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THE C-390: MASTER OF ALL WEATHER AND TERRAIN



**DEFENDING
UKRAINE'S
SKIES: COULD
SWEDISH GRIPEN
JETS DO THE
JOB?**



**AERO SOARS TO
NEW HEIGHTS:
APPROVED
FOR MILITARY
AIRCRAFT
TRAINING**



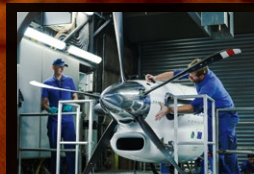
**QINETIQ
BOOSTS AERIAL
CAPABILITIES
WITH STRATEGIC
INVESTMENT**



**NEO ENERGY
AVIATION
ACADEMY -
TEST PILOT AND
LEAD FLIGHT
TEST ENGINEER
COURSE READY**



**HERON FAMILY
OF UAS: THE
KEY TO GAINING
TACTICAL AND
STRATEGIC
INTELLIGENCE**



**EXPLORING
THE FUTURE
OF HYBRID-
ELECTRIC
PROPULSION**

C-390 MILLENNIUM

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When it comes to humanitarian missions, the rapid reconfiguration, speed and flexibility of the C-390 Millennium has proven indispensable for the Brazilian Air Force. During the height of the COVID pandemic, they employed the C-390 to deliver vital medical supplies, including ambulances and liquid oxygen, to remote communities in the Amazon Basin. After the 2021 Haiti earthquake, a C-390 was used by the Brazilian Air Force to deliver 10.5 tonnes of medicines, food and health equipment to help victims and support the emergency relief operation. And when a devastating explosion occurred in the port area of Beirut, Lebanon, the Brazilian Air Force got vital medicines and food supplies 'on the ground' in just under 16 hours. Proven in the field and in the toughest of environments, the C-390 has now been chosen by the Portuguese and Hungarian air forces to lead their humanitarian missions.

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Tipping Point

As we grapple with the ever-changing security landscape of our world, it is of paramount importance to stay informed and remain aware of the latest developments. The recent news of Russia suspending its participation in the last remaining treaty which limits the number of nuclear weapons between the United States and Russia is a cause for grave concern and has put the treaty beyond repair, raising the risk of a new arms race between the two countries.

Ukraine has been embroiled in a devastating war for the past year, and is now urgently appealing to US congress members to urge the Biden Administration to provide F-16 jetfighters. This would provide Ukraine with a much-needed boost in their ability to effectively target and destroy Russian missile units with precision-guided American rockets. The potential of Swedish JAS Gripen fighter jets to do the job has also been highlighted, given their tough and easy to operate features, as well as their unique ability to land on normal straight asphalt.

The potential for instability is alarming and it is heartening to see that companies like Aero Vodochody AEROSPACE a.s., QinetiQ GmbH, and NEO ENERGY Aviation Academy are actively investing in defense and security, providing training and instruction on military aircraft, expanding their fleets with advanced aircraft, and offering Test Pilot and Lead Flight Test Engineer courses.

Our cover story this month shines a light on the Embraer C-390 Millennium, a masterpiece of innovation and excellence which sets new standards in the medium air mobility category. Developed and designed by Embraer, it is part of a modern and innovative product portfolio and offers a versatile and multi-mission platform to air forces with exceptional fleet performance and low operating costs. It is equipped with state-of-the-art

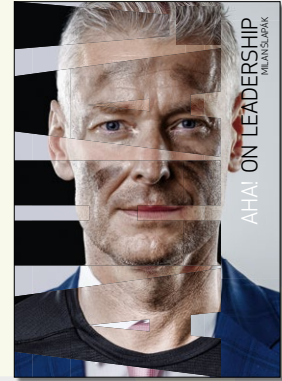
technology for the tactical radar, self-protection, avionics, vision enhancement, cargo handling and air drop.

IAI has been a leader in unmanned systems for more than four decades and provides a broad range of unmanned systems, from the Boeing 737 size, more than five-ton Heron TP, Heron 1 solutions, down to mini and micro UAS. IAI has developed unique autonomous mission systems that provide situational awareness and control of the platform to assist the human operator on the mission and take over when the situation requires. The Heron family comprises several platforms designed for operations from the tactical to the strategic level, enabling users to scale operations and gain joint training and logistics advantages.

As we look ahead to the future, let us remember the risks and challenges that lie in wait, but with prudent investments in the latest advancements, we can forge a more secure and stable world. That's why we invite you to join us at some of the premier events in the aviation and security industry this spring and summer. From the Arab Aviation Summit in UAE to IDET in the Czech Republic, the Kecskemét International Air Show in Hungary, the SIAF International Aviation Days in Slovakia, and the NATO Days and Czech Air Force Days in the Czech Republic, these events offer a great opportunity for aviation and security enthusiasts to come together, learn more about the industry, and stay informed. So, mark your calendars and don't forget to pick up your copy of the magazine at the event for the latest news and insights!

Until then, stay safe, stay informed, and keep your eyes to the skies!

Katerina Urbanova
Editor-in-Chief



IT IS PERFECTLY OK TO FAIL AND LEARN FROM IT.
LEARNING FROM SOMEBODY ELSE'S MISTAKES IS EVEN BETTER!

Shooting an exciting promo video in the Himalayas at the most dangerous airport on the planet. Crawling in the mud and swimming in ice-cold water. Making the mark in aviation market space, navigating the business through rough waters of crisis cycles. Building mental and physical resilience through pain. What do have these themes in common? Mistakes, failures ... and learnings. Failures that make us stronger alongside the road to success.

Up close and personal AHA leadership moments of Milan Slapak, an over the two-decade corporate senior leader, MBA lecturer, public speaker, and aviation enthusiast who decided to swim with the sharks instead of adopting old-school advice that it was better to be a large fish in a small bowl rather than a small fish in a big one. Milan Slapak is a synonym for GE in the Czech Republic and for the resurgence of the Czech aviation industry.

New book and e-book of Milan Slapak coming out soon. Stay tuned or join the early bird offer at

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NAVIGATING THE TURBULENT SKIES: **THE AEROSPACE INDUSTRY IN 2022 AND BEYOND**

The aviation industry is facing turbulence due to the war in Ukraine, inflation, and energy crisis (mainly in Europe), which is probably the largest individual loss ever to hit areas of the aviation insurance market. Inflation is increasing costs across the industry and challenging insurers as it affects nominal premium growth and global demand. The aviation sector is heavily dependent on specialist materials such as composites and high-value aerospace engineering skills, leading to rising aircraft values and increased repair costs.

AEROSPACE AND INFRASTRUCTURE

During Q4 of 2022, the insurers were in a positive position due to sufficient market capacity and competition on price to maintain market share. However, by the end of 2022, the market faced “dark clouds” as insurers started to increase premiums. The previous 10-year period was unprofitable due to major claims, causing insurers to harden their pricing strategy. The dramatic increase in the Boeing Max loss, which is approximately USD 1 billion in reserves, affected the



The post-covid market recovery ended with the war in Ukraine.

aviation market as a whole and led to price adjustments. Some insurers were instructed to increase renewal premiums by 10-15% or not to renew conditions. Retaining current business was considered more acceptable than winning new business or increasing share of existing business.

AIRLINES THAT DISAPPEARED FROM THE SKY IN 2022

In 2022, air transport resumed with the lifting of restrictions, but many airlines faced financial difficulties due to the pandemic. Some airlines decided not to ►



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The diverse market still offers attractive insurance conditions.

► resume flights while others stopped them permanently within a few months of resumption. A list of more than 20 airlines that ended flights in 2022 or were expected to be liquidated was published by Airways.cz. The reasons for termination included the impact of COVID-19, unpaid fines, lack of cash, overall financial problems, company restructuring leading to liquidation, and international sanctions due to Russian ties. These included Blue Air, CargoLogicAir, CargoLogic Germany, Comair, Onur Air, and Royal Flight.

GENERAL AVIATION IS A STRONG AND GROWING SECTOR

The global airline sector is still recovering from the pre-COVID-19 level, while the General Aviation sector is optimistic about growth. Corporate business jets, rotor wing aircraft, air ambulances, and small commercial operators are recovering better than commercial airlines. Private aircraft offer more comfort, hygiene, better connectivity, and improved service compared to commercial air transport. There is increased demand for commercial helicopters and replacement of older fleets, driven by local factors such as the promotion of drone technology for goods and service delivery. Every innovation and technology have risks, but for an aviation insurer with a spirit for the future,

it offers an opportunity to rethink their business focus.

THE GLOBAL INSURANCE OUTLOOK

Insurers and reinsurers are reviewing and renewing their business at the end of the year in December and January. The 2022-2023 renewal period is affected by the military conflict in Ukraine, beginning of a global economic recession, and rising inflation, unprecedented over the past 40 years. This provides an opportunity for insurers to review deductible levels, policy terms and conditions, and pricing policy. The diverse market still offers attractive insurance conditions, but pressure to improve margins and increase market share is forcing many insurers to examine and re-evaluate their pricing models.

WILL LIGHT SHINE THROUGH THE DARK CLOUDS?

Rising Costs and Geopolitical Tensions Ahead for Airlines and Aviation Investors

In the coming year, the outlook for airlines and aviation investors will continue to be affected by rising costs and geopolitical tensions. Major UK and European airlines have already revised down their expectations for 2022 and 2023 and reduced capacity guidance by as much as 20% or more due to operational capacity.

Furthermore, the 2023 Global Business Travel Forecast by Carlson Wagonlit Travel and the Global Business Travel Association predicts that airfares will rise by more than 48% in 2022, followed by an 8.5% increase next year to cover high costs.

INSURANCE MARKET ADJUSTS AMID TURBULENCE, FOCUS ON NEW TECHNOLOGY



The future of goods and service delivery.



Hana Kulhova, Head of the Aviation Department at RENOMIA, a. s.

Low-cost carriers, on the other hand, appear well positioned to weather the economic shocks from these rising costs and may even see an increase in demand as consumers are forced to consider cheaper flights.

results of 2022 will lead to a 2023 with favourable rating levels in place and sufficient capacity for most insurance risks. However, significant instability remains due to the likely pricing impacts of a large claim.

delivering these services along with the highest service standards through 2023.

