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WORLD AIR NEWS

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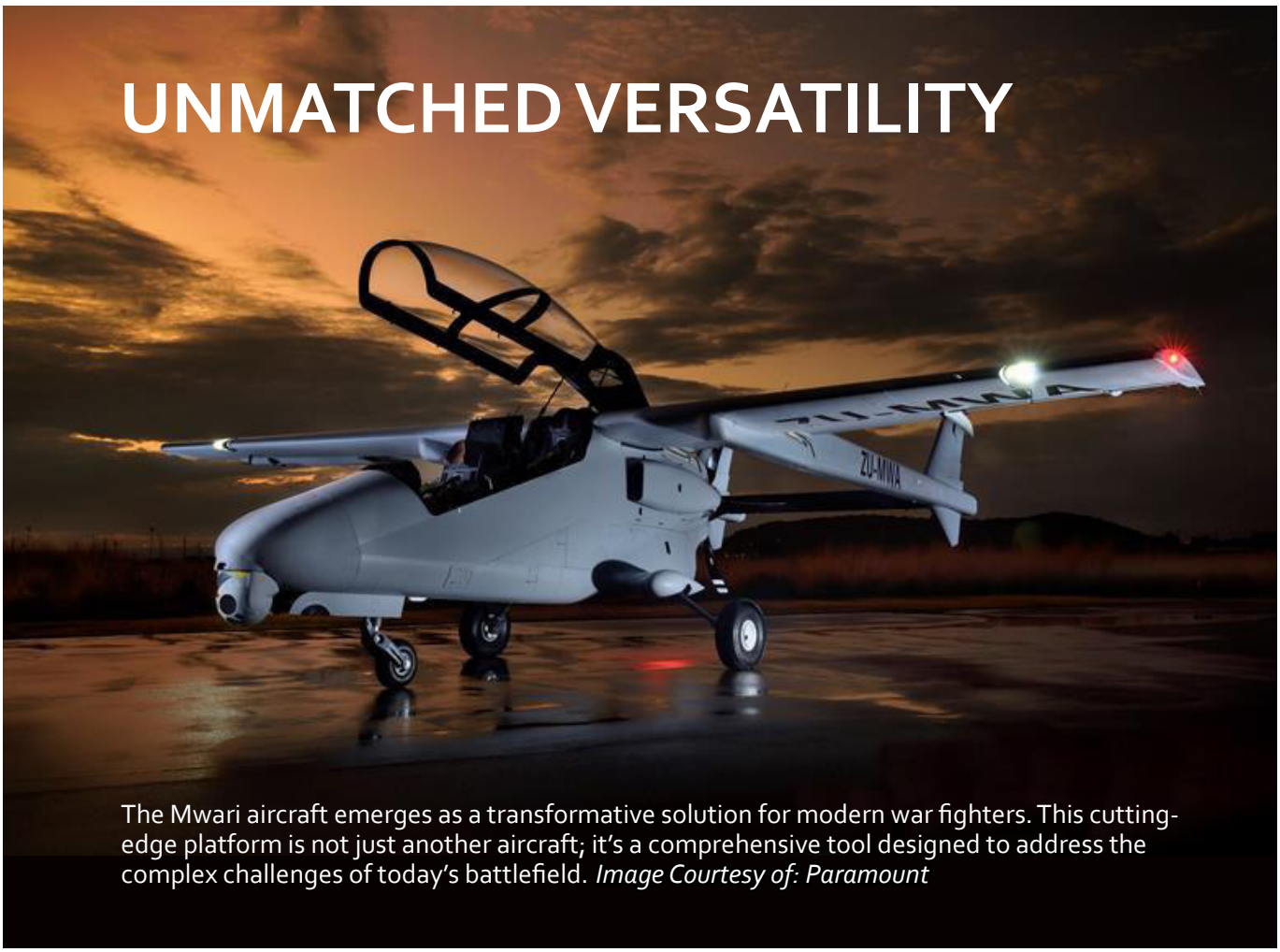

The Mwari aircraft emerges as a transformative solution for modern war fighters. This cutting-edge platform is not just another aircraft; it's a comprehensive tool designed to address the complex challenges of today's battlefield. *Image Courtesy of: Paramount*

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FUTURE OF AIR POWER: GLOBAL COLLABORATION AND DEFENCE INNOVATION

As we approach the highly anticipated Africa Aerospace and Defence (AAD) 2024 expo, the September edition of *World Airnews* offers a comprehensive exploration of the latest developments and innovations shaping the global aviation and defence industries.

This month, we dive deep into the cutting-edge advancements in air power, with a focus on the rapidly evolving world of fighter jet design. As nations like the United States, China, Russia, and several European and Asian countries strive for air dominance, we examine the newest iterations of fifth and sixth-generation fighters, including the groundbreaking Global Combat Air Programme (GCAP). Turkey's bold strides in developing its MMU Kaan fighter jet are also highlighted, showcasing its ambitions to join the elite ranks of nations with fifth-generation air power.

In our coverage of supersonic technologies, we shed light on the BrahMos supersonic missiles, which are now making their way into Africa, marking a significant milestone in precision-guided weaponry.

The future of warfare is also being reshaped by the increasing reliance on unmanned aerial vehicles (UAVs) and the emergence of cutting-edge eVTOLs. We explore how drones are revolutionising military and homeland security operations, offering unparalleled precision and effectiveness in modern combat scenarios.

Our military aircraft program section delves into Bell Textron's Future Long Range Assault Aircraft (FLRAA), which has recently reached a pivotal stage in its development. Additionally, the MWARI precision strike aircraft is examined as a transformative solution designed to meet the demands of contemporary military conflicts.

International collaborations are at the forefront of defence innovation, as exemplified by the Global Combat Air Programme (GCAP) that has produced the world's first 6th generation fighter jet. We also highlight the latest offerings from Rosoboronexport, presented at the International Military-Technical Forum, reflecting Russia's continued influence in the global defence market.

Technological advancements remain a key focus, with detailed analysis on the integration of advanced stealth, artificial intelligence, hypersonic missiles, and directed energy weapons in next-generation air combat platforms. We also take an in-depth look at the art and future of aerial refuelling, and the legacy of the Bell Boeing V-22 Osprey, a revolutionary tiltrotor that has redefined military aviation.

As the importance of cybersecurity in aviation continues to grow, we spotlight Alchemy Defence, a leader in fending off sophisticated cyber threats that target the aviation industry. Their expertise in defending against digital threats underscores the critical role of cybersecurity in maintaining the integrity and safety of modern aviation.

Sustainability is another pressing issue, and we explore the transformative potential of Sustainable Aviation Fuel (SAF) in military aviation. As the global focus shifts towards greener alternatives, SAF emerges as a strategic imperative for reducing the environmental impact and enhancing the energy security of military operations.

Our events and industry updates section covers the recent Royal International Air Tattoo (RIAT) 2024, a celebration of significant anniversaries within the aviation community. We also provide an essential preview of the upcoming AAD 2024, Africa's largest aerospace and defence exhibition, which promises to be a pivotal event for industry leaders, government officials, and military representatives.

Finally, we address critical issues in space and sovereignty, offering insights into the evolving landscape of international space policy and the challenges associated with navigating this final frontier.

This September edition of *World Airnews* is packed with insightful analysis and exclusive content, ensuring that defence professionals, industry insiders, and aviation enthusiasts alike will find plenty of reasons to immerse themselves in the pages of this issue.

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The U-2 "Dragon Lady" Credit: Lockheed.

FROM HYPERSONIC JETS TO ALIEN TECHNOLOGY

The United States government maintains that certain aircraft do not exist. However, history has shown that some of the most ground-breaking advancements in aviation have emerged from the shadows of secrecy. We delve into the clandestine world of the U.S. Air Force's black projects, exploring everything from hypersonic fighter jets to futuristic concepts that push the boundaries of what we think is possible.

The U-2 Spy Plane: The Beginning of a Secret Legacy

The first secret aircraft to be developed at the infamous Area 51 was the U-2 spy plane. Achieving its maiden flight on August 1, 1955, the U-2 was tested at the Groom Lake, Nevada Test and Training Range, a site that would later become synonymous with top-secret military projects. Test pilot Anthony W "Tony" LeVier's unintentional first flight, originally planned as a high-speed taxi test, set the stage for the U-2's legacy as a critical tool for intelligence gathering.

The aircraft went on to perform high-altitude reconnaissance missions over the Soviet Union, Cuba, China, and other communist nations during the Cold War. Despite the advent of high-altitude surface-to-air missiles that threatened the U-2's missions, this spy plane remains in service today, proving invaluable in scenarios where satellites fall short.

The SR-71 Blackbird: Outrunning Threats

In response to the growing vulnerability of the U-2, legendary aircraft designer Clarence "Kelly" Johnson developed the SR-71 Blackbird—a high-speed, high-altitude reconnaissance aircraft designed to outpace enemy defences. With a top speed of Mach 3.3 (2,193 mph), the SR-71 was an engineering marvel that served for over two decades. The Air Force cloaked the Blackbird project in intense secrecy, even monitoring civilian sightings and media reports. It wasn't until 1964, when President Lyndon Johnson revealed the existence of the SR-71 during his campaign, that the aircraft's true capabilities became public knowledge.

The Blackbird remained operational until the 1990s, and its legacy continues to inspire advancements in aerial reconnaissance.

The F-117 Nighthawk: Stealth Redefined

The 1970s ushered in a new era of aviation with the development of the F-117 Nighthawk, the world's first operational stealth aircraft. Designed by Lockheed's Skunk Works under the code name "Have Blue," the

The SR-71 "Blackbird" Credit: Amalgam

F-117 featured a faceted, diamond-like surface to deflect radar beams, making it virtually invisible to detection systems. The Nighthawk took its first flight over Area 51 in June 1981 and remained shrouded in secrecy for seven years. Its capabilities were unveiled to the world during Operation Desert Storm in 1991, where it played a crucial role in targeting high-value sites in Baghdad. The F-117 continued to serve in conflicts in Afghanistan and Iraq before its official retirement in 2008, although rumours persist that a select few may still be operational.

The F-117 "Nighthawk" Credit: Getty Images

Artist render of The SR-72 "Darkstar" Image: Creative Commons

The SR-72: The Next Generation of Speed

The SR-72, often referred to as the "Son of the Blackbird,"or Darkstar , represents the next leap in hypersonic flight. First announced in 2007, the SR-72 is rumoured to be capable of reaching speeds exceeding Mach 6. While the U.S. Air Force has neither confirmed nor denied the existence of this aircraft, Lockheed

The SR-91 hypersonic "Aurora" Credit: Tech Planet

Martin has acknowledged on going work on the SR-72, with a prototype reportedly set to take flight in the near future. This hypersonic successor to the SR-71 could revolutionize reconnaissance missions, operating at speeds that make it nearly impossible for enemy defences to respond.

The SR-91 Aurora: Myth or Reality?

One of the most secretive projects in aviation history is the SR-91 Aurora, a rumoured hypersonic reconnaissance aircraft believed to have been developed in the 1980s or 1990s. The SR-91 is thought to be capable of reaching speeds between Mach 4 and Mach 6, making it a potential replacement for the SR-71 Blackbird.

Despite the lack of official confirmation, tantalizing hints of the Aurora's existence have surfaced over the years. A British Ministry of Defence report from 2006 mentions a U.S. priority to develop a hypersonic vehicle, and sightings of triangular aircraft and unexplained sonic booms lend credence to the speculation surrounding the Aurora.

The TR-3B Black Manta: Blurring the Lines Between Science and Fiction

Perhaps the most controversial aircraft in the realm of black projects is the TR-3B Black Manta, rumoured to be powered by a reverse-engineered anti-gravity drive recovered from alien technology. While these claims border on science fiction, there is some evidence to suggest that advanced propulsion systems may be in development. In 2020, the U.S. Navy filed patents for technology that resembles the capabilities attributed to the TR-3B, including gravitational wave generators and space-time modification weapons. Reports of triangular UFOs, such as the sightings during the Belgian UFO wave of 1989, have fuelled speculation that the TR-3B might be more than just a myth.

The Thin Line Between Myth and Reality

The world of U.S. Air Force black projects is one of intrigue, where cutting-edge technology and classified operations blur the lines between myth and reality. From the high-speed reconnaissance missions of the SR-71 Blackbird to the rumoured hypersonic capabilities of the SR-72 and SR-91 Aurora, these secretive aircraft continue to capture the imagination of aviation enthusiasts and conspiracy theorists alike. As we push the boundaries of what is possible in aerospace engineering, one can only wonder what new advancements are being developed in the shadows, waiting for the day when they too will emerge from the classified abyss.

Artists Rendition. The hypersonic TR-3B "Black Manta" Credit: r/imaginary Technology

TEMPEST 6TH-GEN FIGHTER JET: A LANDMARK IN GLOBAL DEFENCE COLLABORATION

In a historic moment for the global defence industry, the world's first 6th generation fighter jet was officially unveiled at the Farnborough International Airshow. This cutting-edge aircraft is the centrepiece of the Global Combat Air Programme (GCAP), an ambitious international collaboration between the United Kingdom, Italy, and Japan aimed at developing a next-generation combat air capability.

