VOLUME 52 ISSUE 01 / MARCH 2024

WORLD AIR NEWS

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This Airbus A321-253N of Azores Airlines was in Malta for maintenance at one of the major MRO providers on the island. Registered CS-TSF the aircraft was delivered new to Azores Airlines in December 2017, making it just over six years old. It was photographed on departure from LMML on its way to Lisbon. Photo credit - Mario Caruana / MAviO News.

Our front cover photo was provided by *World Airnews* photographer Pieter Cronje.
It is a USAF Sikorsky HH-60G Pave Hawk and the shot was taken at AAD 2022 held at the Waterkloof AFB.

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MIGHTY MILITARY HELICOPTER TYPES

By Heidi Gibson

As the focus this month turns to military helicopters, it's exciting to shine a spotlight on the significant strides being made towards the operational capabilities of the South African Air Force's iconic Rooivalk attack helicopter.

The formal agreement with Aselsan, a Turkish defence electronics company and Denel was built on a memorandum of understanding (MoU) signed during the Africa Aerospace and Defence (AAD) 2022 exhibition. In terms of this, the companies agreed to work towards the integration of Aselsan's MEROPS or multi-spectral extended range optical sight system on the Rooivalk. The collaboration marks a pivotal moment in the Rooivalk's development.

So, what is the MEROPS system? In brief it's an advanced version of the Aselsan CATS or common aperture targeting system, currently used on the TAI Anka and Bayraktar TB2 UAVs. It was specifically-designed for long-range observation and reconnaissance, area illumination and target designation in extreme situations. It is ideal in low lighting during dawn and dusk, in smoke and dust. The system features the latest in image processing and image enhancement technologies, and uses the latest machine vision and AI-based algorithms for moving target and threat identification and classification. It provides multi-target auto tracking with automatic target re-acquisition.

And this is just the tip of the iceberg. There is a whole lot more. The project has achieved certification in July last year setting out and defining the technical solution, outlining the delineation of work on the avionics modernisation from the existing block 1F baseline configuration. There are a whole of other enhancements that require a separate focus feature, allowing for a proper and more comprehensive explanation. In short, and put simply, it's exciting.

As a last word, building on the historical context of South Africa's pursuit of indigenous attack helicopters during the arms embargo era of the 1980s, plans are now afoot for the Rooivalk Mk II with potential export discussions spanning nations such as Egypt, Nigeria, Brazil, India, and Poland.

There is other exciting news packed into this month's edition. Must reads include a personal account flying the Russian Mil Mi-8 helicopters between Malta and Gozo by Joe Ciliberti – our aviation expert from Malta. And how could we produce a military helicopters magazine without the iconic Bell 'Huey' - the famous military multi-mission utility platform.

With its signature 'whomp-whomp' that heralds its imminent arrival, the Huey is the most successful military helicopter ever produced – it's a great read.

Look out a bit later in the mag for our selection of top Vertical Take Off and Land (VTOL) types, drones and their ever expanding uses as well Recardo's cabin seating innovations. As always World Airnews provides a wide range of articles focused on the current as well as the future.

As a parting shot: "The desire to fly is an idea handed down to us by our ancestors who, in their grueling travels across trackless lands in prehistoric times, looked enviously on the birds soaring freely through space, at full speed, above all obstacles, on the infinite highway of the air."– Wilbur Wright

Bell 407M – Part of Bell's Special Mission Aircraft fleet, offering multi-mission civil helicopters modified for parapublic/military use.

THE HUEY WORKHORSE – JOINED BY NEXT GEN MULTI-ROLE PLATFORMS

If ever there was an iconic military helicopter, it is Bell's 'Huey' - the famous military multi-mission utility platform. With its signature 'whomp-whomp' that heralds its imminent arrival, the Huey is the most successful military helicopter ever produced.

Since its inception in 1956, the Huey family of over 16,000 platforms, many of which are still in operation all over the world today, has completed more than 27 million flight hours - making it the most successful military platform in aviation history.

The Huey began as the Bell XH-40, named by the US Army as the HU-1 Iroquois, after the native American tribe; but the Huey nickname stuck from the very beginning, coming from that first HU designation, which later changed to UH.

From October 1956 up to 1961, the medium-lift AB204 Huey went on to undergo a variety of small updates, each time changing its suffix, until the launch of the AB205 UH-1 in 1961, which had a slightly longer fuselage and more powerful engine.

Alongside the Huey multi-role helicopter, its attack counterpart, the AH-1 Cobra, first appeared in 1965, later becoming the Super Cobra and most recently, in 2000, the Viper.

The attack helicopters can support a variety of weapons configurations and advanced fire control systems providing customisable configurations to meet each mission's requirements Generations of H-1 helicopters operating around the world, from hot and high conditions, rugged mountain terrain, at sea and over frozen landscapes, have proven that the H-1 is an aircraft that militaries rely on.

In 2005, the Huey II came out, with a modernised airframe and incorporated dynamic components from Bell's commercial platform, the Bell 212. It also included enhanced safety features such as a wire-strike protection system and a digital cockpit. The increased horsepower and additional hover capability in hot conditions, along with an easily reconfigurable interior for enhanced

Story continues page 06

Bell 205A – A single-engine, medium-sized utility helicopter, derived from the iconic Huey, with the ability to carry up to 14 passengers and heavy loads.

multi-mission capability, all combined with lower direct maintenance costs, and ensured the Huey II continued its well-deserved workhorse status into the next generation of military service.

But those first Hueys didn't stop performing - and Bell ensured that they could be upgraded where required, by introducing Huey II upgrade kits. Bell's aftermarket service and consideration of its platforms throughout its lifespans have always set the company apart from the competition.

Since then, the H-1 programme has continued to develop its technology to align the two platforms - the utility and the attack - so that the current UH-1Y Venom and the AH-1Z Viper of the H-1 programme share 85% common components. This represents a significant advantage to operators in terms of maintenance, especially in the field. Added to the fact that the H-1s are renowned for their reliability and rapid deployability. Militaries all over the world, including those of many African countries boast an H-1 platform - mainly the AB205a, to their fleet with some individual airframes amassing over 30,000 flight hours. In Africa, there are significant fleets in service in Morocco, Uganda, Tanzania, Zimbabwe, Tunisia, Albania, and Zambia.

Bell and its Huey continue to perform and inspire, carrying out day-to-day missions that include transporting vital personnel and equipment, medical evacuations, and combat assault support.

Bell has also been working hard to bridge an important gap between the commercial and military markets with its Special Missions Aircraft (SMA).

With today's greater demand for public safety and defence requirements, Bell has taken its proven commercial platforms and produced a special series of kits that allow for a helicopter to be para-public or Helicopter Emergency Medical Service mission ready within 30 minutes. From transporting VIPs or troops to performing Search and Rescue operations or even armed for security missions, a platform can maximise its fleet hours to make it the most cost-effective solution, whatever the requirement.

The commercial Bell 407 is a very popular platform across Africa already with 124 in operation across Africa and the Middle East. First introduced in 1996 and based on the famous OH-58 Kiowa Warrior the 407 is well known for its reliability and versatility. The popular Bell 429 and Bell 412 will follow providing well-established and successful airframes for even more mission capability.

Looking ahead, Bell continues to pave the way for a more accessible world with vertical lift solutions to suit a multitude of requirements and budgets. Through advanced air mobility vehicles and revolutionary commercial and military technology, the company is looking to unlock even more possibilities in the world of flight.

Bell 204B – Derived from the UH-1B, the Bell 204, first delivered in 1961, was the first platform powered by a turboshaft.