Text by: Hana Kulhova

Photo: Adobe Stock, Claremore Airport, Boeing Factory Tour, NASA

HOLIDAY SEASON TELLS THE STORY FOR TOURISM IN 2023

All eyes are on tourism during the upcoming holiday season, which will provide a good indicator for travel themes in 2023. This holiday season will be extremely telling for the industry's future profitability and asset return predictions.

FAVOURABLE RATING LEVELS AND SUFFICIENT CAPACITY FOR MOST INSURANCE RISKS

As an insurance broker, despite all the negatives affecting the insurance market, we predict that the relatively positive

NEW TECHNOLOGY: KEY FOCUS FOR 2023

New technology remains a key focus for the future and, despite several delays, 2023 should see the first insurance involving software-defined satellite and new generation launch vehicles being bound by insurers.

COMMITTED TO DELIVERING EXCELLENT MARKET PERFORMANCE FOR OUR CLIENTS

RENOMIA has demonstrated excellent market performance for our clients throughout 2022 and we are committed to

AIRPORTS PREPARE FOR BUSY SUMMER DESPITE POTENTIALLY CHALLENGING CONDITIONS

With the expected recovery of global passenger demand to pre-pandemic levels, airports across Europe, North America and Southeast Asia are preparing for the busy summer season. Labour shortages and strikes threaten to bring long lines, delayed flights and piles of baggage, but airports, airlines and government agencies are doing their best to prevent this.

- Airports are doing their best to prevent summer travel disruptions despite labour shortages and strikes.
- Airlines are reporting strong financial results as customers protect their summer holidays.

EasyJet, Ryanair and Wizz Air have already reported strong financial results for the start of 2023 as customers are protecting their summer holidays. Airports such as Schiphol and Montreal-Trudeau International Airport are implementing services to reduce lines and Canada is introducing a bill of rights for passengers. In conclusion, airports are preparing for the summer season, but may still face challenging conditions.

AEROSPACE SUPPLY CHAIN STRUGGLES TO KEEP UP WITH JET OUTPUT HIKES

The results of the Morgan Stanley survey of 80 suppliers have revealed that the aerospace supply chain is struggling to keep up with the planned jet output hikes this year. Inflationary pressures, labor availability and other factors have impacted the sector's progress, leading to a dampened sentiment.

- The Morgan Stanley survey of 80 suppliers revealed that the aerospace supply chain is not ready for the planned jet output hikes this year.
- Inflationary pressures and labor availability impeded the sector's progress and have dampened sentiment.

Boeing and Airbus have been having difficulty raising jet production due



Airports preparing for busy summer.

to parts and labor shortages. The U.S. planemaker is attempting to increase production of its bestselling 737 MAX narrowbody jetliner from a stable rate of about 31 jets a month to 38 by the end of 2021. On the other hand, Airbus has announced that it is slowing the production ramp-up of its top-selling model.

US CONGRESS URGED TO SEND F-16 JETFIGHTERS TO UKRAINE

Ukrainian officials have been actively calling on US congress members to press

the Biden Administration to supply F-16 jetfighters to Kyiv. This plea was made during the Munich Security Conference in mid-February, where Foreign Minister Dmytro Kuleba spoke to Democrats and Republicans from both the Senate and House of Representatives.

- US Congress is being urged to press the Biden Administration to send F-16 jetfighters to Ukraine, which would greatly improve their ability to target and destroy Russian missile units with US-made rockets.
- The F-16s would be the latest addition to the US' support of Ukraine's defense, ▶



The world of jet trainer aircraft has its rising star in the Aero L-39NG

The latest developed trainer jet aircraft of the Czech manufacturer Aero Vodochody, the L-39NG, has obtained unrestricted type certification since last year. This allows it to be sold to customers around the world.

The L-39NG uses modern technology and equipment. The wing and fuselage design of the L-39NG is the result of the latest developments. To maintain the best possible flight characteristics and lower weight, the wing leading edges, ailerons, engine air inlet duct, dorsal covers, nose gear doors, and many other parts of the aircraft are made of lightweight composite materials, which also gives them great strength. The wings integrate tanks that, together with the fuselage tanks, can hold more than 1,400 liters of fuel. The leading edges of the wings are certified for potential bird strikes up to 650 km/h without damage, thus ensuring sufficient protection of the wing structure and systems and thus the safety of the aircraft crew.

The L-39NG is capable of performing the role of a light attack aircraft, an aircraft for air support and reconnaissance missions, and a single, comprehensive aircraft for full training of pilots of modern air forces. The aircraft's avionics are ready for

training future pilots of fourth and fifth-generation aircraft. It also includes a wide range of simulation technologies, including the upcoming integration into a highly advanced tactical simulation center to enhance training effectiveness. Customers appreciate the high quality, practicality, and value for money.

Aero Vodochody focuses on the development, production, maintenance, and improvement of civil and military aircraft and is the largest aircraft manufacturer in the Czech Republic and one of the oldest aircraft manufacturers in the world. It was founded in 1919 and has produced more than 11,000 aircraft during its existence. It cooperates with the most renowned aircraft manufacturers. It rightfully belongs to the prestigious club of eight worldwide aircraft manufacturers that can invent, certify, manufacture, sell, and provide full after-sales service to customers.

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Photo F-16 USAF Thunderbirds by Simon Hurry on Unsplash.

► following the delivery of Javelin anti-tank missiles and a shipment of FGM-148 Javelin anti-tank weapons in December 2020.

The F-16s have been proposed as a way to enhance Ukraine's ability to hit Russian missile units using US-made rockets. This would be a great advantage to Ukrainian pilots, as they could use the F-16's advanced avionics to more effectively target Russian S-300 and S-400 air defense systems with AGM-88 HARM air-to-surface rockets.

The US has previously provided military aid to Ukraine, including the delivery of Javelin anti-tank missiles and a shipment of FGM-148 Javelin anti-tank weapons in December 2020. The F-16s would be the latest addition to the US' support of Ukraine's defense.

DEFENDING UKRAINE'S SKIES: COULD SWEDISH JAS GRIPEN FIGHTER JETS DO THE JOB?

Ukraine's President Volodymyr Zelensky recently asked for fighter planes to "close the sky" and protect Ukraine from Russian air and missile attacks. The Swedish JAS Gripen fighter jet has been

cited by some as the best option for this job. This article looks at how suitable they are for the job and their advantages and disadvantages.

- The Swedish JAS Gripen fighter jet is tough and easy to operate and can use shorter runways, even landing on roads in some cases.

- The Gripen is "developed with Russia in mind and is therefore very suitable for the situation that Ukraine finds itself in today".

The Gripen has been described as tough and easy to operate and can use shorter runways, even landing on roads in some cases. It can fly low, and needs smaller crews and support staff. ►



Gripen C.

► Furthermore, it is “developed with Russia in mind and is therefore very suitable for the situation that Ukraine finds itself in today”, according to Arash Heydarian Pashakhanlou, an air power expert at Sweden’s Defence University.

Martin Lundmark, an expert in defence systems at the Defence University, explained that the Gripen is “unique” in that it can handle normal straight asphalt, as found on roads, unlike other modern jet fighter planes which need smooth cement for their runways. He warned, however, that British enthusiasm for the Gripen’s ability to land on “rough runways” could be exaggerated. “It depends on how rough, and there can’t be potholes. Then the risk of a puncture or other damage to the plane would be too great.” In addition, Lundmark added that pilot training normally takes several years and there would also be a need for facilities close to Ukraine for tasks such as maintenance, refuelling, equipping and supplying spare parts.

Furthermore, Sweden doesn’t have any surplus of the plane, and they are all currently in use, so any transfer would reduce the number of planes that Sweden has available to defend its own

skies. Although Swedish Prime Minister Ulf Kristersson has said he’s not ruling out any decision on Gripens for Ukraine, it appears that practical issues may be the biggest barrier to Ukraine getting the current version of the Gripen, the model C/D.

AERO SOARS TO NEW HEIGHTS: APPROVED FOR MILITARY AIRCRAFT TRAINING

Aero Vodochody AEROSPACE a.s., a leading aircraft manufacturer, has received the green light to conduct training and instruction on military aircraft. The certificate, issued by the Department of Military Aviation Supervision at the Czech Republic Ministry of Defense, grants Aero approval to provide education and training on the Albatros, Alca, and the highly-anticipated L-39NG aircraft.

- Aero has received certification from the Czech Republic Ministry of Defense to provide training and instruction on military aircraft, including the Albatros, Alca, and L-39NG.

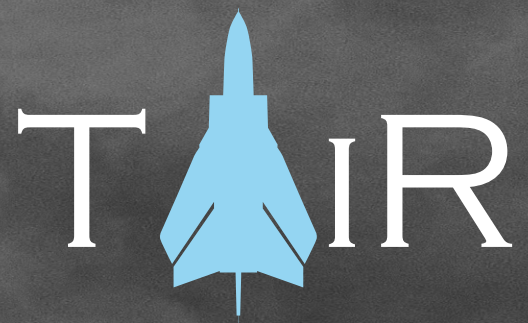
- Aero’s Approved Training Organization is authorized to conduct type and instructor training within the Czech Republic airspace and at the Vodochody Airport, but authorization from the Ministry of Defense is required for training at other airports.

Pavel Tůma, Executive Vice President and Chief Program Officer at Aero, says “We’re thrilled to have this certificate in hand, as it confirms Aero as a trusted organization for training on military aviation equipment. This means we can now offer training on all of our aircraft, including the L-39 Albatros, L-159, and the exciting new L-39NG trainer aircraft that we’ve recently begun serial production on.” The certificate builds on Aero’s previous authorization for training and takes into account the latest European EMAR rules, now integrated into Czech national legislation. Aero’s Approved Training Organization, its instructors, and experts are now authorized to conduct type and instructor training and other privileges on Aero aircraft within the Czech Republic airspace and at the historic Vodochody Airport.

Note that authorization from the Ministry of Defense is required for training at any airports outside of the Czech ►



L-39NG.



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► Republic. The certificate of competence for training on military aviation equipment is awarded based on meeting the requirements outlined in the Act on the Armed Forces of the Czech Republic.

