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"Air power is indivisible. If you split it up into compartments, you merely pull it to pieces and destroy its greatest asset - its flexibility."

- Field Marshall Bernard Montgomery, British Army.
The Journal of the Royal United Service Institution, November 1954

Contents

Opinions and Analysis

Air Power

Space

Global Aerospace Industry

Indian Aerospace Industry

Technology

Opinions and Analysis

Conflict in West Asia and War in Ukraine: Supply Chain Impact on Indian Defence Sector

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

28 October 2023

Source: FirstPost | https://www.firstpost.com/opinion/conflict-in-west-asia-and-war-in-ukraine-supply-chain-impact-on-indian-defence-sector-13312202.html

BrahMos supersonic cruise missile. Image: X/ @ DDNational

The never ending and somewhat stalemated conflict in Ukraine has crossed 600 days. Within a few initial months, Russia took control of nearly 20 per cent of Ukrainian territory. Ukraine has received a large amount of military equipment from the US and other mostly Western countries amounting to over $150 billion. The items included fighter jets, helicopters, tanks, artillery guns, anti-tank weapons, vehicles, AD systems, Missiles, UAVs, drones, military gear, ammunition, among others. US President Biden plans to request the Congress for $100 billion more in funding that would include money for Israel and Ukraine.

Meanwhile, Russia has been closer to China and also become friendlier with Iran. The Ukrainian counter-offensive did not work out as planned. The Russian army was continuing its military operations in areas where it could improve its position. Russia is likely to take advantage of shifted global attention and launch a fresh ground offensive aiming to break through Ukrainian defences. Clearly it can be a protracted war.

The large-scale surprise attack by Hamas militants from Gaza against Israel on 7 October 2023, left hundreds of Israelis dead, and many more injured. Very significant numbers, including a few Israeli soldiers were taken hostage. The multi-pronged attack included rocket strikes, forced militant crossing into Israel, and commando entry using motor gliders. Israel responded promptly with retaliatory airstrikes followed by a formal declaration of war. Israel also cut off fuel, electricity, water, and food supplies to the Gaza strip. Massive Israeli air assault continues using stand-off weapons. There have been a large number of casualties on both sides and numbers continue to increase. Israel is getting all set for the ground offensive to weed out all Hamas presence from the Gaza strip. There is also a risk of Iranian backed Hezbollah opening a front from Lebanon. Both sides are apportioning blame on each other for the bombing of a hospital that resulted in many deaths. With over 3,500 Palestinian deaths already, there is a sympathy wave for innocent civilians. The world is trying to prevent an expanded conflict that could engulf the region with more global and regional powers taking sides.

Military Equipment Used in Ongoing Conflicts

The world is closely watching the use of both Russian and Western equipment being used in Ukraine. The vulnerability of the tank and

other ground targets from anti-tank missiles and kamikaze drones got highlighted. Similarly, large ships being vulnerable to cruise missiles, was a lesson. Success of ground-based air defence systems meant air denial to Russian air power which was forced to use expensive stand-off weapons. Blockade of Ukrainian Black Sea ports showed the importance of sea power. Unmanned sea-surface and submarine vehicles were also used. Hypersonic missiles were used operationally for the first time. There is a need to assess the efficacy of using expensive hypersonic weapons against static strategic targets, vis-à-vis use of conventional cruise or ballistic missiles. Among the others, the importance of Satellite based Command, Control, Communication, Computers, Intelligence, Surveillance Reconnaissance (C4ISR); AEW&C and JSTAR; UAVs; anti-drone systems; and directed energy weapons; got highlighted.

Failure of Israeli intelligence agencies to monitor such large rocket stocking by Hamas, and to anticipate a massive assault is being questioned. In Israel-Hamas conflict, additionally, used were ground launched rockets; motor gliders; precision-strike aerial weapons; AD systems to take-on rockets; laser weapons etc. Also the accuracy and lethality of weapons vis-à-vis the cost is being evaluated. Iron Dome's capability to take on a huge barrage of rockets has been questioned. Containing co-lateral civilian casualties in a densely populated area is a challenge despite precision weapons. This is more so when civilians are being used as human shields. It requires a high degree of intelligence.

War Impact on Military Supplies from Russia

India has been buying Soviet/Russian weapon systems since the 1950s when the USA chose to align with Pakistan. At its peak, India had nearly 85 per cent military equipment of Russian origin. Even after the Soviet Union imploded and became weak economically, the decoupling from Russia was not easy.

Today, nearly 60 per cent of Indian armed forces are of Russian origin. While India has been consciously trying to reduce dependence on Russian arms, but yet, between 2011 and 2021 India's import from Russia arms worth $22.8 billion. India's imports from the Western countries including Israel were $13.5 billion or around 60 per cent as from Russia for the same period.

For a long India has been making payments to Russia in dollars. Immediately after the Russian invasion, the USA had imposed sanctions and put restrictions on dollar payments to Russia. India had already ordered some major equipment from Russia including the S-400 AD system. Also India purchased large quantities of crude oil from Russia in the last year. All these payments had to be made in Indian Rupees. There is only finite amount that Russia can accept in this de-facto barter system. This would mean delays in payments, and in turn, supplies of some systems.

Russian Armed Forces require a continued supply of weaponry to continue the war in Ukraine, therefore production capacities have got diverted to their own needs. This also affects foreign sales, even though arms exports are an important source of foreign exchange for Russia.

Among the major Russian systems with India are Indian Army's T-72 and T-90 main battle tanks, BMP-2 infantry fighting vehicles, Smerch multiple rocket-launch systems, and mobile and static air defence systems. Indian Navy has Vikramaditya (modified Kiev-class) aircraft carrier, Soviet

Kilo-class attack submarines, Soviet Kashin-class guided-missile destroyers, Soviet Krivak-class frigates, Soviet Pauk-class corvette, and Soviet–Polish Polnocnyclass amphibious warfare vessels, among a few others. Indian Navy also has a fleet of MiG-29 fighters, Il-38 maritime-patrol aircraft, and Ka-28 anti-submarine and maritime patrol helicopters. The Indian Air Force (IAF) has a large fleet of Su-30 MKI, upgraded MiG-29s, some MiG-21 Bison, Il-78 aerial tankers, Il-76 heavy transports, An-32 medium transports, and a large number of Mi-17 transport helicopters. IAF has very significant Russian aerial missiles (R-27, RVV-AE, R-73, Klub cruise missile and others), bombs (KAB, and others), and rockets in its inventory. The three services operate some Russian ground based radars, and AD weapon systems like Pechora, OSA, and Igla. BrahMos is a joint venture to produce cruise missiles. The AK-203 assault rifle will be produced in India.

In July 2022, the US government granted India a waiver in for the Countering America's Adversaries Through Sanctions Act (CAATSA), that allowed India to continue to receive the S-400s.

The war in Ukraine has caused delays in supplies of systems ordered and has impacted supplies of Russian spares and aggregates, along with hampering the munitions supply chain. It will impact the Su-30 MKI upgrade plan. India had been negotiating with Russia to acquire a few more MiG-29s and SU-30s. This may also be affected. IAF was also reportedly forced to cancel/postpone plans to purchase 48 Mi-17 V5 helicopters from Russia. Some of these will affect its overall modernisation plan. Acquisition of additional Russian Ka-31 airborne early warning and control helicopters for the Indian Navy has been postponed. The proposal for Ka-226T helicopters may also be shelved, giving boost to the indigenous LUH. There has been delay in supply of two frigates currently under construction for the Indian Navy because of delays in Russia supplied components. BrahMos missiles have been ordered in significant numbers. Some parts have to come from Russia. Also the newer variants of BrahMos have to be developed. Similarly there is a need for some other weapons.

The most important ongoing Russian system under delivery is the S-400 Triumf air defence system bought by India in 2018 for $5.4 billion. Three of these systems have been delivered and two more are awaited. They are bound to be delayed. IAF could not use up its capital budget allotments because of this.

Spares are also required for repairs and overhauls that are done in India. Some items still go to Russia for repairs and overhaul. Some of these supplies are getting delayed and could impact fleet serviceability. IAF also sources many An-32 spares from Russia.

This has underscored the need for India's self-reliance in the defence industry. For some time, India has been working towards diversifying away from the Russian arms basket. The war in Ukraine will actually hasten that process.

While Russian President Putin announced a large-scale effort to build up capacity to produce more weapons for the war, the same may not be the case for the exports. In fact, Russia has been seeking back some critical spares from India and some other clients.

Supplies from Ukraine

The bilateral trade between India-Ukraine was $2.8 Billion pre-Covid-19, in 2018-19. India was Ukraine's largest export destination

in the Asia-Pacific and the fifth largest overall export destination. The main items imported by India from Ukraine are chemicals, equipment, machines and engines.

Critical defence equipment that got spares from Ukraine include the 130 mm medium guns, spares for T-72 tanks as well as the T-90 tanks, the OSA-AK surface-to-air missile system, and Tunguska anti-aircraft weapon system. The gas turbine engines of several ships of the Indian Navy also come from Ukraine. There were some other items like helmet mounted sights, and some missile test equipment. With Ukraine's military industrial complex more or less destroyed by Russia, such supplies are likely to be affected.

Before the conflict, Ukraine was also showing interest in participating in some hi-tech programs of the Indian Armed Forces, such as in supply of anti-UAV systems. It was also vying for the upgrade of tanks and Smerch multiple rocket launcher system. Ukraine is not affected by dollar payments. But dealing with Ukraine could antagonise Russia and would have serious implications.

Supplies from Israel

The highest engagement with Israel is on aerospace. Nearly 8-10 percent of IAF assets are of Israeli origin. 37 per cent of all Israeli arms exports in the period 2018-22 were to India. Israel's expertise in missiles, sensors, cyber-security, and various defence sub-systems is of immense value to India. Specific systems with Indian armed forces include UAVs, UCAVs, drones, aerial radars, AEW&C radar, ground based radars, Aerostats, aerial and ground based missile systems, electronic warfare equipment, targeting pods, PGM laser guidance kits, FLIR equipment, integrated helmets, head-up displays, and many other avionics, among many others. Israel also supports India's indigenous AD systems development including the Anti-Ballistic Missile system.

Indian armed forces continue to integrate the next-generation Barak-8 surface-to-air missile systems under three joint projects between the DRDO (Defence Research and Development Organization) and Israel Aerospace Industries (IAI), representing an investment worth over Rs 30,000 crore.

Israeli companies such as IAI, Rafael Advanced Defence Systems, Elbit, and Elta Systems have also formed seven joint ventures (JV) with Indian counterparts. These ventures aim to further strengthen the defence partnership, focusing on technology sharing and innovation.

All these items are critical operational systems. Israel also supports India in space based sensors (RISAT), and intelligence. Israeli SPICE glide vehicles were used for the Balakot strike. The much larger Crystal Maze (POP-EYE) is also supplied by Israel. The Special Forces of the two countries work together and also use some similar equipment. The two work closely on cyber warfare equipment and software tools.

For India, Israel remains a very reliable, 'no-questions-asked' defence systems supplier. The relations between the two are based on mutual interests and strategic considerations. But India has traditionally maintained a balanced approach in the Israel-Palestine conflict. It made a strong statement against the Hamas terror attack, but also wants a solution to the Palestine problem in a fair and equitable manner. Extended conflict in Israel would increase their own needs and thus impact India supplies.

Way Ahead

India has a two-front threat scenario, with two nuclear power neighbours, both having significant military power. Trigger events can start wars. Indian armed forces have to continuously build capability and be trained and ready. Capability building involves producing or acquiring state-of-the-art platforms, equipment and munitions. It also means training to acquire human skills. This is a deliberate continuous activity that also requires funding. These two conflicts have highlighted the need for air defence systems to take on small projectiles, including when fired in a barrage. Having a huge stock of munitions, and secure supply chains is another important lesson. Punitive capability has to be visible, and even advertised, so that it can act as deterrence.

The involvement of India's two principal military hardware providers Russia and Israel in war is significant and the impact may last for some time. It would mean an impact on very significant Russian and Israeli military equipment. There will surely be delays. These two conflicts have added to the impact that Indian armed forces faced due to two years of Covid-19. India would have to find alternatives and try to indigenise some items. This will have its own limitations.

While India's arms dependence on Russia in absolute terms is still high, nevertheless, India's imports from non-Russian sources are steadily growing, and in-turn gradually reducing dependence. Since 2008, India has acquired from the US the P-8I maritime aircraft, C-17 heavy lift, C-130J for Special Operations, Chinook heavy-lift, Apache attack helicopters, M-777 ultra-light howitzers, and MH-60 R multirole helicopters. GE-404 is powering all LCA Mk1 and Mk1A variants. India will soon acquire the General Atomics Predator MQ-9 UAVs, and build the GE-414 in India.

France has been India's time-tested partner. With them, it was business as normal even after India's Pokhran nuclear tests. From Toofani, Mystere, Mirage-2000 to more recent Rafale fighter jets, have all proved their worth. French Alouette helicopters, and support for ALH aero-engine have helped India. Safran could one day partner GTRE or a private player to develop India's indigenous fighter aircraft engine. India has also acquired many other systems from the UK and Germany, among some other European countries.