SA342 Aerospatiale

TOP MILITARY ATTACK HELICOPTERS IN AFRICA

A specialised aircraft that provides fire support for ground forces, engages enemy armoured vehicles, fortifications, and personnel - military attack helicopters are essential in war. Equipped with a variety of fire power such as rockets, missiles, cannons, and machine guns, they can be used for close-air support (CAS) missions, where they co-operate with friendly ground units and provide them with accurate and timely military capability.

African countries in the West and Central parts of the continent still have many security challenges. Civil wars, insurgencies, terrorism, piracy, and border disputes continue to play out across many countries. This has in turn, fuelled the need for African governments to acquire their attack helicopter fleets.

While some of the attack helicopters used by African air forces are from foreign suppliers, others are developed and produced locally.

In this article World Airnews, has not included the well-known Russian types (Mil) Mi-17/Mi-18 multi-role, Mi-24/35 Hinds and Mi-28 types in this article. An overview of the common Russian attack helicopters is placed in a separate article on page 10 in this edition.

THE SA342 AÉROSPATIALE GAZELLE

This is a light utility and attack helicopter developed by the French company Aérospatiale in the 1960s. The Gazelle is versatile and can perform various roles, such as reconnaissance, observation, transport, training, and anti-tank. The Gazelle can carry up to four passengers, or two stretchers, or 590 kg of cargo. It can be armed with a 20 mm cannon, or four HOT anti-tank missiles, or four Mistral air-to-air missiles, or 68 mm rockets. The SA342 Gazelle has a sleek design, is agile and a valuable asset for a range of operational requirements.

It is operated by several African countries, such as Algeria, Botswana, Burkina Faso, Chad, Djibouti, Egypt, Gabon, Ivory Coast, Kenya, Libya, Morocco, Niger, Rwanda, Senegal, Sudan, Tunisia, and Zimbabwe. The Gazelle has seen combat action in various conflicts, such as the Western Sahara War, the Chadian Civil War, the Libyan Civil War, and the Mali War.

MD HELICOPTERS (MDH) MD 530F CAYUSE WARRIOR PLUS

A light scout and attack helicopter developed by the American company MD Helicopters in the 1980s. The MD 530F is a variant of the MD 500 series, which are based on the Hughes OH-6 Cayuse. The MD 530F has a five-blade main rotor and a four-blade tail rotor, which provide improved performance and manoeuvrability. The MD 530F can carry up to three passengers, or 680 kg of cargo. It can be armed with a 12.7 mm machine gun, or two FN Herstal HMP400 pods, or four AGM-114 Hellfire missiles, or seven Hydra 70 rockets.

Well known for agility and effectiveness, the MD 530F is often used to provide precision firepower in challenging environments. It is operated by Kenya, Uganda, and Nigeria in Africa.

Boeing AH-64E Apache

THE DENEL AH-2 ROOIVALK

A South African attack helicopter known for itsmanoeuvrability and agility. The Rooivalk helicopter is a single-engine attack helicopter developed by the South African company Denel in the 1990s. The Rooivalk is the first and only attack helicopter designed and produced in Africa.

The Rooivalk is based on the Aérospatiale SA 330 Puma, which is a medium-lift transport helicopter. The Rooivalk has a five-blade main rotor and a four-blade tail rotor, which provide high performance and stability. The Rooivalk has a tandem cockpit for the pilot and the gunner, and a chin-mounted turret for the weapons. The Rooivalk can be armed with a 20 mm cannon, or eight Mokopa or AGM-114 Hellfire anti-tank missiles, or four Mistral or FIM-92 Stinger air-to-air missiles, or 70 mm or 68 mm rockets.

The Rooivalk has been used for peacekeeping and combat operations in the Democratic Republic of the Congo, where it proved its effectiveness and reliability.

It boasts a unique tandem cockpit design and can provide crucial support to ground forces in various operational scenarios. The Rooivalk is being modernised by Denel and Turkish Aselsan.

BELL AH-1Z VIPER

An upgraded version of the AH-1 Cobra, featuring improved engines, avionics, and weapons systems. The AH-1Z Viper is a twin-engine attack helicopter developed by the American company Bell in the 2000s. The Viper has a four-blade main rotor and a four-blade tail rotor, which provide improved performance and reduced noise. The Viper has a tandem cockpit for the pilot and the co-pilot/gunner, and a chin-mounted turret for the weapons. It can be armed with a 20 mm cannon, or 16 AGM-114 Hellfire missiles, or 16 APKWS II rockets, or four AIM-9 Sidewinder or AIM-120 AMRAAM air-to-air missiles. It excels in anti-armour and close air support roles.

The Viper is operated by Nigeria in Africa, which ordered 24 units in 2019. The Super Cobra is operated by Kenya.

T-129 ATAK

The Turkish T-129 ATAK is a twin-engine attack helicopter developed by the Turkish company TAI in the 2010s. The ATAK is a variant of the Agusta A129 Mangusta, which is the first attack helicopter designed and produced in Europe. The ATAK has a five-blade main rotor and a two-blade tail rotor, which provide high performance and agility. The ATAK has a tandem cockpit for the pilot and the gunner, and a nose-mounted turret for the weapons. The ATAK can be armed with a 20 mm cannon, or eight UMTAS or AGM-114 Hellfire anti-tank missiles, or 12 CIRIT or Hydra 70 rockets, or four Stinger or Mistral air-to-air missiles.

It offers exceptional performance with advanced avionics and weaponry and can conduct a wide range of missions, from armed reconnaissance to anti-tank engagements. It is operated by Nigeria in Africa, which ordered six units in 2019.

KA-52 ALLIGATOR

The Ka-52 Alligator is a twin-engine attack helicopter developed by the Russian company Kamov in the 1990s. The Alligator is a coaxial rotor helicopter, which means it has two contra-rotating main rotors, which provide high speed, manoeuvrability, and stability. The Alligator has a side-by-side cockpit for the pilot and the gunner, and a nose-mounted turret for the weapons. The Alligator can be armed with a 30 mm cannon, or 12 Vikhr or Ataka anti-tank missiles, or four Igla or R-73 air-to-air missiles, or 80 mm or 122 mm rockets.

It is operated by Egypt in Africa, which ordered 46 units in 2015.

BOEING AH-64E APACHE

The latest variant of the iconic Apache, is a twin-engine attack helicopter developed by Boeing in the 1980s. It is the most advanced and widely used attack helicopter in the world, with over 2,000 units in service in 16 countries.

The Apache has a four-blade main rotor and a four-blade tail rotor, which provide high performance and agility. The Apache has a tandem cockpit for the pilot and the gunner, and a chin-mounted turret for the weapons. The Apache can be armed with a 30 mm cannon, or 16 AGM-114 Hellfire or Spike anti-tank missiles, or four AIM-92 Stinger or AIM-9 Sidewinder air-to-air missiles, or 76 Hydra 70 or CRV7 rockets.

The Apache is operated by Morocco and Egypt in Africa, Morocco ordered 24 units in 2019, while Egypt ordered 46 in 2018. In November 2018 Egypt requested the sale of ten AH-64E Apaches for an estimated (US) $1 billion. The Apache is also the most combat-proven attack helicopter in the world, having participated in various conflicts, such as the Gulf War, the Kosovo War, the Iraq War, the Afghanistan War, and the Syrian Civil War.

Renowned for its versatility, the AH-64 Apache is a mainstay in many African air forces.

These are just a few examples of the most well-known military helicopters, new technologies and increasing demand for advanced capabilities will continue to drive innovation in the military helicopter industry in the years to come.

