

eFlight Journal



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Quarterly Vol. 02 - 2022

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Show Special



eMagicNext

e-Trainer:

Bristell

Diamond

Elektra Solar

Flight Design

Pipistrel

Guide:

Pure Flight

Sustainable Aviation Trail



Voltaero Cassio 1



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expo

AERO in strange times

Dark shadows but some light

For two long years, we the pilots in Europe and around the world had to live without our AERO show, the biggest General Aviation expo in Europe, because of COVID. We thought that it couldn't get any worse. Not even close! With Putin's attack on Ukraine, we are facing upheavals that I never thought possible. Nothing less than defending the freedom of our liberal society in Europe is at stake (sounds pathetic, but it is true). This is including the freedom to fly. You do not have this in Putin's Russia or other autocratic countries, but you have it in the free Europe, in the US, and many other free countries in the world. The pilots and aviation companies of the Ukraine also enjoyed this freedom in recent years. Many of them will not be able to be at AERO in Friedrichshafen, Germany. Those who do make it, like the Kiev company AEROS, or Flight Design (who manufactures their aircraft in Cherson/Ukraine) are supported by the AERO exhibition management to show their products despite production temporarily stopped.

For those pilots who have the chance and privilege to be at AERO expo in Friedrichshafen from the 27th to the 30th of April—enjoy it! There are many new e-aircraft to discover. For example, more and more electric trainer aircraft. Pipistrel, which is now owned by Textron Aviation, will display their CS-LSA trainer Velis. Also e-trainers are heading into other aircraft classes. They fly for example as UL (with 600 Kg MTOW), as CS-23, and CS-22 motorgliders. In the UL-section the Elektra Trainer from Elektra Solar will have its show premiere. The Pureflight Phenix will be present as well. In EASA part 23 the eDA0 from Diamond, Bristells Energic, and Flight Designs F2e (a fuel cell version is planned as well) will be on display. In the same Part 23 class the H3PS hybrid project of Rolls-Royce (together with Tecnam and Rotax) is flying now and can be seen at the AERO for the first time. The EU Horizon 2020 research project is developing the first parallel hybrid powertrain for a General Aviation, 4-seat aircraft.

More e-flight premiers

There are more impressive e-newcomers at the show: The eMagicOne, the first "Lift and Cruise eVTOL", which fits in the German Ultralight class. And the Hybrid eCOMMUTER Proof of concept Cassio1 from VoltAero. The latter one is supposed to arrive in Friedrichshafen in flight. VoltAero

CEO Jean Botti CEO will give an update of the program in the fixed wing session of the e-flight-Expo Forum like many other e-Manufacturers. Another debut at the show, the famous Hy4, Professor Kallo's fuel cell 4-seat aircraft, is now flying passengers in a fuel cell aircraft for the first time. It can be seen flying in Friedrichshafen and be located at the e-Flight-Expo hall A-7.

Sustainable Aviation Trail

A little side note with eAviation: although engineers have been trying to teach us for years that it is more accurate to indicate the power of an engine in kilowatts and not in horsepower, we still love HP. Here the AERO with more electric aircraft than ever, it will pave the way because e-Motors are measured in kW. This year you will find steps to the sustainable aviation of the future not only in the e-flight-hall A-7, but in nearly in all other halls as well. That's why the AERO show makers created a Sustainable Aviation Trail (SAT) which is marked by Green Balloons with the SAT logo at each e-Exhibit. Start point is our e-flight-Expo booth in Forum E(ast) next to the e-Magic-Exhibit and the main forum stage. More details in the SAP – Map on page 18 and 19 in this Special.

You also can meet us at the e-flight-Journal main booth, like every year in the A-7 Hangar (Booth 100), right next to the Cassio 1. Here you receive more e-news from the eVTOL scene: Vertical Aerospace will show its lift system (at the Rolls-Royce booth), and Samad Aero from UK will show details from its eVTOL at the booth of MGM Compro. By the way: due to COVID there are no ticket-sale on site. You have to buy the tickets on the AERO website: www.aero-expo.de.

Final Note

Certainly the pessimists are right. In the next years there will be a price increase in aviation as well, especially for fuel. General aviation will become more expensive. The optimists will see the other side, the significant price increase from the Russian initiated Ukraine war, will force us to move away faster from fossil fuel energy. So it's paving the way to more sustainably in aviation.

Looking forward to see you at the AERO.

Willi Tacke



Cover eFlight Journal
2-2022 / AERO SPECIAL
Cover Images: eMagicNext
(large); Voltaero Cassio1.



We the **eFlight Journal** (eFJ) founders are a team of aviation journalists and enthusiasts who created Flying-Pages. Publishing several aviation publications around the world. It started with the interest in electric flying in 2009.

We co-founded the e-flight-Expo in Friedrichshafen/Germany as part of the AERO, and established it as the largest show for electric aviation worldwide.

The eFJ is supported by the GAMA EPIC committee, FACC, Rolls-Royce, Rotax and many others.

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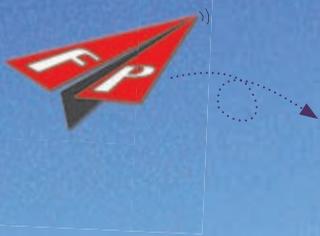
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Neues von der AERO

Autoflight X 600

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eVTOL in der ULM-Klasse

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2021-2022

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e-FLIGHT EXPO

e-VTOLs, e-Trainers



Since over 10 years the e-flight EXPO at the AERO shows the most interesting developments from eVTOLS e-Trikes to e-Gyros, e-helis to e-training aircraft and e-Commuters. Although many new developments are now taking place in the heavier aircraft classes, there are also some interesting innovations in the ultralight area.

SUSTAINABLE AVIATION TRAIL

At the beginning of the e-flight-Expo, the electric planes and developments still fit into the West Forum area. Then they moved to Hall A7. There are now suppliers of products and aircraft in the field of climate-neutral ecological flying in almost all exhibition halls. Therefore, AERO created the "Sustainable Aviation Path", which leads interested visitors to the relevant manufacturers. The starting point is in Forum East. There you can not only see the eVTOL highlight of the fair, the eMagicOne, on the large lecture stage, but also the starting point of the "sustainability path". It is - like all e-exhibitors - marked with a big green balloon.

EMAGICONE--THE UL EVTOL

The single-seater eVTOL from eMagic fits into the German UL category and would even comply with the UL weight limit in France with a reduced battery pack. But since multi-motor flying is not allowed in the French UL class, the eMagicOne is not allowed to take off from our neighbor. In Germany, however, it is UL approved and tested, although the approval is currently only valid for takeoff and flying in conventional flight mode. Manned hover flights will be conducted at a later stage. The eMagic One is the first legal UL in lift and cruise design. This means that there are separate motors for vertical takeoff and landing and another motor that provides the necessary thrust for horizontal flight, in which lift is generated by the wing surfaces. www.emagic-aircraft.com

ELECTRIC TRAINING AIRPLANE

In addition, there are several electric two-seaters in conventional aircraft configurations aimed at the flight training market. In addition to the PipistrelVelis, which is certified as CS-LSA and already shown at AERO 2019, there are also new training machines in the German UL class: The Elektra trainer from the German company Elektra Solar (www.elektro-solar.com) and the U15E



& e-Commuters



Voltaero Cassio 1

ONIX from Czech company Pure Flight, which took over all aircraft from Phönix Aircraft (<https://www.pure-flight.eu>). On both aircraft, the two seats are arranged side by side. Both have a motor glider design that allows flight times of up to two hours thanks to good gliding performance and minimal sink rate. "Due to our very efficient and lightweight design, we will even offer a version for the French UL class with 525 kg MTOW", says Elektra Solar founder and e-Flight pioneer CalinGologan. "This aircraft will have fewer batteries, but will still be able to fly for more than an hour because our energy consumption when cruising is very low."

Also on display in Friedrichshafen will be BRM's BristellEnergic, which is aiming for EASA Part 23 class (www.bristell.com), as well as the Diamond eDA 40 trainer (www.diamondaircraft.com) and the F2e by Flight Design (www.flightdesign.com). While BristellEnergic, Flight Design F2e and PipistrelVelis are based on ultralights, they all have a higher MTOW than the underlying ULs due to their heavy battery packs. Flight Design will even show the F2e in a version with a fuel cell designed by Kasaero as the power source.

IMPORTANT SUPPLIER COMPANIES

On the supplier side, these companies will be present at the e-flight Expo:

MGM Compro, which not only supplies the engine and the complete electrics for Pure Flight, but is also involved in more than 20 e-flight projects (www.mgm-compro.com).