India's thrust for 'Atmanirbharta', 'Make-in-India' is very well founded. India is already insisting on more Original Equipment Manufacturers (OEM) to set up manufacturing facilities in India. The most recent being the GE-414 engine for LCA Mk2. India's private sector has already been galvanised. The Indian private sector is already making many aero-structures, including fuselage, wings, and sub-systems for international customers. The MSME sector makes a large number of sub-systems. The UAV and drone sector is picking up. Both the defence PSUs and DRDO have been asked to promote private partners. India has also decided to upgrade its Su-30 MKI fleet on its own, albeit it may still source some items from Russia.

Each service headquarters has set up a directorate of indigenisation. Large number of items have been identified for indigenisation and listed on service and MoD websites. Import substitution of spares, especially of Russian origin are being driven. A technology development fund has been set up. Procedures have been further simplified. It is time to indigenise from split pins,

nuts, bolts and sealing rings and simple spares to larger aggregates. India has both economic and technological backing today. These two conflicts should be a catalyst for pushing indigenisation. Time to act is now, lest India gets left behind.

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IAF Battles Problems on Logistics and Technology Fronts

Sanjib Kr Baruah | 29 October 2023

Source: The Week | https://www.theweek.in/theweek/current/2023/10/21/iaf-battles-problems-on-logistics-and-technology-fronts.html

Soaring concern: Tejas takes flight during the Indian Air Force Day celebrations at the Hindon airbase in Ghaziabad, Uttar Pradesh, on October 8, 2019 | PTI

The opening words of the Charles Dickens classic A Tale of Two Cities sum up the dilemma that the world's fourth largest air force is facing. The Indian Air Force's strength—derived from its 1.5 lakh personnel and 1,700 aircraft, including fighters, tankers, helicopters, trainers and transport craft that guards India's vast air space of 40 million cubic kilometres—also doubles as its weakness.

Into its 91st year of existence, the Air Force now has a fleet of truly staggering range. It has fighter aircraft of Russian (Sukhoi 30, MiG 21, MiG 29), French (Rafale, Mirage 2000), and Anglo-French (Jaguar) origin; an indigenous light combat aircraft (Tejas); a transport fleet of Russian (AN-32, IL-76), American (C-130J Super Hercules, C-17 Globemaster), British (Avro), Brazilian (Embraer), Spanish (C-295) and German (Dornier) origins; Russian mid-air refuelling tankers (IL-78) and helicopters (Mi-17); American (AH-64 Apache and CH-47 Chinook) and indigenous helicopters (Prachand, Rudra, Dhruv); and unmanned aerial vehicles from Israel and the US, to name a few.

It means the Air Force is in a happy position to pick and choose from a broad range of aircraft with different configurations, mandates, roles, and operative and military capabilities. A superb example of the various air assets at work was the Balakot operation of September 26, 2019. It saw 12 Mirage 2000 fighters—loaded with SPICE 2000 and Popeye precision-guided munitions—cross over to Pakistan-occupied Kashmir and drop their bombs. Standing guard were a few Sukhoi-30 MKI fighters, along with IL-78 mid-air refuellers, a Heron drone, and aircraft carrying the Netra and Phalcon airborne early warning and control systems.

With aircraft of every conceivable operational role at its disposal, the IAF boasts robust combat capabilities and preparedness. But this advantage also poses a disadvantage that is among the Air Force's best-kept secrets—nightmares of the logistical kind.

Military aircraft, especially ones in combat roles, require special care during maintenance. From the hangar that houses the aircraft to the nuts and bolts that go into it, everything has to be made to specifications and fit perfectly. Else, the aircraft's capability and battle readiness take a hit.

The IAF bases usually house a mix of fighter squadrons with more than one type of aircraft.

Each aircraft type has to be backed up by an entire line of support staff and personnel, and specific machinery, tools and backup systems. With a wide range of aircraft of different origins, maintenance has become a complex process, resulting in high costs as well as low serviceability and availability of aircraft.

Aircraft of different origins have also led to an increasing dependency on other countries for parts and components. India's ongoing indigenisation efforts have somewhat eased this dependency, but in most cases, the reliance on components from abroad continues in the absence of complete transfers of technology.

Around 65 per cent of the IAF's fighter aircraft are of Russian origin. The breakup of the Soviet Union had impacted the supply of spare parts and inventories, which in turn affected the IAF's capability. Though Ukraine gradually became a major supplier, quality issues cropped up as spares were found to be of inferior quality.

Ensuring supply of spare parts and components for Russian-origin aircraft have become a huge challenge with the ongoing Russia-Ukraine war. Asked about the problem, IAF chief Vivek Ram Chaudhari told THE WEEK: "I am confident that we will be able to overcome the shortage…. We were worried about our large inventory that come from different countries. After the ongoing conflict in Europe, we realised that we have to have multiple options open to build up our inventory."

Chaudhari said the IAF was facing problems in procuring spares from Russia and Ukraine. "But our self reliance drive had taken off a few years ago. A lot of joint ventures were signed by Russian and Indian companies, and this has helped us mitigate some of the shortfall in spares," he said. "In the long term, we are also looking at inviting more [Russian] firms to come and partner with Indian firms to build spares and components in India so as to sustain our equipment for the next few decades."

What adds a distinct layer of complexity to the procurement of spares and components from abroad is that each country has its own ecosystem of rules and regulations governing the defence market. There have long been fears of spare parts becoming obsolete or unavailable abroad, leading to crippling of IAF aircraft.

The IAF also faces the challenge of ensuring the operational integration of its diverse flying platforms, which is a prerequisite for the modern-day concept of network-centric warfare. The US, for instance, may be reluctant to let its platforms be integrated with Russian ones or vice versa.

"The US will never agree to integrate its platforms with the Sukhoi fighters," said a top IAF officer. "And in most cases, the technologies are impossible to integrate. This is something we will have to live with."

The scarcity of fighter aircraft is also a worrying factor. The IAF's fighter fleet comprises 12 Sukhoi-30 squadrons, six Jaguar squadrons, three squadrons each of Mirage 2000s, MiG 29s and MiG 21s, and two squadrons each of Rafales and Tejas. With just 31 fighter squadrons, the IAF is 11 short of the mandated 42 squadrons that would be needed if a two-front war breaks out. Each squadron has, on an average, 18 aircraft, which means the IAF has 558 fighters—198 short of the required 756.

With several squadrons nearing phaseouts, the problem of scarcity is only expected to get worse. For instance, the MiG 21 made its last

flypast on October 8 at Prayagraj at an event to mark the IAF's 91st anniversary. The three MiG 21 squadrons will be phased out in the next two years, leaving the IAF with just 28 squadrons. To bridge the deficit, aircraft are being bought off the shelf from Russia and the production of Tejas is being hastened.

In comparison, the Pakistani air force operates 24 fighter squadrons, and the Chinese have at least 2,500 fighters and bombers. "The challenges come from the technology platforms that the adversaries are possessing today. So it is not sufficient to just have the numbers," said Chaudhari.

According to him, the IAF needed to at least match the enemy's technology. "We cannot simply substitute the numbers with low-end platforms, and then say that we have enough. We need to match the capability of the adversary, and if possible, better it," said Chaudhari.

The IAF is also pondering an existential question. With the move to set up theatre commands, there is a fear that its role may be diluted. There is a possibility that the IAF's already scarce air assets would be distributed among the various theatre commands.

In the modern war scenario, though, an airforce's role is critical. There is buzz about the creation of an aerospace force, and the importance of drones and similar cutting-edge aerial platforms are growing. For the IAF, these are silver linings.

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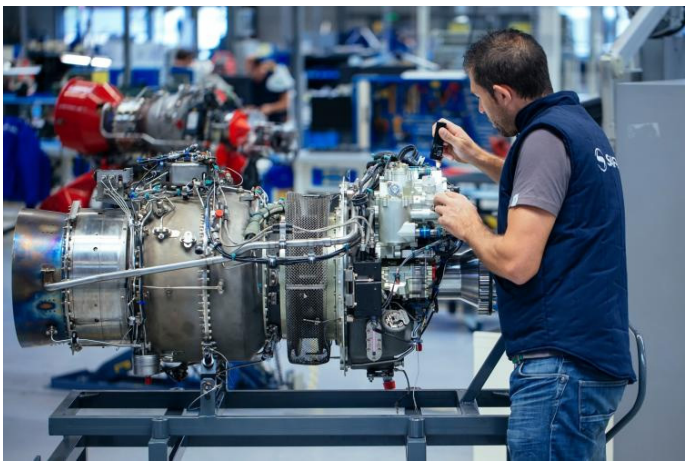
Engines For Military Helicopters: Indian Context

Lt Gen BS Pawar (Retd) | 18 October 2023

Source: Bharat Rakshak | https://bharatshakti.in/engines-for-military-helicopters-indian-context/



Safran and HAL have a 50-year-long relationship during which they have developed a variety of engines that have been powering our helicopter fleet. As such, the induction of Safran for producing the engines for IMRH has a fair chance of being a successful journey that should lead to the latest engine technology powering our future helicopter fleet.

Helicopters use horizontally spinning rotors to generate lift and thrust, allowing them to fly vertically and hover. The rotors require power to spin, which comes from the engine. While turboshaft engines are the most common type of engine used on helicopters today, a few light helicopters continue to use the piston engine due to benefits accruing mainly related to cheaper running costs.

The earliest helicopter designs were concepts that relied on rubber bands or spindles to generate power. The first breakthrough came with the introduction of the internal combustion engine, which provided enough power to lift helicopters into the air and hence, the first

powered helicopters had custom-built or rotary engines – automobile engines were also used in some early helicopters. These designs did not succeed as the engines were not capable of proving sufficient power to generate enough lift for sustained flight. The creation of the VS-300 by Igor Sikorsky in 1939 used a single four-cylinder 75 hp piston engine to power both rotor systems. After that, four-cylinder piston engines became standard in helicopters until the advent of the turboshaft engine in the late 1950s. The turboshaft engines revolutionised the aviation industry as they were lighter, more reliable, and capable of providing sustainable high-power output.

In the following decades, helicopter engines were further refined and improved to provide better performance. Currently, most helicopters in the world, both military and civil, are powered by turboshaft engines, while, as brought out earlier, a few light helicopters continue to be powered by piston engines and are mostly used for the initial training of pilots.

The entire current helicopter fleet of the Indian military is also powered by turboshaft engines only, the Russian Mi-4 being the last piston-engine helicopter, which was phased out of service in the late 1970s. While heavy and medium-class helicopters may use two or three turboshaft engines, light helicopters typically use a single engine. However, there are exceptions to the same – the Russian Ka-226T helicopter, which was in the pipeline to replace our ageing Cheetah/Chetak fleet, is powered by two engines.

Helicopters Power Plants/Engines: Indian Context

Currently, the world's leading countries for turbine engine manufacture are the US, UK, France and Russia. While the US is the leader with manufacturers like General Electric Pratt & Whitney, the UK boasts of Rolls-Royce, France has the Safran Helicopter Engines and Russia with Aviadvigatel and NPO Saturn – Safran is the largest manufacturer of helicopter engines worldwide. While China is also in the business of production of turbine engines, the technology is not as advanced and hence, they suffer from power issues. A clear example is the Chinese much touted Z-10 attack helicopter losing out to the Turkish ATAK-129 attack helicopter due to their performance in high altitude areas, wherein Pakistan was the acquiring country.

India, unfortunately, has been a laggard in the area of development of engine technology, especially for the military, despite its distinct achievement in the indigenous design, development and manufacture of combat aircraft like the Tejas and advanced state-of-the-art helicopters like the Dhruv, Light Combat Helicopter (LCH), the Light Utility Helicopter (LUH) which is in the pipeline and of course HAL's future Indian Multi-Role Helicopter (IMRH) project.

However, India attempted to develop a jet engine GTX-35VS KAVERI, which was first tested in 1996. This engine was developed and manufactured by the Gas Turbine Research Establishment, along with Godrej & Boyce. While this engine has been tried out on the initial model of the Tejas combat aircraft, it has fallen woefully short of the performance requirements despite some claims being made to the contrary. In this context, HAL signed an agreement in June this year with General Electric of the US for joint production of its F414-GE-INS6 engines in India to power the Tejas fighter jets.

The company is also expected to fulfil an order of 99 x F404 engines that will support India's Light Combat Aircraft programme.

Safran Engines & Helicopters

The French 'Safran Helicopter Engines' is not only the world's leading manufacturer of rotorcraft turbines but the only one dedicated to this market. Operating worldwide, it offers the widest range of helicopter engines from 500 to 3000 SHP. The company has a history of commitment to design and manufacturing excellence for more than 80 years and has 21000 engines in service presently – Safran is also looking at electric helicopters.

The French firm's partnership with HAL began more than 50 years ago, starting with the manufacturing of Turbomeca Artouste IIIB turboshaft 550 SHP engines for the Cheetah & Chetak helicopters – both the helicopters and engines were produced under licence by HAL, and it continues to be so even today. Presently, the Indian military is one of the largest operators of Safran-designed helicopter engines, with a fleet of over 1500 engines. Safran and HAL have also co-developed the Shakti engine (the Ardiden1H1), incorporating innovative propulsion technology, which powers the Dhruv, the Armed Dhruv as well as the LCH. Each of these helicopters is powered by two engines, each producing a SHP 1400-2000 per engine – more than 500 Shakti engines have been produced at Bengaluru.