Ka-52 Alligator

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Mi-28NE (photo Rosoboronexport)

RUSSIAN HELICOPTERS: A DOMINANT FORCE IN AFRICAN SKIES

Russian-manufactured helicopters have established a commanding presence in the African aviation landscape, with over 900 of these aerial vehicles registered across the continent. Notably, nearly 40% of military helicopters in Africa originate from Russia, with models like the Mi-8/17 family and the Mi-24/35 series leading the fleet. This dominance underscores African nations' preference for the reliability and combat effectiveness of Russian helicopters.

Mi-8AMTSh (photo Ulan-Ude aviation plant)

Mi-35P (photo Rostvertol)

Russia's commitment to providing reliable and combat-effective aerial solutions is exemplified by modernised helicopters like the Mi-35P, known as the Phoenix. With enhancements inherited from its predecessor, the Mi-24P, the Phoenix excels in cost-efficiency, modern avionics, and optimized weaponry. Additionally, the latest Mi-28NE Night Hunter offers unparalleled combat prowess, thriving in diverse environmental conditions and bolstering African air forces' defence capabilities.

THE MI-28NE IN ACTION

The Ugandan Air Force's endorsement of the Mi-28NE speaks volumes about its effectiveness in combating insurgent forces and enhancing regional security. Testimonials from Lieutenant General Charles Okidi highlight the pivotal role played by the Night Hunter in real-world scenarios, showcasing its instrumental contribution to safeguarding African territories.

Despite the dominance of Russian helicopters in Africa, concerns persist regarding operational safety and maintenance practices. Incidents of helicopter crashes prompt scrutiny, emphasising the need for adherence to authorized maintenance procedures and comprehensive training under certified Russian instructors. Deviating from these standards risks compromising fleet integrity and jeopardising mission success.

To ensure the continued reliability and safety of Russian helicopters in Africa, collaboration between stakeholders is paramount. African nations must prioritise adherence to established maintenance protocols and invest in comprehensive training programs to empower their aviation personnel.

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AN AIR BRIDGE USING Mi-8s

by Joe Ciliberti

A frequent flyer on Russian Mil Mi-8 helicopters between Malta and Gozo, Joe Ciliberti has written a personal account of his experiences piloting the Russian "Hip". These aircraft were used by Malta Air Charter for an air service between the two Mediterranean islands of Malta and Gozo during the 1990s until 2004.

High on the political agenda of the small Mediterranean island of Gozo, the second largest of the Maltese islands has always been to provide a reliable air service between themselves and Malta.

The efforts and initiatives were mainly driven by the Gozo Business Chamber and the Gozitan population at large.

While the ferry services between the two islands had greatly improved and brand-new RORO ferries ordered by the ship company Gozo Channel, the service was still dependant on weather. When strong winds prevailed (a constant threat to the islands) the service had to be severely curtailed or suspended, sometimes for days on end.

That's when Malta Air Charter (MAC), a subsidiary of Air Malta, commenced a regular helicopter service between the two islands on June 27, 1990 that operated from Park 8 at Luqa airport to a landing strip in Xewkija, a quiet village on Gozo.

The strip is an historical location as it has the last remnants of a 2-runway airfield built by the United States during World War Two. Constructed for 'Operation Husky', which was to be the invasion of Sicily and beyond, from Malta, the Americans looked for a place to operate their fighters and bombers as close to Sicily as possible.

The Brits had run out of room at their air bases in Malta, so American engineering squadrons descended on Gozo and built the airfield in less than 14 days. From Gozo they flew hundreds of offensive missions towards Sicily and vacated it after five weeks. 'Operation Husky' proved to be very successful with various airfields in Sicily overrun and providing a base for Allied Forces to push North.

FLEET

For a short period MAC made use of an August Bell 212 and over the years, the company also flew various versions of the Russian-built Mil Mi-8s. After the meltdown of the Soviet Union, these aircraft were available on the commercial market in their hundreds.

A contract with a Russian company, later replaced by Heli Air of Bulgaria, provided 2 Mi-8s at any time, which performed the regular service linking the two islands. The early switch from an AB-212 to Mi-8s made a lot of sense in financial terms. The Russian helicopters were less expensive to operate, requiring less maintenance, and the crew were paid much less than any AB-212 aircrew.

Resplendent in white and red colour scheme, the helis soon got into the business of flying passengers across the two islands.

Since the Mil Mi 8 was considered not to meet EU noise requirements, the ACMI contract came to an end with Malta's accession to the European Union in 2004. With an increase in demand during latter years, Malta Air Charter employed 2x Mil Mi 8 on the Malta-Gozo route including LZ-CAV leased from Bulgaria's Heli Air. Photo credit to - Anthony Seychell / MAviO News

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RECALLS

I flew on the Mi-8s a few times and in those years, from an aviation point of view, it was almost surreal to be flying in a Russian helicopter, code-named Hip by NATO, when until two years earlier they were the secretive assets of the Soviet Union.

One of the things that stuck in my mind was the sweet little fan the crew had on top of the heli's control panel. Boy was it needed! It was a furnace sitting in that heli. No only in summer while sitting on the tarmac.

As soon as the crew fired up their two Isotov TV-2 turboshaft engines the heat became almost unbearable.

The blowers on top of the passenger seats hardly served their purpose but I remember saying to myself that it was mostly very cold in Russia and Eastern Europe and engine starting on a Mi-8 probably came as a relief to all the passengers in that climate.

Very quickly Malta Air Charter realised that the use of Mi-8s may become a heavy financial burden.

Another company flying MI-8s was hired to run the service in the ongoing effort to further cut down on the expenses in running the Malta-Gozo air service.

I remember once going to an office in the old terminal and passed a room which had beds on the floor and an unpleasant smell emanating from the area. At first I thought it was a holding cell for passengers waiting to be deported. On my way back through the same corridor I noticed there were items belonging to Malta Air Charter.

When I enquired what was the purpose of that room. I was informed that it belonged to the air and ground crew of the personnel operating the MI-8s!

Cost-cutting had reached a new level, I thought! Can't imagine the crew resting in that sordid environment with no air conditioner and when it's time to fly they had to fly in a furnace. Those were different times, the service was good, but the revenue did not meet the expenses.

With the change overs of the contracting companies, a few good different MI-8s operated out of Malta. Some were Russian-registered and others were LZ, denoting their Bulgarian ownership.

The helicopters were regularly sent back to Russia or Bulgaria for deep maintenance, to be temporarily replaced by others which were sometimes in different colours and only spent a few weeks in Malta before being replaced by the MI-8.

Overall, it was a good, smooth, and safe service, with no serious incidents ever reported.

It was surely a much faster service than the ferry boats but with the imminent entry of Malta in the European Union, there was no way the service could continue to operate such helicopters as the helicopters did not meet the EU's JAR OPS 3.

When Malta joined the EU in May 2004, five months later Malta Air Charter stopped the two-island service for good and the Hips were gone. Twenty years later Malta has yet to find a way to operate a financially sensible solution to an air bridge between the two islands.

Malta Air Charter operated a number of Mil Mi-8 helicopters sourced from Russian and Bulgarian operators. This example carries the registration RA-24639 and was operated by Sochispetsavia. Though operated by Malta Air Charter, the flights were marketed under the brand "Gozo Wings" for a short time. Photo by Joe Ciliberti.

HIGH-SPEED VTOL AIR UTILITY VEHICLES

The US-based manufacturer of the Speeder Air Utility Vehicle - Mayman Aerospace and Savback Helicopters have signed a letter of intent for the procurement of 300 AI-ready Speeder P100 aircraft. Building upon an earlier letter of intent signed in 2022 for 25 Speeders, this recent strategic agreement focuses on the latest P100 model.