QINETIQ BOOSTS AERIAL CAPABILITIES WITH STRATEGIC INVESTMENT IN DA62 AND PC-9 B PLANES

QinetiQ GmbH, a leading global defense and security company, has recently expanded its fleet with two new Diamond DA62 planes and nine Pilatus PC-9 B planes to support the provision of Aerial Threat Representation for its German and European customers.

- QinetiQ GmbH has recently expanded their fleet with two new Diamond DA62 and nine PC-9 B aircraft to support the provision of

Aerial Threat Representation for German and other European customers.

- The company offers a range of services including target towing, close air support, maritime air operations, and training in ground-based interception and air traffic control.

QinetiQ GmbH has recently expanded its fleet with two new Diamond DA62 aircraft and nine PC-9 Bs to support the provision of Aerial Threat Representation for its German and other European customers.

The two Diamond DA62 aircraft were configured for ISR (Intelligence Surveillance Reconnaissance) missions. The DA62-ISR system, which was developed specifically to deliver critical customer functionality, allows for airborne data collection on land and sea and was integrated into the two DA62 MPPs by

QinetiQ and Hensoldt for use as an ISR or training platform by national and international customers.

In addition to the two DA62 MPPs, nine Pilatus PC-9 Bs have been added to the existing fleet. This gives QinetiQ a total of twelve Pilatus PC-9s and two PC-12s for further expansion of its training capabilities for German forces and other international customers in the areas of flight training (ATS), specialized Joint Terminal Attack Controller (JTAC) and Close Air Support (CAS).

Graham Ollis, Managing Director of QinetiQ GmbH, stated: "Germany and NATO forces must maximize their defense capabilities and be fully prepared for any possible military operations around the world. Thanks to the strategically important procurement of these new aircraft, QinetiQ can offer its customers even greater value. The new machines are equipped with some of ►



PC-9 B.

AIR FORCE RESERVE COMMAND

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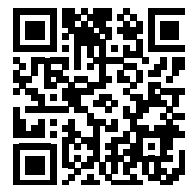
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The fleet of PC-9 and PC-12 aircraft, flown by highly qualified, military-trained pilots, offers a range of services, including tow-targeting, Close Air Support, maritime air operations, ground-based intercept training and air traffic control training. QinetiQ is a leading provider of manned flight target representation for the live training of air force, army, and naval forces. Over the past 20 years, QinetiQ has completed more than 75,000 flight hours in support of troops and sees itself as a critical component in protecting soldiers through the provision of this high-quality training.

In conclusion: This strategic investment by QinetiQ is a significant step in enhancing its capabilities to offer its customers a greater value. The new DA62 and PC-9 B planes are equipped with some of the most technologically advanced equipment and are ready to face the challenges of today and tomorrow. With over 75,000 flight hours in support of troops, QinetiQ is a vital component in protecting soldiers through high-quality training. This expansion of the company's fleet will further strengthen its position as a leading provider of manned flight target representation for the air force, army, and naval forces.

NEO ENERGY AVIATION ACADEMY – TEST PILOT AND LEAD FLIGHT TEST ENGINEER COURSE READY FOR AUGUST 2023

The Neo Energy Aviation Academy (NEA), Europe's newest fully private Approved Training Organisation, is now ready to offer a comprehensive range of highly specialised competency-based training in the areas of flight test and specialised operations and has just announced the launch of its new Test Pilot and Lead Flight Test Engineer training courses. The Academy, which was established last year and was granted EASA ATO approval in the summer of 2022, is now ready to offer specialised instruction in the areas of flight test and specialised operations, while already successfully conducting Desdemona

Advanced UPRT with Boeing 737 cockpit for an airline in Germany and Deep Stall training on F-16 in Desdemona for an international military customer.

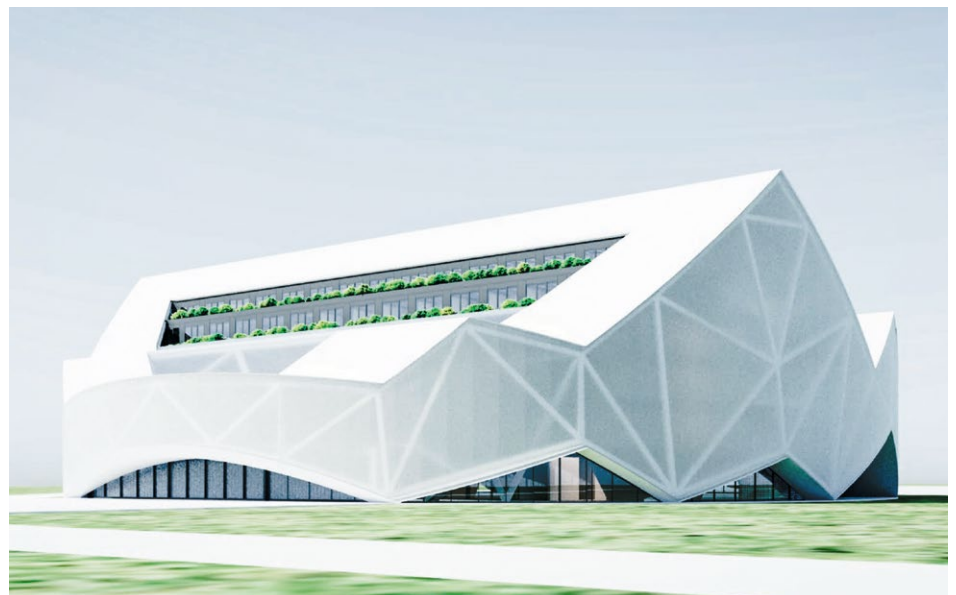
- **NEO ENERGY Aviation Academy offers Flight Test Pilot and Lead Flight Test Engineer Training courses as well as custom tailored short courses for specialised operators in the private and governmental sector.**
- **NEO ENERGY Aviation Academy is the European Union's newest fully private Approved Training Organisation to deliver highly specialised competency based training in the areas of flight test and specialised operations training.**

The Academy's flexible fleet of highly capable aircraft, as well as state of the art flight simulation training devices (the highlight being DESDEMONA centrifuge simulator), allow it to deliver unique, first of a kind specialised training solutions. Highly experienced staff from the areas of civil and military flight training, simulation, testing, from airlines, universities, research and design organisations come together at the academy to serve clients from Europe and around the world with an interest in efficient, specialised multi-role training services.

At the core of NEO ENERGY Aviation Academy's philosophy is an integrated safety culture and commitment to safety

standards, organisational safety and applied security procedures in operational environments. The Test Pilot and Lead Flight Test Engineer training courses are designed according to the latest innovations of Competency Based Training and Assessment as outlined in ICAO PANS Doc 9868. This approach enables the Academy to tailor the courses to specific needs and constraints. The courses are now open for enrollment with a start date August 1st, 2023.

Text by: ACE Team



Future home of NEO Energy Aviation Academy that will also include The Aircraft Museum Mönchengladbach, an Art Exhibition and a hotel.

THE EMBRAER C-390

A Masterpiece of



Setting New Standards in Medium Air Mobility

MILLENNIUM:

Innovation and Excellence



with Unmatched Flexibility and Advanced Technology



Designed and developed by Embraer, the C-390 brings a new concept to the market, offering a versatile and multi-mission platform with very low operating costs and fast turnaround.

**WITH THE EMBRAER C-390 MILLENNIUM,
EMBRAER HAS DEMONSTRATED A NEW
GENERATION OF THINKING, AND CREATED A NEW
GENERATION OF AIRCRAFT.**

The Embraer C-390 Millennium is a masterpiece of innovation and excellence; a new multi-mission military transport aircraft setting new standards in the category. Designed to meet the very demanding specification set by the Brazilian Air Force (FAB), the aircraft brings a new concept to the market, offering a versatile and multi-mission platform with very low operating costs and fast turnaround: an unbeatable combination. The C-390 provides air forces with



DESIGNED WITH FLEXIBILITY AT ITS CORE IT OFFERS UNRIVALLED AIR MOBILITY AND CARGO CAPACITY IN THE MILITARY TACTICAL TRANSPORT AIRCRAFT CATEGORY.

supporting commercial aviation operations has created an ethos of high availability and maintainability; this has been incorporated into the C-390, Embraer's most modern and sophisticated transport aircraft.

The C-390 Millennium's military mission systems are truly impressive. It is equipped with state-of-the-art technology for the tactical radar, self-protection, avionics, vision enhancement, cargo handling and air drop. The 'one aircraft many capabilities' concept enables rapid reconfiguration for aerial resupply; aerial assault; air-to-air refuelling (the KC-390 variant); aerial firefighting; Search and Rescue (SAR); humanitarian aid; medical evacuation; and support to Special Operations. The C-390 can also be fitted with a removable EO/IR (Electro-Optical/Infra-Red) pod to enhance SAR, Maritime Patrol and Special Operations capabilities.

The C-390 is built to withstand any challenge, whether it is the hottest, highest, driest areas in the world or the coldest in the ice and snow of the Arctic and Antarctica regions. It is designed to



Bosco da Costa Junior, President & CEO, Embraer Defense & Security.

operate in austere environments with minimal ground support, including operations from unpaved (natural surface) or damaged runways.

"Air forces are looking for an aircraft that is multi-mission capable and that is easy to maintain and operate. The C-390 offers flexibility, advanced technology, and the ability to operate in austere environments, which makes it the perfect match for any mission. Its built-in ►

exceptional fleet performance with a cost-effective combination of high levels of availability and productivity.

Designed and developed by Embraer, a global aerospace company with more than 50 years of history, the C-390 is part of a modern and innovative product's portfolio offered by Embraer Defense & Security. Embraer has built its reputation for quality through the constant evolution of its commercial, executive, and defence portfolio. Its experience in



The C-390 is equipped with state-of-the-art technology for the tactical radar, self-protection, avionics, vision enhancement, cargo handling and air drop.

► rapidly reconfigurable multi-mission design and maintainability features make it a cost-effective and efficient choice”, said Bosco da Costa Junior, President & CEO, Embraer Defense & Security.

In comparison to other medium-sized military transport aircraft, the C-390 Millennium is a powerhouse. It flies faster (470 KCAS), carries more (max payload 26 tonnes), and goes further (1470 nm for 23 tonnes). In terms of range, speed, and payload it is 40% more effective than a medium lift turboprop.