The GCAP represents a strategic partnership between the governments and defence industries of the UK, Italy, and Japan, with leadership from BAE Systems (UK), Leonardo (Italy), and Mitsubishi Heavy Industries (Japan). This alliance is not only focused on advancing military objectives but also on strengthening industrial ties and securing the future of combat air industries in each participating nation.

This trilateral collaboration is driven by a shared vision of addressing the evolving threats of 2040 and beyond, with the new fighter jet slated for service by 2035. The program's international design is expected to foster innovation and technological advancements, while also offering significant economic benefits to the partner nations.

The GCAP has seen steady progress since its inception. In September 2023, a pivotal Collaboration Agreement was signed between BAE Systems, Mitsubishi Heavy Industries, and Leonardo SpA, signalling strong trilateral cooperation. This agreement set the stage for further integration, collaboration, and information sharing among the partners, paving the way for the next phase of the program.

A major milestone was achieved in December 2023 when the defence ministers from Italy, Japan, and the UK signed an international treaty to officially develop the next-generation stealth fighter under the GCAP banner. This treaty also established the joint GCAP government headquarters in the UK, reinforcing the program's international nature and strategic importance.

At the Farnborough Airshow, the GCAP partners unveiled a new concept model of the fighter jet, showcasing the substantial progress made in its design and development. The aircraft, known as Tempest in the UK, is poised to be one of the most advanced, interoperable, and adaptable fighter jets in the world.

The Tempest fighter jet is designed to meet the future demands of aerial combat. It features an advanced intelligent weapons system, a software-driven interactive cockpit, and integrated sensors that provide unprecedented situational awareness. A next-generation radar system, capable of delivering 10,000 times more data than current models, will give the Tempest a significant edge in battle.

BAE Systems is leading the UK's efforts in this international collaboration, building on the progress and investment made through the Team Tempest partnership, which includes Leonardo UK, MBDA UK, Rolls-Royce, and the UK Ministry of Defence. Since 2018, this partnership has been at the forefront of researching and developing future combat air system capabilities.

"At BAE Systems, we're proud to lead the UK's world-leading combat air sector in this exciting and forward-leaning partnership," a BAE Systems spokesperson said. "This collaboration will deliver a crucial and affordable defence capability, while maintaining our sovereign combat air skills across all three nations."

As the GCAP continues to develop, the world is witnessing the dawn of a new era in aerial warfare. With its cutting-edge technology and international collaboration, the Tempest fighter jet is set to redefine the future of combat air capabilities, ensuring the participating nations remain at the forefront of global defence for decades to come.

SOURCE: https://www.baesystems.com/
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MWARI: PRECISION STRIKE AIRCRAFT

In an era where military conflicts demand precision, adaptability, and rapid deployment, the Mwari aircraft emerges as a transformative solution for modern war fighters. This cutting-edge platform is not just another aircraft; it's a comprehensive tool designed to address the complex challenges of today's battlefield with unparalleled efficiency.

The Mwari is a two-crew C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance) and F3EAD (Find, Fix, Finish, Exploit, Analyse, Disseminate) precision strike aircraft. It stands out with its capability to carry a diverse array of weapons, sensors, and systems, making it a versatile asset in extended airborne missions. What truly sets the Mwari apart is its pusher propeller configuration and open system architecture, which allows for the seamless integration of both current and emerging technologies. This feature establishes a new benchmark in mission flexibility and adaptability, ensuring that the aircraft remains relevant as warfare evolves.

One of Mwari's most significant advantages is its hybrid ISR and close air support capabilities. Unlike any other platform specifically designed for these roles, Mwari guarantees smarter operational efficiency and enhanced mission success, all at a cost of less than $1,000 per hour. Its rugged design is tailored for operations in remote and austere environments, requiring minimal logistical support—a critical factor in modern military operations where resources can be scarce.

Mwari's versatility is further demonstrated by its multi-mission pod system. This innovative feature allows the aircraft to rapidly switch between various roles, making it a true multi-role platform. From peacekeeping, surveillance, and policing to border and coastal patrol, anti-smuggling operations, disaster relief, and intelligence gathering, Mwari can be quickly reconfigured to meet the demands of any mission. With the ability to stay airborne for over seven hours, it is particularly well-suited for patrolling vast land areas, borders, and oceans.

The aircraft's role in F3EA (Find, Fix, Finish, Exploit, Analyse) operations is unparalleled, offering real-time C4ISR capabilities that are perfectly aligned with the needs of modern air forces. Its tactical versatility makes it an indispensable asset in addressing the diverse threats faced by military forces today.

In summary, Mwari is more than just an aircraft; it's a platform that embodies the future of military aviation. Its combination of mission adaptability, cost-effectiveness, and operational efficiency makes it the ultimate solution for the war fighter, ensuring that they are equipped to meet the challenges of tomorrow's battles. As military forces continue to evolve, the Mwari is poised to play a pivotal role in securing success on the modern battlefield.

The Mwari is a two-crew C4ISR Credit: Paramount

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TURKEY'S AMBITIOUS PATH TO FIFTH-GENERATION AIR POWER

Turkey's journey toward becoming a dominant player in the skies has taken a bold step forward with the development of its national fighter jet, the MMU Kaan. This fifth-generation fighter, which took its maiden flight in February, is poised to place Turkey among an elite group of nations, including the United States, Russia, and China, that have fielded such advanced aircraft. However, the road ahead for Kaan is fraught with challenges that must be navigated before it can truly claim the title of a fifth-generation fighter.

The Kaan, which means "ruler" or "master" in Turkic languages, symbolises Turkey's aspirations to transition from a regional actor susceptible to international arms embargoes into a formidable power that commands respect on the global stage. The aircraft's stealth capabilities, which make it hard to detect by enemy radar and sensors, along with its ability to communicate and share data with other military units, are key features of fifth-generation fighters.

Yet, despite the promising start, analysts caution that Kaan will need to overcome significant obstacles before it can match the capabilities of its peers. One of the primary challenges is the extensive testing required to ensure the aircraft's reliability and effectiveness. The planned eight prototypes will need to undergo thousands of hours of ground and flight testing, which could delay the project's timeline and push back the plane's planned mass production.

The Engine Dilemma

A critical component of Kaan's development is its engine. Currently, Turkish Aerospace Industries (TUSAS), the manufacturer, plans to deliver the first batch of Kaan fighters to the Turkish Air Force by 2028, powered by US-made General Electric F110 engines.

However, for Turkey to achieve true independence in its military capabilities, the second batch of Kaans, dubbed "Block 20," is planned to be equipped with domestically made engines.

Huseyin Fazla, a retired Turkish Air Force fighter pilot and former TUSAS test pilot, estimates that these domestic engines, which would meet fifth-generation requirements, might not be ready until 2040. This timeline presents a significant challenge, as the engines must be rigorously tested in prototypes and produced in large quantities to meet the demands of mass production.

Technological Advances and Testing Strategies

One of the innovative approaches being used to expedite Kaan's development is digital twin technology, where a digital version of the aircraft undergoes extensive testing through computer simulations. This allows engineers to identify potential issues and refine the design without needing to physically test each prototype. Additionally, the eight Kaan prototypes could be put through different types of tests, with some used exclusively for ground testing, while others focus on specific flight conditions.

However, despite these advances, some experts remain sceptical about whether these strategies will be enough to meet the ambitious timelines set for Kaan's development. A Turkish defence industry specialist, speaking on condition of anonymity, pointed out that the limited number of optimal weather days in Ankara, where TUSAS's manufacturing plants are located, could further constrain the time available for flight tests.

A Matter of National Pride and Independence

The Kaan project is more than just a military program; it is a symbol of national pride and Turkey's desire to assert its independence in the global defence industry.

The development of Kaan is seen as Turkey's "war of liberation in the field of aviation," as it aims to reduce reliance on foreign military technology and overcome the challenges posed by international arms embargoes.

Once a key partner in the US-led F-35 program, Turkey was removed from the initiative in 2020 following its purchase of Russian-made S-400 air defence systems.

This left Turkey in a difficult position, as it had initially planned for Kaan to complement the F-35 in its air force. With no expectation of receiving the F-35, Kaan must now take on the full range of duties initially intended for the US-made fighter, including deep-penetration missions into enemy airspace and electronic jamming of enemy radar.

The Financial Challenge and the Need for Partnerships

While TUSAS is a well-resourced company with a strong track record of collaboration with global aerospace giants like Boeing and Airbus, developing a fifth-generation fighter jet is an expensive endeavour. Estimates suggest that the cost of producing the Kaan fleet could range between $15 billion and $25 billion, presenting a significant financial challenge for Turkey.

To mitigate these costs, analysts suggest that Turkey should consider partnering with other countries in a manner similar to the F-35 program. By involving international partners in the project, Turkey could reduce the per-unit production cost of Kaan, making it more economically viable in the long term. Without such partnerships, the project could face sustainability issues, particularly if production is limited to 200 units for domestic use.

Despite the challenges, there is widespread optimism that the Kaan project will succeed in advancing Turkey's aerospace industry and military capabilities. Close coordination between TUSAS, the Turkish Air Force, and Turkey's Defence Industry Agency is expected to accelerate the production process and ensure that Kaan remains on track.

As Fazla aptly put it, "Kaan is our way forward. It is the flagship of our aerospace industry." The success of this ambitious project will not only elevate Turkey's status as a global military power but also pave the way for future advancements in aviation technology, ensuring that Turkey remains a key player in the world of defence and aerospace for years to come.

The KAAN 5th-generation Stealth Aircraft Credit: Wikipedia Commons

Shri Atul Dinkar Rane - BrahMos Aerospace CEO

SUPERSONIC BRAHMOS FOR AFRICA

Last year, the India-Russia Joint Venture (JV) BrahMos Aerospace marked its Silver Jubilee. The JV company involving India's DRDO and Russia's NPO Mashinostroyeniya was set up in February 1998 with a goal to design, develop and produce world's fastest precision guided weapon BRAHMOS. Since then, BrahMos Aerospace's journey has been replete with many milestones.

BrahMos has successfully designed, developed, tested and delivered a very versatile supersonic cruise missile system to the three services of India – Army, Navy and Air Force. Over these two and half decades, the defence JV entity has improvised, upgraded and incorporated many advanced features in the BRAHMOS Weapon System to retain its supremacy as world's "deadliest tactical system". The supersonic cruise missile, through a record number of test firings conducted from ground, ship and air platforms of India till date, has validated its multifarious roles, including undertaking network-centric operations in highly complex combat environments of modern times. BRAHMOS with its unparalleled range, precision, firepower and maneuverability, remains a "game-changer" in modern war dynamics.

Indian Navy became the very first customer of BRAHMOS through an order for the missile's anti-ship variant in 2004. BrahMos Aerospace successfully executed the order. Today, all frontline surface combat ships of Indian Navy are armed with both anti-ship and land-attack variants of BRAHMOS which remain their 'prime strike weapon' for littoral and high sea warfare missions.

In 2023 - 2024, BrahMos Aerospace received major orders from Indian Navy to deliver advanced BRAHMOS surface-to-surface missiles (SSMs) to bolster the Navy's maritime strike and anti-surface warfare (ASuW) capabilities. There is also an order for Next-Generation Maritime Mobile Coastal Batteries (NGMMCB) to be armed with supersonic BRAHMOS to enhance the Navy's multi-directional maritime strike capability. The company has started work to execute all these orders from Indian Navy.

In March 2013, BrahMos Aerospace successfully tested BRAHMOS sub-launched cruise missile (SLCM) variant from an underwater platform, validating the weapon's flexibility to be integrated onto conventional attack submarines. BRAHMOS SLCM has identical configuration to its ship-based version. The canisterised missile can be vertically installed in a modular launcher in the pressure hull of the submarine. Being a state-of-the-art system, BRAHMOS can be seamlessly integrated onto any suitable submarine platform in the future depending on the need of Indian Navy.

BRAHMOS land attack versions are in service with Indian Army since 2007. BrahMos Aerospace has incorporated several advancements in the LACMs over the years to bolster the Army's land warfare capability from complex, difficult war-zones. The Block I variant has precision firepower, maneuverability and other operative capabilities. Block II variant has supersonic steep dive and target discrimination capabilities while Block III configuration has mountain warfare capability.

Today, BRAHMOS air-launched cruise missile (ALCM) remains the most powerful conventional airborne weapon in terms of range, lethality and outreach. For the Indian Air Force, BRAHMOS-A integrated on Sukhoi-30MKI fighter aircraft has become an incredible 'stand-off' weapon having precision firepower to undertake deep air strike missions from 'beyond visual' ranges over large distances even without getting closer to enemy territory. So, this missile definitely offers an unparalleled edge to the Air Force of a nation having the Su-30 fighter aircraft in its inventory. Of course, the company is looking at this aspect of selling BRAHMOS-A to any friendly nation operating the Sukhoi-30 platform.