Also in the e-flight hall A7 will be the German company



Pureflight φNIX

Geiger, which not only supplies the forward flight motor for the eMagic, but also the drive for the Small AERO Ultralight Trike. In addition, Geiger is involved in some other developments- such as the Ikarus C42-Electric. (www.geigerengineering.de)

E-COMMUTERS IN APPROACH

While several electric trainers are getting ready for use the next category of electric Aircraft is getting ready like Tecnam's pVolt or Ampaire's EEL. With VoltAero Cassio 1, the first commuter will arrive to this year's e-flight-expo in flight and also the Hy 4 the fuel cell 4-seater will pay a visit to the world's largest General aviation show.

EVTOLS FROM UK

With Vertical and Samad two manufacturers of eVTOLs from UK show info on their Products They can be seen at their propulsion suppliers, Vertical Aerospace at Rolls-Royce and Samad at MGM Compro. ✓



Panel discussions at the e-flight-expo @ AERO unite the leaders of electrical Aviation from around the world.

PANELS & e-FLIGHT EXPO

Like every year a conference during the e-flight-expo is giving an overview how the developments in the different fields of electric aviation is progressing. An internal conference of the GAMA Epic committee on April 26th, the day before the show, helps to coordinate international activities among the manufacturers.

Wednesday April 27th

EVTOL "PLAYERS IN EUROPE"

Efex-forum 1: 13.00 -13.55 o'clock

eAERO Conference Stage East

Key Players and some "New Kids on the block" gives some insights of the News on development of eVTOL in EUROPE. Each player gives a short introduction on his Activities in Europe in the eVTOL field followed by a Panel discussion with Q&A .

Participants:

- eMagicAircraft - Michael Kugelgen CEO
- AutoflightEurope - Mark R Henning CEO
- Samad Aerospace -DR SEYED MOHSENI CEO
- Wisk AERO - Tom Gunnarson - Government Relations

PROPULSION – & ENERGY SOURCE

Efex-forum 2: 15:00 -16:15 o'clock

eAERO Conference Stage East

A certified e-Propulsion-System together with its power source are the core elements for all airborne e-mobility. Established aviation Companies, Startups and Research in-

stitutes work in this field gives an overview on the latest developments in Propulsion and energy source. The panelist Each gives a short introduction on his Activities followed by a Panel discussion with Q&A .

Participants:

- APUS - Philip Scheffel - CEO:
Fuel cell Aircraft development and Hydrogene Storidge
- Rolls-Royce Electrical - Dr. Qinyin Zhang:
Gas turbine-Generator - as energy source for e Commuters
- HyFly - Kai Kemke & Peter Stadthaler
(Project Managers): Hydrogen Systems for Sustainability Powered Light Aircraft .
- DLR - Prof. Dr. Lars Enghardt, Institut für Elektrifizierte Luftfahrtantriebe:
New research capacities for airborne electric propulsion
- MGM Compro - Martin Dvorsky ,CEO:
Sizing E-propulsion for different aircraft types
- VFS – Ken Schwartz, Director VFS: Overview on e-Flight propulsion & energy Source from the US market.
Host: Flying pages Willi Tacke

Thursday April 28th

ENABLERS FOR E-AVIATION

Efex-forum 3: 15:00- 16:25 o'clock

eAERO Conference Stage East

Everybody talks about the Vehicles for Urban air Mobility . But Before the services can take place a lot of other details must be solved. Large Industry players as well as startups



Professor Florian Holzzapfel of the Technical University Munich gives an update on their latest eVTOL test programs.

describe their approaches in the different field followed by a Panel discussion with Q&A .

- Bosch GA - Tony Jager-Angelo, Director US
- FACC - Christian Mundigler, VP: UAM Certified composite structures for eVTOL and ways to certification
- Rolls-Royce - Dr. Stefan Breunig (Rolls-Royce Electrical) und Carolin Käufer (Rolls-Royce Power Systems)
- UAM- Airport – Charging infrastructure
- Skyroads - Corvin Huber, CEO:

Developing the ATC for UAM

- TUM - Prof. Florian Holzzapfel

Fly by wire systems and research infrastructure for lift and cruise concepts.

- Theion - Dr. Ulrich Ehmes CEO -Solid-state batteries on lithium-sulfur basis Solution also in eAviation?
- ITK Wolfgang Leidl - certified eAircraft software



The hybrid eGenius at Klaus Ohlmann A7 -203.



The new founded DLR -Institut Alectric Aviation Propulsion Systems and the BTU Cottbus explain their research, focus A5 - 301.

Friday April 29th

FIXEDWINGEIRCRAFT: FROM TRAINER TO COMMUTER

Efex-forum 5: 13:45 - 15:00 o'clock

After the Velis was certified as the first e-trainer in the CS VLA class in 2020 now at the next AERO 2022 several manufacturers are ramping up for trainers in different classes, from Ultralight to CS 23, but also in the next larger category - the small 6-seaters and eCommuters.

- Electra Solar - Electra Trainer - Calin Gologan CEO /
- Diamond Aircraft - eDA - 40 Maarten Frijling CTO
- BRM Aero Energic /- CEO Andre Borschberg H55 /
- Tecnam P-VOLT - H3PS - CTO Fabio Russo
- Voltaero Cassio - CEO Jean Botti
- Green flyway Sweden - Director Hans Dunder



First Airrace E plane at AERO die cassutt of the University of Nottingham at the booth of Kasaero in A7-105.

Saturday April 30th.

INTRODUCTION OF DLR -INSTITUT ELECTRIC AVIATION PROPULSION & B-TU COTTBUS

Efex-forum 6 10:00 -11:00 o'clock

Conference Stage East

- Prof. Dr. Höschler (BTU – CESCO),
- Prof. Dr. Möhlenkamp (BTU - CESCO)
- Prof. Enghardt (Head of the new DLR -Institut electric aviation Propulsion systems)

PULITZER ELECTRIC AIRCRAFT RACE

Efex-forum 7 11:00 -11:45 o'clock

Conference Stage East

- Klaus Ohlmann - record pilot and team leader.

E-FLIGHT-EXPO AWARD

Efex-forum 7 11:35 -11:45 o'clock

Conference Stage East

Award of the e-flight-expo prize 2022



FACC is reporting in the Panel on their collaboration with different eVTOL manufacturers like eHang in certification.



MORE E-CONFERENCES

<p>Wednesday, 27. April 2022 11:00 - 13:00 o'clock AERO Conference Stage Foyer West</p>	<p>GREENER SKIES AHEAD - THE FUTURE OF REGIONAL AVIATION</p>																						
<p>Wednesday, 27. April 2022 11:00 - 13:00 o'clock AERO Conference Stage Foyer West</p>	<p>IASA CONFERENCE -GREENER SKIES AHEAD THE FUTURE OF REGIONAL AVIATION PIONEERING SUSTAINBLE AIR TRANSPORT</p> <table border="1"> <tr> <td>Greetings and Introduction</td> <td>Ralf Nolting, Director Conferences, IASA</td> </tr> <tr> <td>Sustainable Mobility and the Future of Regional Aviation</td> <td>Rudolf (Rolf) Doerpinghaus, President, IASA</td> </tr> <tr> <td>Deutsche Aircraft D328eco - A Platform to Shape the Future of Regional Air Transport</td> <td>NN, tbc</td> </tr> <tr> <td>Pioneering Electric Aviation In 10 Years from Elektra One to the Scylax E10</td> <td>Calin Gologan , CEO and Founder Elektra Solar GmbH</td> </tr> <tr> <td>Regional Air Traffic Today and Tomorrow</td> <td>Prof. Dr. Hansjochen Ehmer , International University Bad Honnef</td> </tr> <tr> <td>Towards a Climate-Friendly Future of Business Aviation</td> <td>Andreas Mundsinger , CEO, German Business Aviation Association GBAA</td> </tr> <tr> <td>Powered by Hydrogen H2FLY - Emission-Free Flying</td> <td>Prof. Dr.-Ing. Josef Kallo , Founder and CEO H2FLY</td> </tr> <tr> <td>Certified Sustainability as Guideline Towards a Thriving Future of Aviation</td> <td>Michael Wühle, Senior Vice President, IASA</td> </tr> <tr> <td>Outlook and Closing Remarks</td> <td>Ralf Nolting, Rudolf (Rolf) Doerpinghaus</td> </tr> </table> <p>Preliminary program as of March 24, 2022 Notice: Program and times subject to change. Conference language: English</p>		Greetings and Introduction	Ralf Nolting, Director Conferences, IASA	Sustainable Mobility and the Future of Regional Aviation	Rudolf (Rolf) Doerpinghaus, President, IASA	Deutsche Aircraft D328eco - A Platform to Shape the Future of Regional Air Transport	NN, tbc	Pioneering Electric Aviation In 10 Years from Elektra One to the Scylax E10	Calin Gologan , CEO and Founder Elektra Solar GmbH	Regional Air Traffic Today and Tomorrow	Prof. Dr. Hansjochen Ehmer , International University Bad Honnef	Towards a Climate-Friendly Future of Business Aviation	Andreas Mundsinger , CEO, German Business Aviation Association GBAA	Powered by Hydrogen H2FLY - Emission-Free Flying	Prof. Dr.-Ing. Josef Kallo , Founder and CEO H2FLY	Certified Sustainability as Guideline Towards a Thriving Future of Aviation	Michael Wühle, Senior Vice President, IASA	Outlook and Closing Remarks	Ralf Nolting, Rudolf (Rolf) Doerpinghaus			
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Climate-friendly transformation of Decentralised Aviation – a general overview and our expectations to the policy makers.	Andreas Mundsinger Geschäftsführer GBAA	11:10 - 11:30																					
Panel discussion	Host Volker Thomalla	11:30 - 11:50																					