In addition, the Safran Helicopter Engines 'Ardiden 1U' variant also powers the new LUH, which is a single-engine helicopter. In a major development in July this year, HAL and Safran Helicopter Engines have signed a major agreement to build advanced helicopter engines in India. HAL's tie-up with Safran will involve design, development, certification, production, sale and support of helicopter engines for the Indian military. The initial focus will be on the 13-16 Ton IMRH project conceived as a replacement for the Mi-17 fleet of helicopters. One of the important features of this agreement is that HAL will hold the type certificate for the engine on completion of the development project – this is indeed a path-breaking development and will go a long way in boosting HAL's capabilities in this sector.

Let us also look at helicopters which have been inducted into the military ex-import, some in the last three to four years with the process still on, like the Apaches for the Army and the Sea Hawks for the Navy. These helicopters are the Russian Mi-17V5 and the American AH-64E Apache, Chinook CH-47F and the MH-60 Romeo Sea Hawk, which have been inducted with engines manufactured in their respective countries.

The Mi-17V5 is fitted with two Klimov TV3-117VM or VK 2500 turboshaft engines with Shaft Horse Power (SHP) of 2100 and 2700, respectively, enabling the helicopter to operate at high altitudes. The Apaches are fitted with two General Electric T700-GE-701D powerful turboshaft engines with a SHP of 2000 each, which enables it to carry a lethal package of armaments, making it the most dreaded attack helicopter in the world. The Chinook, the highly battle and combat-tested heavy lift helicopter in the world, is powered by two Honeywell T-55 engines, which gives it the capability to lift artillery guns and carry tanks in its body. Lastly, the Sea Hawk, a multi-mission helicopter capable of operating from ships and aircraft

carriers, is powered by two General Electric T700-GE-401C.

Conclusion

The path to strategic autonomy is complex and expensive, but its potential benefits are inarguable. Surprisingly, a nation that can land a spacecraft on the moon and has developed a strong eco-system for designing and developing technologically advanced missile systems has been struggling to develop suitable engines for its military's combat aircraft and helicopters. A nation's power today is as much about It's military and economic strength as it is about its technological capabilities. In this regard, the agreements signed by HAL with General Electric of the US for co-producing the F-414 engines for the Tejas fighter aircraft in India and with French Safran Helicopter Engines for the design and development of a suitable engine to power the future IMRH project are a great leap forward, as this will further boost India's push for Atmanirbharta. However, a prominent caveat lies in the reluctance of these companies to fully share their technology, especially when it comes to transferring sensitive technology – despite the agreements on how this part will play out, only time will tell.

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Air Power

Need to Assimilate Niche Technologies Quickly into Military use to Enhance Operational Capabilities: Air Chief

Ravi Shankar | 15 October 2023

Source: Bharat Shakti | https://bharatshakti.in/need-to-assimilate-niche-technologies-quickly-into-military-use-to-enhance-operational-capabilities-air-chief/

The Indian Air Force (IAF) Chief Air Chief Marshal V.R. Chaudhari emphasised the importance of proactive anticipation rather than reactive responses to changing aspects of warfare. Speaking at the India Defence Conclave 2023 hosted by Bharat Shakti on 10th October in the capital, he outlined the Indian Air Force's vision for its upcoming centenary decade, highlighting the commitment to keeping up with technological advancements and enhancing operational capabilities. He noted that, as they enter their centenary decade, the IAF's vision is to become a nimble and versatile air force that delivers decisive aerospace power to advance national interests, as defined in their new doctrine.

"As we march into our centenary decade, I think it is apt for me to put forth what is the vision for the Indian Air Force in the next ten years or

so," the IAF Chief said.

"Very clearly, our new doctrine has articulated the vision of the Air Force to be an agile and adaptable air force that provides decisive aerospace power in furtherance of our national interests," he said.

For this, we need to understand, assimilate and absorb the newest technology available to us. He said that our doctrine has also clearly spelt out that "we are shifting from being merely a threat-based and demanded force to a capability-demanded force".

Technology High on Air Force Agenda

During his address at the event attended by over 60 foreign defence attaches and leaders of foreign and domestic defence industries, the IAF Chief stressed the importance of integrating disruptive technologies into their arsenal, recognising their pivotal role in future conflicts. He highlighted the need to swiftly assess how these specialised technologies can be effectively incorporated into military applications and bolster operational capabilities. Air Chief Marshal Chaudhari underscored the significance of keeping pace with technological advancements, ensuring that the Indian Air Force comprehends and leverages these technologies to optimise operational efficiency as part of their vision for the next decade.

The IAF chief underlined that "we need to incorporate disruptive technologies in our induction; it will play a critical role in future conflicts as we have to now seriously look at how some of these niche technologies can quickly be assimilated and put into military use, and how will they enhance our operational capabilities," and added, "we also need to equally match up as to how best it can enhance our operational capabilities".

"The IAF's vision for the next 10-odd years will be to keep pace with technology development, to understand and educate ourselves as to how best these technologies can be adopted to enhance our operational efficiencies," he added.

IAF's Vision for the Centenary Decade: PowerPoint Presentation

In a PowerPoint presentation titled 'IAF's Vision for the Centenary Decade,' Air Chief Marshal Chaudhari outlined the Indian Air Force's vision for modernisation. He emphasised the critical importance of capability development, especially in light of the constantly changing global and geopolitical landscape. This vision is based on four pillars: capability development, technology assimilation, human resource management and training, and the promotion of jointness and integration.

The dynamic shifts occurring worldwide require a continuous reassessment of their capabilities, whether for swift, short-term conflicts or prolonged engagements. The IAF Chief stressed the need to adapt their equipment and training to address evolving threats nationally and internationally through constant analysis and vigilance.

The kind of upheavals being seen across the globe have given rise to "continuously reassess our capabilities, whether we need to be equip and train for a short and swift war or we need to equip and train for a protracted conflict. Which part of the country or the globe is going to be affected next is something that we need to keep analysing all the time," the IAF Chief said.

"The existing structure and resources need to

be constantly restructured, keeping in mind the changing character of warfare," he said.

"And, it is for us, the leadership in the armed forces, to understand that we need to always anticipate the change in the character of warfare rather than reacting to it after it happens, and for this, we need to understand, assimilate and absorb the newest technology that is available to us," he emphasised.

The IAF Chief used the acronym 'ABCD' for steps needed for capability development – 'Acquire', 'Boost', 'Conserve' and 'Develop'. Air Chief Marshal Chaudhari said that this means acquiring news platforms, boosting the capability of existing platforms, conserving ageing platforms, and developing and R&D of new platforms and capabilities.

Focus on 'Make In India, Atmanibharta'

The Air Chief emphasized that the Indian Air Force's primary focus will continue to centre around initiatives such as "Make in India," self-reliance (Atmanirbharta), joint ventures, and technology transfers. During his address, he also mentioned the recent inclusion of C-295 aircraft and the IAF's intentions to acquire an additional batch of 97 Tejas Mark-1A aircraft and upgrade 84 Sukhoi-30MKI jets.

"The C-295 project will involve 125 MSMEs spanning seven states and is expected to generate a little over 40 lakh man-hours of work. And, 96 per cent of these man-hours work will be undertaken in India," he said.

Air Chief Marshal Vivek Ram Chaudhari, the Chief of Air Staff, announced that the enhancement of 84 SU-30MKI aircraft, at a cost of Rs 6,000 crore, will encompass the upgrading of 51 systems, with 78% of the content being indigenous. Among these 51 systems, Hindustan Aeronautics Limited (HAL) will upgrade 30, the Defence Research and Development Organisation (DRDO) will handle 13, and the private sector will upgrade eight systems.

He said the indigenous Light Combat Aircraft (LCA) project has created a national aerospace ecosystem with 140 design agencies and 340 production agencies, generating around 5,000 jobs in the private sector. Once the IAF orders 97 additional LCA-MK1A, this will expand further.

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Indian Air Force rescues 2,000 People from Flood-Affected Regions in Sikkim

Mohammed Safi Shamsi | 19 October 2023

Source: Deccan Herald| https://www.deccanherald.com/india/sikkim/indian-air-force-rescues-2000-people-from-flood-affected-regions-in-sikkim-2734217

IAF utilised a fleet of helicopters, namely, Cheetah, Chinook, Mi-17 1V, and Mi-17 V5 for the rescue operations. Credit: DH Photo

With 262 sorties, facilitating relief efforts of the Sikkim government, the Indian Air Force (IAF) has rescued around 2,000 people from the disaster-stricken areas, following the flash floods.

Working continuously, extending humanitarian assistance to the flood-affected region in the state, IAF has utilised a fleet of helicopters, namely, Cheetah, Chinook, Mi-17 1V, and Mi-17 V5. "The

IAF has executed a remarkable 262 sorties to bolster the state government's relief endeavours," an official note mentioned.

As per the update (last received), 2,002 civilians have been rescued. They have been relocated from the stricken regions to secure places. Relief material – 132,805 kg – has been transported, extending support to the affected people.

Besides, IAF facilitated movement of relief workers, and of Indian Army personnel. "A total of 259 relief workers and 179 personnel from the Indian Army have been ferried, enhancing the operational efficiency and reach of the relief efforts," the note added. "The synergy between the IAF and the state government reflects a coordinated approach in alleviating the plight of those affected by the disaster."

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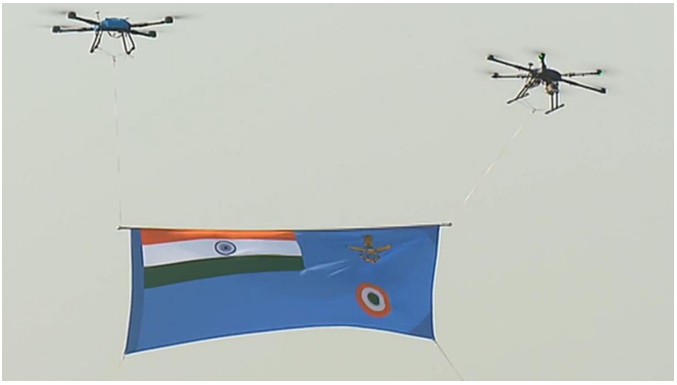
IAF Chief Unveils New Ensign as the Force Marks 91st Anniversary

Dinakar peri | 08 October 2023

Source: The Hindu | https://www.thehindu.com/news/national/iaf-chief-unveils-new-ensign-as-the-force-marks-91st-anniversary/article67395507.ece



The Indian Air Force unveiled its new Ensign at the annual Air Force Day parade at Prayagraj on October 8, 2023. Photo: X/@IAF_MCC

Indian Air Force (IAF) Chief Air Chief Marshal (ACM) Vivek Ram Chaudhari on Sunday unveiled a new Ensign for the force, as it marked its 91st anniversary, by the inclusion of the Air Force Crest in the top right corner of the Ensign, towards the fly side. This year, the Air Force Day parade was held at Air Force Station Bamrauli in Prayagraj.

The air display held in the afternoon on the banks of Triveni Sangam, saw a few lakh people turn up to watch the aerial manoeuvres.

In a first, scaling up the degree of difficulty by a couple of notches, the Sarang helicopter display team has gone from a four helicopter to a five helicoptermilitary display team. "Catch us perform the five aircraft display on the occasion of Air Force day on October 08 at Prayagraj," the team posted on social media platform 'X'.

In another first, the newly inducted C-295 transport aircraft made its maiden appearance in

any air display in India, while the legacy MiG-21 Bison made in what is likely its last appearance in an air display, prior to the planned phasing out by the year 2025.

"We have not only circumvented challenges but also turned those challenges into opportunities. The current geopolitical landscape has provided us an opportunity to reduce dependency on imports by developing indigenous capability," ACM Chaudhari said addressing the parade.

The theme for this year's Air Force Day was 'IAF - Air Power Beyond Boundaries' which the Air Chief said aptly reflects the "inherent global reach of air power and how air power will prove decisive in future conflicts." "Air Force operations extend worldwide, providing rapid mobility and global reach. This reach allows a nation to project air power beyond boundaries in the form of rapid deployment, Humanitarian Assistance and Disaster Relief (HADR) and peacekeeping missions," he said stressing on the need to understand the nuances of evolving air power, setting the pace to preserve peace and if and when necessary, to fight and win wars.

IAF's First Woman Officer

This is the first Air Force Day Parade to be commanded by a woman officer, GP Capt. Shaliza Dhami. She is also the first woman officer of the IAF to command a combat unit. Also for the first time, the parade had an all women contingent comprising of the newly inducted Agniveer Vayu women. The parade also included a flight of Garud Commandos of the IAF for the first time, as the they recently completed 20 years of service.

At the parade, the Air Chief presented Unit Citations to four IAF Units — 16 Squadron, 142 Helicopter Unit, 901 Signal Unit and 3 Base Repair Depot for their exemplary contribution to the service.