As regards to further developments in air-launched version, BrahMos Aerospace is now focused on designing and developing a lighter, miniature variant of BRAHMOS which would be called BRAHMOS-NG. With its reduced weight, smaller dimensions and other advanced features, this new weapon would fit onto the air platforms in more numbers. The company believes a Sukhoi-30 would be able to carry up to two or more BRAHMOS-NG systems. Thereafter, BrahMos Aerospace intends to install the missile on other fighter aircraft, including India's indigenous LCA Tejas.

BrahMos Aerospace has finalized the design blueprint and is now moving ahead to the next phase of BRAHMOS-NG development. The company is hopeful to come out with a prototype missile in near future after which it will start the testing phase. If all goes as planned, then BrahMos Aerospace would be ready with this new weapon by 2027 and start series production thereafter.

The BRAHMOS contract with the Republic of Philippines became the company's first-ever export breakthrough. This historic contract, signed on January 28, 2022, entails the supply of shore-based BRAHMOS anti-ship missile batteries to the Philippine Navy. BRAHMOS shore-based anti-ship missile system (SBASMS) could be the primary weapon of the Coastal Defense Regiment (CDR) – a newly formed unit of the Philippine Marine Corps.

BrahMos Aerospace has started the process of executing this landmark contract for its first foreign customer country as per the scheduled timeline.

There are many countries across continents, including from the Global South, which are strongly intending to acquire supersonic BRAHMOS.

The main priorities for the JV over the next 5 to 25 years would be – 1) Design, development and delivery of advanced BRAHMOS-NG systems to Indian Armed Forces; 2) Incorporation of new tech advancements and more indigenous content in existing BRAHMOS; 3) Consolidating the company's global foothold by taking forward the missile's export potential to newer, farther frontiers.

More information is available at the BrahMos Aerospace exposition at the Africa Aerospace and Defence at the Waterkloof Air Base, RSA on September 18-22, 2024.

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BELL'S LONG RANGE ASSAULT AIRCRAFT ENTERS MILESTONE B

Image Credit: BELL

In a significant development for military aviation, Bell Textron Inc., a subsidiary of Textron Inc. (NYSE:TXT), announced on the 5th of August 2024 that the United States Army has granted Milestone B approval for the Future Long Range Assault Aircraft (FLRAA). This decision marks the official commencement of the weapon system's Program of Record (PoR), setting the stage for the next phase of development in what promises to be a transformative advancement in military aviation.

Ryan Ehinger, Bell's Senior Vice President and Program Director for the FLRAA program, emphasised the historical importance of this milestone. "This achievement marks a historic moment for both the U.S. Army and Bell," Ehinger stated. "Now that the program has Milestone B approval, the course is set for delivering transformational capability to the war fighter. The FLRAA team remains laser-focused on working in tandem with the U.S. Army to execute the next phase of Engineering and Manufacturing Development (EMD)."

The Milestone B decision is a crucial part of the Major Capability Acquisition process, following years of close collaboration between Bell and the U.S. Army. This collaborative effort aimed to decompose requirements, reduce risk, and inform the weapon system acquisition.

A key component of this process was the Preliminary Design Review (PDR), which ensured that the aircraft's design—encompassing weapon systems, sustainment, and other system integrations—met the U.S. Army's special mission requirements.

COL Jeffrey Poquette, FLRAA Project Manager, highlighted the dedication and hard work that have brought the program to this point. "This significant milestone is made possible by the years of hard work and sacrifice by Team FLRAA and our teammates throughout the Army and the Department of Defence," he said. "We are poised to deliver a truly transformational aircraft for the Army. The hard work continues into the Engineering and Manufacturing Development Phase where we will design, build, and test FLRAA prototypes. It is certainly an exciting time for the program."

Since winning the U.S. Army's FLRAA contract in December 2022, Bell has established several state-of-the-art facilities and innovative manufacturing processes to optimise cost, schedule, and performance in support of the program. As the FLRAA team moves into the EMD phase, the focus will shift to continued design maturation and prototyping, ensuring that the new long-range assault aircraft will meet and exceed the Army's expectations.

The U.S. Army's new FLRAA is poised to change military aviation, offering capabilities that far surpass the current fleet. With a design that incorporates mature tiltrotor technology, an innovative digital engineering approach, and an open architecture, this aircraft is expected to be the most reliable, affordable, and high-performing long-range assault aircraft in the world. It will fly twice as far and twice as fast as existing aircraft, delivering unparalleled performance in the most demanding missions.

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ARMSCOR EXPANDING STRATEGIC PARTNERSHIPS

Armscor continues to evolve its strategic partnerships to enhance South Africa's defence and security capabilities. Recently, Armscor established a significant service level agreement (SLA) with the South African Police Service (SAPS) for the acquisition of new rotorcraft. This SLA is a critical move to achieve synergy across the Cabinet's security cluster departments, ensuring a unified and robust approach to national security.

"At Armscor, we collaborate with the industry to ensure that we can support government entities in fulfilling their mandates," said Segomotso Tire, Armscor's Executive Manager of Business Development and Industry Support.

One of the notable collaborations between Armscor and SAPS is the disposal of obsolete landward and aeronautical platforms, as well as other ancillaries. These efforts highlight Armscor's commitment to lifecycle support and maintenance management for both new and existing platforms, ensuring that they remain operationally ready in an efficient and effective manner.

In a recent task, Armscor facilitated the disposal of 13 grounded BO 105 helicopters from the SAPS Air Wing, decommissioned in 2017. Seven of these helicopters were acquired by a private buyer through an Armscor tender last year. Armscor also previously managed the procurement of six R44 helicopters for SAPS, delivered from 2008 onwards.

Currently, the SAPS Air Wing operates 16 AS350/H125 helicopters. According to Airbus, the H125 is "a multi-mission workhorse," offering excellent manoeuvrability, visibility, and low in-cabin vibration. This versatile rotorcraft can be rapidly reconfigured for various missions, including aerial work, firefighting, law enforcement, search and rescue, air ambulance services, and passenger transport.

The SAPS fleet also includes six R-44 Raven IIs, two MD500s, and a BK 117, alongside a selection of fixed-wing aircraft such as eight PC-6 Turbo Porters, a PC-12, a King Air C90, and a Citation Sovereign jet. These aircraft are critical in supporting a range of policing operations, including crime prevention, vehicle tracking, crowd control, VIP transport, and search and rescue missions. Several aircraft are equipped with specialised tools like hoists, cameras, searchlights, and slings to enhance their operational capabilities.

The SAPS Air Wing conducts over 2,000 airborne law enforcement operations annually, predominantly using helicopters. This unit employs approximately 50 pilots and 300 support personnel to maintain its operations, ensuring that SAPS remains at the forefront of law enforcement and public safety across South Africa.

Armscor's role as a strategic partner in South Africa's defence and security ecosystem cannot be overstated. Its commitment to delivering state-of-the-art defence solutions, backed by rigorous research and development, and supported by world-class maintenance capabilities, makes it an invaluable asset to the nation. As global defence challenges continue to evolve, Armscor remains steadfast in its mission to provide the South African Defence Forces and other government entities with the tools they need to safeguard the nation and its interests.

The Mi-28NME Night Hunter is able to employ a wide range of smart weaponry 24/7 at all weather conditions

ARMY FORUM 2024: A SHIFT TOWARDS BUSINESS

The ARMY-2024 International Defence Forum, held from August 12-14, 2024, marked a significant shift in its format. Unlike previous editions, this year's event was notably streamlined, lasting only three days instead of a full week, and absent of the usual public spectacle. The globally renowned Tank Biathlon and live firing demonstrations were conspicuously absent, and no tickets were sold to the general public. Instead, the forum was an exclusive event for military officials, industry representatives, and media professionals.

Despite these changes, the forum still attracted official delegations from over 80 countries, highlighting its continued relevance on the global stage. The business-oriented focus was underscored by the signing of contracts worth an estimated 500 billion Rubles (approximately USD 5.6 billion). The event showcased over 28,000 samples of military and dual-purpose equipment, ranging from real-life models to detailed mock-ups. Among these, the most intriguing innovations in Army aviation caught the attention of industry insiders.

Yak-130M: A Combat Trainer with Enhanced Capabilities

Yakovlev, a subsidiary of the United Aircraft Corporation and part of Rostec, unveiled the Yak-130M, an upgraded version of the well-known Yak-130 combat trainer. The modernization aims to enhance the aircraft's combat capabilities, making it more competitive in the international market.

Vladimir Artyakov, Deputy CEO of Rostec, explained, "The modernised Yak-130M will appeal to foreign partners who do not plan to purchase heavier and more expensive aircraft. The upgrades will significantly increase the armament payload, including air-to-air missiles and high-precision air-to-ground weapons with satellite and laser guidance systems."

The Yak-130M, which has completed its design phase, is now being assembled at the Irkutsk Aviation Plant. With a maximum take-off weight of 10,290 kg and a weaponry payload of up to 2,500 kg, the aircraft can reach a maximum flight range of 2,265 km with external fuel tanks. Equipped with advanced systems like the 130R radar and the SOLT-130K optical locator, the Yak-130M is set to become a formidable light fighter while retaining its training capabilities.

Mi-28NME: The Night Hunter Takes on New Challenges

The Mi-28 NME, an export variant of the Mi-28N, was another highlight at the forum. Dubbed the "Night Hunter," this helicopter is designed for fire support in

various combat scenarios, including anti-armour defence and air reconnaissance. The Mi-28NME has proven its worth in combat, demonstrating its ability to destroy a wide range of targets, from armoured vehicles to low-flying helicopters and drones.

One of the helicopter's standout features is its extended firepower. It can carry a variety of guided and unguided weapons, including the Ataka-VM and Khrizantema-VM missiles, as well as the new 305E missile, which extends the helicopter's firing range to 14,500 meters. The Mi-28NME also boasts UAV-link capability, enabling it to coordinate with unmanned aerial vehicles in real-time combat scenarios.

Russian Helicopters: Showcasing Versatility

The Russian Helicopters Holding, a Rostec subsidiary, presented several advanced models at the forum. Notable among them was the Ka-52E, an export version of the Ka-52 "Alligator" combat-reconnaissance helicopter. Equipped with the new 305E missile, the Ka-52E has a maximum take-off weight of 12,200 kg and can reach speeds of up to 300 km/h. The helicopter is combat-proven, having been used extensively in recent military operations.

The Mi-35P, another advanced export version on display, highlighted the versatility of the Mi-24 helicopter lineage. With a maximum speed of 335 km/h and the ability to transport up to seven fully equipped troops, the Mi-35P is designed for both combat and transport missions.

Unmanned Aerial Systems: The Future of Warfare

The forum also featured cutting-edge unmanned aerial vehicles (UAVs), signalling the future of military aviation. The Orion-E, a medium-altitude long-endurance (MALE) UAV, was one of the stars of the show. Capable of performing a wide range of reconnaissance and strike missions, the Orion-E can carry up to four guided missiles or six guided bombs, making it a versatile asset on the battlefield.

Another notable UAV was the GROM (Thunder), a high-speed strike drone designed to operate in tandem with manned aircraft. With a payload capacity of up to 2,000 kg and a maximum speed of 1,000 km/h, the GROM represents a significant leap in unmanned combat capabilities.

Orion-E long-range UAV can be used in both reconnaissance and striking configuration

Mi-35P gunship is a reliable robust product well-known in Africa

Lancet -E UAV system presentation was a real show sensation/

C-76 UAV: A New Era in Cargo Transportation

The United Aircraft Corporation (UAC) showcased a full-scale prototype of the C-76, a vertical take-off and landing (VTOL) unmanned aircraft designed for cargo transportation. Developed by Sukhoi Design Bureau, the C-76 can carry up to 300 kg over a distance of 500 km. This innovative platform promises to revolutionize logistics, particularly in hard-to-reach areas, by providing a fast and efficient means of transportation without the need for traditional airfield infrastructure.

Lancet-E: Precision and Lethality

Rosoboronexport's presentation of the Lancet-E loitering munitions system marked a significant development in the international arms market. The Lancet-E, an export version of the Lancet system that has proven highly effective in combat, consists of a reconnaissance drone and two kamikaze drones. With a range of up to 50 km and a flight endurance of 150 minutes, the Lancet-E is designed for precision strikes against a variety of targets, including armoured vehicles and fortifications.

The ARMY-2024 Forum, though more business-focused and less public-facing, showcased a wide array of advanced military technologies, particularly in the field of Army aviation. From upgraded combat trainers and helicopters to cutting-edge UAVs and loitering munitions, the forum highlighted the continuing evolution of military aviation and its growing importance in modern warfare. As the global arms market becomes increasingly competitive, the innovations displayed at ARMY-2024 are likely to play a crucial role in shaping the future of military aviation.

SOURCE: LAGUK-Media

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WHEN EVERY MINUTE COUNTS: THE CRITICAL ROLE OF DATA IN MODERN MILITARY OPERATIONS

By Mehmet Keyvan

The landscape of military operations has undergone a seismic shift in recent years. Gone are the days when missions relied solely on the pilot's decisions and visual planning. The advent of new-generation aircraft, unmanned aerial vehicles (UAVs), and drones has transformed the way military and government operations are conducted. Today, data—not just visuals—drives these missions, with an intricate web of information that must be meticulously collected, analysed, and synthesised before any operation can commence.