<p>Thursday, 28. April 2022 14:30 - 15:15 o'clock BOSCH AVIATION Conference Center East, Room Paris</p>	<p>ADVANCED AUTOMOTIVE ENGINEERING AND MANUFACTURING SOLUTIONS AS ENabler FOR AEROSPACE-BOSCH AVIATION</p> <p>Zero emission mobility as a common goal across the industries - whether on the road, in the air or in space - motivates us to develop advanced engineering and manufacturing solutions for the future. We believe that it is key to utilize synergies across these industries to speed up and to enable the technological transition. We will focus on the benefits, potentials and hurdles for future aerospace solutions based on our experience in different product areas and projects as fuel cell peripheral components, automotive based high precise micro-electronics, advanced adhesive manufacturing processes and advanced electronic manufacturing solutions.</p>
<p>Thursday, 28. April 2022 15:00 - 15:30 o'clock AERO Conference Stage Foyer West -</p>	<p>DREHMOMENTWERKZEUGE FÜR DIE LUFTFAHRT Stahlwille supported by aerokurier</p>
<p>Thursday, 28. April 2022 15:15 - 15:45 o'clock Conference Center East, Room Lissabon</p>	<p>XAEROS HYBRID-ANTRIEB FÜR DIE GENERAL AVIATION Speaker: Hans Schwöller XAEROS AvioPower GmbH</p>
<p>Thursday, 28. April 2022 15:30 - 16:30 o'clock BOSCH AVIATION Conference Center East, Room Paris</p>	<p>ADDITIVE MANUFACTURING – PROCESS CHAIN OF THE FUTURE BOSCH AVIATION</p> <p>Aviation and Space industry has growing demand for application specific parts made with additive manufacturing processes. 3DPSPACE is offering a build2print service to support this development. Accompanying the additive process, additional postprocess steps enable an innovative service, offering a complete quality chain from testing production materials, simulations of buildjobs as well as final quality checks to ensure steady production of small to midsize batch sizes Speaker: Dr. Tobias Kolb</p>
<p>Thursday, 28. April 2022 16:00 - 17:00 o'clock Conference Center West, Room Schweiz</p>	<p>DRIVETRAIN TO FLYTRAIN - WHAT ELECTRIC AVIATION CAN LEARN FROM THE AUTOMOTIVE INDUSTRY Speaker: Tobias Kahnert</p>
<p>Friday, 29. April 2022 11:15 - 11:45 o'clock Conference Center East, Room Lissabon</p>	<p>XAEROS HYBRID-ANTRIEB FÜR DIE GENERAL AVIATION Speaker: Hans Schwöller XAEROS AvioPower GmbH</p>

Subject to change. Date: April 14, 2022

E-FLIGHT-EXPO AWARD



As has been the case for twelve years, the coveted e-flight award will be presented again in 2022. The ceremony will take place on Saturday at 11:45 a.m. on the stage in the forum of the foyer east.

The 2019 e-flight-expo Award winner was the Team Autoflight from China and Germany.





HY4, the technology demonstrator of fuel cell passenger airplane, made the first flight on September 29, 2016.



(photo credit: H2FLY)

Is this the dawn of the first hydrogen airline?

A new milestone in human flight was achieved in Germany on September 29, 2016 when HY4, a four-seat airplane powered by hydrogen fuel cells, took off from Stuttgart Airport for its first flight and stayed airborne for 10 minutes. Since HY4 has more than one seat, it literally can be called the world's first passenger aircraft powered by a hydrogen fuel cell system. Down the road, the team is partnering with Deutsche Aircraft to develop a hydrogen-powered Dornier 328, a 40-seat aircraft covering up to 2000 km, by 2025.

HY4 is a combination of two Pipistrel Taurus G4 motorglider fuselages, connected by a common central-wing section on top of where the propulsion unit is located. The unique design gives it high efficiency and long flight duration.



A concept design of the hydrogen fuel cell-powered commuter airplane by H2FLY. The team leader Prof. Josef Kallobelieves that a 40-seater aircraft powered by hydrogen is technically feasible and could carry passengers over 600 miles at speeds of more than 250 mph. (photo credit: H2FLY)



A team led by Prof. Josef Kalló from the DLR Institute of Engineering Thermodynamics at the German Aerospace Center has been developing HY4's powertrain and worked with industry and research partners Pipistrel, H2FLY, The University of Ulm, and Stuttgart Airport to make its maiden flight in 2016, a reality. The DLR researchers developed the Hydrogenics hydrogen fuel cell powertrain and installed it in the aircraft. The aircraft was built by the Slovenian airplane manufacturer Pipistrel, and consists of two Pipistrel Taurus G4 motorglider fuselages connected by a common central-wing section on top where the propulsion unit is located. It consists of an 80 kw electric motor with the propeller in front and three low-temperature hydrogen fuel cells behind. The hydrogen is carried in two high-pressure tanks made of carbon fiber, located in each of the two fuselages just at of the passenger cabin. HY4, as a technology demonstrator, can fly at a cruising speed of 145 km/h and maximum speed of ap-

proximately 200 km/h. Its range varies from 750 km to 1,500 km, depending on the speed, load and altitude parameters. The empty weight of HY4 without the fuel cell, battery, and storage system is approximately 630 kg, whereas the maximum weight is 1,500 kg. With the success of HY4, the team aimed for more ambitious goals. In 2021, H2FLY the managerial body of HY4 project, secured a large funding both through a strategic investor and a wide range of government backed research grants. A sixth-generation fuel cell engine, powering the latest HY4 model, was designed by Josef Kalló and his team. Despite the difficult circumstances, the modified HY4 took off on November 6, 2020, in Slovenia, towards a new horizon of commercial prospect. Now a team of over 40 led by Johannes Hartmann called EXACT (Exploration of Electric Aircraft Concepts and Technology) has been working on new efficient, eco-friendly commercial airplane technology at the DLR Systems Engineering Institute. Research-

The 80 kw electric power system powered by hydrogen fuel cell on the initial HY4 demonstrator.



EDNY: N 47 40.3 E 009 30.7



H2FLY is partnering with Deutsche Aircraft to develop a hydrogen-powered Dornier 328, a 40-seat aircraft covering up to 2000 km, by 2025. (photo credit: H2FLY)

ers from 20 different DLR organizations aim to bring a 70-passenger aircraft with a 2,000-kilometer range to technological maturity by 2040. H2FLY and the partners intend to develop and validate a fuel cell powertrain's functionality for a Dornier 228 airplane with an electric MTU propeller engine providing over 500 kilowatts of power. The Do-228 demonstrator's maiden flight could take place in 2026.