With a value exceeding (US) $120 million, Savback Helicopters could begin receiving its initial Speeders around Q4 2025, with deliveries continuing through Q2 2027.

Recognising the Speeder's exceptional manoeuvrability, high-speed capabilities, and substantial payload capacity, Michael Savback, chairman of Savback Helicopters said, "Speeder is an outstandingly versatile machine, and we are proud to announce this expanded agreement with Mayman Aerospace. With its advanced VTOL technology, we are confident that Speeder will meet European defence operators' complex mission requirements."

Mayman Aerospace is strategically adapting the Speeder family of Air Utility Vehicles to seamlessly integrate with a wide range of battlefield management systems.

The P100 model will be equipped for autonomous operation in a networked battlespace, achieve speeds approaching Mach 0.75, and carry a payload of 100lb. The Speeder family of VTOL aircraft will expand to include P400 (400lb payload) and P1000 (1000lb payload) variants.

This recent agreement solidifies the existing collaboration between the two innovative companies. Savback Helicopters was appointed as the exclusive marketing and sales representative for the Speeder in the Nordic countries in June 2022, and this expanded LOI reflects its growing confidence in the aircraft.

Mayman Aerospace's CEO and founder, David Mayman comments on Speeder AUV platform's potential in defence applications. "This LOI with Savback Helicopters demonstrates the Speeder AUV platform's real-world military market demand. We are delivering an aircraft ready for integration into the next-generation AI-managed battlefield. The Speeder system delivers essential value for defence applications through its ease of deployment, reduced operational cost and extensive capabilities. We are excited to be working under contract with the US Department of Defence to further develop and certify the Speeder range of aircraft and anticipate high-speed Speeder P100 testing in Q3 2024."

The jet-powered Speeder, based on scalable technology, takes off and lands vertically, and is capable of moving heavy payloads at very high speeds. It is fully reusable and outpaces electric drones and eVTOLs while being faster, more compact, and more cost-effective than traditional helicopters.

Speeder design iteration for defence applications

HOW DRONES ARE BEING USED IN AND ABOVE THE GREENHOUSE

Drones in and above the greenhouse? While still a new use case, drone use in agriculture is expanding at a rapid pace. Advances in materials and battery technology, as well as onboard sensors, have created opportunities for drones to assist with pest scouting and control, crop monitoring, structural inspection of overhead components, marketing (think overhead photo and video for your website), and even application of greenhouse shading compounds.

Some agricultural drones weigh just over an ounce, while others are powerful enough to carry 40 litres of liquid for aerial applications. Some drones are flown by or with the supervision of a human pilot, while others flown indoors can be people-free. To make the process user-friendly, many companies now offer drones as a subscription service. The vendors take care of drone maintenance and repair.

The inside of a greenhouse is a tricky space to fly in. Expensive light fixtures, plants, wires, support posts, and other items would seem to be in the way. Images of plastic-crunching impacts and sweeping up pieces come to mind.

Frans-Peter Dechering is the co-founder of Corvus Drones. He explained how a drone could fly inside a greenhouse, where the GPS signal is often spotty, without hitting any posts or light fixtures.

"We have developed a drone which navigates by camera, so it's not using GPS," Dechering said. "We fly in the greenhouse fully automatic - you can deploy the drone from your office, schedule flights, and link tasks."

Before this drone takes off for the first time, an initial accessibility check is performed, but the requirements aren't much.

"We can fly in almost every greenhouse," Dechering said. "We need two metres of space between the canopy and the first greenhouse obstacle. That's it in most modern greenhouses, it's no problem at all."

APPLYING GREENHOUSE SHADING

Applying shading compound usually takes some brave souls who are willing to crawl around on a glass roof, dragging heavy hoses. It can take hours or days, and there is real risk involved. Several companies, including AutoSpray Systems of the UK, are now using drones to apply the white stuff with no humans leaving the ground (your insurance agent will approve).

The drones not only carry the liquid into the air, they also precisely disperse it and track where they've been. When it's time for a tank changeout, they return to the base station. An operator swaps tanks and batteries in a couple of minutes, and the drone flies back to begin again where it left off. Application times are faster than humans balancing on a glass roof, and shading application is more even, saving expense two ways.

INTEGRATED PEST MANAGEMENT

Growers can use drones to monitor pests, apply biologics, and even hunt problem moths with killer drones. Some drones help you get rid of insects, others help you apply them.

Bram Tijmons is the CEO and co-founder of PATS Indoor Drone Solutions. He explained that from frustration with mosquitoes came the idea for small drones that target moths and terminate them mid-flight. He sees technology and biology working hand in hand to reduce insecticide use and control greenhouse pests.

"If you spray something, then you also kill all your beneficials that are eating your whiteflies," Tijmons said.

Working together as a system, a permanently mounted 3-D camera and a small drone eliminate the pest moth.

"The camera is constantly updating its map and includes locations of upright poles, wires, plants, and other fixtures. An interception is a calculation made by the system and the drone together in real time," Tijmons said.

The PATS-X drone is guided by the PATS camera box, which flies the drone for the intercept. When given the command and instructions, the drone leaps from its charging pad and chases the moth with high-speed and high-G manoeuvres. The trespassing insect meets its doom in the drone impellers, and then the drone returns to the pad. It happens fast.

"We need one and a half seconds for a chase," Tijmons said.

By looking at moth size, flight characteristics, and other data, the system can distinguish between different species to avoid harming beneficial insects. It won't bother a bumblebee, but recognises harmful bugs. "We make frameworks," Tijmons said, "insect profiles, as we call them, and start monitoring them."

The PATS-X drones are tiny, about 30 grams or one ounce, and fit in your hand. They are safe to fly around people, but you likely won't see them in action - these drones hunt at night when the moths are active.

Parabug uses drones to apply beneficial insect treatments on crops.

"A lot of the time in ornamentals, your target pests are similar or the same, and they're using generalist predators who might go after multiple pests in each of those," said

Jaclyn Bennett, general manager at Parabug. "We do a lot of lacewing application with East Coast nurseries and then some of the predatory mites for thrips."

Think of the drone as the delivery system, ensuring an even treatment over a wide area. The container rotates in flight, maintaining a uniform distribution, and keeps the bugs gently mixed with the carrier material for even distribution.

MONITORING FOR GERMINATION AND GROWTH PROBLEMS

Large, inaccessible areas can be challenging for growers to monitor accurately, and new drone technology can assist with that.

"We do growth monitoring for all kinds of growers, and we recently launched the lettuce application suite, which starts from, let's say, germination growth, size estimation, and also gutter alignment," said Dechering.

"Use case number one is gutter alignment because everyone has an issue with the gutter. When growing hydroponic lettuce, the gutters are sometimes misaligned and the plants are wilting," he said. "We fly alongside the posts, monitor if the gutters are aligned, and if not, we send a text or email alert to the grower that in Bay XYZ between post 20 and 21, the gutter is not aligned."

Saving labor, reducing chemical inputs, and enabling better data collection are all areas where drones are making an impact. With affordable solutions like that, it may not be long before you hear the buzz of drones in a greenhouse near you.

This article first appeared here: *https://www.globalagtechinitiative.com/*

FUNDRAISING GOALS EXCEEDED

Commemorative Air Force (CAF) Airbase Georgia has exceeded its goals for an annual fundraising programme that designated two World War II-era aircraft for 2023 - a Stearman biplane trainer and a Republic P-47 Thunderbolt fighter.