“The C-390 is establishing a position for itself in the market as the next generation multi-mission transport aircraft. It’s impressive performance, demonstrated on operations with the Brazilian Air Force and through participation in joint exercises with other air forces, is gaining the attention of governments and air forces around the world,” complements Bosco da Costa Junior.

FULLY COMPLIANT WITH FUTURE CNS/ATM REQUIREMENTS AND EQUIPPED WITH STATE-OF-THE-ART MILITARY MISSION SYSTEMS



A rapidly reconfigurable multi-mission design and maintainability that makes it an optimal choice for fleet performance.

KC-390 AIR-TO-AIR REFUELLING VARIANT

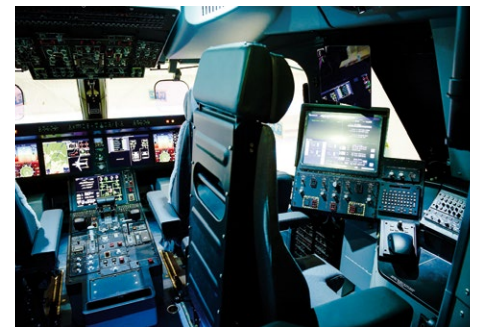
Speed range enables probe-and-drogue AAR for fast fighter aircraft to helicopters; AAR pairings clearances already exist. Built-in rapidly reconfigurable multi-mission design – enhanced cargo handling system enabling quick reconfigurations from one mission to another, all mission’s configuration takes less than a duty day from ground operation/maintenance crew to be held.

DESIGNED FOR MAINTAINABILITY

The C-390 Millennium brings to operators a combination of mature solutions such as IAE V2500 engines,



The C-390 is equipped with the IAE V2500 engines.



An optional third crew station in the cockpit, equipped with an integrated display, communication system and mission controls, supports efficient coordination on advanced missions including Search and Rescue and Aerial Refueling.

The operational capacity of the C-390 on semi-prepared and unpaved airfields is achieved through a combination of a highly capable structure, and landing gear designed to operate and reduce damage on soft unpaved airfields.

with accrued 240 millions of hours in commercial aviation operations and the widest global maintenance, support & spare part net and innovations, as well as the Rockwell Collins Pro Line Fusion Avionics, with all Mission Systems integrated to the avionics and Fly-By-Wire system, which negates the need for any control cable inspections and adjustments, reducing the maintenance. Also, the use of commercial aircraft techniques and experience (MSG-3, On-board Maintenance System) delivers the same airliner reliability and availability levels to military operators, and no scheduled airframe depot level maintenance, with reduced time on ground for maintenance. It provides air forces with optimal fleet performance generated by a cost-effective combination of high availability and productivity.

ACQUISITIONS

In addition to Brazil, the aircraft has been acquired by Portugal (five aircraft) and Hungary (two aircraft), both NATO nations. The next step is the integration and tests of NATO systems, which will occur in Portugal in the first half of 2023, enabled by local industrial cooperation and participation, prior to the first delivery to the Portuguese Air Force. The first Hungarian aircraft is due to be delivered in 2024.

In June 2022, the Netherlands Ministry of Defence announced the selection of a fleet of five C-390 Millennium aircraft to replace their current fleet of C130 Hercules, highlighting the performance and operational output of the aircraft as a key reason for their decision.

Embraer continues to play an active role in defence markets identified as ►

DESIGNED TO OPERATE IN AUSTERE ENVIRONMENTS, FROM THE DRIEST DESERT AREAS TO THE ICY CONDITIONS IN THE ARCTIC AND ANTARCTICA

**A RAPIDLY
RECONFIGURABLE
MULTI-MISSION DESIGN
AND MAINTAINABILITY
THAT MAKES IT AN
OPTIMAL CHOICE FOR
FLEET PERFORMANCE**

► having potential for new business. The technical competence of The Royal Netherlands Air Force represented a quality stamp for the C-390 and caused an immediate increase in the interest of the global market for the aircraft which, associated with the current geopolitical scenario, accelerated the requests for information about the C-390 by potential customers.

THE C-390 IN BRAZIL

Since its first delivery to the Brazilian Air Force (FAB), in 2019, the C-390 Millennium has proven its capability, reliability, and performance. The aircraft

has been used in operations to transport equipment and medical supplies, ranging from liquid oxygen to vehicles across Brazil at the peak of the COVID-19 outbreak. Brazil's current fleet of C-390s, all in its refuelling configuration (KC-390), stands at five aircraft of the 19 on order. The fleet has exceeded 7,500 flight hours to date with a mission completion rate of 99% which is outstanding availability and productivity for aircraft in this category.

A FAB C-390 Millennium has recently resupplied the Brazilian Antarctic research station through airdrop, reinforcing the aircraft's performance and utility in challenging environments and operational conditions. In its first mission to Antarctica, the C-390



In June 2022, the Netherlands Ministry of Defence announced the selection of a fleet of five C-390 aircraft to replace their current fleet of C-130 Hercules.



WHY C-390 MILLENNIUM

The Embraer C-390 Millennium provides the perfect blend of mature and proven technology with state-of-the-art thinking to ensure the best of both worlds - reliability and new experience in performance. Delivers unrivalled air mobility and cargo capacity in the military tactical transport aircraft category.

It is fully compliant with future CNS/ATM requirements and military mission systems include: tactical radar; self-protection systems (IR and radar threats); state-of-the-art cargo handling system with continued computational drop point to precise aerial resupply; troopers and paratroopers seats and parachute static line bags recovery; roll-on/roll-off modular airborne fire-fighting system; medical evacuation litters installation and intensive care units provisions; EO/IR pod for search & rescue and patrol; and other integrated mission systems capabilities including Night Vision systems. Interoperability in multi-domain networked data centric environments.

Designed to operate in austere environments from the driest desert areas in the World to the icy conditions in the Arctic and Antarctica, including the Amazon region, where humidity levels average a breath-catching 88%, and operations with minimal ground support, including flight operations from unpaved or damaged runways.

Millennium delivered nine packages to the grateful personnel at the research station. If required the aircraft can airdrop 24 CDS (Container Delivery System) bundles up to a combined total of 21,400 kg. The aircraft took off from the city of Punta Arenas, south of Chile, carrying the supplies to the Brazilian research station and flew back non-stop.

Despite the limited drop zone, the highly accurate airdrop system allowed

the release of two packages simultaneously, reducing the operation time in half from missions executed in the past with other aircraft types. The packages all landed within an average of 30 meters from the desired impact point on the drop zone, despite of the heavy winds in area, proving the exceptional capabilities of the aircraft.

The aircraft has demonstrated and proven that it can swiftly and effectively

respond to situations such as displaced person evacuation missions, humanitarian aid and disaster relief missions and the full range of military air transport operations including dirt and damaged field operations.

The aircraft already participates in military exercises around the world, such as Operation Culminating, in the US. This was an operational joint exercise where the Brazilian Army and the Brazilian Air Force took part alongside the U.S. Army and U.S. Air Force. The Embraer C-390, C-130 and C-17 operated together for the first time during this joint exercise and both Air Forces were pleased with the performance of the C-390 and the results of the exercise.

Recently, a C-390 Millennium took part in the Multinational Combined Air Exercise SALITRE IV operation in the Atacama Desert region, described as the driest desert in the world, performing in-flight refuelling missions. The objective of Exercise SALITRE IV is to expand cooperation and relationships between air forces from South America, the US and Canada, increasing their interoperability through common planning in a NATO format.

Text by: Embraer

Edited by: Katerina Urbanova

Photos by: Embraer

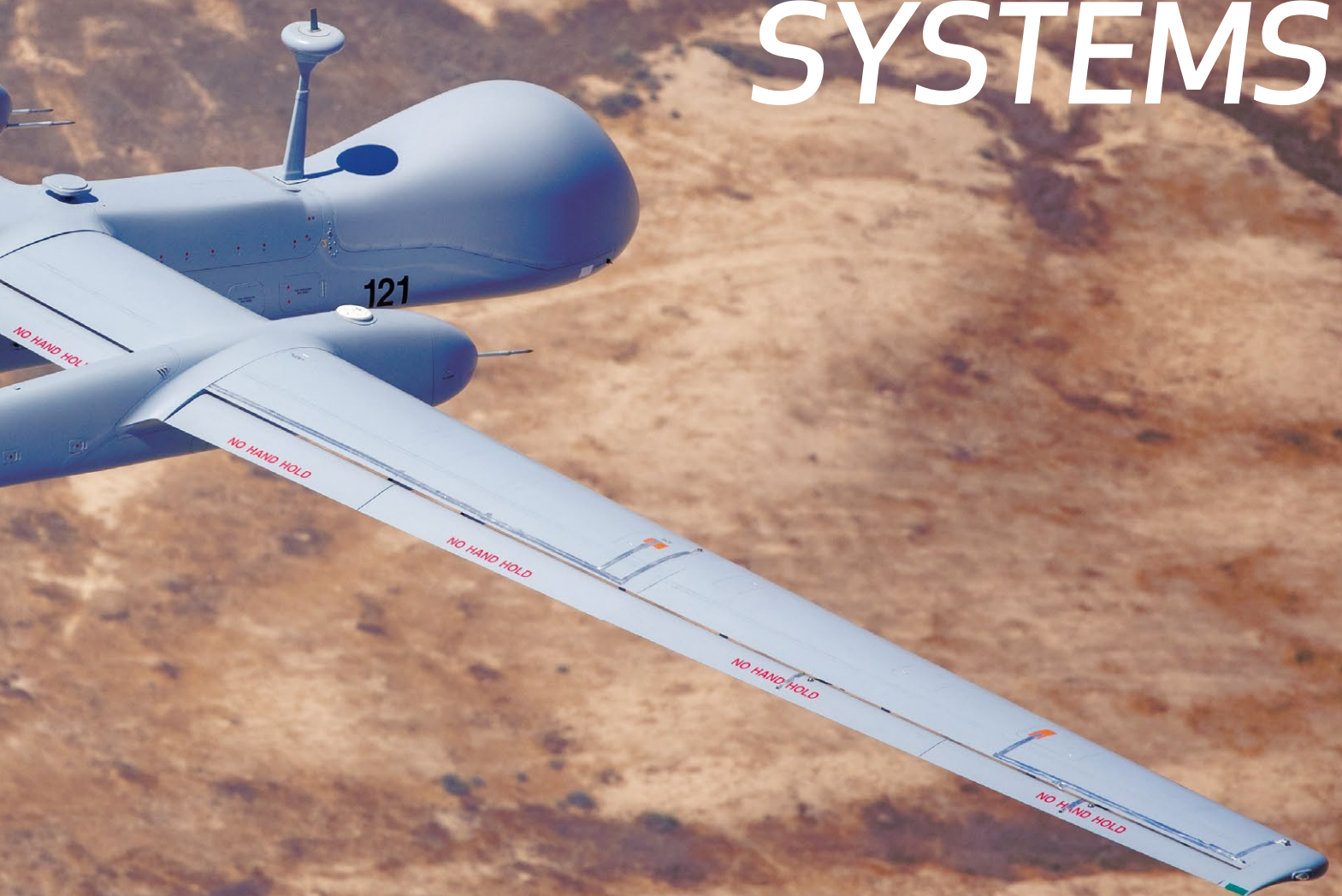
THE AIRCRAFT HAS BEEN ACQUIRED BY PORTUGAL AND HUNGARY, WITH DELIVERIES SCHEDULED IN 2023 AND 2024.