Many industry experts believe that fuel cells utilizing sustainably produced hydrogen offer the greatest long-term potential for realizing emissions-free aviation, especially for regional, short- or medium-distance aircraft. According to Prof. Kallo, it is only a matter of time before aircraft with a capacity of six to 10 passengers will transport people over distances of 600 miles at 190 mph. Kallo said calculations have shown that a 40-seater aircraft powered by hydrogen is technically feasible and could carry passengers over 600 miles at speeds of more than 250 mph. ✓

Visionary plans: Josef Kallo does not only want to develop a 40-seater with 2000 km range but as well a fuel cell driven eVTOL and business aircraft.



air taxi

4-6 passengers with ranges well over 500km



business aircraft

19 seat aircraft with ranges up to 1500km

We aim for commercial introduction of our zero-emission powertrain within this decade

2021	Flight tests 110kW prototype Hy4 System integration and component development
2023	Maiden flight of 300 kW system Flight testing of pressurized fuel cell and liquid hydrogen on Hy4 platform
2025	Ground tests of 1,5 MW system Scaling of propulsion system
2026	Maiden flight of H2-electric Do328 Demo of propulsion system capability to power 40 Seat aircraft and cover 2.000km range
2028	Commercialization Certification, Product development, and go-to-market

info@h2fly.de | www.h2fly.de



E-Starling from Samad Aerospace



An exciting concept comes from UK this year to AERO for the first time: Seven occupants and a range of 1000 Kilometers as a Hybrid version. A 50 % Cargo Drone with a similar concept successfully flew in the last year. The company began marketing the drone and said they started the manned version certification.



EDNY: N 47 40.3 E 009 30.7



Dr. Seyed Mohseni and his eStarling (photo above): the 50 % scaled prototype which uses the same concept, made his maiden flight last year in March (small photo middle). The final aircraft should be capable of vertical and/or STOL take-offs.

Another eVTOL from Samad Aerospace will be for the first time at e-Flight-Expo @ AERO. The company does not have a booth but will show some details at the booth of MGM Compro (Hall/Stand No. A7-401). The Czech company is developing the propulsion and lift system together with them.

Dr. Seyed Mohseni founded Samad Aerospace in 2017 in the UK. The technology start-up wants to create an electric vertical take-off and landing (eVTOL) and hybrid-electric VTOL passenger aircraft for Urban Air Mobility. A cargo version is planned as well. Seyed Mohseni is a serial entrepreneur who has founded several businesses. He holds an MSC in Aerospace Propulsion (Cranfield University), an MBA, and a doctorate in Gas Turbine Technology (Cranfield University). The Starling Cargo S5M is a sub-scale (half-size) eVTOL air cargo demonstrator aircraft for remote and piloted use. The 50 % sub-scale demonstrator, which flew in 2021, is used to test the

aircraft's aerodynamics, flight control systems, the handling quality of the plane (in VTOL, transition, and forward flight) and validate all of its technology. The VTOL concept has 2 tilted fans and 2 additional lift fans in the wings, which are closed in wingborne flight. After the proof of concept was flying in a lift and horizontal mode, the company wants to develop the final certified aircraft in four years. The final product, the 7- seated e-Starling, should be on the market in 2026 when everything follows the plan. ✓



AERO Sustainable Aviation Trail



“Sustainable Aviation” is the main topic at AERO Friedrichshafen 2022, which is why we have created the AERO Sustainable Aviation Trail for the first time. An essential part of this is our proven e-flight-expo in Hall A7 with many exhibitors from the field of electric flight. However, not only electric aviation, but also topics such as alternative fuels e.g. bio-fuel and PtL (power-to-liquid), lightweight construction, hybrid propulsion as well as new and more efficient manufacturing technologies lead to more sustainability in aviation and will be addressed at the upcoming AERO.

On this path, we would therefore like to make the variety of topics on the entire venue visible during the 4 days of the show linked to sustainable aviation. In addition

to exhibitors with corresponding products and services, we also want to include conferences on these topics in the AERO Sustainable Aviation Trail and make them visible.

On the next pages you will therefore find the relevant exhibitors and conference topics bundled together. You can also download our AERO trade show app - there will also be a separate section for the AERO Sustainable Aviation Trail.

On site, all participating stands will be marked with a corresponding balloon on which the AERO Sustainable Aviation Trail logo is clearly visible.

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Telephone: +49 2225 888713 | Fax: +49.2225 888710



Companies at the SAT

A6-201 Garmin International, Inc.
 A6-209 AURA AERO
 A6-301 Porta Air Service

A5-113 IDRF e.V.
 A5-129 Aerobility
 A5-211 Luftfahrt- Bundesamt
 A5-218 General Aviation Manufacturers Association (GAMA)
 A5-226 UAV DACH e.V.
 A5-235 XAEROS AvioPower GmbH
 A5-300 EASA - European Union Aviation Safety Agency
 A5-301 Brandenburgische TU Cottbus-Senftenberg
 A5-301 Cotesa GmbH
 A5-301 DLR Institut für Elektrifizierte Luftfahrtantriebe
 A5-301 Innovence Airport Systems GmbH
 A5-301 X2E Aerospace Technologies GmbH
 A5-305 Air BP Limited
 A5-309 RED aircraft GmbH



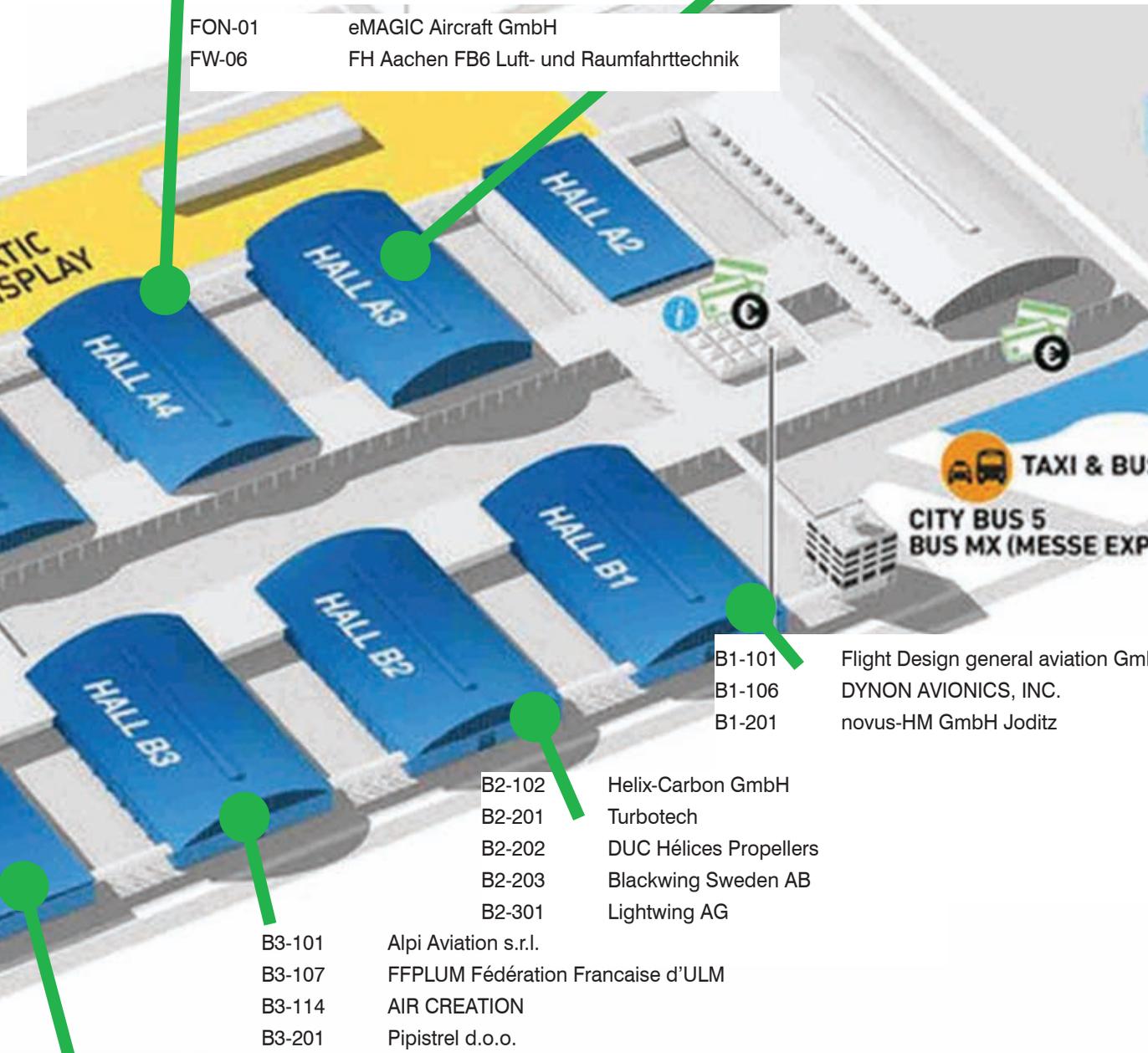
A7-100 Flying Pages GmbH
 A7-101 Voltaero
 A7-103 Deep Blue Aviation Meder & Partner
 A7-105 Kasaero GmbH / Hyfly
 A7-110 Bosch General Aviation Technology GmbH
 A7-110 FACC
 A7-110 Autoflight Europe
 A7-127 SONG-Electro Martin Steffen
 A7-129 H2Fly GmbH
 A7-201 Rolls-Royce Deutschland Ltd & Co KG
 A7-203 Ohlmann, Klaus
 A7-209 inspire AG c/o e-Sling
 A7-210 Verein Electrify-In Switzerland Sandra Dubach
 A7-211 AdvanTec GmbH
 A7-212 Skywalker Paramotors Europe
 A7-213 LZ design d.o.o.
 A7-301 APUS Aviation Engineering
 A7-303 Lehrstuhl für Flugsystemdynamik TU München
 A7-305 A.I.R. & Co. GmbH
 A7-305 Geiger Engineering GmbH
 A7-311 BRM AERO, s.r.o.
 A7-311 H55 S.A.
 A7-401 MGM COMPRO s.r.o.
 A7-403 Elektra Solar GmbH
 A7-403 SilentWings GmbH
 A7-403 TQ Systems GmbH