Military and government operations extend far beyond traditional conflicts between nations. They encompass a diverse array of missions, including humanitarian aid, rescue operations, special security tasks, VIP transport, border controls, and other non-scheduled events. While some operations might still involve military engagements, the need for accurate and comprehensive data is universal, regardless of the mission type.

The Importance of Data in Modern Military Operations

The success of any military mission hinges on detailed planning and preparation. New-generation aircraft operators require specialized data, tailored knowledge, and precise information about the area of operation. This data is critical for making informed decisions and ensuring that missions align with both military objectives and public expectations.

Collecting relevant information allows decision-makers to plan for better targeting, fleet management, and mission execution. The significance of UAVs, drones, and advanced fighter jets has grown exponentially in recent years, particularly due to their reliance on seamless communication between the aircraft and headquarters.

No operation, whether domestic or international, can succeed without thorough knowledge of the operational environment. Factors such as weather conditions, terrain, landing and take-off locations, refuelling points, and potential risks must be accounted for to ensure mission safety. This is especially true for helicopter and UAV operations, where understanding the weather

and terrain is vital for avoiding accidents and ensuring successful missions.

Challenges in Data Collection and Reliability

Collecting and analysing large volumes of data—ranging from obstacles and terrain to weather patterns and landing zones—is a daunting task. Military and government organizations require trustworthy and reliable data sources to ensure that the information they gather is accurate and applicable to their specific operational needs. The data must align with the capabilities of their aircraft and teams, meet all operational scenarios, and minimize risks both during and after the mission.

One of the most pressing challenges for decision-makers is finding a certified and dependable source of data. In a world where political situations can change rapidly, losing access to crucial data due to shifting alliances or conflicts is a risk that military organizations cannot afford to take. Therefore, it is imperative to secure a long-term, reliable data source that remains unaffected by political fluctuations.

The Role of UAVs and Drones in Data-Driven Operations

The operation of UAVs and drones is far more complex than traditional visual flights. These aircraft require meticulous planning, constant management, and real-time monitoring throughout their missions. For UAVs operating beyond the range of visual observation and relying on autopilot systems, having detailed, high-accuracy data stored within their systems is essential. This data enables operators to ensure that the mission is conducted in a safe environment, with all relevant information analysed before the mission begins.

Helicopter operations, often dedicated to border control, rescue missions, and humanitarian aid, also demand precise data. Helicopters frequently operate in difficult-to-reach areas, such as forests and mountains, where accurate terrain and weather information is crucial for avoiding accidents. Pilots must be fully aware of the risks, terrain, and weather conditions they will encounter during the mission.

Data Sharing and Post-Operation Analysis

In addition to collecting data, it is crucial to share this information with decision-makers at the Operations Control Center (OCC), Mission Control System, and Mission Control Team. Sharing data with pilots via flight management systems, iPads, or other electronic flight bag (EFB) devices is essential for preparing them for the risks they may face.

Post-operation analysis is equally important. After each mission, it is beneficial to review the operational data to ensure that the mission was executed as planned and to identify any discrepancies. If differences are found, a root cause analysis should be conducted to address the gaps and ensure that future missions are safer.

In the modern world, data is the backbone of any military operation. Accurate, detailed data must be collected and shared with flight crews before missions, and post-operation reviews must be conducted to identify any gaps in planning or execution. Without this data, successful operations involving UAVs, drones, helicopters, or military aircraft would be impossible.

For government and military organisations, the collection, storage, and internal sharing of data are paramount to ensuring safe and effective operations. Many governments prefer to keep their data analysis within their own territories, and building an in-house team to handle this task is a crucial step toward maintaining operational security and sovereignty. By transferring technology and expertise into the hands of government organizations, nations can ensure that their military operations are conducted safely and efficiently, with reliable data guiding every decision.

FOR MORE INFORMATION VISIT: https://keyvan.aero

WHO IS MEHMET KEYVAN?

Mehmet Keyvan is a prominent figure in the global aviation industry, known for his innovative contributions as the founder and CEO of Keyvan Havacilik A.S. (Keyvan Aviation) based in Istanbul, Turkey. Under his leadership, Keyvan Aviation became the first Turkish company and the fourth globally to achieve EASA approval for processing and delivering aeronautical and navigation databases critical for aircraft avionics and navigation systems.

With a background as an avionics engineer and technical consultant, Mehmet has over 20 years of experience working with leading aviation brands on new avionics systems. His visionary approach led to significant achievements, including partnerships with GE Aerospace, ASELSAN, and TUSAS (Turkish Aerospace Inc.).

Beyond his corporate success, Mehmet is a respected member of several prestigious industry associations and committees. His expertise in data utilization, AI, and sustainable aviation is frequently sought after at international aviation events and universities, where he mentors the next generation of aviation professionals. His leadership has earned him multiple accolades, including the "Aviation CEO of the Year 2023" by the Global CEO Excellence Awards.

GPS SPOOFING RISK CHANGES AND GROWS

The aviation industry is witnessing a troubling surge in GPS spoofing incidents, significantly impacting flight safety. Recent data reveals a drastic increase in the number of flights affected by spoofing, with daily encounters rising from an average of 200 in the first quarter of 2024 to around 900 in the second quarter. On some days, as many as 1,350 flights have reported spoofing

Expanding Spoofing Hotspots

Initially concentrated in a few regions, GPS spoofing has now spread to more than ten locations globally. The phenomenon, first observed in September 2023 near Baghdad, Cairo, and Israel, has since expanded to the Black Sea, Cyprus, the Korean border, and Russia, creating new challenges for flight operations in these areas.

Particularly concerning are the frequent reports of GPS spoofing in the busy south-western corner of the Black Sea. Pilots have reported significant interference, leading to potential unintentional deviations into Russian or Turkish airspace without clearance. Reports from various aircraft types flying on different airways have highlighted complete losses of navigation capability, transponder functions, and numerous nuisance EGPWS warnings.

Manufacturers and aviation authorities have been slow to react to this emerging threat. While some type-specific guidance has been issued, the universal mitigation strategy remains the same: disable GPS before entering areas known for spoofing. However, it's important to note that Inertial Reference Systems (IRS) are not immune to GPS interference, and by the time spoofing is identified, it may already be too late to rely solely on them.

Evolving Safety Risks

As the frequency and intensity of spoofing increase, so do the associated safety risks. Initially, the primary concern was navigational: autopilots would steer aircraft unexpectedly, leading to uncertainty in aircraft positions and, in some cases, the loss of IRS. With Air Traffic Control (ATC) assistance, usually via radar vectors, these situations were often resolved.

However, the rise in spoofing incidents has introduced a second, more concerning set of risks. GPS is deeply integrated into many aircraft systems, including the Enhanced Ground Proximity Warning System (EGPWS), a critical safety tool designed to prevent Controlled Flight Into Terrain (CFIT) accidents. Spoofing has caused EGPWS to generate false alerts, sometimes hours after the spoofing event, leading many flight crews to inhibit the system. This loss of trust in EGPWS is particularly alarming, as it is a key safeguard against CFIT incidents.

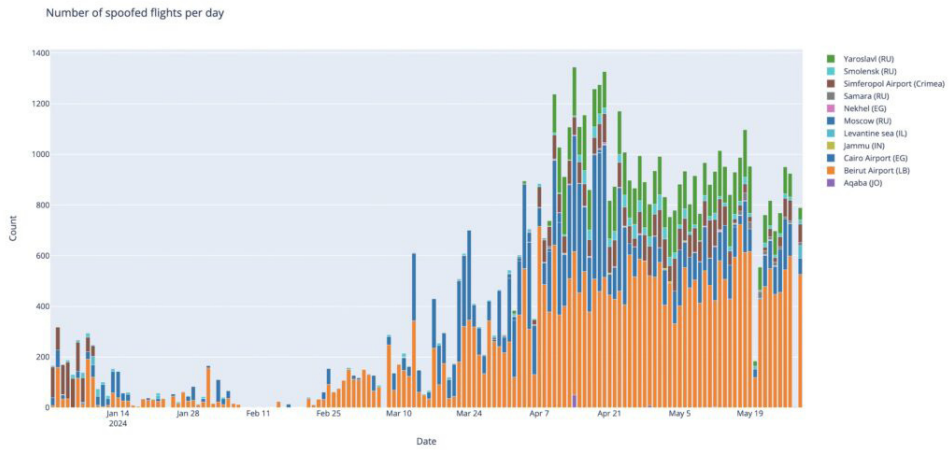
Moreover, GPS spoofing is increasingly causing go-arounds, particularly due to false EGPWS alerts. In some instances, spoofing has resulted in incorrect wind indications on Navigation Displays, leading to confusion. In other cases, autopilot malfunctions and unusual glideslope or localizer indications have caused missed approaches. Each go-around adds to crew workload and reduces the overall safety margin.

The Safety Layer of "Swiss Cheese" Removed

Spoofing also affects other critical aircraft systems, including TCAS, ADS-B, HUD guidance, and transponders. The aircraft clock, often one of the first systems to be impacted by spoofing, can cause further complications, such as rendering CPDLC unusable. Eurocontrol has reported daily occurrences of these issues.

For Air Traffic Control, especially in oceanic and remote regions where on-board navigation accuracy is crucial, spoofing presents significant challenges. Shanwick and Gander Oceanic Area Control Centers (OACCs) now regularly encounter aircraft that fail to meet the RNP4 requirement for oceanic crossings due to spoofing. This situation forces controllers to work harder to maintain aircraft separation, occasionally resulting in diversions to Iceland.

These shifts in safety risk are occurring largely unnoticed, representing latent hazards that could become glaringly evident only after an accident. A full layer of the aviation safety "Swiss Cheese" has been quietly removed this year, leaving a critical gap in the industry's defences.



A Unified Response

In response to the 400% increase in GPS spoofing, a dedicated GPS Spoofing Workgroup has been established to unite the international civil aviation community and address this escalating problem. The Workgroup is actively collecting data, surveying flight crews, and analysing the distinct elements of the issue. The goal is to produce a comprehensive report in time for the 14th ICAO Air Navigation Conference at the end of August, to inform discussions there.

The Workgroup has attracted 450 participants, including representatives from industry organizations such as IFALPA, IFATCA, OPSGROUP, IBAC, EBAA, ECA, and BALPA. Airlines and operators represented include Aer Lingus, Alaska Airlines, Cathay, Singapore Airlines, Turkish Airlines, United Airlines, and the USAF, among others.

Encouragingly, the Workgroup also includes GPS and PNT experts from NASA, Boeing, Collins Aerospace, and other leading institutions. Aviation authorities from around the world, including Eurocontrol, the FAA, and the Civil Aviation Authorities of several countries, are also participating.

The Workgroup aims to shift the focus toward quickly available solutions and to raise industry awareness of the growing safety risks. It also seeks to provide flight crews with better guidance and GPS systems information.

SOURCE: OPSGROUP IMAGES COURTESY OF" OPSGROUP

ISTARI DIGITAL X-PLANE FIRST DIGITALLY-CERTIFIED AIRCRAFT

Istari Digital has announced that a modification of the Lockheed Martin Skunk Works® X-56A is on track to become the world's first digitally-certified aircraft.

Last year, the United States Air Force awarded Istari Digital a $19 million contract to pioneer this ambitious program, aptly named Flyer Øne in homage to the Wright Brothers. The goal? To create and flight certify a digital twin before it's physically built, paving the way for future aircraft development to mirror the rapid pace of software engineering.

While digital certification is routine in industries like Formula 1 racing, it's unprecedented in aviation. "It's not as futuristic as it sounds," said Will Roper, Istari Digital founder and CEO. "For a new aircraft variant, if the structure and flight dynamics can be simulated accurately, physical prototypes become the slow lane. Hardware as software is the fast lane."

Istari Digital has previously been tight-lipped about the specifics of their aircraft and industry partners. In an exclusive reveal, they shared the exciting news. "Having just passed a major Design Review, we're thrilled to announce the modification of the Skunk Works X-56A is on track to achieve the first digital flight release," Roper said. "The United States Air Force X-Plane program has a storied history of breaking physical boundaries—from the sound barrier to sub-orbital flight. Now, they're breaking digital barriers too."

The X-56A, developed by Lockheed Martin Skunk Works, is an advanced modular uncrewed aerial vehicle designed to push the boundaries of High-Altitude Long Endurance flight. With a 2.286-meters fuselage and a 8.382- meters wingspan, the X-56A first took flight in the summer of 2013 from Edwards Air Force Base. With a unique mission to demonstrate flutter prediction capability and flutter suppression, the program achieved significant progress in flight control, demonstrating the ability to suppress body freedom flutter through the development of slender, flexible wings.

The Flyer Øne design features significant modifications to landing gear systems, cameras, as well as addressing obsolescence issues. "In many respects, this is a simpler variant of the aircraft," said a member of the Skunk Works team. "We collected significant data during the original program, so the simulation of updated flight performance has a solid foundation."