Heron TP.

HERON FAMILY OF UAS: **THE KEY TO GAINING TACTICAL**

PAVING THE WAY FOR UNMANNED AUTONOMOUS SYSTEMS



AND STRATEGIC INTELLIGENCE

Since their inception, Unmanned Aerial Systems (UAS) have carved their place in modern warfare, first as means of intelligence gathering and later as combat intelligence, surveillance, target acquisition, reconnaissance (ISTAR) missions and Bomb Damage Assessment (BDA) systems.



**UNMANNED
AUTONOMOUS
SYSTEMS ARE
BECOMING
INCREASINGLY
IMPORTANT FOR
MODERN WARFARE,
PROVIDING ESSENTIAL
INTELLIGENCE
GATHERING,
SURVEILLANCE, AND
TARGET ACQUISITION
CAPABILITIES**

Initially used for overhead aerial photography, unmanned aerial platforms are now equipped with payloads capable of gathering information from standoff range via visual, thermal, and radar sensors, scanning the electromagnetic spectrum to spot radar and telecommunications activity, and designating targets for guided weapons launched by other aircraft or ground forces.

IAI has been a leader in unmanned systems for more than four decades. Today, the company provides a broad range of unmanned systems, from the Boeing 737 size, more than five-ton Heron TP, Heron 1 solutions, down to mini and micro UAS that weigh a few kilograms, loitering weapons of different types, along with unmanned systems designed for land and maritime operations. These systems use different aerodynamic configurations and various propulsion systems that optimize for operation at different altitudes and ranges. Still, all have a common thread in their ability to operate

autonomously, thus replacing the human operator in dangerous, dull, and dirty military missions. To meet those tasks, IAI has developed unique autonomous mission systems that provide situational awareness and control of the platform to assist the human operator on the mission and take over when the situation requires. Although the implementation of such systems is different in each class, the principles, based on a deep understanding of unmanned and autonomous control technologies and mission management, are common to all systems.

The iUCS mission control system is the standard ground control for IAI's Heron family UAS. The system supports all mission phases, platforms, and payloads. The modular iUCS supports different configurations for tactical deployment in armored vehicles or shelters, maritime, and airborne platforms. The system is designed to operate with a single crewmember or stack several iUCS to support larger crews on more complex missions.

IAI IS A LEADER IN THE DEVELOPMENT AND PRODUCTION OF UNMANNED SYSTEMS, WITH A BROAD RANGE OF PLATFORMS AND UNIQUE AUTONOMOUS MISSION SYSTEMS



Heron 1.

THE HERON FAMILY

The Heron family comprises several platforms designed for operations from the tactical to the strategic level. All members of the Heron family can share payloads, avionics, and ground systems, enabling users to scale operations and gain joint training and logistics advantages. These new models of the family are backed by IAI's rich heritage, which accumulated over 2,200,000 UAS operational flight hours worldwide.

The Heron family features a highly efficient design for intelligence, surveillance, target acquisition, reconnaissance (ISTAR) and Bomb Damage Assessment (BDA) missions. Multiple sensor payloads are carried on board and can operate simultaneously, installed in and under the fuselage, on the booms, and carried under the wings. Together, they provide a complete, multi-modal intelligence-gathering capability with a single platform. These

payloads enable the collection of reconnaissance, surveillance, and intelligence in real-time, covering large areas of interest. Using dedicated sensors, the system can perform standoff reconnaissance (with the M19 advanced EO/IR payload) over a long distance (up to 100 km) or persistent surveillance over a wide area (Wasp payload). Synthetic aperture radar (SAR), Electronic Intelligence (ELINT), and Communications Intelligence (COMINT) measures are also included. The platform supports several datalinks, including a high throughput line-of-sight and satellite communications terminal providing a robust downlink for all sensor data. Identification, Friend or Foe (IFF), and a Traffic collision avoidance system (TCAS, DAA) to assist airspace integration.

Heron TP is the largest variant of the family. It has been operational with the Israeli Air Force since 2010. With a maximum Takeoff Weight (MTOW) of 5,670 kg, Heron TP can carry 2,700 kg of payloads. It can operate at an altitude of



Heron 1.

THE HERON FAMILY OF UNMANNED PLATFORMS IS HIGHLY EFFICIENT AND VERSATILE, CAPABLE OF CARRYING MULTIPLE SENSOR PAYLOADS AND OPERATING FOR EXTENDED PERIODS OF TIME, MAKING IT A VALUABLE ASSET FOR A WIDE RANGE OF MILITARY MISSIONS

45,000 ft on missions lasting 30 hours. These platforms are designed to meet NATO standards, including STANAG 4671, a military airworthiness standard enabling the system to operate in civilian airspace, a process successfully concluded in 2022.

Heron 1 is the backbone member of the Heron family, performing strategic as well as tactical missions. It reflects the latest technology and operational maturity IAI, and its customers have gained since the early 2000s. At a 1,430 kg MTOW Heron 1 can carry 490 kg on missions of up to 45 hours, soaring to a ceiling of 35,000 ft. As its bigger sibling, Heron 1 is certifiable to STANAG 4671.

UAS are indispensable for modern combat, as they offer the intelligence gathering, surveillance, and target acquisition required for the planning and execution of combat operations and precision attacks. Recent conflicts have shown the decisive effect of military operations combining UAS, loitering weapons, and precision-guided munitions. To enable continuous operations in contested, UAS should maintain low signatures in the radar, acoustic, and thermal bands. To evade enemy air defenses, large UAS should be able to obtain intelligence from standoff range and be equipped with survivability aids like combat aircraft. The smaller and more affordable platforms should be agile, attritable, and easy to use to enable simultaneous

operations in significant numbers by the tactical forces.

IAI's UAS families reflect all these capabilities today. As a multi-disciplinary aerospace and defense company, IAI has the know-how, experience, and technology to empower modern armies with autonomous solutions tailored to their needs

CONCLUSION:

In conclusion, unmanned autonomous systems (UAS) have become a critical component of modern warfare, providing vital intelligence and surveillance capabilities for combat operations. Israel Aerospace Industries (IAI) has been at the forefront of UAS development for over four decades and currently offers a range of unmanned systems optimized for different altitudes and ranges. IAI's Heron family of UAS offers a complete intelligence-gathering capability, featuring multiple sensor payloads that can operate simultaneously. These UAS platforms are designed to operate autonomously, replacing human operators in dangerous missions. They are also backed by IAI's vast experience, with over 2.2 million operational flight hours worldwide.

Text: IAI
Edited by: Katerina Urbanova
Photo credit: IAI

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SLOVAK INTERNATIONAL AIR FEST

SIAF 2023

SEPTEMBER, 2 - 3

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IDET INTERNATIONAL DEFENCE AND SECURITY TECHNOLOGIES FAIR:

A SHOWCASE OF THE LATEST AND GREATEST IN DEFENCE AND SECURITY

Join us as we explore the latest developments in defence and security technologies, and learn how to protect your country and people in the face of rising global conflicts.

Exciting developments in the defence and security industry have been taking place across Europe, and the IDET International Defence and Security Technologies Fair is poised to showcase the latest and greatest in the field. In an interview with the director, Mr. Michalis Busios, we delve into the key trends impacting the industry and get a sneak peek of what to expect at this year's event while also discussing key trends in the defence and security industry in the context of the escalating tensions on the Ukrainian border, that has significantly increased the need for advanced defence and security technologies.

With the defence and security industry experiencing dynamic growth in Europe, how will this trend affect the next edition of IDET?

According to Mr. Busios, the latest developments in the security situation will drive the modernisation of armed forces across European countries, including the Czech Republic. This means an increase in spending and investment in the defence industry, which is reflected in the interest in participating in IDET. Visitors can look forward to seeing leading domestic and foreign companies showcasing their modern defence technologies, making IDET an important platform for industrial cooperation.

Czech companies have a strong reputation in the defence and security industry. How do you see their position in relation to global markets over the last years or even decades?

The defence and security industry is vital to the Czech economy, and Czech companies have been able to develop ►

THIS YEAR'S EVENT WILL AFFIRM ITS ROLE AS AN IMPORTANT PLATFORM FOR INDUSTRIAL COOPERATION IN TIMES OF UNCERTAINTY



► innovative solutions that enable them to compete on a global scale. According to Mr. Busios, in recent years, a number of new companies have been established to produce progressive technologies, often based on new technological developments such as virtual reality, 3D printing, or software. IDET is also focusing on these companies through the Start-Up Innovation Zone project, which aims to introduce new innovations and companies from the defence industry.

IDET has a strong export orientation. How have you managed to build such a strong communication platform, and what traditions are you building on?

IDET has a long tradition, going back to the beginning of the autonomous Czech Republic. This year, the fair is celebrating 30 years since its first season, just as it is celebrating 30 years since the establishment of the autonomous Czech



IDET is celebrating 30 years since its first launch.