- A4-103 Leichtwerk AG
- A4-103 [ardey : felsch]
- A4-120 Diamond Aircraft Industries GmbH
- A4-126 CAMOTOOL SOFT SL
- A4-319 Costruzioni Aeronautiche Tecnam S.p.A.

- A3-101 Atlas Air Service AG
- A3-109 TotalEnergies Marketing Deutschland GmbH
- A3-116 Hartzell Propeller Inc.
- A3-205 BRP-ROTAX GMBH & CO. KG
- A3-209 Avionik Straubing GmbH
- A3-210 MT-Propeller Entwicklung GmbH
- A3-303 Continental Aerospace Technologies

- FON-01 eMAGIC Aircraft GmbH
- FW-06 FH Aachen FB6 Luft- und Raumfahrttechnik



- B1-101 Flight Design general aviation GmbH
- B1-106 DYNON AVIONICS, INC.
- B1-201 novus-HM GmbH Joditz

- B2-102 Helix-Carbon GmbH
- B2-201 Turbotech
- B2-202 DUC Hélices Propellers
- B2-203 Blackwing Sweden AB
- B2-301 Lightwing AG

- B3-101 Alpi Aviation s.r.l.
- B3-107 FFPLUM Fédération Française d'ULM
- B3-114 AIR CREATION
- B3-201 Pipistrel d.o.o.

- B4-100 Deutscher Ultraleichtflugverband (DULV) e.V.
- B4-102 LAA CR - Light Aircraft Association of the Czech Republic
- B4-113 Deutscher Aero Club e.V.
- B4-201 AVI srl



Companies in alphabetic order at the SAT

Company	Hall, booth No		
[ardey : felsch]	A4-103	Geiger Engineering GmbH	A7-305
A.I.R. & Co. GmbH	A7-305	General Aviation Manufacturers Association (GAMA)	A5-218
AdvanTec GmbH	A7-211	H2Fly GmbH	A7-129
Aerobility	A5-129	H55 S.A.	A7-311
Air BP Limited	A5-305	Hartzell Propeller Inc.	A3-116
AIR CREATION	B3-114	Helix-Carbon GmbH	B2-102
Alpi Aviation s.r.l.	B3-101	IDRF e.V.	A5-113
APUS Aviation Engineering	A7-301	Innovence Airport Systems GmbH	A5-301
Atlas Air Service AG	A3-101	inspire AG c/o e-Sling	A7-209
AURA AERO	A6-209	Kasaero GmbH	A7-105
AVI srl	B4-201	LAA CR - Light Aircraft Association of the Czech Republic	B4-102
Avionik Straubing GmbH	A3-209	Lehrstuhl für Flugsystemdynamik TU München	A7-303
Blackwing Sweden AB	B2-203	Leichtwerk AG	A4-103
Bosch General Aviation Technology GmbH	A7-110	Lightwing AG	B2-301
Brandenburgische TU Cottbus-Senftenberg	A5-301	Luftfahrt- Bundesamt	A5-211
BRM AERO, s.r.o.	A7-311	LZ design d.o.o.	A7-213
BRP-ROTAX GMBH & CO. KG	A3-205	MGM COMPRO s.r.o.	A7-401
CAMOTOOL SOFT SL	A4-126	MT-Propeller Entwicklung GmbH	A3-210
Continental Aerospace Technologies	A3-303	novus-HM GmbH Joditz	B1-201
Costruzioni Aeronautiche Tecnam S.p.A.	A4-319	Ohlmann, Klaus	A7-203
Cotesa GmbH	A5-301	Pipistrel d.o.o.	B3-201
Deep Blue Aviation Meder & Partner	A7-103	Porta Air Service	A6-301
Deutscher Aero Club e.V.	B4-113	RED aircraft GmbH	A5-309
Deutscher Ultraleichtflugverband (DULV) e.V.	B4-100	Rolls-Royce Deutschland Ltd & Co KG	A7-201
Diamond Aircraft Industries GmbH	A4-120	SilentWings GmbH	A7-403
DLR Institut für Elektrifizierte Luftfahrtantriebe	A5-301	Skywalker Paramotors Europe,	A7-212
DUC Hélices Propellers	B2-202	SONG-Electro Martin Steffen	A7-127
DYNON AVIONICS, INC.	B1-106	TotalEnergies Marketing Deutschland GmbH	A3-109
EASA - European Union Aviation Safety Agency	A5-300	TQ Systems GmbH Patrick Schrot	A7-403
Elektra Solar GmbH	A7-403	Turbotech	B2-201
eMAGIC Aircraft GmbH	FON-01	UAV DACH e.V.	A5-226
FFPLUM Fédération Francaise d'ULM	B3-107	Verein Electrifyfly-In Switzerland Sandra Dubach	A7-210
FH Aachen FB6 Luft- und Raumfahrttechnik	FW-06	Voltaero	A7-101
Flight Design general aviation GmbH	B1-101	X2E Aerospace Technologies GmbH	A5-301
Flying Pages GmbH	A7-100	XAEROS AvioPower GmbH	A5-235
Garmin International, Inc.	A6-201		



HALL A2

Drones for Emergency and Rescue Services

HALL A3

Business Aviation, General Aviation, Services, Equipment

HALL A4

Business Aviation, General Aviation, Services, Equipment

HALL A5

General Aviation, ENGINE AREA, Maintenance, Propulsion Systems, Pilot Supplies

HALL A6

Avionics, Cockpit and Onboard Systems, Flight Simulation

HALL A7

Flying-Pages & e-flight-expo, e-VTOL, General Aviation



HALL B1

UL, VLA, LSA

HALL B2

UL, VLA, LSA, AEROKunst (Art Exhibition)

HALL B3

UL, VLA, LSA

HALL B4

Gyrocopters, DAeC, DULV, Idaflieg

HALL B5

Helicopter Hangar

STATIC DISPLAY

Business Aviation, Second hand aircraft

FOYER WEST

AERO Conference Center West, Be a Pilot, MRO Area

FOYER EAST

AERO Conference Center East

PASSAGE EAST

General Aviation

Subject to change.



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H3PS- the first parallel hybrid electric airplane took off



*H3PS airplane
is based on
Tecnam's
single-engine
four-seat P2010*

Tecnam Aircraft, in collaboration with Rolls-Royce and Rotax specialized teams, successfully flew the H3PS hybrid aircraft for the first time on 21 December, 2021. The flight was performed by Tecnam's Chief Experimental Test Pilot Lorenzo De Stefano, with Tecnam, Rolls-Royce and Rotax Teams on the ground. The Permit to Fly was issued by ENAC, the Italian Civil Aviation Authority.

H3PS stands for “High Power High Scalability Aircraft Hybrid Powertrain”. It is a project funded in 2018 under the European Union Horizon 2020 research and innovation program. With H3PS’ success, Tecnam Aircraft and project partners have validated the aircraft’s scalability potential, lower emissions, state of the art power management technology, building a viable launchpad for future green aircraft models.

According to Tecnam R&D Director Fabio Russo, H3PS is not intended for market purposes. The H3PS demonstrator airplane served as a validation tool and launchpad for Tecnam Aircraft and its project partners, who are now focused on expanding their sustainability efforts.

H3PS is converted from Tecnam P2010 single-engine four-seat airplane. The airplane is normally powered by a 180 hp Lycoming IO-360 combustion engine, but the H3PS demonstrator is converted to a 104 kW Rotax 915iS engine coupled with a 30 kW Rolls-Royce electric motor, totaling 134 kW (180 hp) powertrain in a fully integrated parallel hybrid configuration. As such, H3PS aircraft is first of its kind of parallel hybrid electric airplane.