Roper initiated the defence trend of adopting digital engineering practices during his tenure as Assistant Secretary of the Air Force, penning the Matrix-inspired "There is No Spoon" in late 2020. The Pentagon has since directed digital engineering for all future programs. However, unlike the simulation platform adopted by Formula 1, aerospace and defence face challenges in integrating numerous intellectual property and classified data sources, making it more difficult.

Istari Digital's solution is a new decentralised data meshing technology that expands on the concept of a "digital thread." They launched Model Øne, a program to build an "internet of models" for the Pentagon in August.

"Applying software practices to hardware will lead to revolutionary speed and agility," Schmidt said. "Istari Digital is providing the missing infrastructure to connect coding environments with existing engineering tools,

making software speeds possible for hardware at scale." For the digital X-56A, this new digital infrastructure will act as a plug-and-play interface between Lockheed Martin's simulations and the Air Force's stringent airworthiness process. The aim is to meet the burden of proof normally required physically for a Military Flight Release.

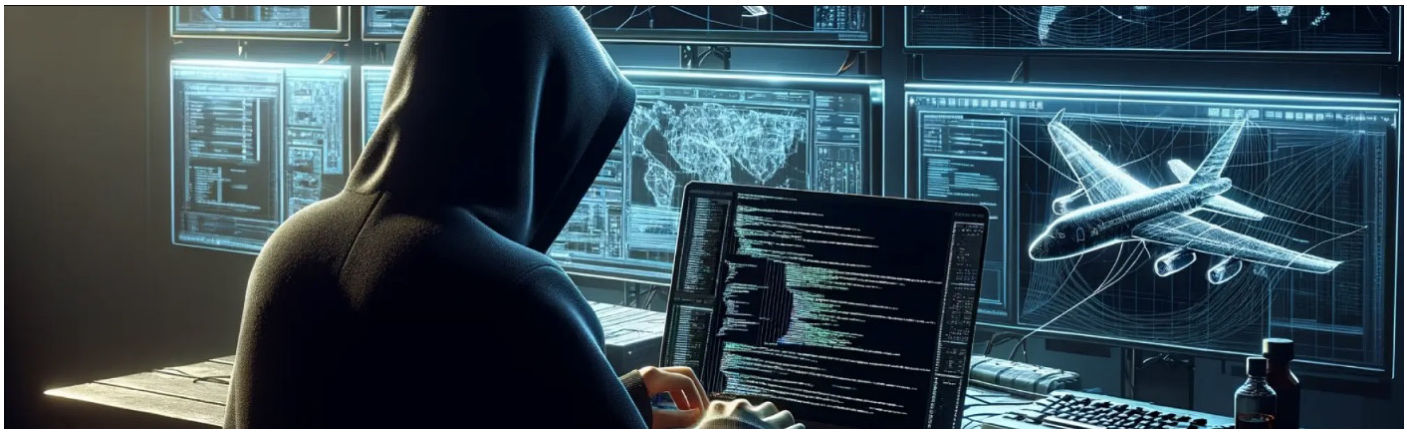
Once approved, the aircraft-on-a-chip will be built to specification and flown at Edwards Air Force Base. If the physical twin matches the digital model, the aircraft-on-a-chip is a real aeroplane, at least from a research and development perspective. It can be updated and evolved using software processes without the time, cost, and environmental impact of physical world innovation.

However, Roper cautions, "It isn't surprising this subsonic drone can be modelled in near virtual reality because it is anchored by significant physical world data. The original X-56A was built to collect flexible wing data because it could not be modelled from extrapolated rigid-wing designs. Model pedigree determines what can be a digital twin."

The risk of over-extrapolation was evident in the 2022 Formula 1 season when new ground-effect regulations led to unexpected "porpoising" effects for many teams, including Mercedes. Taking over half the season to model, understand, and then correct them, Mercedes Tech Director, Mike Elliott, blamed a single simulation error: "If we hadn't made that one mistake, we'd have a car that was winning the world championship," Elliott said.

As Flyer Øne, and with it, aviation, now take to the digital skies, both new design speeds and technical risks will follow in its wake. Clinging to legacy processes seem to be a losing strategy. Even with new risks, design speed and cycle time win.

SOURCE Istari Digital, Inc.



DEFENDERS OF THE CYBER-SECURITY BATTLEFRONT

In today's increasingly digital world, the aviation industry stands at a critical juncture. As technology evolves, so do the threats that target it. For an industry that thrives on precision, safety, and trust, the rise of cyber threats poses a significant challenge. At the forefront of this defence stands Alchemy Defence, a team of cybersecurity professionals with over a decade of experience in fending off sophisticated and targeted cyber attacks.

Alchemy Defence has spent the last ten years honing its skills in a relentless battle against cyber threats. Their approach is not just about reacting to threats but anticipating them. By focusing on the full spectrum of people, processes, and technology, Alchemy Defence has helped organisations, particularly in government, military, transportation, and energy sectors, fortify their defences against an array of cyber challenges.

For the aviation industry, where the stakes are incredibly high, cybersecurity is more than a necessity—it's a lifeline. The potential consequences of a cyber attack in this sector are enormous, affecting everything from passenger safety to global trade. Alchemy Defence's ability to operate as an extension of their clients' teams, providing tailored solutions and rapid response to threats, makes them a strategic partner for any aviation company.

Their work in protecting IoT devices, securing passenger data, and ensuring the integrity of communication and control systems directly impacts the safety and security of air travel. As aviation continues to integrate more digital systems and smart technologies, the need for robust cybersecurity measures grows increasingly urgent.

Digital threats are constantly evolving, becoming more sophisticated and harder to detect. Alchemy Defence's decade of experience and deep understanding of cybersecurity complexities make them a crucial ally in this ongoing battle. For the aviation industry, partnering with a team like Alchemy Defence is not just about security—it's about ensuring survival in a world where the next cyber threat could be just a click away.

SOURCE: Alchemy Defence.

RIAT 2024

Article and Images By Steve Crampton

The 100th anniversary of the Royal Canadian Air Force, the 75th anniversary of NATO and the 60th anniversary of the RAF Red Arrows; these were just some of the major anniversaries being celebrated at this year's Royal International Air Tattoo. Add to these, the 50th anniversaries of the F-16 Fighting Falcon, Panavia Tornado and Bae Hawk and the 60th anniversary of the Patrouille Suisse and there was much to celebrate at RIAT 2024. Once again, this three-day airshow, held at RAF Fairford in Gloucestershire was completely sold out, helping to raise much needed funds for the Royal Air Force Charitable Trust.

The RIAT format, tried and tested over many years, divides the flying display into several sections, each headlined by a special formation flypast or display team and 2024 was no exception to the rule. Opening the flying display on the Friday, the RAF parachute display team, The Falcons, were making their first show appearance for several years. Jumping from a C-17 Globemaster III, conditions were absolutely perfect for their display with clear blue skies and little wind. Trailing coloured smoke, the team performed all the manoeuvres from their repertoire, much to the delight of the appreciative audience. Fast military jets are always a crowd draw at airshows.

Not surprisingly in its 50th anniversary year, a large number of F16 Fighting Falcons, or Vipers as they are nicknamed, were present at the show, both in the static park and the flying display. Resplendent in its 50th anniversary colour scheme, the Royal Danish Air Force F-16 thrilled spectators with a high-octane display of aerobatics in clear blue skies, flames from its afterburner almost adding to the searing temperatures being experienced within the showground. More fast jet action, from another strikingly painted jet quickly followed, in the form of the Luftwaffe's Eurofighter EF2000, the first time in a number of years that the German Air Force has provided a solo fast jet display in the UK. Also celebrating its 50th anniversary in 2024, The Qatar Emiri Air Force were represented in the static park and flying display, with its Boeing F-15QA Ababil featuring in both. The F-15QA is the Qatari version of the famous multi-role US fighter and features many next-generation technologies; its manoeuvrability easily demonstrated for all to see in the skies over Fairford.

Embraer's KC-390 Millenium was then put through its paces before, possibly, the most anticipated item in Friday's show – a very rare airshow flying display from the USAF's Lockheed U-2S "Dragon Lady"; the high-altitude surveillance aircraft appearing in the flying display at a UK airshow for the first time in over 30 years. The first of the rotary-winged aircraft in Friday's flying display, the NH90 of the German Army, was next to display, providing a more gentle but nonetheless exciting routine as aircraft that had taken off earlier formed up for the NATO 75th anniversary flypast; the helicopter's agility able demonstrated by the German crew. Split into several sections, the NATO flypast featured aircraft from many member states, both old and new. The first section, a formation featuring a Royal Air Force RC-135W Rivet Joint, Czech Air Force's SAAB Gripen, French AF Mirage 2000 and Italian Air Force Panavia Tornado, was followed by another led by a NATO E3 Sentry. This second section, which also featured a Luftwaffe Eurofighter EF2000, Spanish Air Force F-5 and Hawk from Finland, was followed by two further sections featuring F-16 Fighting Falcons operated by NATO members. Solo displays from the Finnish Air Force Hawk and Saab Gripen of the Swedish Air Force were followed by another rotary-winged act, the Royal Navy Black Cats and their Wildcat helicopters. A spirited aerobatic display from the Slovenian Air Force Pilatus PC-9 was followed by yet another incredible aerobatic demonstration from the Italian Air Force and their C-27J Spartan; always a crowd favourite at RIAT. As Friday's flying display began to draw to a close, the Royal Canadian Air Force's CF-188 took to the air for a solo display before departing to join up with the RAF's Red Arrows. The Spanish Navy brought the ever popular and much missed Harrier, complete with special colour scheme, to provide an aerial spectacle that few other aircraft can match, before the Red Arrows and Canadian Air Force CF-188 provided the Royal Canadian Air Force Centennial Flypast; the Reds trailing red and white smoke representing the colours of the Canadian flag. The Red Arrows then took centre stage for their own display. Back to a nine-ship formation for this, their diamond jubilee season, the team delighted the crowd as they officially closed Friday's flying display with their famous blend of team and individual aerobatic manoeuvres. A special treat then awaited those enthusiasts who stayed around at the end of the scheduled flying display. A second Lockheed U-2S made an appearance. Having taken off early on Friday morning, the Dragon Lady was returning to RAF Fairford following an eight-and-a-half-hour mission.

Displays on Saturday and Sunday featured further solo acts, display teams and special anniversary formations including the Royal Canadian Air Force Centennial Heritage Flight featuring the CF-188 alongside Spitfire LFVb "City of Winnipeg" and the Hawk 50th Anniversary Flypast featuring Hawk jets from nations operating the aircraft. The Hawk featured heavily in the flying display with the Saudi Hawks, The Finnish Air Force Midnight Hawks and RAF Red Arrows all using the type for their aerobatic displays. Other display teams thrilling spectators included the Royal

Qatar Emiri Air Force F-15QA Ababil

Lightning II RAF

Norwegian Air Force Yellow Sparrows, Royal Jordanian Falcons and the Patrouille Suisse whilst fast jet displays from SAAB Gripens, Eurofighter Typhoons, F-16s and the RAF F-35B Lightning II role demo provided more noise and excitement.

On the ground, RIAT's static park was filled with aircraft from 29 nations, the highlight for many being the Viper Line, the line-up of F-16s celebrating the type's 50 years of flight. With a theme of "Pushing the Boundaries in Air and Space", the static park also featured a collection of aircraft dedicated to that theme including test aircraft, electric aircraft and the popular Twin Otter of the British Antarctic Survey, flying nearly 12,000 nautical miles from its base in Antarctica to be at RIAT 2024.

With its combination of unusual formation flypasts and rare aircraft types, the Royal International Air Tattoo continues to be a major event on the global airshow calendar.

Royal Canadian Air Force Centennial Flypast - RAF Red Arrows and Royal Canadian Air Force

Royal Danish Air Force F-16AM Fighting Falcon

STEALTH: CRUCIAL OR OVERRATED?

In the high-stakes arena of modern air warfare, stealth technology has emerged as a key factor that can make the difference between mission success and catastrophic failure. By significantly reducing the distances at which an aircraft can be detected, stealth technology has redefined the principles of aerial combat, making it possible for aircraft to penetrate hostile airspace with minimal risk of detection. But as this technology evolves, the question arises: is stealth as crucial as it's made out to be, or is it becoming overrated in the face of advancing countermeasures?

The origins of modern stealth technology can be traced back to the late 20th century when Lockheed Martin began exploring the radar wave scattering models developed by Soviet physicist Pyotr Ufimtsev. These models demonstrated that by using faceted designs and minimizing vertical surfaces, an aircraft's radar cross-section (RCS) could be significantly reduced. This research culminated in the development of the F-117A Nighthawk, a stealth fighter designed to evade radar detection and penetrate enemy defences undetected—a capability that was dramatically showcased during the Gulf War in 1991.