Armed Forces. According to Mr. Busios, IDET has become one of the most important showcases of innovations in the defence and security industry in NATO countries. The fair's success is closely related to the long-standing and successful cooperation with the Ministry of Defence of the Czech Republic, the DSIA, and other organisations.

IDET has long enjoyed the interest of international military delegations

and delegations of foreign defence ministries for armament. What kind of participation do you expect this year?

Top political and military leaders are an essential part of the fair, with delegations coming on the basis of invitations from the Ministry of Defence of the Czech Republic, the Armed Forces of the Czech Republic, the DSIA, and the BVV Trade Fairs Brno. Last year, the fair was

attended by members of official delegations and representatives of foreign armed forces from 31 countries, and we can expect a similar turnout this year.

Finally, what is the biggest news this year's IDET will bring, and what can visitors look forward to?

Visitors can look forward to an interesting extra programme, including the IDET ARENA outdoor field polygon, where they will be treated to demonstrations of military, police, and firefighting equipment in action. There will also be several other exciting activities, making IDET a must-see event for anyone in the defence and security industry.

**Interviewed and edited by: Katerina Urbanova
Photo credit: Tino Kratochvil, Anna Vavrikova**



Frederico Fernandes, Summit Director.

NAVIGATING THE SKIES OF CHANGE

A Vision for the Future: Exploring Sustainable Solutions and Disruptive Technologies at the Arab Aviation Summit

In a recent interview, we had the opportunity to sit down with Frederico Fernandes, Director of the Arab Aviation Summit, to discuss the challenges and opportunities facing the aviation sector. As one of the leading industry players, Frederico shared his insights on the past success of the Summit and looked ahead to the future. He emphasized the importance of sustainability, innovation and collaboration in shaping the future of the aviation industry. The Arab Aviation Summit, he said, has been a platform for decision-makers to gather and share their knowledge and experiences, helping to chart a course for the future of the industry. With the summit celebrating its jubilee year, Frederico is looking forward to another successful edition, where experts from around the world will come together to discuss the latest trends, innovations, and successful cases in the aviation industry.

How would you evaluate the previous years of the Arab Aviation Summit and what will make this year's edition special?

The Arab Aviation Summit has been a formidable platform for the aviation and travel industry since its debut edition.

Endorsed by Arab Governments, the Summit has grown in influence far beyond the Middle East, becoming a premier gathering for the industry's most important decision-makers. The platform brings together a perfect mix of influencers and market makers, from Original Equipment Manufacturers to operators, hospitality, and Tourism Boards, which has allowed for enhanced collaboration and new business development opportunities. The support and participation from government and non-government bodies has also brought significant strength to overseeing and enhancing opportunities from the Middle East and other markets to the region. The path has been extremely positive, with the Summit now hosting 750 delegates per edition, selected from over 2500 global applications received. This year's edition will be particularly special as we will be celebrating the jubilee year of the Summit.

What are the most significant changes you see across the industry, and what trends will the upcoming edition confirm?

The Middle East players are leading the way in the aviation and tourism ►



A perspective of the VIP Area.



The Senators Panel with leading Airlines CEOs and Airbus Africa & Middle East President.

► industry, registering spectacular performance and uncovering unprecedented innovation and a stunning and sustainable vision for the future. The upcoming edition of the Summit will confirm the trend of sustainable solutions and showcase the latest advancements in energy, passenger experiences, and technology. We will also have industry leaders sharing their success models that have allowed Arab carriers to thrive and reflect on the next steps to continue delivering market needs without disruption. Additionally, this edition of the Summit will also be focusing on sustainability, launching a partnership agreement with

climate technology company CHOOOSE to calculate and offset its carbon emissions at its milestone 10th event. This partnership makes AAS the world's first aviation and tourism event to calculate carbon emissions and empower its attendees with the knowledge and opportunity to offset their own carbon emissions, highlighting the Summit's wider commitment to proactively addressing the impacts of climate change.

What do you think is the strongest trend in the aviation industry at the moment and how will the industry change over the next few years?



THE ARAB AVIATION SUMMIT IS FOCUSING ON SUSTAINABLE SOLUTIONS AND SHOWCASING THE FUTURE OF ENERGY, PASSENGER EXPERIENCES, AND TECHNOLOGY IN THE AVIATION INDUSTRY



Arab Aviation Summit delegates' tables.

Currently, I believe that the sustainable drive is at the top of the agenda, as well as financial consolidation, where better-performing groups will go to the market to grow through acquisitions. The third disruptor will be urban and regional mobility with the Advance Air Mobility market entry in the next decade. This new mobility industry will change the way we connect and travel. According to a Morgan Stanley report, it may be worth 9 Trillion Dollars by 2050, three times more than the commercial aviation market size.

Personally, you have been involved in aviation for many years and have

followed developments first-hand. Has there been anything that has surprised you recently?

As someone who has been involved in the aviation industry for many years and has followed its developments firsthand, two features have particularly surprised me. The first is the aviation and travel market's resilience to crisis. The need to travel is organic and human, and the sector will always have clients wishing to travel. The recovery of the market after the pandemic is a testament to this resilience. The second feature that has surprised me is the rapid advancement

of technology in the industry. From electric and hybrid-electric aircraft to autonomous flight, the industry is evolving at an unprecedented pace, and it is exciting to see what the future holds.

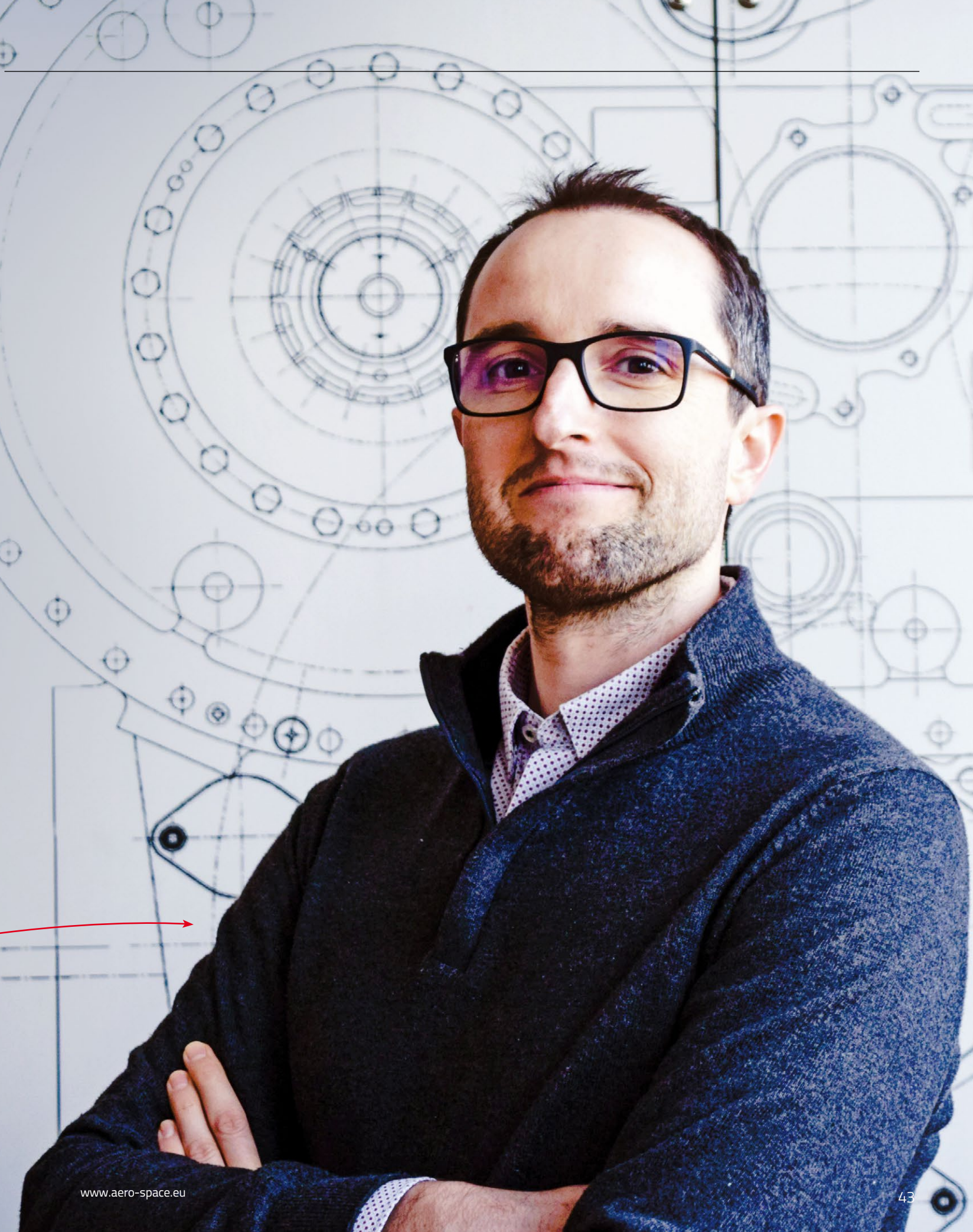
Interviewed and edited by: Katerina Urbanova
Photo credit: Arab Aviation Summit Media Office