According to Tecnam Aircraft R&D Director Fabio Russo, the H3PS successful flight test demonstration marks a major milestone on the aviation industry’s journey to-

wards de-carbonization and R&D on alternative powertrains because the flight tests demonstrate that hybrid powertrain, with combustion engine coupled with an electric motor, can bear the same useful load of the traditional 180 hp combustion engine.

According to Rob Watson, President of Rolls-Royce Electrical, Rolls-Royce Electrical will continue to build capabilities in delivering all-electric and hybrid-electric power and propulsion systems for the advanced air mobility market. Rolls-Royce is committed to investing in the technology solutions to enable and deliver sustainable aviation.

According to Michael Dopona, Head of design Organization BRP-Rotax, the tests showed that there are still challenges to take up, but the project showed that the joint venture lead to very interesting and future-orientated results for innovative propulsion systems.

As an EU-funded research project, H3PS has limits of duration and budget and is thus more for research and technology demonstration purposes rather than for commercial use. However, as the participating partners of the project mentioned, the technology and experiences obtained from H3PS will be transferred to other application which are intended for commercial use. Tecnam’s P-Volt is such case.



part of the H3PS project team with the demonstrator airplane.



AERO19 H3PS Conference: Rotax Marc Becker, Fabio Russo (Tecnam), Frank Anton (former Head Siemens eAircraft), Gergely Gyorgy Balazs (RR former - Siemens), Willi Tacke (efJ)

Last October TECNAM announced a partnership with Rolls-Royce and major worldwide aviation players, including North American and European airlines for the development of the P-Volt: an all-electric, twin electric motor, Short and Medium Range passenger aircraft, designed for maximum versatility and safety, powered by renewable energy. The P-Volt will be the first commercial 9 passengers, cargo, medical evacuation and special mission aircraft to be electrified directly by the manufacturer, raising TECNAM's 'DREAM concept' (Durability, Reliability, Employability, Affordability & Manageability) to a new, unrivalled level of efficiency. The P-Volt will benefit from TECNAM's design experiences and client base of its 11-seat P2012 Traveler twin airplane.

TECNAM made it clear that P-Volt's propulsion system and avionics will be specifically targeted at commercial operations. All-electric motors, avionics, heating,

air conditioning and state-of-the art de-ice/anti-ice systems, will provide fully sustainable and pollution-free transportation.

Rolls Royce Electrical partners with Vertical Aerospace in England. A Rolls-Royce electrical power system will be integrated into Vertical Aerospace's piloted all-electric vertical take-off and landing (eVTOL) vehicle, which will carry up to four passengers for 120 miles at cruise speeds of over 200 mph and is on course to certify in 2024. Rolls Royce Electrical will design the system architecture of the whole electrical propulsion system, the electric power system that includes our latest 100 kW-class lift and push electrical propulsion units, the power distribution and the monitoring system that will support operations.



ABOUT H3PS

H3PS (acronym for “High Power High Scalability Aircraft Hybrid Powertrain”) is a project funded under the European Union Horizon 2020 research and innovation programme, Grant Agreement No 769392.

Three aviation companies will work together: TECNAM, BRP-ROTAX and SIEMENS. Start date of project: May 1st, 2018 (36 months duration). The project will allow broadening the horizons of knowledge in the field of parallel hybrid propulsion systems.

By developing electrical components, including a parallel hybrid drive system for GA segment, the project will introduce the most advanced technologies for all-electric aircraft and thus stimulating innovation in the sector.

www.h3ps.eu

ABOUT TECNAM

TECNAM traces its roots back to the activities of the Italian brothers Luigi and Giovanni Pascale, who developed and produced innovative aircraft soon after the end of WWII (1948) and have continued ever since to create original models that gained worldwide recognition under the name Partenavia.

Established in March 1986, Costruzioni Aeronautiche TECNAM now operates in three production facilities. The Casoria facility is located adjacent to Naples Capodichino Airport. The Capua facility is located adjacent to the “Oreste Salomone” Airport. Recently a new facility was established in Sebring, Florida, USA and in Australia to serve and support the needs of Tecnam local owners and operators.

www.tecnam.com

ABOUT BRP-ROTAX

BRP-ROTAX GmbH & Co KG, a subsidiary of BRP Inc., located in Gunskirchen, Austria is a leader in the development and production of innovative 4- and 2-stroke high performance Rotax engines for BRP products such as Ski-Doo and Lynx snowmobiles, Sea-Doo watercraft, Can-Am all-terrain, side-by-side vehicles and Can-Am Spyder lineup as well for motorcycles, karts, ultra-light and light aircraft. In the last 50 years, the company has developed more than 350 engine models for recreational vehicles and produced over 7 million engines.

www.rotax.com www.flyrotax.com

ABOUT ROLLS-ROYCE HOLDINGS PLC

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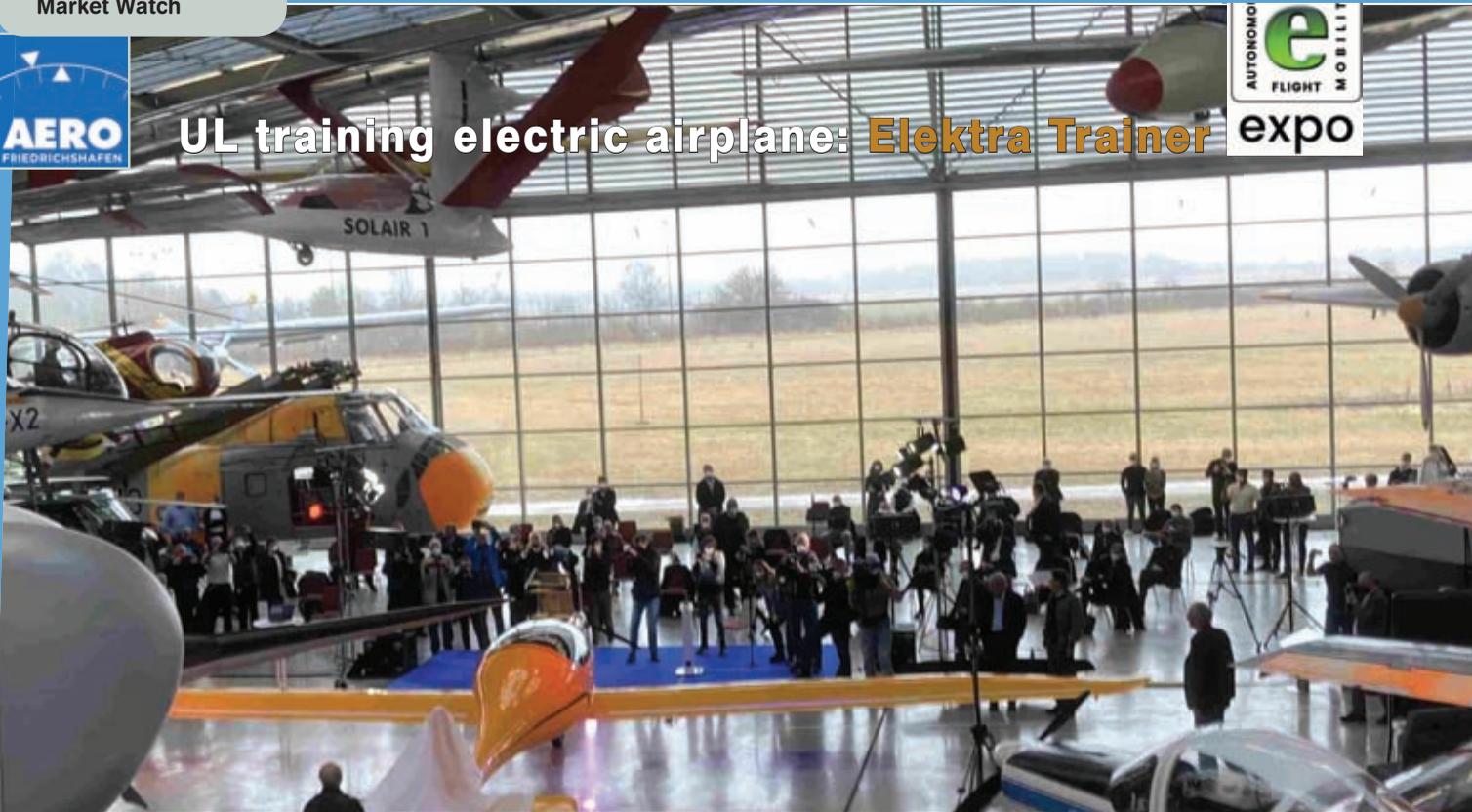
Rolls-Royce has customers in more than 150 countries, comprising more than 400 airlines and leasing customers, 160 armed forces, 70 navies, and more than 5,000 power and nuclear customers.