Evolution and Application in Air Warfare

Stealth technology didn't stop with the F-117. It evolved further with aircraft like the B-2 Spirit stealth bomber and the F-22 Raptor. The B-2, with its radical bat-winged design, eliminated traditional vertical stabilizers, further minimizing its radar cross-section surface. The F-22 Raptor, on the other hand, integrated advanced materials and engineering techniques to offer more cost-effective and maintainable stealth capabilities.

This evolution continues today with aircraft like the F-35 Lightning II and the upcoming B-21 Raider, both of which incorporate lessons learned from previous stealth platforms.

Operational Realities and Limitations

While stealth offers significant advantages, it is not without its drawbacks. Maintaining a low RCS is a complex task that requires meticulous attention to detail. Any protrusions, such as open weapon bays or poorly designed cockpit canopies, can compromise an aircraft's stealthiness. Even the placement of engines and the design of pilot helmets must be carefully considered to minimize radar reflections. These complexities not only contribute to the high costs of stealth aircraft but also necessitate specialised maintenance, making them more expensive to operate compared to their non-stealth counterparts.

Enduring Value or Vulnerable Technology?

Stealth remains a cornerstone of modern air warfare strategies, offering unparalleled advantages in penetrating enemy airspace and executing surprise attacks. However, as radar technology advances, particularly with the development of quantum radar, the effectiveness of stealth may be challenged in the future. Military planners are aware of these potential vulnerabilities and are actively exploring complementary technologies such as multi-purpose radars, electronic warfare systems, and AI-driven defences to maintain air superiority.

Capabilities and Countermeasures

Modern stealth aircraft, like the F-22 and F-35, are equipped with advanced systems that minimize their exposure to enemy radar. For instance, these aircraft can open their weapon bays, release munitions, and return to a stealthy profile within seconds. Moreover, they are engineered to avoid detectable radio frequency (RF) emissions, relying instead on passive infrared and low-light TV sensors for tracking and targeting.

However, radar cross-section (RCS) remains a critical metric for stealth effectiveness. While stealth aircraft have RCS values comparable to small birds or large insects, they are not entirely invisible. Certain low-frequency radars can still detect them, albeit with less precision. Additionally, advanced infrared search and track (IRST) systems, like those found on the MiG-35 and Rafale, can detect the surface heat generated by stealth aircraft, posing a significant challenge to their invisibility.

Tactical Considerations and Operational Constraints

Stealth aircraft are not without their operational challenges. Deploying weapons, for instance, requires opening bay doors, which temporarily increases their RCS and makes them more detectable. Although modern stealth fighters are designed to minimise this exposure time, it remains a vulnerability that can be exploited by sophisticated enemy defences. Additionally, the internal storage of fuel and weapons, a necessity for maintaining a stealth profile, limits the payload capacity of these aircraft compared to non-stealth platforms.

To mitigate these risks, stealth aircraft employ a range of sophisticated tactics, such as exploiting radar Doppler slots and selecting flight paths that present the lowest RCS. Additionally, they use chaff and manoeuvring tactics to further confuse enemy radar systems, increasing their chances of mission success.

Stealth's Enduring Relevance

Stealth technology has undoubtedly transformed modern air warfare, providing significant advantages in evading detection and executing precise strikes. However, its effectiveness hinges on constant innovation and adaptation. As countermeasures continue to evolve, the future of stealth will depend on the ability of military planners and engineers to stay ahead of these advancements. Whether crucial or overrated, one thing is clear: stealth will remain a critical component of air warfare for the foreseeable future, shaping the strategies and tactics of tomorrow's battles.

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Tunisia: C-130J-30 Upgrades

AFRICA'S MILITARY UPGRADES OUT IN FORCE: A STRATEGIC SHIFT IN REGIONAL AIR POWER

Across the African continent, a new wave of military modernisation is taking shape as several nations bolster their air forces with advanced aircraft and upgrades. From Tunisia's tactical transporters to Nigeria's cutting-edge attack helicopters, these developments signal a strategic shift in how African militaries are equipping themselves to address modern threats and maintain regional security.

Tunisia: Enhanced Capabilities with C-130J-30 Upgrades

Tunisia is taking a significant step in upgrading its military air capabilities. The Tunisian Air Force, with the help of Honeywell and ST Engineering Defence Aviation Services (STEDAS), is implementing a comprehensive upgrade to its two C-130J-30 tactical transport aircraft. Tunisia was the first African nation to receive the C-130J-30, with deliveries in 2013 and 2015.

The upgrades will feature the integration of Honeywell Aerospace Technologies' Cockpit Display System Retrofit (CDSR), introducing large-format multi-function LCD displays, digital instruments, and new air data and altitude sensors. Additionally, the aircraft will be equipped with an RDR7000 weather radar and Traffic Collision Avoidance System (TCAS), significantly enhancing situational awareness, safety, and operational efficiency.

Nigeria: A Force to Be Reckoned With

Nigeria is rapidly expanding its air force capabilities, with the recent induction of two Turkish Aerospace T129 ATAK attack helicopters and the introduction of the Beechcraft King Air 360ER. These developments are part of a broader strategy to strengthen Nigeria's military response to terrorist threats, particularly from groups like Boko Haram and ISWAP.

The Nigerian Air Force's 115th Special Operations Group, now equipped with the T129 ATAKs, is poised for more aggressive counter-terrorism operations.

This unit will soon be further reinforced with additional attack helicopters, including 12 MD Helicopters MD530F Cayuse Warriors and 12 Bell AH-1Z

Vipers from the United States. The induction of these aircraft, along with the ongoing delivery of UAVs such as the Bayraktar TB2, underscores Nigeria's commitment to maintaining air superiority in the region.

Ghana: A-29 Super Tucano

Ghana: Strengthening Counter-Insurgency Operations

Ghana is also stepping up its defence capabilities with a focus on counter-insurgency. The Ghana Air Force recently showcased the A-29 Super Tucano light attack aircraft at Accra Air Force Base, highlighting its potential as a game-changer in regional security. This aircraft, known for its versatility in training and light attack roles, is already in service with several African nations and is playing a critical role in maintaining stability across the Sahel.

If Ghana proceeds with its acquisition of the A-29 Super Tucano, it will join a growing list of African operators using the aircraft to enhance border security and combat terrorism.

Kenya: Expanding Peacekeeping Capabilities

Kenya is preparing to receive 16 MD500MD Defender helicopters from South Korea, a significant addition to its military fleet. These helicopters, previously operated by the Republic of Korea Army, will be refurbished before delivery to Kenya and will be used primarily in support of United Nations peacekeeping missions. This move reflects Kenya's on-going commitment to regional stability and its role in international peacekeeping efforts.

Ethiopia: New Fighter Jets and UAVs

The Ethiopian Air Force has recently expanded its fleet with the acquisition of two Sukhoi Su-30K fighters and several Bayraktar Akıncı armed UAVs. These additions are expected to enhance Ethiopia's aerial combat capabilities significantly. The Su-30Ks, initially manufactured for the Indian Air Force, have been upgraded and are now part of Ethiopia's growing arsenal, signalling a strategic investment in advanced air power.

Tanzania: A Focus on Humanitarian and Civil Support

Tanzania is taking a different approach, focusing on civil support and humanitarian missions with its recent order of two Leonardo C-27J Spartan transport aircraft. These versatile aircraft will be equipped for fire fighting, search-and-rescue, and humanitarian missions, particularly in response to challenges like wildfires on Mount Kilimanjaro. This acquisition highlights Tanzania's commitment to using its air force for both military and civilian purposes.

A New Era of African Air Power

The on-going military upgrades across Africa reflect a broader trend of modernisation and strategic investment in air power. As African nations continue to face diverse security challenges, from terrorism and insurgency to humanitarian crises, these new aircraft and technologies will play a crucial role in maintaining stability and security across the continent. With these advancements, Africa's air forces are better equipped than ever to address both current and emerging threats.

Tanzania: : Leonardo C-27J Spartan.

Bell Boeing V-22 Osprey . Images `Courtesy: Bell

THE BELL BOEING V-22 OSPREY'S UNMATCHED LEGACY

For over three decades, the Bell Boeing V-22 Osprey has redefined the boundaries of military aviation, merging the best attributes of fixed-wing aircraft with the vertical lift capabilities of a helicopter. This revolutionary tiltrotor has not only transformed the operational strategies of the U.S. Marine Corps, Air Force, and now the Navy, but has also become a cornerstone of global military aviation.

A Legacy of Versatility and Reliability

Since its first flight in March 1989, the V-22 Osprey has continuously proven its worth across a wide array of military operations. Whether in combat zones or during humanitarian missions, this aircraft has demonstrated an unparalleled ability to adapt to the most challenging environments. With a fleet exceeding 400 aircraft and more than 600,000 flight hours logged, the Osprey remains a testament to innovative engineering and enduring performance.

The V-22's versatility is evident in its ability to execute missions previously thought impossible. By combining the speed, range, and altitude capabilities of a fixed-wing aircraft with the vertical lift and landing capabilities of a helicopter, the Osprey has established itself as a game-changer in modern military operations. From the scorching deserts to the icy Arctic, the Osprey has withstood the harshest conditions, consistently delivering exceptional results.

Technological Superiority

At the heart of the V-22's success is its sophisticated technology, designed to enhance both performance and safety. The aircraft's fly-by-wire controls reduce pilot workload while improving situational awareness, making it safer to operate under various conditions, including long-range flights and challenging landings in low-visibility environments.

The Osprey's fuselage is another example of its cutting-edge design. Built with corrosion-resistant materials and coatings, it is specially designed for maritime operations. Its durable structure includes enhanced electromagnetic interference protection and a blade-fold mechanism for shipboard storage, making it an ideal asset for naval deployments.

Enhanced Operational Capabilities

The V-22's operational capabilities extend beyond its advanced technology. It boasts an impressive range, capable of resupplying remote bases up to 400 nautical miles away on a single tank of fuel. With auxiliary tanks and aerial refueling capabilities, the Osprey can stay airborne for over five hours, ensuring mission success even in the most remote locations.

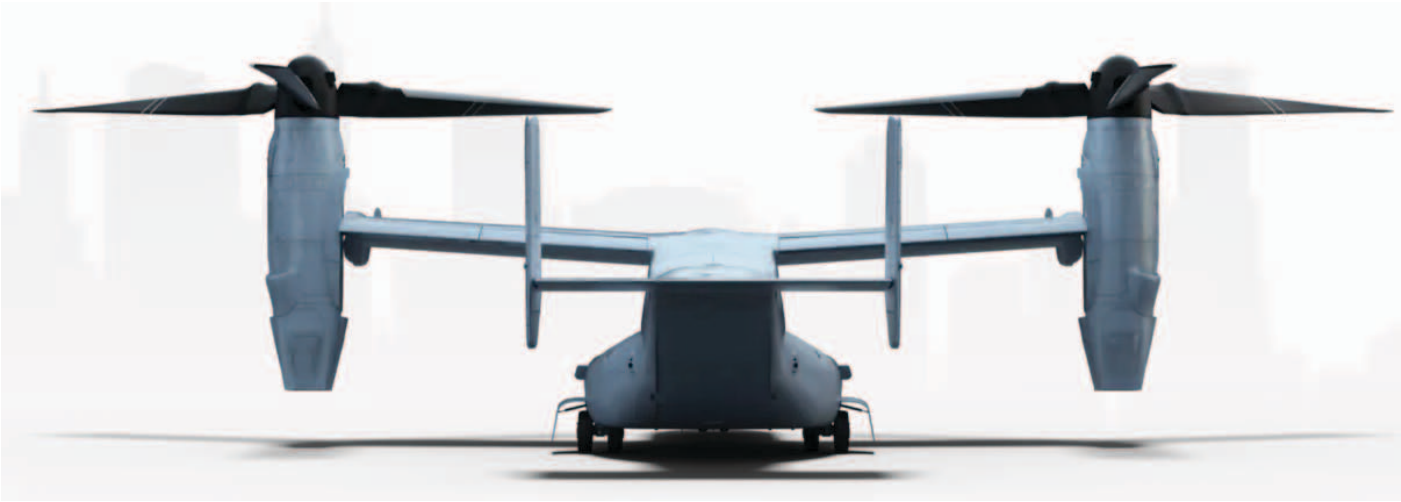
As a troop transport, the V-22 is unmatched. It can carry up to 24 combat troops and is equipped with provisions for fast rope and rappel operations, enhancing its utility in rapid deployment scenarios. Its high-tech cabin includes GPS repeaters and external antennas for troop radios, ensuring that commanders remain connected with their forces throughout the mission.

A Timeline of Excellence

The V-22's journey from its first flight to its current status as a vital component of U.S. and allied military operations is marked by several key milestones:

- March 1989: First Flight
- September 2005: Full-rate production granted
- June 2007: MV-22B Initial Operating Capability
- October 2007: MV-22B Combat Debut
- March 2009: CV-22 Initial Operating Capability
- February 2011: 100,000 Flight Hours
- July 2015: Contract awarded for V-22 Ospreys toJapan
- November 2017: 400,000 Flight Hours
- October 2019: 500,000 Flight Hours
- June 2020: 400th Delivery; First CMV-22B Delivery to the U.S. Navy
- July 2020: First Japan V-22 Delivery
- March 2021: 600,000 Flight Hours
- December 2021: CMV-22B Initial Operating Capability

The Bell Boeing V-22 Osprey continues to set the standard for tiltrotor aircraft, embodying the future of military aviation with its unparalleled versatility, advanced technology, and proven durability. As the world's militaries face increasingly complex challenges, the V-22 Osprey stands ready to meet those demands, delivering the ultimate advantage in the most critical operations.



