:** Fog at Grozny was the primary catalyst for the diversion. Alternate airports must meet stringent criteria, including CAT I weather minima, to ensure they can accommodate diverted flights under all conditions.
- 2. Timely Diversion Decisions:** The delay in initiating the diversion to Aktau reduced the flight crew's options and safety margins. Early decision-making is essential to avoid scenarios where fuel reserves are critically low.
- 3. Impact of GNSS Disruptions:** The navigation deviations caused by GPS jamming and spoofing exacerbated the situation, increasing fuel consumption and disorientation during an already challenging flight. Pilots and operators must be prepared

for such risks, particularly in regions prone to GNSS interference.

4. **Fuel Planning in High-Risk Scenarios:** Airlines operating in areas with known GNSS disruption risks must account for additional fuel consumption in their planning. Conservative fuel reserves and real-time monitoring of operational risks are critical.

J28243 is a tragic reminder of the interplay between operational decision-making, adverse weather, and technological vulnerabilities. Dense fog at Grozny forced the crew to divert, while GNSS disruptions and delayed decision-making compounded the fuel crisis. The crash was not the result of a single failure but a series of interconnected factors, each exacerbating the next.

### **The Case for Technological Resilience**

The J28243 crash also underscores the need for more robust navigation systems to counter GNSS disruptions. Key technologies that can enhance resilience include:

1. **Satellite-Based Augmentation Systems (SBAS):** SBAS improves the accuracy, reliability, and integrity of GNSS signals, reducing the impact of jamming and spoofing. Wider adoption of SBAS can significantly enhance safety in regions with frequent GNSS disruptions.

2. **Multi-Frequency GNSS Receivers:** These systems provide better resistance to interference and can operate even under degraded conditions. They act as a safeguard against malicious GNSS disruptions.

3. **Inertial Navigation Systems (INS):** INS provides reliable navigation data independent of GNSS signals. Integrating INS with existing systems can mitigate the impact of GNSS disruptions.

Moving forward, the aviation industry must address these vulnerabilities by improving weather preparedness, ensuring timely diversion decisions, and adopting resilient navigation technologies. Proactive measures are essential to prevent similar tragedies and ensure the safety of all who take to the skies. Only by learning from incidents like J28243 can we hope to build a safer future for aviation.

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### **Conclusion: A Preventable Tragedy**

The crash of Azerbaijan Airlines Flight

## Further Reading

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*“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.”*



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