The parade was followed by an air display on the banks of the Triveni Sangam at Prayagraj in the afternoon. The air display on the banks of the Triveni Sangam featured about 108 IAF aircraft along with Dhruv Advanced Light Helicopters of the Indian Army and a P-8l aircraft of the India Navy as well the Surya Kiran and Sarang display teams. Lakhs of people, braving the heat, made it to the sangam area to witness it and cheered loudly as the display went on.

New Ensign

Going back in history, the Royal Indian Air Force (RIAF) Ensign comprised of the Union Jack in the upper left canton and the RIAF roundel (Red, White & Blue) on the fly side. Post-Independence, the IAF ensign was created by replacing the Union Jack with the Indian tricolour and the Royal Air Force roundels with the IAF tricolour roundel. A new lAF ensign has now been created to better reflect the values of the Force, the IAF said in a statement.

Explaining the new Ensign, the statement said the IAF Crest has the national symbol, the Ashoka lion on the top with the words 'Satyameva Jayate' in Devanagari below it. Below the Ashoka lion is a Himalayan eagle with its wings spread, denoting the fighting qualities of the IAF, it stated, adding, "A ring in light blue colour encircles the Himalayan eagle with the words 'Bharatiya Vayu Sena' and the motto of the IAF is inscribed below Himalayan eagle in golden Devanagari."

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F-16s Deploy from Germany to Iceland for Air Policing Mission

Greg Hadley | 24 October 2023

Source: Air and Space Forces | https://www.airandspaceforces.com/spangdahlem-f-16s-air-policing-iceland/

A C-130J Super Hercules tactical aircraft carrying F-16 Fighting Falcon fighter aircraft support personnel departs Spangdahlem Air Base, Germany to support North Atlantic Treaty Organization (NATO) Air Surveillance and Policing at Keflavik International Airport, Iceland, October 22, 2023. U.S. Air Force photo by Staff Sgt. Max J. Daigle

A quartet of F-16 fighters and some 100 Airmen from the 480th Fighter Squadron at Spangdahlem Air Base, Germany, arrived in Keflavik, Iceland, on Oct. 22 to take over the NATO Air Policing mission there—the first deployment of U.S. Air Force fighters to Iceland in two years.

The arrival of the F-16s detachment comes a month after three B-2 bombers departed Keflavik, wrapping up a month-long Bomber Task Force deployment there.

In a social media post, NATO Allied Air Command wrote that the F-16s would "conduct Air Surveillance missions and provide interceptors for NATO's Air Policing mission in the High North." In a release, NATO stated the deployment would last until Nov. 12.

Like other NATO allies that lack combat air forces, Iceland hosts a rotation of allied fighters to keep its airspace secure. Unlike air policing missions in the Baltic States and Eastern Europe, NATO does not maintain a continuous presence in Iceland, however, instead deploying forces for three to four weeks three times per year.

Most recently, Norwegian F-35s deployed to Keflavik in January. The last American fighters to deploy to Iceland did so in July 2021, when F-15s from RAF Lakenheath, U.K., fulfilled the rotation.

"The mission demonstrates U.S. commitment to the NATO Alliance, security in Europe and the strong transatlantic bond among our members," Maj. Clifford Peterson, 480th Expeditionary Fighter Squadron detachment commander, said in a statement.

Images shared by NATO Allied Air Command also showed a C-130J Super Hercules from Ramstein Air Base, Germany, carrying F-16 support personnel to Iceland.

Deploying F-16s from a German base to Iceland comes as the U.S. Air Force is shuffling aircraft and personnel around the globe. B-1 bombers recently landed at RAF Fairford, U.K., for another Bomber Task Force rotation, while in the Middle East, F-16s from the New Jersey Air National Guard have joined five other fighter squadrons in the region as the U.S. bulks up its Middle East presence in an effort to deter any expansion of the Israel-Hamas War. Meanwhile, in the Pacific, B-52 bombers are flying missions out of Andersen Air Force Base, Guam, amidst a BTF deployment.

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China Says Nuclear Weapons only Intended for 'Self-Defence'

Courtney Albon | 15 September 2023

Source: Straitstimes | https://www.straitstimes.com/asia/east-asia/china-says-nuclear-weapons-only-intended-for-self-defence#:~:text=Beijing%20officially%20adopts%20a%20nuclear%20policy%20of%20%E2%80%9Cno,as%20they%20did%20not%20threaten%20China%20with%20attack

Beijing officially adopts a nuclear policy of "no first use" – stating it will only use its nuclear weapons if attacked first. PHOTO: REUTERS

BEIJING – Beijing on Friday stressed its nuclear programme was only intended for self-defence, insisting nations had nothing to fear as long as they did not threaten China with attack.

Washington said this week that China's nuclear arsenal was developing much faster than US projections had previously anticipated, and Beijing is likely to have more than 1,000 operational nuclear warheads by 2030.

Asked about the claim, China's foreign ministry expressed its "firm opposition" to the US report, though a spokesperson did not outright deny the numbers given.

"China firmly pursues a nuclear strategy of self-defence," foreign ministry spokeswoman Mao Ning said.

"We have always kept our nuclear forces at the minimum level required for national security and have no intention to engage in a nuclear arms race with any country."

"No country will be threatened by China's nuclear weapons as long as it does not use or threaten to use nuclear weapons against China," Ms Mao added.

She also hit back at US moves to "invest heavily in upgrading its nuclear" forces and its policy of providing nuclear protection to non-nuclear allies, formally known as "extended deterrence".

"These policy actions aggravate the risk of a nuclear arms race and nuclear conflict, and will only worsen the global strategic security environment," Ms Mao warned.

The United States currently possesses about 3,700 nuclear warheads, trailing Russia's roughly 4,500, according to the Stockholm International Peace Research Institute, which counts 410 warheads for China.

Beijing officially adopts a nuclear policy of "no first use" – stating it will only use its nuclear weapons if attacked first.

But in recent years, under President Xi Jinping, it has begun a massive military modernisation drive that includes upgrading its nuclear weapons to not only deter foes but also be able to counter-attack if deterrence fails.

Experts say China's assessment of what constitutes a credible nuclear deterrent may also be changing – and that substantial upgrades to its forces will embolden its military, particularly in Taiwan and the disputed South China Sea, the

majority of which China also claims.

China, which regards the self-governing Taiwan as its territory to be reunified, has in recent years regularly carried out military drills around the island as it seeks to assert its sovereignty claims and pressure Taipei. Taiwan rejects China's sovereignty claims. AFP

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IAF Strikes 150 Hamas Tunnels, Bunkers; Tanks in Gaza; Gallant: War Entered New Phase

Emanuel Fabian | 28 October2023

Source: Times of Israel | https://www.timesofisrael.com/warplanes-hit-150-hamas-tunnels-bunkers-ground-forces-push-into-northern-gaza/#:~:text=Israeli%20warplanes%20pounded%20northern%20Gaza,protracted%20incursion%2C%20the%20military%20said.

This image grab from an AFP TV footage shows fire and smoke rising above Gaza City during an Israeli strike late on October 27, 2023. (Yousef Hassouna/AFP)

Israeli warplanes pounded northern Gaza overnight Friday and on into Saturday, hitting more than 150 underground tunnels and bunkers of the Hamas terror group as tanks and other forces pushed into the Strip in a limited but protracted incursion, the military said.

Defense Minister Yoav Gallant said Saturday afternoon that the war had "entered a new phase," underlining the stepped-up ground force activity inside Gaza.

Overnight, he said, "the ground shook in Gaza. We attacked above ground and below ground, attacking terrorists of all ranks, in all places." The war would continue "until further notice," he added.

Explosions from continuous airstrikes lit up the sky over Gaza City for hours after nightfall Friday. The Israel Defense Forces said a number of Hamas terrorists had been killed in the airstrikes and in several clashes with troops inside Gaza.

Among those killed was the head of Hamas's so-called aerial array Issam Abu Rukbeh.

A statement from the IDF and Shin Bet intelligence service said that Abu Rukbeh was responsible for managing the terror group's drones, unmanned aerial vehicles, paragliders, aerial detection systems and air defenses.

The military said that he played a role in the planning and execution of the October 7 onslaught by Hamas by directing the terrorists who entered southern Israel on paragliders, as well as the drone attacks on IDF observation posts.

It also said it killed the commander of Hamas's naval forces of the Gaza City Brigade, Rateb Abu Sahiban, in an overnight airstrike.

The IDF said Abu Sahiban planned and commanded a Hamas infiltration attempt via the sea on October 24th, which was foiled by Israeli Navy forces.

There were no reports of Israeli casualties and the ground forces, including infantry, combat engineering forces and tanks, remained inside

Gaza on Saturday morning, operating deeper into the Hamas-run territory than previous limited incursions.

Hamas said it had thwarted Israel's overnight ground incursion, saying it had used anti-tank Kornet rockets and mortar shelling to repel the attack and claimed to have inflicted casualties among Israeli troops. The terror group did not provide evidence.

The IDF released footage of the ground forces operating in the Gaza Strip overnight and Saturday morning.

The military said it would soon hold assessments as to what the next stages will be, either expanding ground operations further, pausing the ongoing raid, or changing to another set of plans.

Also Saturday, the army said it would start allowing significantly more humanitarian aid to enter the southern Gaza Strip from Egypt.

The IDF hopes that the additional food, water and medical supplies will encourage more Palestinians to leave the northern part of the Gaza Strip for the south.

Israel has repeatedly warned that it is heavily targeting Gaza City and other areas in northern Gaza, where Hamas is believed to have its main bases of operations and has extensive underground installations, many of them located under the city. The IDF says it will not allow fuel into the Gaza Strip, as it says it is used by Hamas to manage the fighting against Israel.

Palestinian reports from Gaza were scarce after internet and phone services collapsed amid the Israeli bombardment, creating a near-blackout of information, largely cutting off Gaza from contact with the outside world.

The Palestinian telecom provider, Paltel, said the bombardment caused "complete disruption" of internet, cellular and landline services. The cutoff meant that casualties from strikes and details of ground incursions could not immediately be known. Some satellite phones continued to function.

In one of the few reports to emerge from Gaza on Saturday, a reporter for the BBC said there was "total chaos" in the Strip.

"There was a huge bombardment in the north of Gaza Strip on a scale we've never seen before," wrote Rushdi Abualouf. "At the hospital here, ambulance drivers told me they couldn't communicate with anyone, so they were just driving in the direction of the explosions."

"Hundreds of buildings and houses were completely destroyed and thousands of other homes were damaged," Mahmud Bassal, a spokesman for the Hamas-run Gaza Civil Defence told AFP, saying that the intense bombardments had "changed the landscape" of northern Gaza.

Witnesses said most of the bombing was concentrated in areas around two hospitals — Al-Shifa and the so-called Indonesian hospital — located in the Jabaliya district of northern Gaza.

The strikes left wide craters in the streets and flattened many buildings in the area.

The Israeli military on Friday night revealed that Hamas was using Gaza City's Shifa Hospital as a main base of operations, providing visuals and intercepted audio as evidence of the terror organization's activities.

Hagari said Israel has intelligence that there are several tunnels leading to the underground base from outside the hospital so that Hamas officials do not need to enter the hospital to reach

it. But Hagari added that there is also an entrance to the underground complex from within one of the wards.

Hagari also said Israel has "concrete evidence" that "hundreds of terrorists flooded into the hospital to hide" following the October 7 terror onslaught.

Hamas's internal security also has a command center inside Shifa Hospital, from which it directs rocket fire on Israel and stores weapons, he added.

Israel ramped up airstrikes in the Gaza Strip on Friday night and said it was expanding ground operations into the coastal enclave following several nights of limited raids.

"The Air Force is striking underground targets very significantly," said IDF Spokesman Rear Adm. Daniel Hagari.

"In addition to the attacks that we carried out in recent days, ground forces are expanding their activity this evening. The IDF is acting with great force… to achieve the objectives of the war."

For the last two days, IDF infantry forces and tanks have conducted limited operations in the Gaza Strip.

Hagari said the IDF will continue to strike Gaza City and surrounding areas in northern Gaza, and renewed his call for Palestinians to evacuate to the Strip's south.

"We are prepared to defend in all arenas. We are acting in order to protect the security interests of the State of Israel," he said.

The Hamas terror group's military wing, the Izz ad-Din al-Qassam Brigades, said it was confronting Israeli forces in Gaza and that "violent clashes" were taking place near Beit Hanoun in the northern part of the Palestinian enclave, and Bureij in the center.

US and Israeli officials told ABC News that the Israeli ground incursion in Gaza was not the expected large-scale offensive Israel has been threatening for three weeks — aimed to dismantle Hamas following its devastating October 7 onslaught into Israel. On that Saturday morning, some 2,500 terrorists streamed into Israel by land, sea and air, killing over 1,400 people, a majority of them civilians in their homes and at an outdoor music festival in border communities across southern Israel. Hamas and allied terrorist factions also dragged over 230 hostages — including some 30 children — into the Gaza Strip where they remain captive.

An unnamed American source told ABC that the operation Friday was another limited one. And IDF spokesman Peter Lerner said the activity was not the major operation that has been expected since the devastating terror assault.