Heron TP . All Images Courtesy Of: IAI

ISRAEL AEROSPACE INDUSTRIES: LEADING THE WAY IN UNMANNED AERIAL SYSTEMS

For over four decades, Israel Aerospace Industries (IAI) has been at the forefront of unmanned aerial systems (UAS) technology, shaping the future of military and law enforcement operations worldwide. With an impressive record of over 2.2 million operational flight hours in diverse and challenging environments—from scorching deserts to icy arctic regions—IAI's UAS platforms are synonymous with reliability, innovation, and tactical superiority.

A Strategic Edge in the Skies

IAI's Medium Altitude Long Endurance (MALE) systems are a cornerstone of modern aerial warfare, offering unparalleled capabilities in intelligence, surveillance, target acquisition, and reconnaissance (ISTAR). These robust, combat-proven platforms have been tested in hundreds of thousands of operational flight hours, providing mission-critical support to over 50 global customers.

The MALE systems are designed to excel in any environment, regardless of terrain or weather conditions. This flexibility is further demonstrated by their ability to adapt to various operational configurations, including maritime patrols and persistent surveillance missions. Among the standout models in this category are the Heron TP, Heron, and Heron MK II, each of which offers unique capabilities tailored to specific mission requirements.

Tactical Solutions for Modern Warfare

In today's rapidly evolving combat scenarios, the need for real-time intelligence and swift decision-making is more critical than ever. IAI's tactical UAS platforms are designed to meet these demands, offering medium-range surveillance solutions that provide comprehensive situational awareness, target acquisition, and damage assessment.

Models such as the Tactical Heron, BirdEye 650D, and WanderB-VTOL are built with the ruggedness and endurance required for the most demanding operations. These systems deliver the flexibility needed to respond to dynamic threats, ensuring that commanders have the vital information needed to make informed decisions in real time.

BirdEye 650D

Ground Control

Behind every successful UAS mission is a sophisticated ground control system that processes vast amounts of data, enabling seamless command and control. IAI's Mission Operation and Intelligence Center (MOIC) and Unified Control Station (UCS) represent the cutting edge of ground control technology.

These systems are designed to improve real-time fleet operation by centralising mission command and control. The MOIC and UCS maximise mission flow efficiency, allowing operators to process data from multiple sensors—both online and offline—while conserving manpower and resources. This technological prowess ensures that IAI's UAS platforms operate at peak performance, even in the most challenging environments.

Training for a New Era of Warfare

IAI understands that the effectiveness of its UAS platforms depends not only on advanced technology but also on the skill and expertise of the personnel operating them. To this end, IAI offers comprehensive training programs at its UAS Academy, as well as on-site training through its UAS Mission Trainer (UMT).

These programs cover every aspect of UAS operation, from candidate screening and basic flight training to complex team operations and instructor courses. IAI's commitment to training ensures that its customers can fully leverage the capabilities of their UAS systems, making them a formidable force in any conflict scenario.

A Legacy of Excellence

IAI's reputation as a pioneer and leader in unmanned aerial systems is well deserved, with a legacy of innovation that continues to shape the industry. While the company's focus is on its latest UAS models, it also remains committed to supporting its older platforms, many of which continue to provide exceptional service to customers around the world.

Platforms like the Scout and Pioneer have set the standard for UAS performance and reliability, and their enduring service is a testament to IAI's dedication to excellence. This legacy, combined with a relentless drive for innovation, ensures that IAI will continue to lead the field of unmanned aerial systems for years to come.

Israel Aerospace Industries continues to push the boundaries of what is possible in aerial warfare. From its cutting-edge MALE and tactical platforms to its sophisticated ground control systems and comprehensive training programs, IAI provides its customers with the tools they need to succeed in today's complex and challenging operational environments. With a legacy built on four decades of innovation and a future defined by technological excellence, IAI remains at the forefront of the UAS industry, leading the way in the evolution of modern warfare.

SOURCE: https://www.iai.co.il/

Orion -E (MALE) UAV

SYNTHETIC FUEL IN MILITARY AVIATION: A STRATEGIC IMPERATIVE

In the rapidly evolving landscape of modern warfare, military aviation remains a critical component of national defence, providing unmatched strategic agility and operational capability. However, the continued reliance on traditional fossil fuels poses significant challenges, particularly in terms of environmental impact and energy security. As the global focus shifts towards sustainability, the emergence of Sustainable Aviation Fuel (SAF) is poised to revolutionize military aviation, offering a greener and more resilient alternative to conventional jet fuels.

The quest for SAF has gained significant momentum in recent years, fuelled by escalating concerns over climate change and the urgent need to reduce carbon emissions. SAF, which can be produced from renewable sources such as biomass, waste materials, or even captured carbon dioxide, presents a promising solution for decarbonising military aviation. Unlike conventional jet fuels derived from crude oil, SAF has the potential to significantly reduce the carbon footprint of military operations, aligning with global efforts to combat climate change.

Moreover, SAF offers strategic advantages that extend beyond environmental benefits. By diversifying fuel sources and reducing dependence on volatile oil markets, militaries can enhance their energy security and operational resilience. The ability to produce SAF domestically also reduces logistical vulnerabilities, streamlines supply chains, and ensures sustained operational effectiveness in various combat and non-combat scenarios. This capability is critical for maintaining military readiness in the face of geopolitical uncertainties and for achieving energy independence—an essential element of national security.

Military Leadership in SAF Development

The military's interest in SAF is not new. The U.S. military, for example, has been actively involved in the development and testing of SAF for over a decade. A landmark event occurred in 2010 when an unmodified U.S. Navy Boeing F/A-18F Super Hornet flew using a 50:50 blend of sustainable biofuel and conventional jet fuel. At the time, this flight was part of a broader strategy by the Navy to reduce its reliance on fossil fuels by half over the following decade—a goal that,

while ambitious, highlighted the military's commitment to exploring sustainable energy alternatives.

Similarly, in 2022, the Royal Air Force (RAF) made headlines by conducting the world's first 100% sustainable fuel flight using a military aircraft the size of an Airbus A330. This historic flight was a joint effort between the RAF, the Ministry of Defence, and key industry partners, including Airbus, AirTanker, and Rolls-Royce. The success of this mission underscored the feasibility of SAF in military operations and set the stage for further exploration and adoption across other branches of the armed forces.

In 2023, France's Ministry for Armed Forces, in collaboration with Safran, Airbus Helicopters, and Total Energies, conducted the first test flight of an NH90 helicopter using SAF without any engine modifications. These milestones, while still in the experimental phase, signal a broader trend towards the integration of sustainable fuels in military aviation.

Opportunities and Challenges Ahead

The adoption of SAF in military aviation opens up a new frontier of innovation and collaboration within the defence industry. Public-private partnerships, government incentives, and research and development initiatives are driving efforts to optimise SAF production processes and scale manufacturing capacities. Advanced technologies, such as carbon capture, utilization, and storage (CCUS), are being explored to transform carbon dioxide emissions into valuable feedstocks for SAF synthesis, turning environmental liabilities into strategic assets.

Despite these promising developments, the path to widespread SAF adoption is fraught with challenges. In 2023, global SAF production volumes reached over 600 million litres—double the amount produced in 2022. However, this still represents a mere 0.2% of the total aviation fuel consumed that year. The limited availability of SAF and its high production costs remain significant barriers to its broader deployment. Additionally, the scalability of SAF production is constrained by limited feedstock availability, while supply chain bottlenecks could hinder the widespread rollout of this sustainable fuel.

The capital-intensive nature of synthetic fuel production also poses financial challenges, especially for defence budgets that are already stretched thin by competing priorities. Furthermore, concerns about the energy density, combustion characteristics, and compatibility of SAF with existing aircraft engines persist. Any compromise in operational efficiency or safety could undermine the viability of SAF as a replacement for conventional jet fuels, limiting its adoption within military fleets.

What Lies Ahead?

In the short to medium term, the adoption of SAF in military aviation is expected to accelerate as governments prioritise decarbonisation and energy security. Increased investment in research and development will likely lead to advancements in SAF production technologies, driving down costs and improving scalability. Collaborative efforts between defence agencies, industry partners, and research institutions will be crucial in developing certification standards and regulatory frameworks, facilitating the integration of SAF into military operations.

Moreover, strategic partnerships and international cooperation will play a pivotal role in expanding global production capacities and ensuring the availability of SAF for military use. By leading the charge in SAF adoption, militaries can not only enhance their operational effectiveness and resilience but also inspire a broader shift towards sustainable aviation practices across the global aviation industry.

As the military aviation sector navigates the complexities of transitioning to a low-carbon future, SAF emerges as a key enabler of sustainable operations and energy security. While challenges remain, the potential benefits of SAF—in terms of environmental sustainability, operational resilience, and strategic independence—are too significant to ignore. By embracing innovation and fostering collaboration, militaries can overcome the obstacles to SAF adoption, paving the way for a greener and more secure future in defence aviation.

The journey towards a sustainable military aviation sector is just beginning, but the steps taken today will shape the future of defence operations for decades to come.

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Image Courtesy of: Lockheed Martin

AI TAKES ON HUMAN PILOTS IN REAL-WORLD COMBAT TESTS

The Defence Advanced Research Projects Agency (DARPA), the Pentagon's research arm, has taken a significant step forward in integrating artificial intelligence (AI) into combat aviation. Through its Air Combat Evolution (ACE) program, DARPA is pushing the boundaries of what's possible in aerial warfare by testing AI-powered fighter jets in real-world scenarios against human pilots.

DARPA equipped existing F-16 fighters with AI systems, transforming them into X-62A or VISTA (Variable In-flight Simulator Test Aircraft) jets. These AI-powered jets, driven by machine learning algorithms based on historical flight data, engaged in aerial dogfights with human-piloted planes. The results, according to DARPA, represent "transformational progress" in the development of human-machine teaming and trusted autonomy.

"The X-62A demonstrated that cutting-edge machine learning-based autonomy could be safely used to fly dynamic combat manoeuvres," said Frank Kendall, Secretary of the Air Force. "The team accomplished this while complying with American norms for safe and ethical use of autonomous technology."

These tests mark a critical milestone in the ACE program's evolution. Initially, the AI systems were tested in virtual environments, where pilots used virtual reality headsets to engage in simulated dogfights against AI adversaries. However, DARPA researchers recognised the limitations of these simulations, noting that they could not fully replicate the unpredictability and complexity of real-world interactions.

"One of the primary problems machine learning and AI have had to overcome is something called the sim-to-real problem," explained Chris Cotting, Director of Research at the U.S. Air Force Test Pilot School.

By moving the AI tests from virtual simulations to the skies above Edwards Air Force Base in California, DARPA aims to address this challenge and refine the AI systems in real-world settings.

The broader goal of the ACE program is to enhance the combat effectiveness of fighter jets by integrating AI systems that can assist or even take over certain aspects of aerial combat. While modern jets are already equipped with an array of technological tools—such as advanced sensors, radar, and guided missiles—DARPA envisions AI as the next leap forward in combat aviation.

However, one of the key challenges is ensuring that human pilots trust these AI systems to operate reliably. "We have to be able to trust these algorithms to use them in a real-world setting," said Lt. Col. Ryan Hefron, a key figure in the ACE program.

The U.S. Air Force is not alone in its pursuit of autonomous combat aviation. The Air Force is also conducting the Skyborg project, which aims to develop unmanned combat aerial vehicles (UCAVs) capable of operating alongside manned aircraft. Additionally, the Wingman project envisions a future where swarms of missile-carrying unmanned drones fly in formation with fighter jets, providing support during combat missions.

Globally, other nations are also exploring similar technologies. Chinese military researchers at the Aerodynamics Research and Development Center in Mianyang conducted AI-powered fighter jet tests last summer, and Japan has announced plans to develop unmanned fighter jets by 2035.

As DARPA continues to refine its AI systems through the ACE program, the future of aerial combat is poised to change dramatically. With autonomous fighter jets showing promise in real-world tests, the integration of AI into military aviation is no longer a distant concept but an emerging reality.

SOURCE: https://www.darpa.mil/

THE ART OF **AERIAL REFUELLING**

In military aviation, aerial refuelling stands as one of the most awe-inspiring feats of precision and coordination. Despite the leaps in technology, this complex manoeuvre remains a test of aeronautical skill and experience, a dance in the sky that demands the highest level of expertise.

At the heart of this operation is the Airbus A330 MRTT, a marvel of versatility. As a multi-role tanker transport, it serves not only as a freighter or passenger aircraft but also as a flying fuel pump capable of carrying up to 111 metric tons of fuel. When tasked with refuelling, the A330 MRTT positions itself in restricted airspace—often in sparsely populated regions, such as those permitted in Germany. Here, it awaits the arrival of a fighter jet, which approaches from behind at a mere 20 meters away.