The WWII Stearman biplane trainer being restored at Commemorative Air Force Airbase Georgia in Peachtree City, Ga., now has "feet" and a tail, and has graduated from the shop to the hangar. The CAF 12 Planes of Christmas annual fundraising campaign brought in $15,185 to help purchase an avionics package. (Photo by Angela Decker)

The annual CAF 12 Planes of Christmas campaign raised (US) $15,185 for the Stearman and (US) $109,127 for the P-47, for a total of $124,312. Each aircraft benefited from matching grants that helped stimulate giving during the campaign.

The original goals were (US) $10,000 for the Stearman and (US) $50,000 for the P-47N. The 12 Planes of Christmas campaign has raised (US) $263,931 for Airbase Georgia projects over the past two years, with funds earmarked solely for the restoration of each aircraft.

The Stearman is dedicated to "Rosie the Riveter," the women who worked in factories and shipyards during World War II. The P-47, one of 13 flying in the world, is one of the CAF's original aircraft acquired by CAF founder Lloyd P. Nolen in 1963.

"It is encouraging to see this financial support for our important restoration projects," said airbase leader Joel Perkins.

"It will take much more to see these projects to completion, but we are well on our way to returning these World War II icons to flight, for the education and enjoyment of spectators wherever we go."

The CAF Airbase Georgia, based in Peachtree City, in Atlanta, Georgia was founded in 1987. The Airbase is one of the largest units of the Commemorative Air Force (CAF) and maintains and flies six vintage military aircraft including a P-51 Mustang, an FG-1D Corsair, an SBD Dauntless, a P-63A Kingcobra, a PT-19 Cornell and a T-34 Mentor.

The airbase, composed of more than 500 volunteer members, is a founding partner of the Georgia WWII Heritage Trail launched in 2021. It is part of the CAF, a non-profit, tax-exempt organisation that relies on contributions of time and funds to conduct its mission.

Progress continues on a rare WWII P-47 Thunderbolt being restored at Commemorative Air Force Airbase Georgia in Peachtree City, Ga. Airbase Maintenance Officer Randy Hawkins works on one of the aileron sections to help complete a wing. The CAF 12 Planes of Christmas annual fundraising campaign brought in $109,127 for much-needed parts and equipment. (Photo by Angela Decker)

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A330NEO TAKE-OFF PERFORMANCE ENHANCEMENTS

Since its first delivery in November 2018 and with over 120 aircraft in service today, the A330neo Family has already received various incremental improvements.

These include: a maximum take-off weight (MTOW) increase from its originally certified 242 metric tonnes to 251 tonnes; certification to ICAO's 2028 CO_2 emissions standard; higher "Max-Pax" capacity increase for the A330-900 from 440 to 460 seats in nine-abreast all-economy; as well as a Trent 7000 HP-turbine engine durability enhancement package from Rolls-Royce - doubling the in-service blade life for increased time-on-wing.

Continuing the A330neo's evolution trend: From around Q4 2025, customers will be able to take delivery of an aircraft with even more operational performance and flexibility thanks to the next incremental package, referred to as "step 4".

This will focus on enhancing the aircraft's low-speed performance. This is achieved by further maximising lift and reducing drag during the take-off and subsequent climb-out phases.

ENHANCING TAKE-OFF PERFORMANCE FOR GREATER UPLIFT

With the Step 4 package A330-900 operators will be able to benefit from an extra take-off-weight uplift capability of around 2.6 metric tonnes at some airports, while at other, even more runway-restricted airports, the net gain could be as much as four tonnes – and all without increasing the engine's thrust.

Airports where such operators could expect gains include: Madrid, Minneapolis, Reunion, Dusseldorf, Bogota, Gatwick and Mumbai - among others.

It should be noted that the drag reduction and lift improvement are achieved by two main enablers used together: The first is the provision of some intermediate flap settings, known as 'Enhanced Take-Off Configurations' (ETOC).

The second enabler is the implementation of faster landing gear + landing gear door retraction sequences. These are described below.

ENHANCED TAKE-OF CONFIGURATIONS

To understand how ETOC works, one first needs to understand that today the A330 and A320 Families' common-cockpit has five flap/slat lever settings: Flaps-0 being fully retracted, thru positions -1, -2, -3, and finally 'Full'.

On take-off the flap setting chosen depends on the available runway length and engine thrust settings - plus other factors such as second-segment climb obstacle clearance etc.

In general, the higher the flap setting the greater is the associated lift produced during take-off. However, a higher flap setting also naturally creates more aerodynamic drag (which could impact the aircraft's acceleration), especially during the initial climb phase. Therefore, if the runway length allows, a lower flap setting is usually preferred. Thus "Flaps-Two" is a typical setting, since it provides a good balance between extra lift needed for take-off and lower drag for the subsequent accelerating climb-out whilst maintaining the required flight-path angle.

Nevertheless, since there is still quite a significant aerodynamic 'jump' between each of the respective five flap-lever settings today, Airbus has identified scope for further performance optimisation and smoothing-out the flap and slat transitions by introducing intermediate 'bridging' flap positions – i.e. slotting between Flaps-One and Flaps-Two, and between Flaps-2 and Flaps-3 and Flaps-Full respectively.

To this end, engineers on A330neo programme have developed ETOC which requires no physical changes to the aircraft: From next year, pilots of newly delivered A330-900s will be able to enter the intermediate flap settings into the Multi-Function Control & Display Unit's (MCDU) 'Performance' page.

The four extra flap positions (in addition to the existing five flap lever settings) are denoted as: 1B, 2B, 2C and 3B – making nine positions in total. The particular take-off

flap setting and corresponding take-off 'V-speed' values will be provided to the pilot by the Electronic Flight Bag's (EFB's) runway performance calculator app.

Once flap levers are set (e.g. to 1+F, -2, or -3), the aircraft's avionics will automatically move the slats and flaps on the wing to the desired intermediate position.

For ETOC implementation, there are no physical changes to the actual flap-lever itself. However, some avionic computer hardware modifications are also required, such as to the 'Flight Management Guidance and Envelope Computer' (FMGEC).

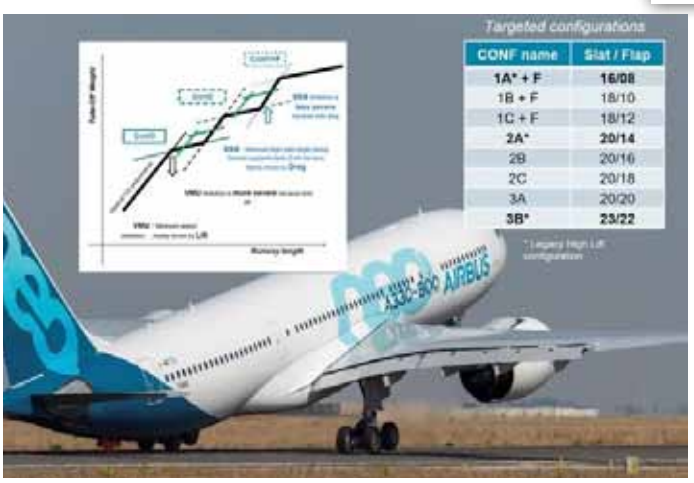
FASTER AND EARLIER LANDING

It should be noted that ETOC is coupled with another drag-reducing measure which reduces the first-segment climb duration. This reduction is targeted through two improvements: shortening the landing gear retraction time by around 0.8 seconds; and reducing the landing gear doors' opening & closing time by around 0.2 seconds.

The modification consists of a new main landing gear (MLG) retraction actuator and flow hydraulic control device, plus new MLG door actuators.

As well as reducing the retraction time itself, the landing gear retraction sequence also commences a couple of seconds earlier after take-off than with today's aircraft.

This shorter cycle is achieved via a new 'Automatic Landing Gear Door Opening' (ALGDO) function. When an engine



failure is detected during take-off, this automatically commands the landing gear doors to open one second after lift-off. This is different to the current sequence in which the door opening sequence starts three seconds after lift-off, triggered by the landing gear lever.