On Friday night, White House National Security spokesman John Kirby repeatedly refused to comment on the expanded activities, and said Washington would not draw "red lines" for Israel.

"We're not drawing red lines for Israel," Kirby said Friday on a call with reporters. "We're going to continue to support them" but "since the very beginning we have, and will continue to have, conversations about the manner that they are doing this."

Defense Minister Yoav Gallant told a small group of foreign reporters earlier that Israel expects a long and difficult ground offensive into Gaza soon. It "will take a long time" to dismantle Hamas's vast network of tunnels, he said, adding that he expected a lengthy phase of lower-intensity

fighting as Israel destroys "pockets of resistance."

Hamas had earlier called on world countries to "act immediately" to stop Israel's response to its October 7 massacre.

Israel has vowed to destroy the Palestinian terror organization while minimizing harm to Gaza civilians.

On Friday evening, terrorists in Gaza launched a series of rocket barrages into Israel, targeting southern and central Israeli cities. A foreign worker was moderately wounded after a rocket landed in agricultural land near Rishon Lezion, according to medics.

In Sderot, a pair of rockets fired from Gaza slammed into a home and an outdoor shelter. Some damage was caused but no one was harmed.

Gazan terrorists have launched thousands of rockets at Israel since October 7, killing and wounding dozens, and sending hundreds of thousands running for shelter, and the education of hundreds of thousands of children disrupted as schools remain shut or in a limited format.

The IDF has for several weeks been preparing a full-scale incursion aimed at rooting out the Gaza-ruling terror group following its murderous October 7 onslaught in southern Israel.

It has pounded the Strip on an unprecedented scale in order to eliminate potential threats to ground troops once the order finally comes. The airstrikes have flattened entire neighborhoods, causing a level of destruction unseen in the last four wars between Israel and Hamas.

Also Friday, the military said that at least 233 hostages were kidnapped and taken to the Gaza Strip during the devastating assault on October 7.

Hagari said the military has notified the families of 229 hostages that their loved ones are currently being held in the enclave.

The number does not include four released hostages — mother and daughter Judith and Natalie Ra'anan, who were freed a week ago, and elderly women Yocheved Lifshitz and Nurit Cooper, freed on Monday night.

Hagari said the number is not final as the military continues to investigate new information.

However, a member of a Hamas delegation visiting Russia claimed that the terror group still does not know where all the people kidnapped by Palestinian terrorists during their attack are being held.

The Hamas official, named as Abu Hamid, claimed in an interview with Russia's semi-official Kommersant news outlet that the terror group has always been willing to release civilians, but "needs time to find them." He additionally claimed members of various groups are holding hostages, and that a ceasefire was needed to allow Hamas to carry out its search, find the hostages and then release them.

On Wednesday, The New York Times reported that Israel had agreed to a request from the United States to temporarily delay the planned Gaza ground incursion to give Washington more time to deploy additional air defense systems to protect its troops in the region.

The US was also reportedly concerned that Israel lacks achievable military goals for its operations in Gaza, leading to fears that the IDF is not yet ready for a ground incursion.

Gaza's Hamas-run health ministry says the Israeli strikes have killed over 7,000 people, many of them children. The figures issued by the terror group cannot be independently verified, and are

believed to include its own terrorists and gunmen killed in Israel and in Gaza, and the victims of what Israel says are hundreds of errant Palestinian rockets that have landed in the Strip since the war began. Israel says it killed 1,500 Hamas terrorists inside Israel on and after October 7.

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IAF to Stop Flying MiG-21 by 2025, Aircraft to Take Part in Last IAF Day Parade this Year: IAF Chief

03 October 2023

Source: Economic Times | https://economictimes.indiatimes.com/news/defence/iaf-to-stop-flying-mig-21-by-2025-aircraft-to-take-part-in-last-iaf-day-parade-this-year-iaf-chief/articleshow/104136418.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst

MiG-21

Amid the efforts to replace its ageing Russian-origin aircraft, the Indian Air Force (IAF) is all set to replace all MiG-21 squadrons with the LCA Mark 1A by 2025, said Air Chief Marshal VR Chaudhari on Tuesday.

He was addressing a press conference in Delhi ahead of the Air Force Day that is to be celebrated on October 8 in Prayagraj.

Responding to a question by on MIG 21, Air Chief Marshal Chaudhari said, "We had signed a contract for 83 LCA Mark-1As. The contract is to be supplemented with 97 additional aircraft. So, it will bring the total to 180 LCA Mark 1As."

"We will stop flying the MiG-21 fighter aircraft by 2025 and we will replace the MiG-21 squadron with the LCA Mark-1A. The same proposal is in place. In another month or so, the second squadron will get number-plated and we will follow with the third one sometime next year. The induction of the LCA Mark-1A will fill the gap of these outgoing MiG-21s," he said.

During the press conference, it was announced that the legendary MIG-21 will also participate in probably the last flypast by MIG-21s anywhere in the world.

MiG-21, which has been in service with the IAF for more than 60 years now, has met with several accidents in the recent past.

Air Chief Marshal Chaudhari also said that the IAF is constantly monitoring the situation along the Line of Actual Control (LAC), especially in eastern Ladakh.

The Indian Air Force is celebrating its 91st anniversary on October 8 with the theme-"IAF-airpower beyond boundaries"

"Keeping with the new tradition, this year's air display will be held in Prayagraj, Uttar Pradesh. IAF will showcase its strength and diversity of air assets over the scenic surroundings of the Sangam area," said an IAF official.

The official added that about 120 aircraft of various types ranging from heritage aircraft like Tigermoth and Harvard to the newly inducted C-295 will be participating in different formations and displays.

In the event, over 20,000 school children are planned to witness the air display towards an outreach to young minds.

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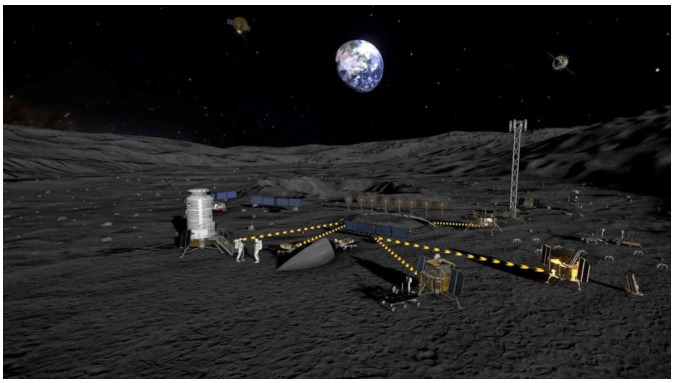
Space

China Adds Belarus as Partner for ILRS Moon Base

Andrew Jones | 23 October 2023

Source: Space News | hhttps://spacenews.com/china-adds-belarus-as-partner-for-ilrs-moon-base/



A render depicting future ILRS infrastructure on the moon. Azerbaijan, Pakistan and Belarus joined the project in October 2023. Credit: CNSA/Roscosmos

HELSINKI — Belarus joined China's International Lunar Research Station program Monday, following a video conference with the China National Space Administration.

Vladimir Gusakov, chairman of the Presidium of the National Academy of Sciences of Belarus (NASB) and Zhang Kejian, CNSA administrator, signed a joint declaration on cooperation on the International Lunar Research Station (ILRS) program Oct. 23.

"According to the joint declaration, the parties will cooperate in the process of creating and operating the ILRS," Belarusian state-owned news agency BelTA reported, citing the press service of NASB.

"The areas of cooperation will be fundamental and applied research in the field of engineering and technologies for space use, new materials and electronic component base, training and advanced training of scientific personnel and specialists. By mutual agreement, the parties shall determine other areas of cooperation," the NASB statement said.

The China-led ILRS project aims to construct a permanent lunar base in the 2030s, with precursor missions in the 2020s. The initiative is seen as a China-led, parallel project and potential competitor to the NASA-led Artemis Program.

CNSA and NASB agreed to draft a cooperation roadmap to include science and technology projects related to the creation and operation of the ILRS, according to the report.

The Belarus Space Agency operates under the NASB, coordinating space research programs.

The joint declaration follows days after Pakistan officially signed up to ILRS. Victoria Samson, Washington Office Director for Secure World Foundation, told SpaceNews that Pakistan's joining has more political than technical relevance.

"Pakistan does not have its own launch capabilities—it depends on China for that—and Pakistan has only 3 active satellites on orbit, while China has over 800," Samson wrote in an email.

"So in terms of it contributing substantively to the ILRS, I'm not entirely certain it will have a lot of technical things to add. But there is something to be said for political support and it is a statement endorsing China's moon plans if nothing else."

Samson noted that the case was similar for

Belarus, stating that it has only three active satellites in orbit. It likewise has long-standing military ties with China. China built and launched the DFH-4-based Belintersat 1 communications satellite to geostationary orbit for Belarus in 2016.

ILRS signatory	Type
China	Country
Belarus	Country
Pakistan	Country
Azerbaijan	Country
Russia	Country
Venezuela	Country
South Africa	Country
Asia-Pacific Space Cooperation Organization (APSCO)	Inter-governmental Organization
nanoSPACE AG (Switzerland)	Firm
International Lunar Observatory Association (ILOA, Hawaii)	Organization
National Astronomical Research Institute of Thailand (NARIT)	Institute

List of known signatories to the China-led ILRS program as of Oct. 23, 2023. Credit: Andrew Jones/ SpaceNews

Azerbaijan joined ILRS earlier this month. The number of recent announcements appears to reflect a plan to attract founding members.

The Deep Space Exploration Laboratory (DSEL), under CNSA, stated earlier this year that China aims to complete the signing of agreements with space agencies and organizations for founding members of ILRS by October.

China is setting up an organization, named ILRSCO, in the city of Hefei in Anhui province to coordinate the initiative.

The ILRS first emerged as a Chinese proposal in the late 2010s. The project was formalized when China and Russia presented a joint road map for the ILRS in June 2021. Beijing has however since apparently taken the role of lead of the project since Russia's invasion of Ukraine.

A recent Chinese presentation on the outline of the ILRS omitted Russian super heavy-launch vehicles displayed in the earlier roadmap.

The U.S. and China are advancing respective Artemis and ILRS lunar exploration plans. The parallel projects highlight a renewed international focus on the moon and competitively seeking to assert space leadership.

The U.S. is expanding its Artemis Accords, recently adding Germany as the 29th signatory. NASA aims to execute crewed missions around and on the moon no earlier than 2025.

China aims to land astronauts on the moon before 2030, preceded by technology-verification missions in 2026 and 2028. This rivalry suggests a potential emergence of distinct international space industry ecosystems.

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FAA Proposes Upper Stage Disposal Rule to Limit Space Debris

Marcia Smith | 20 September 2023

Source: Sapce Policy Online| https://spacepolicyonline.com/news/faa-proposes-upper-stage-disposal-rule-to-limit-space-debris/

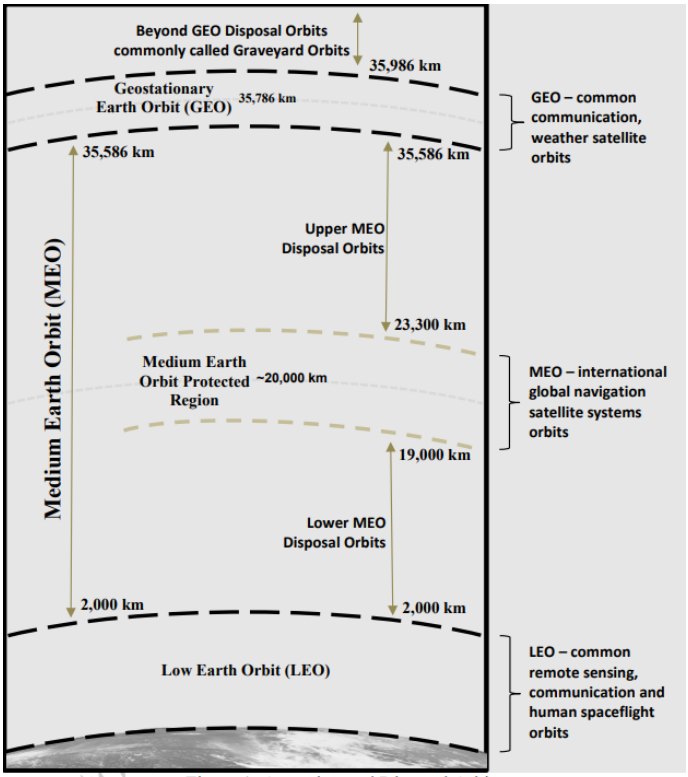

Figure 1: Operating and Disposal Orbits

Source: FAA proposed rule on upper stage disposal (Docket No.: FAA-2023-1858; Notice No. 23-13)

The FAA's press release says there are more than 23,000 objects in space 10 centimeters or more in size, although U.S. Space Command puts that number much higher at over 44,000. Millions of smaller pieces that cannot be tracked are also floating around in orbit.

Brian Weeden, Director of Program Planning at the Secure World Foundation, tells SpacePolicyOnline.com that the proposed rule appears to implement the updated U.S. Orbital Debris Mitigation Standard Practices issued in 2019. He considers them a "modest update" that "don't go nearly as far as some other countries" like France. Nonetheless "they're still a step in the right direction."