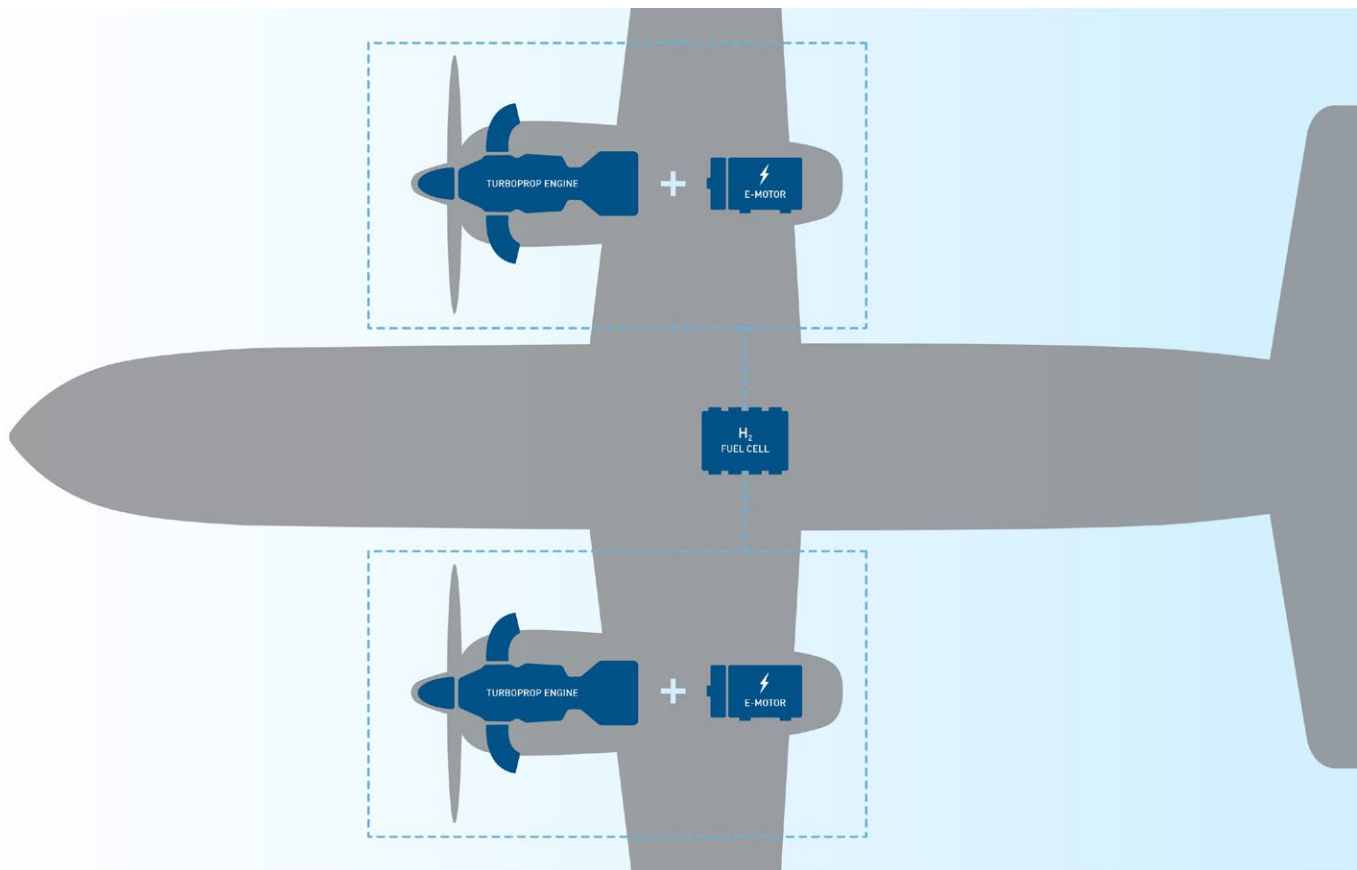
SOARING TO NEW HEIGHTS:

EXPLORING THE FUTURE OF HYBRID-ELECTRIC PROPULSION WITH AVIO AERO'S AMBER PROJECT

The aviation industry is at a crossroads. On one hand, there is the pressing need to reduce its environmental impact. On the other, there is the growing demand for air travel. Avio Aero, a subsidiary of GE Aerospace, is leading the charge with the launch of its innovative AMBER project.

In this interview, we'll delve into the details of this visionary project, which brings together 21 leading organizations to explore the integration of hybrid-electric components, fuel cells, and advanced technology gas turbine systems. With the support of the Clean Aviation Joint Undertaking of the European Commission, AMBER has the potential to revolutionize the skies and bring a cleaner tomorrow for the aviation industry. Join us as we sit down with Jesus Lopez Ruiz, AMBER System Leader at Avio Aero, to learn about the program's goals and the impact it will have on the future of commercial aviation.





AMBER – In this simplified infographic, our parallel hybrid-electric propulsion demonstrator presents a thermal turboprop engine, based on the advanced architecture of the Catalyst™, supplemented by an electric motor powered with hydrogen fuel cells.

THE AMBER PROJECT IS A GROUND-BREAKING EFFORT TO DEVELOP HYBRID-ELECTRIC PROPULSION TECHNOLOGIES FOR COMMERCIAL AVIATION

What is the purpose of Avio Aero's new technology demonstration program?

The purpose of the program is to advance the development of hybrid-electric propulsion technologies for commercial aviation and support European efforts to reduce CO₂ emissions by making air transport more fuel-efficient. The AMBER demonstrator will study the integration of components, including a motor/generator, power converters, and power transmission systems with fuel cells, using Avio Aero's advanced Catalyst turboprop engine.

How much funding has the Clean Aviation Joint Undertaking of the European Commission awarded to the consortium led by Avio Aero for the AMBER demonstrator?

The Clean Aviation Joint Undertaking of the European Union has awarded approximately €34 million over four years

to the consortium led by Avio Aero, which consists of 21 members, including GE Aerospace European sites, Leonardo, H2FLY, and various universities and research centers.

What is the goal of the AMBER demonstrator program?

The goal of the program is to mature, integrate, and validate the key technologies needed for a megawatt-class hybrid-electric propulsion system powered by hydrogen fuel cells. The program aims to establish the performance and readiness of the technologies and propulsion system configuration to support the EU's SRIA objectives for aviation decarbonization.

What components will the AMBER demonstrator study the integration of?

The AMBER demonstrator will study the integration of hybrid-electric components, including a motor/generator,

power converters, power transmission systems, and fuel cells, using Avio Aero's advanced Catalyst turboprop engine. The entire mechanical and electrical network of the propulsion system will be studied and tested.

How will the hybrid-electric propulsion system be powered in the AMBER demonstrator?

The hybrid architecture of the AMBER demonstration program combines electrical components, hydrogen fuel cells, and advanced technology gas turbine systems to increase efficiency and minimize emissions from the propulsion system. For the demonstrations in the AMBER program, the Catalyst gas turbine will use Sustainable Aviation Fuel (SAF), and the fuel cell that powers the electrical machine will run on hydrogen.

What are the potential benefits of hybrid electric propulsion technologies for commercial aviation?

Hybrid electric propulsion technologies can improve engine performance, reduce fuel usage and emissions. The ability to downsize the gas turbine relative to that required by the aircraft in a conventional, non-hybrid configuration can result in significant gains. The electrification technologies being developed by Avio Aero and GE Aerospace are compatible with alternative fuels like SAF and hydrogen and with advanced engine architectures like open fan. The Catalyst engine can operate on approved SAF, which has lower lifecycle CO₂ emissions than petroleum-based fuel.

What alternative fuels are compatible with the hybrid electric technologies being developed by Avio Aero and GE Aerospace?

The alternative fuels compatible with the hybrid electric technologies being developed are Sustainable Aviation Fuel (SAF) and hydrogen.

Who is a member of the consortium led by Avio Aero?

The consortium led by Avio Aero consists of 21 partners across Europe, including Avio Aero's European technology

development network of universities and R&D centers, and GE Aerospace sites in various European countries.

Who is responsible for the build-up of the MW fuel cell system as part of the powertrain validation and testing in the AMBER project?

The German-based company H2FLY is responsible for developing the technologies for the fuel cells that will be integrated into the engine architecture. H2FLY is a worldwide leader in zero-emission propulsion systems powered by hydrogen.

How does the AMBER project fit into Clean Aviation's ambitions for climate-neutral aviation?

The Clean Aviation partnership with industry aims to speed up the development of key technologies, such as electrification, to achieve its goals for climate-neutral aviation and support the European Union's efforts towards carbon neutrality, as outlined in the Strategic Research and Innovation Agenda (SRIA). AMBER is one of several Clean Aviation projects that Avio Aero is involved in, and it has recently received funding. The HYDEA project, which is coordinated by Avio Aero, will work on developing a hydrogen combustion engine and will involve collaboration with Safran Aircraft Engines, Airbus, and other European companies, universities, and research centers. Another Clean Aviation project called OFELIA, coordinated by Safran Aircraft Engines, aims to demonstrate the open fan architecture in flight tests later this decade in collaboration with Airbus, with Avio Aero as a key partner.

What are the specific technologies being tested and developed within the AMBER demonstrator program?

The AMBER demonstrator program will conduct end-to-end demonstrations that will involve electrical components, hydrogen fuel cells, and advanced technology gas turbine systems. The program will also focus on the critical control and thermal management system technologies that are necessary for the success of future propulsion systems. ►

THE PROJECT IS BEING FUNDED BY THE CLEAN AVIATION JOINT UNDERTAKING OF THE EUROPEAN COMMISSION AND BRINGS TOGETHER A CONSORTIUM OF 21 LEADING ORGANIZATIONS

THE GOALS OF THE AMBER PROJECT ARE TO MATURE AND VALIDATE KEY TECHNOLOGIES FOR A HYDROGEN-POWERED HYBRID-ELECTRIC PROPULSION SYSTEM THAT CAN REDUCE FUEL USAGE AND EMISSIONS WHILE IMPROVING PERFORMANCE

How does the AMBER demonstrator compare to other similar programs in the industry?

AMBER, which is led by Avio Aero, is based in Europe and complements other GE Aerospace hybrid-electric demonstrators. The program is unique in that it will test representative sizes and architecture configurations using MW-class fuel cells in combination with the Catalyst engine. GE Aerospace is advancing hybrid electric technologies through multiple technology demonstration programs, including the Electrified Powertrain Flight Demonstration (EPFD) project, which was selected by NASA in 2021 to develop a MW-class hybrid electric propulsion system for flight tests in the mid-2020s. AMBER's testing will include rig, ground, and flight tests with different engine architectures and could potentially lead to product launches and entry into service by the mid-2030s.

What is the timeline for the development and testing of the AMBER demonstrator?

AMBER will be developed within the four-year Clean Aviation Phase I framework, during which the studies and demonstrations will be conducted. Based on the results of these technology demonstrators, the goal is to incorporate hybrid electric capability into future engine applications.

What are the potential challenges facing the successful implementation of hybrid-electric propulsion in commercial aviation?