FURTHER A330NEO ENHANCEMENT STUDIES

The A330neo's development story does not stop here. Airbus is already considering the next set of value-adding incremental evolutions for its customers, along two main axes: efficiency and sustainability.

These include payload and performance optimisations and 100% SAF certification.

RECARO FOR AIR INDIA

RECARO Aircraft Seating, a leader in aircraft seating solutions, has been selected by Air India as the premium economy and economy seating partner for their widebody aircraft.

The partnership will see more than 22,000 RECARO seats installed in both line-fit and retrofit programmes over the next five to six years.

Air India chose the CL3710 and the new CL3810 for economy class, while the premium PL3530 will outfit the premium economy cabin.

The first phase of this collaboration involves the retrofitting of 40 B787 and B777 aircraft with CL3710 and PL3530 seats, set to enter service in 2024. The same seat configuration shall be maintained for 12 A350 and B787 line fit aircraft entering service in 2025.

More recently, Air India committed to an additional order for 34 A350 and B787 aircraft, featuring a new layout with CL3810 and PL3530 seats in the economy and premium economy cabins, respectively.

"We are thrilled to embark on this journey with Air India, as the recipient of this substantial award," said Mark Hiller, CEO at Recaro Aircraft Seating and Recaro Holding.

"RECARO is eager for this collaboration to begin, so that we can bring our innovative seating solutions and exceptional customer service to Air India."

Campbell Wilson, CEO and MD Air India said, "We're happy to get into this partnership with Recaro Aircraft Seating," said

All seats will showcase Air India's signature custom trim and finish. The latest in-flight entertainment (IFE) systems will also be integrated into each seat.

DIGITALISATION, SUSTAINABILITY, AND SAFETY & SECURITY

This month the International Air Transport Association (IATA) announced the agenda for the IATA World Cargo Symposium that will take place in Hong Kong, China from March 12-14.

"Air cargo is an unsung hero of the global economy. In normal times, it delivers some 35% of the value of goods traded across borders. In the pandemic, air cargo brought medical supplies and vaccines to where they were needed.

And today it is providing a vital transport alternative for some products as Red Sea shipping lanes face geopolitical uncertainty. Air cargo's success matters. When air cargo's global leaders gather in Hong Kong for the IATA World Cargo Symposium, ensuring the future reliability and growth of this critical sector will be top of mind with an agenda focused on sustainability, digitalisation, safety and security," said Brendan Sullivan, IATA global head of cargo.

Ronald Lam, Cathay group chief executive officer, Willie Walsh, IATA director general and Marie Owens Thomsen, IATA svp sustainability and chief economist, will join Sullivan in setting the scene for the conference with keynote addresses.

Other cargo experts will include Tom Owen, director of cargo Cathay Pacific, Michael Steen, chief executive officer Atlas Air, Vivian Lau, chief executive Jardine aviation services group, Kirsten de Bruijn, executive vice president cargo WestJet and Marco Bloeman, managing director Accenture and head of Accenture cargo.

The event's overall theme of Driving Sustainable and Inclusive Growth will be supported by three tracks:

- Sustainability, which will include sessions on tracking progress towards net zero carbon emissions by 2050, ESG reporting, optimising operations for environmental performance, reducing single use plastics, and circular strategies for Unit Load Device (ULD) components.
- Digitalisation, which will include sessions on data driven strategies to improve performance and reduce costs, achieving the efficiencies of OneRecord and the potential for generative AI in air cargo.
- Safety & Security, which will include sessions on Annex 18 Regulatory oversight of freight forwarders/ handling agents for dangerous goods shipments, fire containment strategies for lithium battery shipments, ULD airworthiness, latest developments for the safety of live animal shipments, implications of an integrated risk management framework.

Inclusive strategies for managing the people needed to lead and drive the future of air cargo will be the focus of two key event workshops:

- Building the next generation of talent at the Future Air Cargo Executives Summit (FACES)
- The benefits of competency-based training through IATA's Competency-Based Training and Assessment Centre (CBTA Centre) and how it helps to improve workplace safety and performance.

Additional workshops include:

- Improving performance on key market segments using IATA Centre of Excellence for Independent Validators (CEIV) programmes (CEIV Pharma, CEIV Live Animals, CEIV Lithium Batteries and CEIV Fresh).
- How IATA's Cargo Solutions are assisting the industry in decision making and cargo compliance, towards improving safety and efficiency.
- How air cargo billing and settlement can be enhanced using the new CASSLink
- An e-commerce forum to identify how more visibility between e-tailers and cargo operators would improve efficiency.

FACE-UP! Air Cargo Awards 2024

The winner of the 3rd edition of the IATA FACE UP! Award will also be decided at WCS. FACE UP! is a competition for recent university graduates whose thesis is on the subject of innovation and transformation in air transport logistics.

Three finalists will be invited to present their projects during the conference. Delegates will then vote for their preferred innovation and the winners will be announced at the closing plenary of WCS.

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INTRODUCING THE VERTIIA

By Jamie Seidel

Take 15 people. Add a country shed. Find inspiration in a 130-year-old Aussie invention. Then build a viable electric-hydrogen air ambulance.

The 15 employees work with the husband-and-wife team running Australian aerospace company AMSL Aero.

The country shed is a hangar at an Aerodrome Industrial Park at Narromine, 400km northwest of Sydney.

The inspiration is the box kite inventor Lawrence Hargrave used in 1893 to lift himself into the sky above Stanwell Park, NSW. He later developed a three-cylinder rotary engine that kicked off an aeronautical engineering race that lasted half a century.

The eVTOL (hydrogen-electric vertical take-off and landing aircraft) is called the Vertiia.

It's just won a $5.43 million development grant from the Federal Government's Australian Renewable Energy Agency (ARENA). And more recently, AMSL Aero signed an order and received deposits for 10 Vertiia aircraft, with an option for 10 more, from its first civil customer Aviation Logistics.

A battery-electric version of the aircraft successfully completed its maiden test flight - while tethered to the ground by restraining ropes and control lines - early last year. Inventor Andrew Moore said the remote-controlled hover was the first step in proving the design's potential.

"As Vertiia lifted off, we felt the same rush of adrenaline that Lawrence Hargrave must have felt nearly 130 years ago," Moore, the CEO of AMSL Aero, said.
"The prototype flew better than we expected. It was remarkably smooth and a delight to fly."

But test flights are just one step in the long journey towards earning Civil Aviation and Safety Authority (CASA) certification. AMSL hopes to have commercial models rolling off a production line by 2026.

Some members of the AMSL Aero team in front of the Vert

BALANCING ACT

Moore said that Hargrave's box kite is at the heart of the Vertiia's design.

"It's light. It's compact. It's strong," he said.
The shape has the same lift as a conventional wing in half the span and considerably less structural weight. And this cascades into lighter-weight engines, the need for less battery space, and so on, said Moore.

"The combination of its unique aerodynamic and structural design means it travels further using less energy."
The outcome is what he calls the "world's most efficient electric VTOL aircraft."

The initial all-electric prototype was intended to carry a pilot and four passengers at a cruising speed of 300 km/h over a distance of 250 km before needing to recharge its batteries.

But the design allowed for the addition of a supplementary hydrogen fuel cell system to boost the flight distance to about 1000 km. This is the model that has won

AMSL Aero's eVTOL aircraft, Vertiia. Supplied.

The AMSL Aero team with the Vertiia. Supplied.

the interest of ARENA. AMSL will use the money to build a new prototype.