The FAA's proposed rule for upper stages comes one year after the FCC established a rule that requires satellite operators to deorbit their satellites within 5 years of mission completion if they are in low Earth orbit (below 2,000 kilometers).

Space debris is a growing threat to civil, commercial and national security space operations around the globe. Weeden and others are participating in the annual AMOS conference in Maui, Hawaii this week to discuss space debris and Space Situational Awareness (SSA), or Space Domain Awareness (SDA) as the military now calls it — knowing what's in orbit and keeping track of where it is and where it's going.

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Russia's Space Program Pushes Forward Despite Challenges

28 October 2023

Source: Global Village Space | https://www.globalvillagespace.com/russias-space-program-pushes-forward-despite-challenges/

Russia's independent space program is moving forward with determination, President Vladimir Putin declared in a televised meeting with space industry officials. Despite facing corruption scandals and international turmoil, Putin emphasized the country's commitment to space exploration.

The President announced that the first module of Russia's new orbital platform is scheduled to launch in 2027, marking a significant step in the evolving landscape of space exploration.

With the International Space Station's (ISS) resources depleting, Putin stated, "we need not just one segment, but the entire station to be brought into service." This vision represents a crucial development in the new era of space exploration that will follow the expected end of the ISS in 2030.

Russia's lunar program remains a key component of its space ambitions, despite the recent setback of the Luna-25 craft's catastrophic crash landing on the moon's south pole in August. President Putin acknowledged the disappointment, describing it as a "negative experience." However, he underlined the importance of learning from such incidents to prevent future mistakes.

While acknowledging the funding problems, corruption scandals, and setbacks that have affected the space program, Putin emphasized that the lunar program would continue. Mikhail Marov, a 90-year-old astronomer who played a significant role in the failed lunar expedition, had called for an investigation into the mission's failure. Marov's health suffered a "sharp deterioration" following the crash landing, highlighting the seriousness of the incident.

The ISS, a symbol of international scientific cooperation for the past 25 years, is aging and set to conclude its mission around 2030. In response to this transition, President Putin stressed the need for the timely development of a Russian orbital station to ensure that Russia maintains its capabilities in manned space flight.

Yuri Borisov, head of the Russian space agency Roscosmos, concurred, warning that without large-scale efforts to create a Russian orbital station by 2024, there could be a significant time gap during which Russia's space capabilities might be at risk.

Putin underlined the importance of the new orbital station considering "advanced achievements of science and technology" and the ability to take on future tasks. He concluded by emphasizing that the development of the new space station would progress "all in good time."

The meeting also raised the possibility of moving forward the next lunar launch to 2026 from the previously planned 2027, reflecting Russia's commitment to maintaining its space exploration efforts.

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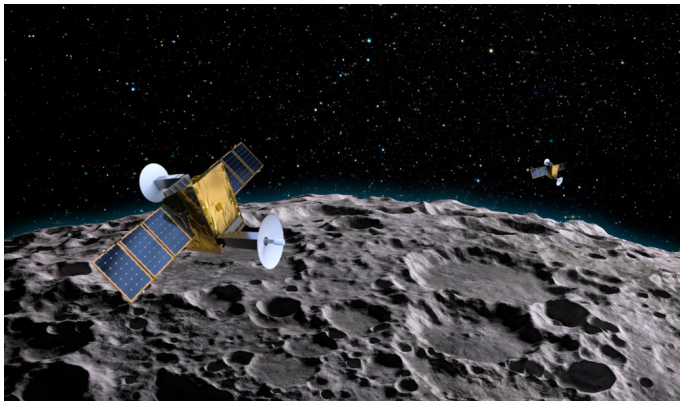
ITU to Consider Lunar Communications Regulations

Jeff Foust | 14 October 2023

Source: Space News | https://spacenews.com/itu-to-consider-lunar-communications-regulations/



Growing commercial interest in the moon, such as Lockheed Martin's Parsec network, may lead the ITU to take up how to regulate lunar communications. Credit: Lockheed Martin

LAS VEGAS — Discussions at an upcoming major telecommunications conference may

set the stage for future work regulating lunar communications.

During a panel discussion at AIAA's ASCEND conference here Oct. 23, an official with International Telecommunication Union (ITU) said delegates at the World Radiocommunication Conference 2023, or WRC-23, may decide to put lunar communications on the agenda for the following conference in 2027.

"That's probably going to lead to some of the most interesting technical preparatory work," said Joanne Wilson, deputy to the director of the ITU's Radiocommunication Bureau.

WRC-23 is scheduled for Nov. 20 to Dec. 15 in Dubai, where countries will debate changes to the Radio Regulations, the treaty-level agreement governing terrestrial and satellite radio communications. The meeting will also set the agenda for the following WRC in 2027.

She did not elaborate on specific issues regarding lunar communications that the ITU might consider, but said the time was now to start considering them. "If you look at the timeframe it takes to build out the space economy and so forth, you can see that this is the next step, a building block to future approaches to regulation of spectrum not just on the lunar surface but on other planetary bodies as well."

In an article published by the ITU in July, Cathy Sham, lunar and human spaceflight spectrum manager at NASA and chair of an ITU working group on space communications, noted growing demand for spectrum for activities on and around the moon. "Mission planners, engineers, scientists, architects, and regulatory experts must work together to ensure adequate radio spectrum access for all users," she wrote.

Two specific topics Sham mentioned in the article is protecting future radio astronomy observatories on the far side of the moon, shielded from terrestrial signals, from interference by spacecraft, as well as the feasibility of spectrum allocations for space research at the moon.

The Federal Communications Commission, meanwhile, has received applications for spectrum for lunar communications, said Julie Kearney, chief of the FCC's new Space Bureau, on the panel. One example she cited is a proposal by Lockheed Martin for a network of satellites called Parsec providing communications and navigation services. Crescent Space Services, a new Lockheed subsidiary, would operate the satellites offer commercial services using them.

The FCC has issued its first license for lunar communications, she said. An Oct. 5 grant of authority to Intuitive Machines covers communications with its first Nova-C lunar lander flying on the IM-1 mission to the moon. IM-1 is scheduled to launch as soon as November, landing a week after launch and operating there for up to two weeks.

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One Step Closer to an Indian Astronaut in Space

24 October 2023

[Source: Indian Express | https://indianexpress.com/article/opinion/editorials/one-step-closer-to-an-indian-astronaut-in-space-8996664/](https://indianexpress.com/article/opinion/editorials/one-step-closer-to-an-indian-astronaut-in-space-8996664/)

Chandrayaan too will not return to Earth. ISRO's challenge, therefore, is to develop a module that can take humans to an orbit of 400 km and bring them back.

On Saturday, ISRO carried out its first test with the aim to launch an Indian astronaut in space in the next two years — the Gaganyaan mission. On trial was the project's safety system. A snag in the ignition rocket caused a delay of about two hours. But ISRO scientists quickly identified and corrected the anomaly, after which a rocket carried a payload comprising the Crew Escape System and an experimental test vehicle, the crew module, 17 km into the atmosphere.

The module plays a critical role in ensuring the astronauts' safety and comfort during the space mission. ISRO has, therefore, done the right thing in giving priority to the mission's nerve centre. Even though, by all accounts, the Gaganyaan vehicle is robust, the space agency doesn't want to leave anything to chance. It wants to ensure that in case of any emergency, astronauts can return to safety. In fact, crew safety was among the considerations behind ISRO's request to the Centre to relax timelines — in his Independence Day speech in 2018, Prime Minister Narendra Modi talked of a manned space mission by 2022. Saturday's trial takes ISRO one step closer towards making Gaganyaan's systems foolproof.

ISRO's Policy Planning Committee first endorsed a crewed space mission in 2004. It has taken close to 20 years to conduct the safety trials. This only underscores the complexity of the venture. Human spaceflight is harder and more expensive compared to the Mars mission or the recently successful mission to the Moon. It requires space agencies to build capsules in which astronauts can live in Earth-like conditions.

Satellites normally launched by ISRO, for communication or remote sensing, remain in space even when their life is over. Chandrayaan too will not return to Earth. ISRO's challenge, therefore, is to develop a module that can take humans to an orbit of 400 km and bring them back. Chandrayaan's success has been a big shot in the arm for the space agency's human spaceflight venture. It will use the same launch vehicle that was used for the moon mission — Saturday's trial, though, was conducted using a lighter rocket. The space agency also worked on parachute systems that ensure the crew module slows down and safely splashes in the water after the mission. Saturday's trial showcased the success of this emergency escape mechanism.

The module was fitted with instruments which will gather data to help ISRO with future tests and the final mission. In the coming trials, the space agency will test more complex safety mechanisms including ascertaining Gaganyaan's performance on all parameters other than crew presence. It plans to send a robot to space as a prelude to the crewed mission. The agency has done the right thing by not finalising Gaganyaan's launch. In

the coming months, its trials will be watched with excitement.

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Global Aerospace Industry

Lockheed Exits Air Force Tanker Competition, Lifting Boeing's KC-46

13 September 2023

Source: Reuters | https://www.reuters.com/business/aerospace-defense/lockheed-exits-us-air-force-tanker-competition-lifting-boeings-kc-46-2023-10-23/

Boeing's KC-46 aerial refueling tanker conducts receiver compatibility tests with a U.S. Air Force C-17 Globemaster III from Joint Base Lewis-McChord, in Seattle, Washington, U.S., July 12, 2016. Christopher Okula/ U.S. Air Force/Handout via REUTERS/File Photo

WASHINGTON, Oct 23 (Reuters) - Lockheed Martin Corp (LMT.N) has withdrawn from the U.S. Air Force's competition to build at least 75 refueling tankers, the company said, giving Boeing's (BA.N) KC-46 Pegasus a boost in the closely watched multibillion-dollar defense contract.

Airbus (AIR.PA) teamed up with Lockheed as the prime contractor in 2018 to offer its A330 multi-role tanker transport. Now the European aerospace company will continue to pursue the competition but without Lockheed, Airbus said late Monday.

Lockheed's pullback gives Boeing a boost, greatly increasing the chance it will win the program despite years of costly mistakes with the existing fleet of KC-46 tankers.

Based on current prices, the total order could equal around $12 billion, but is likely to be higher. The KC-46, however, has been plagued by defects, including problems with an on-board video system and a refueling boom that fails to connect the tanker to aircraft seeking refueling. These errors have cost Boeing $7 billion in losses.

Shares of Boeing turned positive after Reuters first reported the Lockheed news, and were up 1.7%.

An Airbus victory would land Airbus its first aircraft contract with the U.S. Air Force after attempting to penetrate the U.S. defense market for two decades.

Monday's news also marks the second time Airbus had been dumped by a U.S. partner. Airbus, previously worked with Northrop Grumman Corp (NOC.N) to win a $35 billion contract in 2008 to build MRTT tankers for the U.S. Air Force. That effort was scuttled after a Boeing protest succeeded in opening the path for the KC-46.

The Air Force, which aims to replace hundreds of Eisenhower-era KC-135 tankers in three lots, kicked off a competition in 2022 for its second tranche of as many as 160 jets on top of the 179 KC-46 Pegasus planes Boeing has begun to build. The U.S. later slashed the effort to 75.

Lockheed said it would shift the tanker team and resources to other programs including "aerial refueling solutions in support of the U.S. Air Force's Next-Generation Air-Refueling System (NGAS) initiative."

NGAS is the final tranche of the current tanker replacement program. It is expected to be announced and completed in the 2030s.

The abrupt departure of the Lockheed bid, known as LMXT, surprised some Capitol Hill aides. Advocacy for the LMXT, which would be made in Alabama and Georgia, had been extensive with Lockheed spending heavily to assure that Boeing's plane was not a shoo-in to win the second tranche.

In 2011, Boeing won the first of the three-phase procurement to replace the Air Force's aging tanker fleet, securing a contract for 179 KC-46s.

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RTX Jet Engine Problem Ripples Across Global Aerospace Industry

Valerie Insinna, Abhijith Ganapavaram and Rajesh Kumar Singh | 12 September 2023

Source: Investing | https://www.investing.com/news/stock-market-news/airlines-suppliers-warn-of-hit-from-rtx-engine-snag-3172628

© Reuters. FILE PHOTO: Visitor passes the Raytheon Technologies Corporation (RTX) logo at the 54th International Paris Air Show at Le Bourget Airport near Paris, France, June 22, 2023. REUTERS/Benoit Tessier/File Photo

(Reuters) -Aerospace suppliers and airlines around the world warned of rising costs and a squeeze on plane capacity after U.S. engine maker RTX disclosed that a rare manufacturing flaw could ground hundreds of Airbus jets in coming years.

The problem, a rare powder metal defect that can lead to cracks in some engine components, is the latest trouble for the industry, which has been grappling with shortages of staff and supply-chain woes even as travel rebounded from pandemic lows.

RTX said on Monday it would have to pull 600 to 700 of its Pratt & Whitney Geared Turbofan (GTF) engines from Airbus A320neo jets for quality inspections over the next three years.