AMBER focuses on advancing the understanding of the integration of hybrid technologies, which are crucial for the future of aviation. To this end, understanding how to integrate the system into the aircraft, manage the power from the gas turbine and electrical machine, and ensure the safe operation of the fuel cell and the entire system, including the presence of hydrogen onboard, are the focus areas of the AMBER project.

What are the next steps for Avio Aero and the consortium in advancing the development and implemen-



tation of hybrid-electric propulsion technologies in the aviation industry?

The AMBER program was officially launched at the end of January 2023, so the development phase has just begun. The first part of the project involves the technological validation and integration of the components that will form the basis for the different subsystems. These studies will culminate in a series of demonstration activities, including rig tests, in the mid-2020s.



The Catalyst engine inside the test cell at the Turboprop headquarters, in Prague.

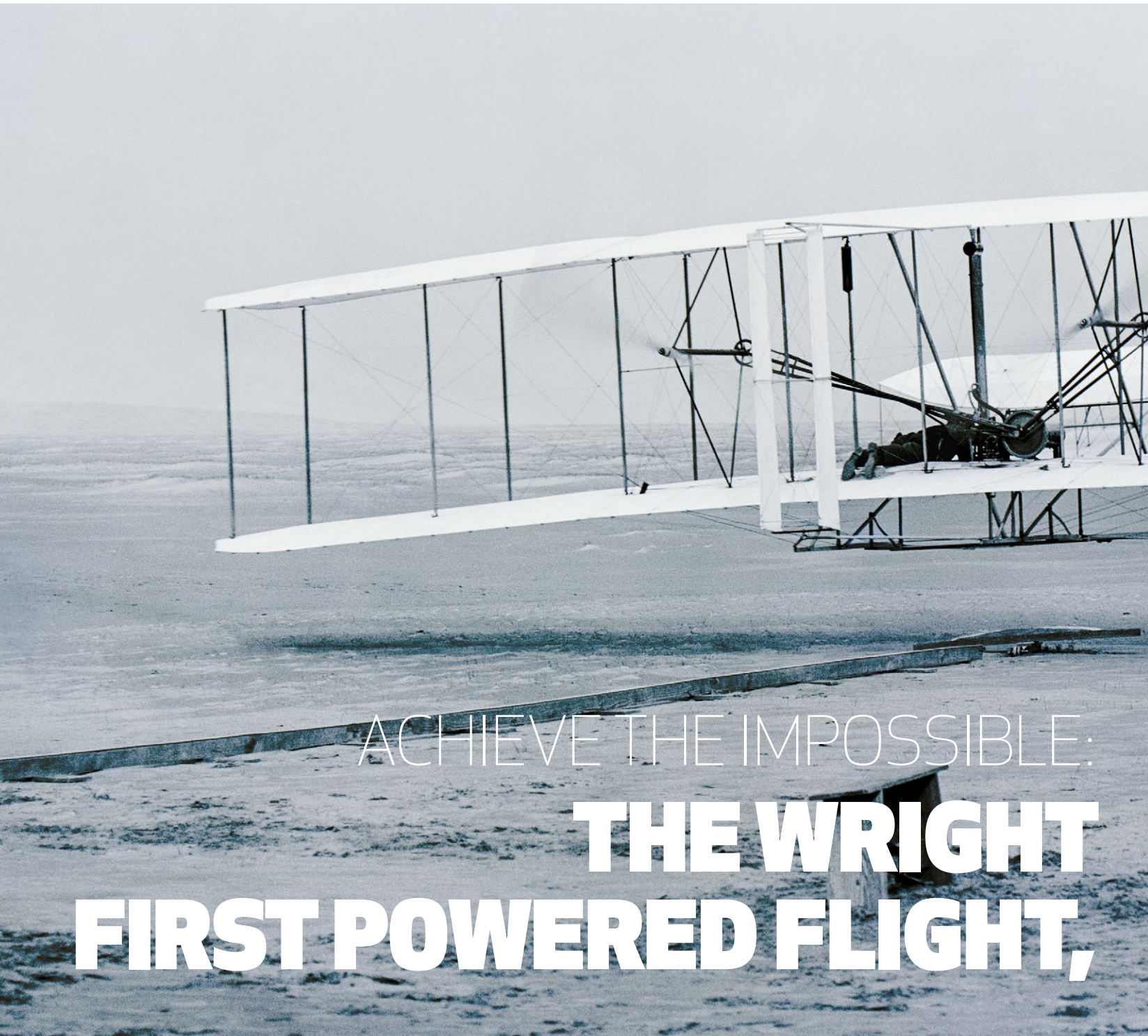
CONCLUSION

The AMBER project is a bold attempt to mature and validate the technologies for a hybrid-electric propulsion system powered by hydrogen fuel cells. With funding from the Clean Aviation Joint Undertaking of the European Commission and the expertise of 21 leading organizations, the program aims to reduce fuel usage, emissions, and the carbon footprint of the aviation industry. The AMBER project will study the integration of components

like motor/generators, power converters, and fuel cells to bring a greener tomorrow for air travel. Get ready to soar with the innovative and environmentally responsible future of aviation.

Interviewed and edited: Katerina Urbanova
Photo credit: Avio Aero, part of GE aerospace

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ACHIEVE THE IMPOSSIBLE:
**THE WRIGHT
FIRST POWERED FLIGHT,**

A look back at the historical moment that changed the world forever.

120 years ago, two brothers from Dayton, Ohio, changed the world forever with a 12-second flight that covered 120 feet. On December 17, 1903, Orville and Wilbur Wright made history by successfully completing the first powered flight in a machine heavier than air. This year marks the 120th anniversary of this

groundbreaking achievement, and it is a fitting time to look back and reflect on the impact of the Wright Brothers' invention.

The Wright Brothers' journey to the first powered flight was a long and challenging one. They began experimenting with gliders in the 1890s, and by 1900, they had built and flown a series of



On December 17, 1903, the Wright Brothers soared into history, defying the odds and reaching new heights as they flew for 12 seconds, traveling 120 feet at a speed of 6.8 mph and reaching an elevation of 10 feet, marking a breakthrough in the world of aviation that forever changed the numbers of human flight.

BROTHERS' 120 YEARS LATER

gliders. However, they quickly realized that a powered machine was necessary to achieve the goal of controlled, sustained flight. In 1903, they began working on their first powered aircraft, the Wright Flyer. The Flyer was powered by a four-cylinder, water-cooled engine and had a wingspan of 40 feet.

The Wright Brothers faced many obstacles in their quest to achieve powered flight. They faced financial difficulties, and the lack of understanding and support from the scientific community. But despite these challenges, they persisted, and on December 17, 1903, they finally succeeded. Orville made the first flight,

which lasted for 12 seconds and covered a distance of 120 feet. Wilbur followed with a flight of 59 seconds and a distance of 852 feet. The Wright Brothers had succeeded in building the world's first practical airplane and had proved that controlled, sustained flight was possible. ►

► The significance of the Wright Brothers' achievement cannot be overstated. They opened the door to a new era of transportation, communication, and commerce. The Wright Flyer was the first machine that could fly under the complete control of the pilot. They opened the door for future generations of engineers, scientists and pilots to take their invention and improve upon it. This first flight was the starting point of the aviation industry. The Wright Brothers' invention and the technology they developed, such as the three-axis control, which allows pilots to steer an airplane and maintain its stability, is still being used today in modern aircraft.

Today, the Wright Brothers' legacy lives on in the form of the Wright Brothers National Memorial in Kitty Hawk, North Carolina, where the first flight took place. The site includes a replica of the Wright Flyer, a museum, and an interpretive center. The Wright Brothers' achievement is also celebrated every year on December 17, which is now known as Wright Brothers Day.

The Wright Brothers' first powered flight was a defining moment in human history, and it continues to inspire and amaze people to this day. The Wright Brothers were not just inventors, but also true visionaries who saw the potential for flight to change the world. Their perseverance, determination and willingness to think outside of the box, helped them to achieve the impossible. Their achievement is not just a triumph of technology, but also a triumph of the human spirit.

As we look back on the 120th anniversary of the Wright Brothers' first powered flight, we are reminded of the incredible impact that one small step can have. The Wright Brothers' invention paved the way for the development of airplanes, helicopters, and space shuttles, and it has transformed the way we live, work, and communicate. The Wright Brothers' legacy continues to inspire future generations of engineers, scientists, and pilots, and it serves as a reminder of the incredible things that can be accomplished when we dare to dream big and strive for greatness.

Text by: Katerina Urbanova

Photo by: Daniels John T, Library of Congress



Flight 85: Orville in flight, covering a distance of approximately 1,760 feet in 40 1/5 seconds; Huffman Prairie, Dayton, Ohio.

IMPACT OF THE WRIGHT BROTHERS' INVENTION ON THE FUTURE DEVELOPMENT OF THE AVIATION INDUSTRY:

Key developments in the aviation industry following the Wright Brothers' invention and its impact on the future development of the aviation industry.

Key Development	Year	Impact
First commercial flight	1914	Opened up the possibility of air travel for the general public
First transatlantic flight	1919	Reduced travel time and increased global connectivity
First airmail service	1918	Revolutionized mail delivery and communication
First air ambulance service	1914	Improved emergency medical care and transportation
First non-stop transcontinental flight	1923	Increased the range and capabilities of aircrafts

EVOLUTION OF THE AIRCRAFT'S DESIGN IN TERMS OF WEIGHT, SIZE AND PROPULSION SYSTEMS OVER TIME:

Key developments in the aircraft design over time. The table highlights how the aircraft's design evolved in terms of weight, size, and propulsion systems.

Year	Weight (kg)	Size (m)	Propulsion Systems
1903	605	21.3 × 6.4 × 3.7	4-cylinder engine, 12 horsepower
1908	794	21.3 × 6.4 × 3.7	4-cylinder engine, 18 horsepower
1913	845	21.3 × 6.4 × 3.7	4-cylinder engine, 25 horsepower
1920	1,140	24.4 × 7.3 × 4.3	In-line, 6-cylinder engine, 50 horsepower
1930	2,200	29.2 × 10.1 × 4.3	Radial, 9-cylinder engine, 220 horsepower

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