The Vertiia eVTOL's ungainly appearance also conceals what AMSL hopes will prove to be a series of advantages over conventional helicopter designs.

One is the simple fact that it has eight independent "off-the-shelf" Slovenian-built engines, each with its own lifting blade. Moore said this eliminates the "single point of failure" risk common to helicopters as the distributed electric propulsion system can compensate for various failures to allow a safe landing.

OLD PROBLEMS, NEW ANSWERS

AMSL moved to Narromine in 2020 after winning a $950,000 grant from the New South Wales Regional Investment Attraction programme. It had a proof-of-concept airframe and tilt-motor system completed by the end of the year. Scale model testbeds were operating in 2022.

Interest from emergency medical service helicopter operator Careflight and the Australian Defence Force saw it shift its initial focus away from producing an "air taxi" towards an emergency evacuation platform.

The company says this is reflected in the emphasis on ease of access for passengers to the Vertiia's cabin, which can be configured to carry one patient and three medical personnel.

The ultimate goal is to produce a low-cost emergency air-lift vehicle with what the designers say will be maintenance costs comparable to any road ambulance.

"Unlike aeromedical aeroplanes that require a runway, Vertiia will carry patients directly from any location straight to the hospital, significantly reducing the complexity and time often required to transport vulnerable patients," said AMSL co-founder Siobhan Lyndon.

"It's not only safe and quiet but it was also developed for the harsh long-distance conditions in Australia. If it can work in Australia, it can work anywhere."

AMSL initially attracted about $10.8 million in funding from the Federal and NSW governments. This was followed in 2022 with a $23 million investor fundraising effort.

"The significant funding provided by ARENA will mean that we can accelerate the design, build and certification activities," said Moore.

COOL TECHNOLOGY

Driving the Vertiia eVTOL project is the fact that the aviation sector contributes roughly 2.5 per cent of global greenhouse gas emissions. And about one-fifth of this comes from short-haul regional flights of under 1000km.

But replacing the flexibility and energy density of fossil-based aviation fuels poses a significant challenge.

Biofuel ethanol promises easy integration with existing aviation infrastructure and engines. But the enormous scale of production - including everything from palm oil and Camelina to waste oils synthesis and algae reactors - threatens to seriously impact the agricultural food industry.

Electric motors are much smaller and lighter than their fuel-driven counterparts, but batteries are heavy. And even the most energy-dense options available take up considerable space.

Hydrogen combustion has powerful potential, and burning the gas simply produces heat and steam. But, at room temperature, the gas is very voluminous - with the energy equivalent of a car's fuel tank taking up the space of a cement-truck's mixing container. And compressing it requires heavy tanks or sustained cryogenic freezing at -253C.

Major aircraft manufacturers believe this may be an answer for large, long-haul airliners. Airbus hopes to have a working hydrogen-powered jet engine by 2026.

Hydrogen-electric power cells are emerging as the most viable alternative for smaller aircraft. Here, hydrogen is fed into a negative electrode cell (or anode), and air into the positive (cathode). A catalyst prompts the hydrogen atoms to break down, sending protons to the cathode to unite with oxygen and create wastewater. The electrons are drawn to the anode and formed into an electrical current.

This simple process is reliable. And it allows a small aircraft to balance the advantages and disadvantages of batteries and hydrogen gas against each other.

Originally published by Cosmos as Hydrogen electric aircraft being considered for emergency role: *https://cosmosmagazine.com/science/engineering/hydrogen-aircraft-amsl-aero/*

INNOVATIVE AND SUSTAINABLE FLIGHT SOLUTIONS

The C-27J Flying Test Bed, a technological demonstration aircraft under the European Clean Sky 2 programme, recently completed the Regional Integrated Aircraft Demonstration Platform (REG IADP) programme at Turin's Caselle airport in Italy.

The demonstration brings to a close a technological development cycle that began 10 years ago in Europe under Leonardo's co-ordination which saw over 100 partners of national aeronautical excellences including SMEs, research centres, universities and other related industries work together.

The programme validates the technical solutions conceived and designed by Leonardo's engineers in Turin and Pomigliano d'Arco, aimed at ultimately reducing fuel consumption for future aircraft.

Leonardo made available its C-27J Spartan aircraft, renowned for its outstanding flight performance and multi-mission capabilities, as a European Flying Test Bed demonstrator aircraft. The aircraft acted as a demonstrator for innovative wing configurations with special mobile surfaces – innovative wingtips and morphing winglets – capable of changing shape during flight through active, adaptive technology and digital systems.

These unusual surfaces are manoeuvred by advanced electromechanical actuators with digital local control units and a central flight control computer on board of the aircraft which acts as a supervisor, checking and regulating the performance of the active Load Control & Alleviation system in real time to optimise the aircraft asset, performance and fuel consumption during the flight.

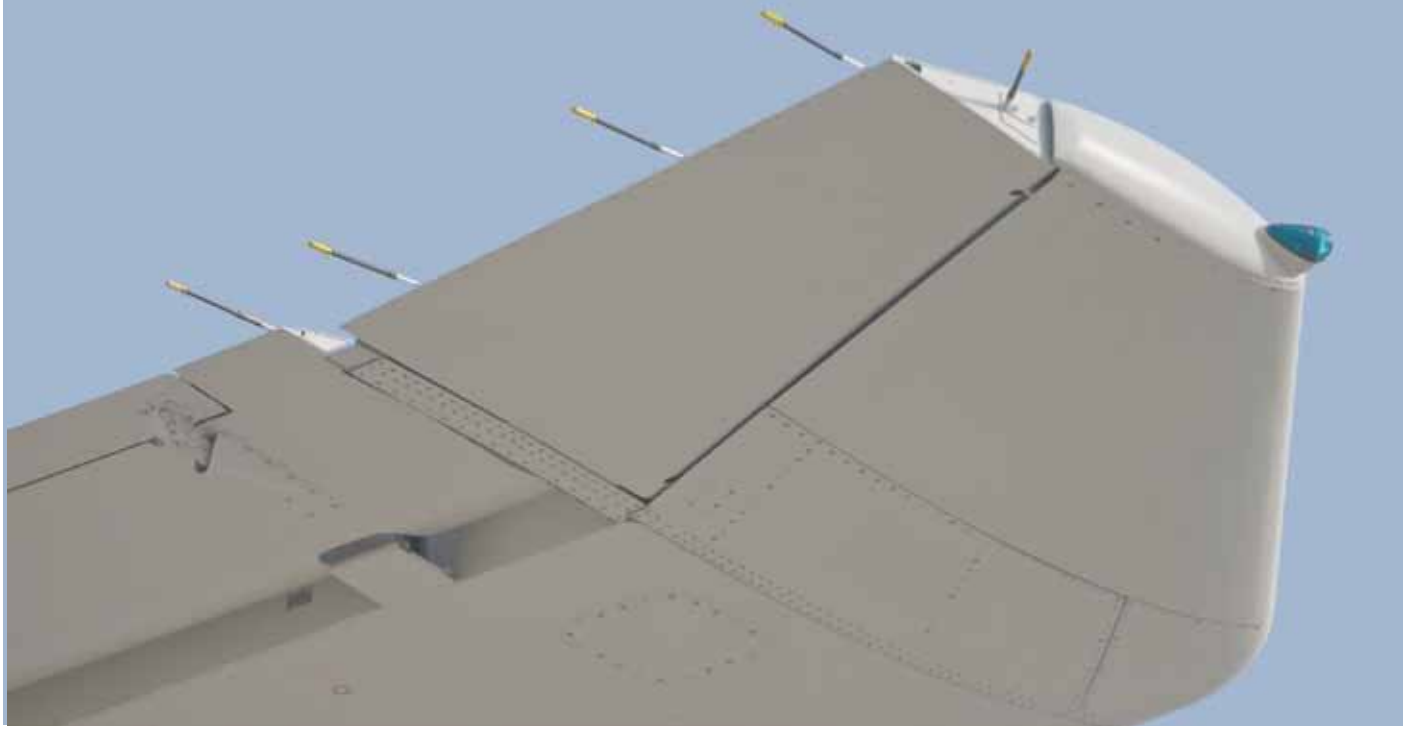
The WingTip is equipped with a mobile part measuring about 80 centimetres, capable of rotating up to ±15 degrees, while the Winglet is a vertical flap about one metre high at the tip of the wing, composed of two independent mobile parts, each with a maximum rotation of +5 to -15 degrees.