The beleaguered supplier's shares closed down 1.7% after earlier hitting a more than two-year low of $73.66 on Tuesday, but it drew backing from Airbus CEO Guillaume Faury who said at an event in Washington D.C. that the repairs were necessary to ensure safety.

"We don't like the situation, but we think that was the right thing to do," he said, adding that the problems are "very unfortunate."

Airbus said on Monday it does not expect an effect on its 2023 deliveries. Its shares fell 2.4% in Paris on Tuesday.

The engine issue was first disclosed in July, but RTX made the extent of the problem clearer on Monday.

The announcement caused waves up and down the industry, from component manufacturers like Japan's Kawasaki Heavy Industries to airline carriers like Germany's Lufthansa that rely on the popular Airbus jets.

The problem may worsen a tug-of-war over engines between airplane factories and repair shops, industry sources told Reuters, as repairs take longer to fix.

The snag could ground an average of 350 jets a year through 2026, with as many as 650 jets sitting idle in the first half of 2024. RTX initially estimated repair work per engine to last 60 days, but it is now expected to take up to 300 days.

In July, RTX said microscopic contaminants were found in a powdered metal used in high-pressure turbine discs that are part of the GTF engine's core. The presence of those contaminants could lead to cracks in the engine.

Replacing the discs requires removing the engine, disassembling and reassembling it. The engines affected were made between 2015 and 2021.

Shares of RTX, which was formed from the merger of Raytheon (NYSE:RTN) and United Technologies (NYSE:RTX) in 2020, have lost a quarter of their value since disclosing the problem in July.

"When the company initially identified the powder metal issue with the GTF engine, we had confidence that the issue, based on the data provided, was relatively well contained," said RBC Capital Markets analyst Ken Herbert in a note.

"The financial and operational impact identified is more substantial than we had expected."

Airlines, Manufacturers Detail Hit

Aerospace suppliers with a stake in the troubled engine program said the issue would affect their costs. London-listed aerospace component maker Melrose Industries said it faces a potential hit of around 200 million pounds ($249.2 million).

Japan's IHI and Kawasaki Heavy Industries said they expect an earnings hit from the lengthy inspections, while German firm MTU Aero Engines (OTC:MTUAY) warned of lower profits on Monday.

Lufthansa said on Tuesday the snag will result in the German flag-carrier grounding 20 A320neos at any time.

When asked if he had a comment on the update from RTX, JetBlue Airways (NASDAQ:JBLU) CEO Robin Hayes said: "No -- we're still waiting for ours."

Air New Zealand, which has 16 A320neo jets in its fleet, said on Tuesday the issue will further reduce engine availability and would have a "significant" impact on its flight schedule from January 2024.

Scoot, a unit of Singapore Airlines (OTC:SINGY), said the inspections would affect four of the engines that power its A320neo fleet and could force it to adjust some of its flights.

On Monday, Hungarian carrier Wizz Air estimated a potential 10% capacity hit in the second half of fiscal 2024.

RTX is one of two manufacturers of engines for the popular narrowbody Airbus A320neo, the other being CFM International, a joint venture between GE and Safran (EPA:SAF).

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India Communicates to France Decision to Procure 26 Rafale Marine Jets

28 October 2023

Source: First Post | https://www.firstpost.com/opinion/c-295-induction-bolsters-iafs-transport-fleet-and-indias-aircraft-production-ecosystem-13172982.html

This photograph taken on June 19, 2023, shows a demonstration of the Dassault Rafale jet fighter during the International Paris Air Show at Le Bourget Airport on the outskirts of Paris. India on July 13, 2023, has approved in principle the purchase of 26 French marine Rafale jets and three Scorpene-class submarines, a day before Prime Minister Narendra Modi will be guest of honour at the Bastille Day parade in Paris. | Photo Credit: AFP

Prime Minister Narendra Modi will be guest of honour at the Bastille Day parade in Paris. | Photo Credit: AFP

India has formally communicated to France its decision to procure 26 naval variant of the Rafale fighter aircraft for the Indian Navy, kick-starting the procurement process under an intergovernmental framework, people familiar with the matter said on Friday.

In July, the Defence Ministry approved the purchase of the Rafale (marine) jets from France, primarily for deployment on board the indigenously built aircraft carrier INS Vikrant.

The issue of procurement of the Rafale Marine jets is learnt to have figured during Defence Minister Rajnath Singh's recent visit to Paris.

It is learnt that India has sent a letter of request to the French government formally communicating its decision to procure the jets from Dassault Aviation under the government-to-government framework.

The negotiations on pricing and other details are expected to take place after the defence ministry receives a response from the French side, the people familiar with the matter said.

Earlier this month, Chairman and CEO of Dassault Aviation Eric Trappier visited New Delhi and discussed various aspects of the proposed procurement by India.

The Defence Ministry in July said the procurement of the jets along with associated ancillary equipment, including weapon systems and spares, would be based on an inter-governmental agreement (IGA) and that price and other terms of purchase will be negotiated with the French government after taking into account all relevant aspects.

The Indian Air Force bought 36 aircraft in fly-away condition. There is a thinking in the IAF that it should go for at least two more squadrons of the Rafale jets.

The defence and strategic ties between India and France have been on an upswing in the last few years.

In July, India and France announced a raft of ground-breaking defence cooperation projects, including the joint development of jet and helicopter engines and construction of three Scorpene submarines for the Indian Navy.

The two strategic partners also expressed commitment to cooperate in the co-development and co-production of advanced defence

technologies, including for the benefit of third countries.

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Indian Aerospace Industry

AF Plans to Induct Military Platforms Worth Rs 3 Lakh Crores

Ravi Shankar | 04 October 2023

Source: Bharat Rakshak | https://bharatshakti.in/iaf-plans-to-induct-military-platforms-worth-rs-3-lakh-crore-air-chief/

The LCA Tejas twin seater is a light weight, all weather multi-role 4.5 generation aircraft.

Air Chief Marshal VR Chaudhari announced that the Indian Air Force (IAF) is contemplating the acquisition of military assets, equipment, and technology worth an estimated Rs 2.5 to Rs 3 lakh crore over the forthcoming seven to eight years. During a press briefing preceding the 91st Air Force Day celebration on October 8th, the Chief of Air Staff disclosed the IAF's commitment to moving forward with the procurement of an additional 97 Light Combat Aircraft Tejas Mark 1A, with an approximate expenditure of Rs 67,000 crore.

The procurement initiative will supplement the existing contract for 83 advanced fighter aircraft, increasing the total count of LCA Mark 1A planes in the fleet to 180. This acquisition will entail an expenditure of Rs 1.15 lakh crore for the 180 aircraft, with the Mark-II version expected to be ready by 2025.

The Indian Air Force's decision to acquire additional LCA Mark 1A aircraft is crucial to its ongoing modernisation efforts. These efforts are geared towards enhancing operational capabilities and gaining a decisive advantage in the ever-evolving regional landscape.

Expanding on the modernisation plans and the emphasis on indigenous technology, Air Chief Marshal Chaudhari mentioned that both the Army and the Air Force are exploring the possibility of signing a contract for 156 Light Combat Helicopters (LCH) Prachand in the upcoming year. Out of these, 66 helicopters will be allocated to the Air Force. Additionally, there are plans to procure 70 indigenous basic trainer aircraft HTT-40 at a cost of Rs 6,000 crore.

"The contract value we anticipate is Rs 45,000 crore. Apart from that, we had already signed a Rs 6,000-crore contract for 70 HTT-40 trainer aircraft.," he said.

The weapons systems Akash-NG, medium-range surface-to-air missile (MR-SAM), air defence system Pusa, Project Khusha to make an indigenous S-400 type air defence system, and ballistic missile system Pralav are among the contracts that the IAF is expecting to sign in the coming year, he said.

"The overall value of these contracts will be well past Rs 2.5 lakh crore-Rs 3 lakh crore. Contracts will be expected to be fulfilled in about seven to eight years. So we will plan our budget accordingly," the Air Chief said, noting

that most of the acquisitions were indigenous.

According to the Air Chief Marshal, the IAF will phase out its ageing MiG-21 fighter aircraft by 2025, with a gradual transition to the more advanced and capable LCA Tejas.

"In another month or so, one MiG-21 squadron will be retired, with the last one following suit after that," Air Chief Marshal Chaudhari said. Incidentally, the iconic aircraft that heralded the jet era in the IAF will make its last formation flight at Prayagraj at the fly-past on Air Force Day.

The Air Chief also revealed plans for an extensive upgrade project valued at Rs 60,000 crore to enhance the Su 30MKI fleet. This comprehensive overhaul will encompass all aspects of the fighter jets, excluding the airframe and engines. The upgrade initiative will bring new avionics, radar systems, and electronic warfare (EW) suites. In its initial phase, approximately 100 of these fighter aircraft will undergo these enhancements, all of which will be carried out within India. Hindustan Aeronautics Limited (HAL) will take the lead in this upgrade endeavour in partnership with the Indian Air Force (IAF) and other collaborators. Notably, this upgrade is expected to substantially augment the Beyond Visual Range (BVR) capabilities of the Su 30MKI fleet.

The Indian Air Force (IAF) has initiated a Mountain Radar project to address surveillance gaps along the Himalayan border, where the Chinese People's Liberation Army has established a more extensive network of radars, sensors, and air defence systems. "When strategically positioned, our mountain radars will provide deep visibility into enemy territory," noted Air Chief Marshal Chaudhari.

As part of the Mountain Radar project, the Indian Air Force intends to acquire additional transportable, lightweight indigenous radars and high-powered radar systems. However, progress in acquiring 114 multi-role fighter aircraft has been slow. Nonetheless, steps have been taken to replace the ageing IL-76 fleet by the end of this decade.

Acknowledging delays in receiving the S-400 air defence systems from Russia due to the Ukraine conflict, the Air Chief mentioned that three regiments have been delivered and expressed confidence that the remaining two will arrive next year.

IAF is Constantly Monitoring Situation Along LAC

The Air Chief also highlighted the Indian Air Force's ongoing vigilance regarding China's military infrastructure and the deployment of air assets along the Line of Actual Control (LAC). The IAF employs intelligence, surveillance, and reconnaissance (ISR) mechanisms to assess the evolving situation, enabling the IAF to adapt its operational strategies accordingly.

"We closely monitor the accumulation of resources and capabilities along our borders. Our operational strategies are highly adaptable and responsive to the developing situation on any front," he explained. He added, "So, in situations where we may not have numerical superiority or match the adversary's strength, we will counter it through superior tactics and enhanced training." He emphasized that the IAF maintains a flexible and dynamic approach to asset deployment, avoiding rigid mindsets. The force continually updates its war plans

based on ISR intelligence to address emerging threats effectively.

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HAL Remains Hopeful as Tejas Fighter Jets Compete Against Global Giants

Yuvraj Tyagi | 24 October 2023

Source: Republic World | https://www.republicworld.com/defence/global-defence-news/hal-remains-hopeful-as-tejas-fighter-jets-compete-against-global-giants.news

In 2003, the LCA was officially named 'Tejas'. It is the smallest and lightest in its class of contemporary supersonic jet. | Image: Twitter/@IAF_MCC

A team from India's aerospace major,. Hindustan Aeronautics Limited (HAL), is actively promoting the indigenous Light Combat Aircraft (LCA) 'Tejas' to the Philippines Air Force (PAF), despite facing fierce competition from established global rivals. While the Philippines embarks on the Modernization Program's Horizon Two, which initiated the Multi-Role Fighter (MRF) tender in 2018, the acquisition of 12 fourth generation or higher" multi-role fighter jets is on the horizon. This marks a significant milestone for the PAF, as it represents their first acquisition of fighter jets since the retirement of the Northrop F-5 Tigers in 2005.

However, the road for HAL;s Tejas appears challenging, with competitions such as Lockhead Martin's F-16 V and SAAB's JAS-39C enjoying established reputations. Notably, South Koreans Korea Aerospace Industries (KAI) is advocating the FA-50 as a cost-effective option for PAF modernization. The PAF already operates 12 PA-50PH aircraft and South Korea has offered to upgrade the fleet, enhancing their capabilities for various missions, including air-to-air ground, air-to sea, and air-to-air. This entails integrating radar and targeting systems and adding a 300-gallon external fuel thank to extend combat range.

Capabilities of the FA-50PH Aircraft

The FA-5-PHs have a top speed of March 1.5 and can be equipped with air-to-air missiles, including AIM-9 "Sidewinder" air-to-air and hear-seeking missiles, in addition to light automatic cannons and bombs. The Philippines acquired a dozen FA-50s form Korea Aerospace Industries for PHP 18.9 billion, with deliveries commencing in November 2015 and concluding in May 2017. These aircraft were deployed during the Battle for Marawi, a five-month conflict in 2017.

Despite challenges, HAL's team in optimistic, citing concerns about the operational readiness of half of the Philippines' FA-50 fighter jet, which were grounded due to logistics problems. The LAC Tejas faced formidable competitors in the form of Lockheed Martin;s F-16 and SAAB's JAS-39 Gripen, making it an underdog in the race. Nevertheless, the presence of the HAL team in the Philippines has reignited hopes for Tejas' prospects, indicating that it is not ready to concede defeat.