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In 2018, Rolls-Royce invested £1.4 billion on research and development. We also support a global network of 29 University Technology Centres, which position Rolls-Royce engineers at the forefront of scientific research.

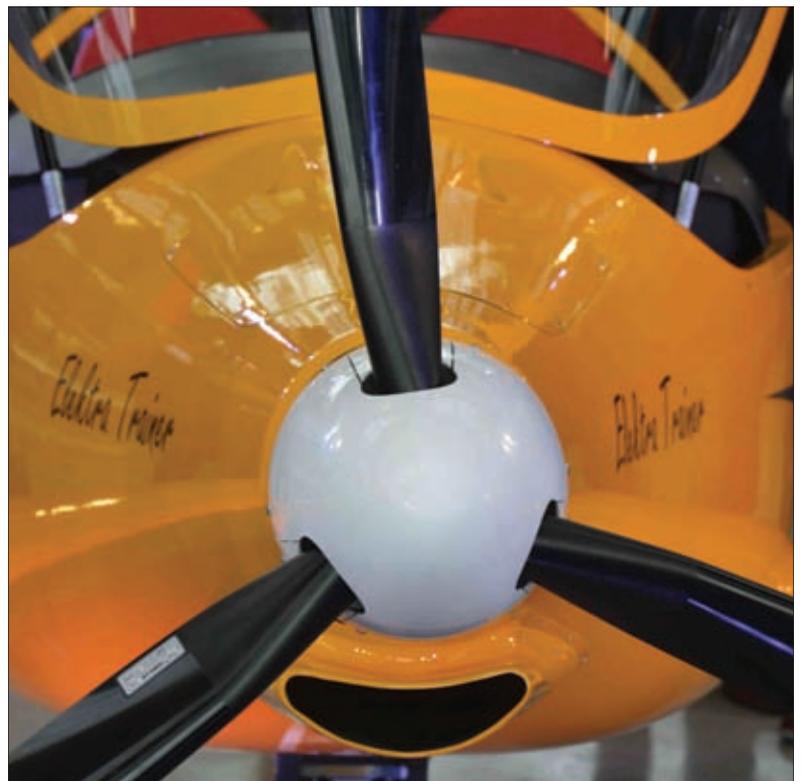
The Group has a strong commitment to apprentice and graduate recruitment and to further developing employee skills.

www.rolls-royce.com ✓



Debut at Deutsches Museum

The Elektra Trainer, the latest aircraft from the German company Elektra Solar, celebrated its world premiere on April 1st in the Flugwerft Oberschleißheim - the Aviation Department of the Deutsches Museum in Munich, the leading technical museum in Germany.





Calin Gologan and Uwe Nortmann present to the head of the Deutsches Museum Prof. Heckl in Munich with a voucher for the first Elektra One prototype, which will soon be included in the exhibition.

The two-seat electric trainer was designed by Elektra Solar founder Calin Gologan. “We think that the Elektra Trainer is ideal for basic flying training due to its aerodynamic efficiency and low energy consumption. These provide the necessary endurance even with the existing battery technology - which so far is not powerful enough to give a converted basic trainer the necessary endurance. Flight duration is up to 2.5 hours plus reserve within the maximum take-off weight (MTOW) of 600 kg in the German UL class, in which the first version of the aircraft will be certified. A motor glider certified according to Part 22 and a version according to Part 23 is planned later,” said Gologan at the presentation, which was also attended by representatives of the Bavarian government and many supporters of the project.

The reception was hosted by Dr. W. M. Heckl, Director General of the Deutsches Museum. After his greeting, Gologan and his partners in the company, Prof. Gerd Hirzinger (former head of the DLR Institute of Robotics and Mechatronics) and his co-CEO Konstantin Kondak, reported on the founding and development of the company and its projects. After that, the small yellow aircraft was unveiled. What a moment! Now it joins historic aircraft such as the Dornier D 31 VTOL, the Do 24 seaplane, and under the wings of another famous electric aircraft from Germany, the Solair 1 by Munich designer Günter Rochelt. All these machines can be seen in the permanent exhibition under the roof of the main hangar of the aviation department of the Deutsches Museum.

Further details on the Elektra Trainer can also be found in our sister magazine “Flügel” Issue 04-2021. If weather permits, Calin Gologan’s team wants to complete the first flight of the Elektra Trainer before the trade fair AERO in Friedrichshafen/Germany.



The main wheel landing gear (above) and the “face of the electric UL flight training” (page left, bottom).



A7 &
E-FLIGHT
EXPO FORUM:
FRIDAY
AT 3:00 PM.



The aerodynamic design (glide ratio 25-28) is the secret for low consumption and long flight duration of the Elektra Trainer.

UL APPROVAL PLANNED FOR 2022

Approval as a two-seater ultralight is supposed to happen very quickly so that the first machines can be used in training as early as autumn this year. The background of this optimistic assessment is that the single-seater Elektra One, which shares many components with the two-seater Trainer, was the first electric UL to receive approval in Spring 2022 following the new LBA regulations for ultralight electric aircraft.

To support the marketing of the machine, Uwe Northmann joined the team. Northmann is an experienced flight instructor and has also gained a lot of experience with electric flight as Managing Director of the Association for Unmanned Aviation (UAV DACH). He is also the

first customer of the Elektra Trainer and wants to start training on this aircraft as soon as the approval is available. "I was particularly impressed by the low energy requirement and thus the low load on the battery," explained Northmann in his presentation at the Deutsches Museum. This means he can train all day and only have to take a one-hour loading break at lunchtime. Therefore, since rapid charging processes can be dispensed with, the battery is not overly stressed. Several representatives of regional associations from all over Germany came to the presentation. Many flying clubs are already eagerly awaiting a quiet e-flight trainer, which could provide new wings for flying, especially in times of expensive aviation fuel, due to its lower noise pollution and the ecological component in connection with renewable energy.

The aircraft will first appear at the e-flight EXPO at the AERO in the e-flight hall A7. Gologan will also present the innovations in a panel on various e-training aircraft in the eflight EXPO forum on Friday at 3:00 p.m. ✓



The future workplace for UL flight instructors: Noble leather and glass cockpit, also some backup "clocks".



VX4 has 12 propellers, four of which are located in the front and are tilt for both vertical takeoff and landing and cruise while eight of which are set in four pairs in co-axial setup, non-tilt and for vertical takeoff and landing only.

Vertical Aerospace Piled up large orders without a flying prototype

The British eVTOL startup Vertical Aerospace was the last company going initial public offering (IPO) in electric aviation sector last year when it became a publicly traded company on the New York Stock Exchange (NYSE), after shareholders of Broadstone Acquisition Corp.,

a special purpose acquisition company (SPAC), approved the merger last December, but it has the second largest order book among eVTOL startups as of today with the total backlog of prospective sales to 1,350 units with a potentially total value of \$5.4 billion.

EDNY: N 47 40.3 E 009 30.7



VX4 has four seats for passengers and a pilot, targets top speeds of 200 miles per hour (322 kilometers per hour), and a range of 100 miles (161 kilometers).



Vertical Aerospace plans to begin flying its tilt-rotor VX4eVTOL prototype in 2022 and to enter service in 2024, with deliveries being fulfilled immediately thereafter. In December 2021 Vertical Aerospace unveiled its full-scale VX4 aircraft mock-up. VX4 will be fully-electric, will carry four passengers and a pilot. In February 2021, Solvay was selected to provide composite aerostructures for the aircraft. This was followed on March 9 by a significant announcement that Rolls-Royce is to develop a new electric propulsion system for the aircraft with over 1MW output. Honeywell will develop the flight control system for VX4 which targets top speeds of 200 miles per hour (322 kilometers per hour), and a range of 100 miles (161 kilometers). Vertical Aerospace is partnering with aerospace company Leonardo to develop the carbon composite fuselage for its VX4.



Vertical Aerospace has not yet disclosed the size and take off weight of VX4, but the full-size mock-up shows that it is not a small aircraft.

Rolls-Royce will develop and provide VX4's electric propulsion system with over 1 MW output.