"We are registering extraordinary technological results," said Aurelio Calcedonio Boscarino, in charge of strategy and innovation at Leonardo's Aircraft Division.

The availability of experimental data will represent a strategic technological asset, because of its potential for training artificial intelligence algorithms for maturing flight controls and future digital systems. The data will offer great reliability and incremental levels of autonomy, with reduced workload, in order to optimise the characteristics and performance of future aircraft during all the phases of the flight. It will reduce overall weight, fuel consumption and costs, while optimising the product throughout the life cycle".

This milestone comes only a few days after another important technological achievement under the European Clean Sky 2 programme: the new fuselage Pax Cabin Demonstrator.

Earlier in the year, a full-scale demonstrator of a regional aircraft fuselage was taken from Leonardo's Large Structures Laboratory in Pomigliano d'Arco to the Fraunhofer Institute in Valley, Germany.



The WingTip is equipped with a mobile part measuring about 80 centimetres, capable of rotating up to ±15 degrees.

Measuring 7.3 metres in length and with a diameter of 3.4 metres, the Pax Cabin Demonstrator structural components are made in composite materials assembled by using advanced automated systems. The goal is to improve onboard comfort with innovative environmental conditioning solutions and cabin components, such as onboard services and special seats.

After passing vibration and acoustic testing in Leonardo's laboratories, the demonstration will be completed at the German research facility under the Leonardo's supervision, conducting comfort tests and validating the technologies integrated at the highest levels of maturity that can be achieved in research.

The research programme and the technological demonstrators were co-financed by the European Union within the framework of the Horizon 2020 programme, and will help develop the technologies required for a future generation of low-emissions aircraft. An essential element will give concrete form to the European Commission's commitment to achieving climate neutrality in air transportation by 2050.

The technologies developed under the Clean Sky programme, in synergy with those that will be developed under the Clean Aviation programme, contribute to guaranteeing a net reduction in greenhouse gases (GHGs) of at least 30% over the state of the art in 2020, aiming to permit the entry into service of a new generation of aircraft no later than 2035 and promoting replacement of 75% of the world's civil aviation fleet by 2050.

Leonardo is a founding partner of the Clean Sky 2 Joint Undertaking, now Clean Aviation JU, Europe's biggest technological research programme steering aviation towards a sustainable future.

Leonardo demonstrator: The Pax Cabin Demonstrator's structural components are made in composite materials assembled by using advanced automated systems. This is part of the European Clean sky 2 programme aimed at finding innovative environmentally friendly solutions to onboard comfort.

DEVELOPING THE FLYING FUEL CELL

A new venture has begun following the launch of the Clean Aviation technology programme or HEROPS - Hydrogen-Electric Zero Emission Propulsion System.

An estimated 30 representatives of participating partners in the fields of industry, research, and science came to Munich, Germany came together to mark the launch at MTU Aero Engines.

Building on MTU's Flying Fuel Cell, the goal is to develop technologies for a climate-neutral, hydrogen-powered electric powertrain that will put regional airplanes in the air starting in 2035.

The HEROPS project officially began September last year, when the governing board of Clean Aviation Joint Undertaking (CAJU) chose eight additional research projects during its second Clean Aviation Call.

During the project's three-year period, the partners, led by MTU, plan to build a HEROPS Ground Demonstrator with 1.2 megawatts of power.

They also want to prove the feasibility of the new, groundbreaking technologies and show that they are highly scalable, reaching between two and four megawatts of power using modular engine architecture.

The HEROPS industry partners are MT Aerospace, RTX's Collins Aerospace, Lufthansa Technik and Eaton; the research partners are Royal Netherlands Aerospace Centre (NLR) and the Technical University Vienna.

The Clean Aviation Joint Undertaking (CAJU) is the European Union's leading research and innovation programme for transforming aviation towards a sustainable and climate-neutral future. It is a successful European public-private partnership between the European Commission through Horizon Europe, the EU research and innovation programme, and the European aeronautics industry.

Clean Aviation is the successor to the two Clean Sky programmes that ran from 2008 to 2024.

REASON BEHIND V-22 JAPAN CRASH UNKNOWN

A probe into the reason for the mishap that killed eight off the coast of Japan in November last year remains ongoing, the US Airforce service said.

According to a recent report in the Flying.com website, Air Force accident investigators continue to search for the root cause behind the deadly CV-22 Osprey crash off the coast of Japan in November that killed eight service members on board the tiltrotor aircraft.

The CV-22 assigned to the Air Force's 353rd Special Operations Wing at Yokota Air Base, Japan, went down offshore of Yakushima Island on November 29 with eight crewmembers on board during a routine training mission. There were no survivors.

"At this time, the material failure that occurred is known but the cause of the failure has not been determined," US Air Force Special Operations Command (AFSOC) said in a statement.

Immediately following the crash, Lieutenant General Tony Bauernfeind, commander of AFSOC, convened both a safety investigation board for internal military mishap prevention and an accident investigation board.

One week later, Bauernfeind also instituted an operational stand-down of the Air Force CV-22 fleet amid the accident probe. The action prompted the Navy and Marine Corps to also ground all V-22 variants out of caution.

"Both investigations are still actively in progress, and analysis is ongoing to determine the cause of the mishap," AFSOC said.

"Engineering testing and analysis is ongoing to understand the cause of the material failure, a critical part of the investigation. Any disclosure of findings prior to investigations being finalised is premature and presumptive. As final safety investigation findings and recommendations are received, the priority is to inform our deliberate return to fly and ensure CV-22 aircrew and maintainers have the information they need to prevent future mishaps."

When the accident investigation is complete, families of those killed in the crash will be briefed on its findings before it is publicly released, AFSOC said.

The command said it was also working in close coordination with the V-22 Joint Programme Office and stakeholders to assess when a change in the ongoing operational stand-down of the V-22 will occur.

The Air Force is also conducting a comprehensive internal review to determine if its CV-22 elements are "appropriately organised, trained, and equipped for safe, effective, and efficient special operations," Defence One reported.

The CV-22 Osprey is the US Air Force special operations variant of the Bell Boeing V-22 tiltrotor transport aircraft. It features enhancements and flight control systems that enable it to operate in high-risk combat environments to rescue downed pilots, or insert and extract special operations forces behind enemy lines. The mission of the CV-22 is to conduct long-range infiltration, exfiltration and resupply missions for special operations forces.

This aircraft offers increased speed and range over other rotary-wing aircraft, enabling Air Force Special Operations Command aircrews to execute long-range special operations missions. The CV-22 can perform missions that normally would require both fixed-wing and rotary-wing aircraft. The CV-22 takes off vertically and, once airborne, the nacelles (engine and prop-rotor group) on each wing can rotate into a forward position.

It is equipped with integrated threat countermeasures, terrain-following radar, forward-looking infrared sensor and other systems that allow it to operate in various austere conditions.