Tejas' Quest for Export Deals

Tejas has been making waves in the defence export market with its aggressive positioning, although it has not yet secured any export deals. Following a setback in the Malaysian tender, even the Argentinian fighter jet deal seemed to

slip from Tejas' grasp. Presently, the Indian Air Force is the sole operator of Tejas. The recent signing of US$ 368 million contract for an India-made Brahmos supersonic missile and an MOU between the Philippine Aerospace Development Corporation (PADC) and Hindustan Aeronautics Limited (HAL) indicate the Philippines' interest in ALH Dhruv and ALH Mk III.

During the first-ever visit for a Filipino Coast Guard Chief to India, HAL conducted a Customer Demonstration Flight onboard ALH MK III in Goa. The ALH Mk III is a variant of the indigenous Dhruv Helicopter and has already been inducted into the Indian Navy and the Indian Coast Guard. Weighing 5.5 tons, it falls into the multi-role, multi-mission category of versatile helicopters.

The ALH Mk III features cutting-edge surveillance radar, capable of detecting and identifying ships and boats up to 120 nautical miles away, significant enhancing the Coast Guard's ability to monitor the Indian coastal regions. With an electro-optical sensor, it can even monitor the smallest vessels at distances of up to 30 nautical miles. Besides maritime reconnaissance, the helicopter can execute long-range Search and Rescue operations. It is also equipped with a heavy machine gun for constabulary missions, making it a valuable asset for a range of Coast Guard operations.

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Airbus and IIT Kanpur Sign MoU to Boost Indian Aerospace Talent

Joy Sengupta | 25 October 2023

Source: The Times of India | https://timesofindia.indiatimes.com/india/airbus-and-iit-kanpur-sign-mou-to-boost-indian-aerospace-talent/articleshow/104690007.cms?from=mdr

PUNE: Airbus and Indian Institute of Technology in Kanpur (IITKanpur) have signed a Memorandum of Understanding (MoU) tofacilitate increased collaboration in developing educationprogrammes to foster talent development in the Indian aerospacesector.

Under the collaboration, both entities will promote research inadvanced technologies and develop programmes and activities toenhance technical capabilities for aerospace students in India.Both organisations will also explore collaboration opportunitieswith global institutes where students will get to work on projectsrelevant to the sector. The partnership aims to build acollaborative culture that provides mentorship, exposure andinvaluable experience to the students of IIT Kanpur. The synergies created through these cross-skillingopportunities will foster the growth of the aerospace industry in the country.

Speaking at the signing, Rémi Maillard, President and Managing Director, Airbus India

and South Asia, said, "AtAirbus we are firmly committed to developing the aerospace ecosystem in India. We continue to invest ineducation and skill development that will help in the creation of a competent workforce in the country. This MoUwill harness Airbus' expertise and IIT Kanpur's capabilities in education, research and training to nurture the next generation of technology leaders and will unlock the potential of the fast-evolving aerospace landscape in thecountry."

S. Ganesh, Officiating Director, IIT Kanpur, stated, "IIT Kanpur has been relentlessly pursuing its vision to supportinnovation, research, and entrepreneurial activities in technology-based fields, and Aerospace is one of the keythrust areas in this endeavor. This collaboration with Airbus Group indeed is a significant step. The collaboration iscertain to enhance the industry experience of aerospace engineering students at the institute. With ourAerospace Department covering an expansive array of research and development in the field we look forward toa mutually fulfilling engagement".

G. M. Kamath, Head of the Department of Aerospace Engineering at IIT Kanpur, mentioned, "The aerospaceengineering department of IIT Kanpur has historically been at the forefront with regard to building strongindustry-academia connections, and leveraging our research to train our students to be more industry-ready. Weare confident that this MOU will lead to impactful outcomes for not only Airbus and IIT Kanpur, but also for theaerospace ecosystem of India at large."

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MoU Signed Between Indian, French Space Industry Bodies to Boost Collaboration

Surendra Singh | 10 October 2023

Source: The Times of India | https://timesofindia.indiatimes.com/india/mou-signed-between-indian-french-space-industry-bodies-to-boost-collaboration/articleshow/104297887.cms?from=mdr&utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst

India's NEW DELHI: Indo-French space collaboration received a boost onMonday when a memorandum of understanding (MoU) wassigned between representatives of Indian space industries , IndianSpace Association (ISpA) and French Aerospace IndustriesAssociation GIFAS to increase space cooperation betweenindustries of the two countries.

Lauding the MoU move at the Indian Space Conclave that wasorganised at the Sam Manekshaw Centre here, Frenchambassador-designate Thierry Mathou said, "Indo-French spacecooperation is not new but goes back to the 1960s when India'sfirst rocket launched from the Thumba launching station carrieda satellite made by the French space agency. India and Francehave also been in a strategic partnership since 1998. We need to expand this cooperation in new space venturesand we need to together develop space

applications." Recalling the contribution of Vikram Sarabhai to the Indianspace sector, the envoy also talked about the recent space reforms ushered in by the Indian government.

Lt. Gen. AK Bhatt (Retd), director general of Indian Space Association, said, "This collaboration between public andprivate sectors promises to propel us to new heights, fostering innovation and driving progress like never before.In this journey, I must acknowledge the importance of our alliance with France, a crucial partner in our spaceexploration endeavors. France has been a steadfast friend, and today's MoU with GIFAS, the French Aerospace Industries Association, reaffirms our commitment to strengthening industry collaboration between our twonations. Together, we shall continue to push the boundaries of space exploration and unlock the limitlesspossibilities that await us."

ISRO chairman S Somanath, who virtually addressed the Space Conclave, said, ""The integration of privateindustries into every facet of the space sector marks a significant milestone, opening new frontiers and sparkinginnovation. I applaud ISpA for fostering an ecosystem that nurtures space startups, driving the growth of ourspace industry. As we engage in profound discussions on sustainable development, disaster management,business domains, and geospatial policy, we recognise the transformative potential that the space sector holdsfor the betterment of humanity. Additionally, the imminent release of FDI rules will further incentivise foreigninvestments, propelling us towards even greater heights in our cosmic endeavours."

At the conclave, French trade commissioner Eric Fajole laid emphasis on enhancing space cooperation betweenthe private sector of the two countries while informing that representatives of a huge French delegation of nearly30 aerospace companies have landed in India to boost business to business cooperation. While talking about therecent agreements of Airbus with Air India and IndiGo for hundreds of civilian aircraft, he said it is time to buildtrust among French space companies. Fajole said, "We want French companies to understand the Indiangovernment's push for Make in India. Therefore French companies should have more tie-ups with Indiancompanies to align its business with Indian policies."

The trade commissioner also informed that while his offices have been opened in four different cities of India,including Bengaluru, Hyderabad and Chennai to boost business cooperation. The representatives of nearly 30French aerospace companies, including Airbus, Dassault, Thales, Safran, participated in a panel discussion toexpress their views about their expectations from the Indian space industry.

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Technology Development

A Look Ahead: What's Next for Aviation Technologies in 2023

Juneyoung Juna | 10 March 2023

Source: Linkedin | https://www.linkedin.com/pulse/look-ahead-whats-next-aviation-technologies-2023-juneyoung-juma/

ctto: Irina Irisa- Aerial View of Red-and-white Enclosed Rides Overlooking City

As Eddie Rickenbacker once famously said, "Aviation is proof that given the will, we have the capacity to achieve the impossible." As we progress into 2023, this quote rings truer than ever – aviation technology has come a long way since Lindbergh's historic flight in 1927, and it will only continue to evolve in the coming years. In this article, we'll explore some of the most exciting and innovative aviation technologies that will make their way into the industry in 2023, helping make flight safer and more efficient.

1. Advances in Automation and Artificial Intelligence

Thanks to automation, aviation has soared above the clouds of restrictions with sophisticated autopilots and computer-aided navigation systems. Today's airplanes rely on fewer crew members while boasting increased efficiency, safety, and reduced costs — but it doesn't stop there. In 2023 airlines are set to tap into AI and predictive analytics for ultra-efficient aircraft operations that will carry us higher than we've flown before.

AI's role in aviation safety is increasing as predictive maintenance, and autonomous aircraft monitoring systems are becoming essential tools for airlines. These technologies help detect potential problems before they become serious while keeping passengers and crews safe with real-time risk detection capabilities.

2. It's All About Precision: GPS, IMUs and More

The ICAO Global Safety Report for 2022 revealed an impressive reduction in aviation-related fatalities. This progress can be credited to the implementation of reliable safety systems and advanced technologies, such as Inertial Measurement Units (IMUs) and digital mapping applications. In 2023, airlines will continue this trajectory by further investing in these cutting-edge solutions that put passenger safety first.

Aircraft incorporate IMUs (devices comprising three accelerometers and gyroscopes) to measure their velocity, orientation and gravitational forces. This data is then used in conjunction with GPS signals to ensure more accurate positioning information when flying at high speeds or navigating sharp turns, which can cause distortion from inertial effects.

An IMU helps compensate for these distortions by providing additional navigation points that increase accuracy even under intense conditions. The use of IMUs and digital mapping applications is helping to make air travel safer than ever before, significantly increasing

passenger confidence in aviation safety.

3. The Future is Now: Introducing Urban Air Mobility

As the aviation sector continues to develop and evolve, one of the most exciting trends to watch out for in 2023 is Urban Air Mobility (UAM). UAM is the concept of using electric flying vehicles to transport passengers and cargo in urban areas. This new form of transportation promises to revolutionize the way we move people, goods and services – reducing congestion and pollution in urban areas while providing a more efficient alternative to traditional ground transportation

Currently, many companies are developing UAM systems intending to deploy them in cities by 2030. These systems include electric Vertical Take-Off and Landing (eVTOL) aircraft, which can take off vertically without a runway. Additionally, these aircraft will be equipped with advanced sensors and navigation systems to ensure safety and reliability, making them a viable option for urban air transportation.

4. Enhanced Biometrics for Airport Security

Airlines and airports worldwide are increasingly investing in biometric technologies to facilitate smoother, faster and more secure travel experiences. In 2023, these technologies are expected to become even more advanced and widely adopted, allowing for speedier airport security verification.

Biometric terminals and boarding gates can use facial recognition technology to verify a passenger's identity and provide them with access to secure areas such as boarding gates and departure lounges. Additionally, these technologies can detect unauthorized individuals and ensure that only approved personnel are in restricted areas.

Using biometric technology, airports can improve their premises' overall security and safety while providing passengers a more efficient travel experience. As such, 2023 is expected to be a year of great progress for biometric-based airport security systems.

5. Augmented reality (AR) to Improve Situational Awareness

The combination of sensors, cameras and displays used in AR allows pilots access to real-time data such as terrain maps, weather updates and more crucial flight information - allowing them greater insight into their environment than ever before. With this newfound knowledge comes improved decision-making capabilities that can make all the difference between mission success or failure.

On top of its practical benefits, AR also facilitates immersive training experiences for pilots, dramatically increasing proficiency across many skillsets – setting new standards in safe flying practices worldwide.

6. Automation in Maintenance

As the aviation industry continues to adopt more advanced technology, maintenance repair and overhaul (MRO) is also becoming a key area of focus. Automation has been steadily making its way into MRO in recent years, and 2023 is expected to be the year when it truly takes off. Automation has the potential to revolutionize MROs by streamlining paper-work processes, reducing downtime and improving safety.

Implementing automation in maintenance scheduling/planning, routine task handling

and asset tracking can reduce turnaround times significantly, allowing for faster and more efficient processes. Additionally, these systems can detect potential problems early on in the process which can help prevent potential disasters. Automation is expected to become increasingly widespread in MROs – allowing the industry to become ever more efficient and safe.

Setting the Standard for Global Air Mobility

Aviation continues to evolve in safety and efficiency, with an array of exciting new technologies making air travel simpler, faster and more reliable than ever before. From automated maintenance processes to state-of-the-art biometric security at airports - not only is the industry keeping us safe, but it is also creating a truly immersive journey experience via augmented reality technology for pilots.

The future looks bright for aviation; as we continue innovating our way into smoother journeys every day. Soar to greater heights in 2023 as our skies open up to unprecedented levels of safety, comfort and convenience. Get ready: it'll be an unforgettable journey!

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Commentary

1. IAF: Touching the Sky With Glory - https://www.udayindia.in/news/iaf-touching-the-sky-with-glory

Further Reading

1. Pakistan's JF-17 'Shoots Down' Six Rafale Fighters During Turkish Wargame? IAF Pilot Decodes Report - https://www.eurasiantimes.com/pakistans-jf-17-shoots-down-six-rafale-fighters-during-turkish/?amp
2. Indian Aerospace Industry : On a High Growth Trajectory Commercial Interruption: Space Wargame Exposes Risk of Dangerous Escalation - https://spacenews.com/commercial-interruption-space-wargame-exposes-risk-of-dangerous-escalation/
3. Space Force Planning $8 Billion Satellite Architecture for Nuclear Command and Control - https://spacenews.com/space-force-planning-8-billion-satellite-architecture-for-nuclear-command-and-control/

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

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

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