The refuelling process itself is a high-wire act. Once the two aircraft are aligned and connected, fuel begins to flow at a rate of up to 1,590 kilograms per minute, depending on the procedure. This delicate operation occurs at altitudes ranging from 1,500 to 10,000 meters and speeds of around 500 kilometres per hour. It is monitored by an Air Refuelling Officer (ARO) who adjusts the fuel volume and refuelling speed based on real-time conditions, with video and infrared camera systems aiding in the precise alignment and docking, even in low visibility.

Despite these advanced systems, the task is far from routine. The autopilot manages the aircraft's course, but ideal conditions—clear skies, good visibility, and steady winds—are preferred to minimise risks. The complexity increases with the necessity to refuel multiple aircraft sequentially or even simultaneously, depending on operational requirements and environmental conditions.

Aerial refuelling employs two primary methods: the boom system and the probe-and-drogue system. The boom system involves the refuelled aircraft extending a telescopic boom that docks with the receiving aircraft's fuel tank. This method allows for rapid refuelling but requires precise manoeuvring by the ARO.

The probe-and-drogue system, on the other hand, features a flexible hose with a drogue—a device resembling an oversized shuttlecock—trailing behind the refuelled. The receiving aircraft's pilot must guide a probe into the drogue to establish a connection. While this method offers greater distance between the aircraft, reducing collision risk, it demands exceptional precision from the receiving pilot.

In recent developments, the Airbus A330 MRTT has become the first tanker certified for automated aerial refuelling during daylight hours. Airbus's automatic air-to-air refuelling (A3R) system leverages automation and advanced image recognition to reduce the ARO's workload, making the process safer and more efficient even under challenging conditions. The system aligns the boom with the receiving aircraft's intake with centimetre-level accuracy and verifies alignment in real-time.

Looking ahead, the next evolution in aerial refuelling will see these operations become increasingly autonomous. The A4R project aims to automate tasks performed by the receiving aircraft, further enhancing safety and efficiency. While automation will ease some aspects of aerial refuelling, the planning and execution of these operations will continue to require extensive experience and skill. As technology advances, the aerial refuelling process promises to become more reliable, preserving its place as one of the most complex and captivating manoeuvres in modern aviation.

THE FUTURE OF WARFARE: DRONES IN MILITARY SECURITY APPLICATIONS

In an era marked by escalating terror threats, unconventional military challenges, and rising geopolitical tensions, unmanned aerial vehicles (UAVs) have become indispensable tools for modern warfare and homeland security. The demand for drones is surging globally as military forces seek to target terrorist and insurgent groups while minimizing risks to human life. The appeal is clear: drones offer precision strikes, enhanced surveillance, and cost-effective operations.

Drones, which began as basic surveillance tools, have evolved into sophisticated instruments of war and peacekeeping. The military drone market is projected to reach $17 billion by 2027, with global military spending on unmanned aerial systems (UAS) expected to soar to $216.5 billion over the next decade, according to the Teal Group.

Cutting-Edge Drone Technology

Today's drones are marvels of modern technology, integrating advanced artificial intelligence (AI), edge computing, and state-of-the-art surveillance systems. These innovations are critical for military and homeland security (HLS) applications, enabling drones to perform a wide range of tasks with unprecedented efficiency and autonomy.

- Autonomous Navigation: Modern drones are equipped with AI and edge computing that allow them to navigate complex environments autonomously. This includes obstacle avoidance, terrain analysis, and adaptive mission planning based on real-time data. For example, during a search and rescue mission in a dense forest, a drone can use its AI capabilities to navigate through challenging terrain, avoid obstacles like trees and cliffs, and adapt its flight plan in response to changing conditions.
- Decision-Making: AI algorithms enable drones to make rapid, critical decisions with minimal human input. In military operations, drones can analyse threats, select targets, and determine flight paths autonomously. For instance, a drone can quickly assess aerial footage to identify enemy combatants or unsecured territories, then choose the safest route to avoid detection and prioritise surveillance targets.
- High-Resolution Imaging: Drones now feature high-resolution cameras that allow for detailed analysis of terrain, structures, and even individual faces from significant altitudes. In urban surveillance, a drone can capture detailed images of a cityscape, identifying individual faces in a crowd or assessing the structural integrity of buildings after a natural disaster.
- Real-Time Data Transmission: Drones can stream data back to command centres in real time, providing instant intelligence and situational awareness. This capability is crucial for time-sensitive operations, such as responding to security breaches or natural disasters, where real-time data can inform rapid decision-making and resource deployment.
- Extended Air Time: Advances in battery and propulsion technologies have significantly increased

drones' endurance, with some models capable of remaining airborne for days without landing. In border surveillance missions, these drones can continuously monitor vast areas, providing persistent surveillance and real-time intelligence to security forces.

- Wide Area Coverage: With their extended air time, drones can cover large geographical areas, gathering data over extended periods—an essential capability for large-scale military and HLS operations. For example, in disaster response scenarios, drones can quickly survey vast regions, assess damage, and locate survivors, ensuring that aid reaches the most affected areas swiftly.

Trends Shaping the Future of Drone Technology

- As drone technology continues to evolve, several key trends are set to shape the future of military and HLS applications.
- •Increased Autonomy: Future drones will be even more autonomous, capable of executing complex tasks such as tactical strikes, surveillance missions, and supply deliveries without human intervention. The MQ-9 Reaper, used by the U.S. military, exemplifies this trend, showcasing the increasing autonomy in operational deployment.
- Coordinated Swarm Operations: Swarm technology, where multiple drones work together through advanced AI coordination, allows for complex, large-scale operations. These drone swarms can be used in various scenarios, from reconnaissance missions to overwhelming enemy defences. The U.S. Department of Defence's Strategic Capabilities Office has successfully tested micro-drone swarms, demonstrating advanced behaviours like collective decision-making and adaptive formation flying.
- •Stealth and Versatility: The trend towards miniaturization is making drones smaller, less detectable, and more adaptable for various operations, including covert surveillance in dense urban environments. The market for small drones is expected to grow rapidly, with the Black Hornet Nano drones, used by U.S. and British forces, exemplifying this trend with their discreet surveillance capabilities.
- 5G Integration: The integration of 5G technology with drones is expected to revolutionize communication and data transfer capabilities. Trials by AT&T and the U.S. Air Force have demonstrated significant improvements in data processing and real-time communication, with 5G enabling drones to transmit high-definition footage 100 times faster than 4G.
- AI Adoption in Military Drones: The increasing use of AI in UAVs is driving the development of advanced military drones with capabilities like multiple sensor systems and autonomous flight. These drones are being designed for a range of military applications, including combat operations and surveillance, and are expected to play a growing role in global defence strategies.

The Strategic Importance of Drones

The rapid advancement and deployment of drone technology are redefining the future of warfare and security. As drones become more autonomous, coordinated, and integrated with cutting-edge technologies like AI and 5G, their strategic importance will continue to grow. The military drone market is expanding, driven by increasing government funding and technological innovations, and drones are poised to play an even more crucial role in global security and defence.

However, this evolution also presents new challenges, including ethical considerations, regulatory issues, and the impact on international security dynamics. As drones become more central to military and HLS operations, addressing these challenges will be essential to harnessing their full potential while ensuring responsible and effective use in the evolving landscape of global security.

SOURCE: https://www.maris-tech.com/

NAVIGATING THE FINAL FRONTIER OF INTERNATIONAL SPACE POLICY

In the ever-expanding domain of space, issues of sovereignty and international cooperation have become increasingly prominent. As nations push the boundaries of space exploration and utilisation, the implications for sovereignty and global policy are profound. The Center for Strategic and International Studies (CSIS), a prominent nonpartisan research institution, offers valuable insights into these complex dynamics, shedding light on the evolving landscape of space policy and international relations.

The Expanding Frontier of Space

Space has long captured the imagination of humanity, but its strategic significance has grown exponentially in recent decades. From satellite communications to space exploration missions, the utilization of space is integral to modern life and global security. As technological advancements make space more accessible, the concept of space sovereignty—the right of nations to control and use outer space resources and activities—has become a critical area of international discourse.

Sovereignty in the Cosmos

The concept of sovereignty in space is distinct from terrestrial sovereignty due to the unique legal and operational frameworks governing outer space. The Outer Space Treaty of 1967, a cornerstone of space law, establishes that space is the "province of all mankind" and is not subject to national appropriation. This treaty, along with subsequent agreements such as the Moon Agreement, aims to ensure that space exploration and use remain collaborative and not dominated by any single nation.

However, as space activities proliferate, the boundaries of these agreements are being tested. Nations are increasingly seeking to assert their presence and rights in space, driven by interests ranging from resource extraction to national security. The rapid advancement of space technology, including the deployment of satellite constellations and the potential for space mining, raises questions about how traditional notions of sovereignty apply in this new context.

The Role of International Cooperation

Given the shared nature of space, international cooperation remains essential for addressing the challenges and opportunities it presents. The CSIS commentary underscores the importance of collaborative efforts in space exploration and utilisation. Cooperative initiatives, such as joint missions, shared research, and collaborative space stations, exemplify how nations can work together to advance scientific knowledge and achieve common goals.

In addition to fostering scientific and technological advancements, international cooperation in space also serves to mitigate conflicts and enhance security. Space is increasingly recognized as a domain where global power dynamics play out, and managing this environment requires diplomatic engagement and collaborative frameworks. The establishment of norms and agreements through multilateral forums helps to prevent disputes and ensure that space remains a domain of peaceful exploration and cooperation.

Navigating New Challenges

The evolving landscape of space presents new challenges for policymakers and international bodies. Issues such as space debris management, the militarisation of space, and the regulation of emerging technologies necessitate a forward-looking approach to governance and policy. The CSIS report highlights the need for updated legal and regulatory frameworks that address these contemporary challenges while upholding the principles of international cooperation and shared benefit.

As space becomes more commercialised, the role of private enterprises in space exploration and utilization also raises questions about governance and sovereignty. The involvement of private companies in space activities introduces new dynamics that require careful consideration and regulation to ensure that space remains a domain accessible to all and not dominated by a few.

Space represents both an opportunity and a challenge for the global community. As nations and private entities venture further into the cosmos, the issues of sovereignty, international cooperation, and governance become increasingly complex. The insights provided by the Center for Strategic and International Studies offer valuable guidance for navigating this dynamic frontier. By emphasizing the importance of collaborative efforts, updated regulatory frameworks, and diplomatic engagement, CSIS helps to illuminate the path forward in ensuring that space remains a realm of shared exploration and benefit.

SOURCE: https://www.csis.org

SANDF ALERTS CITIZENS TO ESCALATING RECRUITMENT SCAMS TARGETING SOUTH AFRICAN YOUTH

In a troubling trend that has gained momentum in recent months, the South African National Defence Force (SANDF) is once again warning the public about a surge in fraudulent recruitment schemes aimed at exploiting vulnerable citizens.

These scams, which have been spreading across social media platforms, falsely claim to be official SANDF recruitment drives. In reality, they are the work of faceless criminals seeking to deceive and financially exploit unsuspecting individuals, particularly the youth.

The SANDF has been clear in its response: there is currently no official recruitment drive underway, and any advertisements claiming otherwise are entirely illegitimate. The repeated deceitful actions by these unpatriotic individuals are not only unethical but also illegal, and the SANDF is calling for a unified condemnation from all law-abiding citizens.

"We find these actions abhorrently unethical," stated an official SANDF spokesperson. "These criminals are preying on the hopes and dreams of young South Africans, offering them false promises and stealing from them under the guise of military recruitment."

The impact of these scams is profound. Unsuspecting individuals are often lured in with the promise of stable employment, only to find themselves defrauded of their money and personal information. The SANDF is urging the public to remain vigilant and to verify any recruitment information through official channels before taking any action.

The criminals behind these schemes are known to operate within the communities they target, often exploiting local trust to further their deceit. The SANDF is encouraging anyone with information about these individuals to report them to the South African Police Service (SAPS) anonymously. This cooperation is vital in bringing these perpetrators to justice and preventing further exploitation of innocent citizens.

In addition to raising awareness, the SANDF is working closely with law enforcement agencies to track down and apprehend those responsible for these fraudulent activities. The goal is to put an end to the scams and to protect the public from further harm.

"The SANDF remains committed to upholding the integrity and security of our recruitment processes," the spokesperson added. "We urge the public to stay informed, to question any suspicious recruitment offers, and to report any fraudulent activities to the appropriate authorities."

As these scams continue to proliferate, the SANDF's message is clear: the public must stay informed and vigilant. By working together, South Africans can help ensure that these criminals are brought to justice and that no more citizens fall victim to their schemes.

For official information on SANDF recruitment and other related matters, individuals are advised to consult the SANDF's official website or contact their offices directly.

The Commercial Aviation Association of Southern Africa

CAASA is a non-profit organisation formed in 1944 to promote and protect the commercial interests of the general aviation industry in South Africa

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