According to a company-issued press release, the total proceeds raised from IPO were \$300 million US, including \$200 million in convertible senior secured notes as well as \$94 million in total private investment in public equity (PIPE) associated with the SPAC merger. Though the cash reserves are far short of the \$1 billion capital expenditure which many industry experts believe would be needed for certification and pre-production, Vertical Aerospace believes that their current total funds after the IPO is still in excess of what the company needs to certify i VX4 by 2024, develop a manufacturing facility, build out its commercial platform, and scale production.

Among the 1350 orders, Avolon pre-ordered 500 of Vertical's VX4 eVTOL last June, valued at \$2 billion US, with the intention of placing them with various airline customers around the world. As of today, Avolon has already placed all of its order book, which includes 250 with Gol and GrupoComporte in Brazil, up to 100 with Japan Airlines, at least 100 with AirAsia and up to 100 with Gözen in Turkey. This means Avolon has now exceeded its initial order book from Vertical, placing 550 units with various international airlines and aviation companies around the world. Besides Avolon, Vertical Aerospace has also secured pre-orders from a range of aerospace companies, including American Airlines, Bristow and Iberojet, which includes conditional pre-order options from Virgin Atlantic and Marubeni.

However, some industry observers raised the alarm that many of these pre-order are conditional and non-binding, and could be financial arrangement between the client and eVTOL startups. In such case, the airline customers basically lend their brand and credibility in exchange for a stake in the startup company and will benefit regardless of whether or not the final eVTOL product would be certified and come into commercial service. Therefore, the large amount of Vertical Aerospace's order book may be taken with a grain of salt.





The Cassio 1 is doing an extensive test program at the moment and is planned to arrive.

VoltAero Cassio 1 Premiere @ AERO

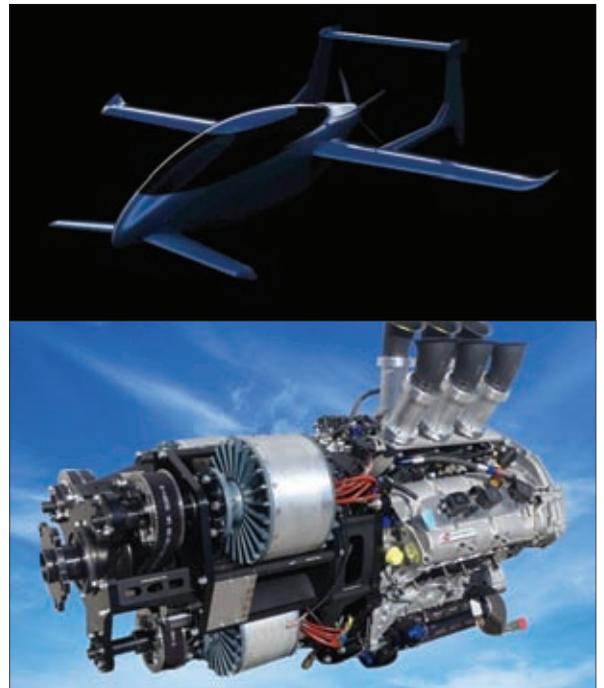
As CTO of Airbus, Jean Botti launched the eFan program. Now he is the founder and CEO of a startup in France that wants to revolutionize General Aviation through a whole group of “Cassio” aircraft, from 4 to 10 seats, around a self-developed Hybrid Power system. The testbed for the power unit is a modified Cessna 337 Sky-master with 2 additional Pull-Propellers on the booms.

The core of the Cassio family General Aviation airplane is an electric-hybrid propulsion system for safe, quiet, efficient, and eco-friendly flight. The Cassio design is based on a sleek, aerodynamically-optimized fuselage and a three-wing design. A forward fixed canard and a middle wing with twin booms that support a highset horizontal tail. The modular family is planned from 4 to 10 persons and should have a flight duration of about 3.5 hours. It will be certified to Europe’s EASA CS23 certification specification as a single-engine, general aviation category aircraft and is designed from the start for a low cost of ownership. The single prop is driven by 1 combustion engine combined with three electric motors but with a single lever control.



One combustion engine and 5 e-motors power the Cassio 1 prototype. Later versions will only have 3 e-motors and the combustion engine.

The Cassio aircraft will be offered in three versions, each sharing a high degree of modularity and commonality: Cassio 330, a four-seat configuration with propulsion from a combined hybrid-electric power of 330 kilowatts; Cassio 480, configured with six seats and a hybrid-electric propulsion power of 480 kilowatts; Cassio 600, with a 10-seat capacity and hybrid-electric propulsion power of 600 kilowatts. The VoltAero flight demonstrator, the Cassio 1 aircraft, is validating Cassio's powertrain configuration, de-risking it for airworthiness certification. Service entry targets early 2024, beginning with the four-seat Cassio 330 version. VoltAero will produce the aircraft in the Nouvelle Aquitaine region of southwest France, they anticipate making approximately 150 aircraft annually. ✓



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Cassio walkaround

The tri-surface configuration is a major advantage. Enhanced aerodynamics, easier access to the cabin for passengers (including handicapped persons), as well as cargo and freight.

Adaptive, multi-blade propeller is optimized for performance and noise reduction.

600-kW parallel electric-hybrid powertrain. Flown and proven as a world's first on VoltAero's Cassio 1 demonstrator aircraft.

Single-pilot operation, with a connected cockpit. The Cassio family will be certified as single-engine aircraft.

Wings will optimize the use of laminar flow.

Fixed landing gear for the Cassio 330 (4-seat version); retractable landing gear on the Cassio 480 (5-seats) and Cassio 600 (10-seats). Taxi, takeoff, and landing are performed in the all-electric mode.

Solutions for fast charging on the ground are under discussion with suppliers. Power requirement for ground charging is 380 volts, which is available at most airports.

The aluminum airframe reduces potential electromagnetic interference and improves lightning strike resistance. Composites are under consideration for the wings, boom, vertical tailplane and canards.



DS-2C-X-eVTOL

Flywhale becomes Dornier DS-2C with an eVTOL ambition

What is the name of an amphibious aircraft from Germany? Since the 1930s, the name Dornier has been synonymous with such an aircraft. Of course, if you asked that question to ultralight aviators over the past decade, the inevitable answer was Flywhale. After Flywhale went bankrupt and the project was taken over by Dornier Seastar GmbH from Oberpfaffenhofen, Germany, the two are now coming together - with an eVTOL ambition down the road.

The Flywhale will be owned by the new owner under the name DS-2C Dornier Seawings GmbH. The company at the traditional Dornier site in Oberpfaffenhofen is working on the Dornier Seastar CD2 push-pull turbo-prop and has had a Chinese majority owner from Wuxi, China for several years.

The 14-seater Seastar offers 180 knots cruising speed and a range of 900 nautical miles. "We decided to buy Flywhale because the concept fits perfectly with our Seastar. Both aircraft are made of composite construction, both have short stub wings called sponsors on the fuselage, which increase lift in the water and thus facilitate water starts. In addition, these sponsors stabilize the aircraft when the water is rough," explains Simon Schell, who is the program manager for the aircraft in Oberpfaffenhofen. "Another advantage of the Flywhale is that it has successfully completed the German UL approval with 650 kg. So we can start production and marketing as soon as possible!" Because the basic



version of the Amphibian is very light, it had previously received approval in Germany at 516 kg, on the basis of which a French approval was also granted. There is even a French dealer already. An LSA version for Europe is not planned. It has also not yet been decided whether a Part 23 version will follow in the foreseeable future. At the moment there are no thoughts about using the powerful Rotax 915 as a drive train, but if there is a corresponding customer demand, the topic will probably be dealt with. Of course, that doesn't mean that the only thing on the agenda now is to set up production in Germany.



At the same time, approval in China as an LSA is being sought, since some interest in the DS-2C is expected there in the recreation flight sector. "The final assembly is to take place here in Oberpfaffenhofen, as is the case with the Seastar and the Orca version for authorities' approval. But like the big sister, after a transition period, we want a lot of parts to be produced in China." says Schell. In the medium term, the machine is also planned to fly electrically and even an eVTOL variant is in prospect. Some observers, looking at the first images of the eVTOL design with internally designated name DS-2C-X-eVTOL, had assumed that it was a turbojet version. But what looks like a jet engine at first glance is more likely to be an electrically driven ducted fan. The DS-2CX-eVTOL is currently only planned as a test vehicle. Whether it will be further developed into a product is not yet certain. It is also unclear whether this machine will be fully electric, hybrid or even powered by a fuel cell. In addition, the energy-guzzling vertical takeoff should only be an option in the event that a normal takeoff is not possible. In any case, it should be exciting to see what the company with the big name and Chinese money will do with the little Flywhale. ✓

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