FUTURE OF ELECTRIC FLIGHT

News / Manufacturer

Travelling down the electric avenue

Electric propulsion has the potential to revolutionise flight. From cleaner, quieter travel to completely new types of vehicles and operations, the benefits could be huge. In this interview, Glenn Llewellyn, Airbus General Manager, Electrification, discusses flying demonstrators, what's next for the E-Fan and how electric propulsion can fundamentally change aircraft design.

Why is electric propulsion so important for the future of aviation?

There are the obvious benefits of reduced CO2 emissions and noise levels, but electrification also allows us to re-evaluate the entire design of an air vehicle. It's much easier to tilt electric motors, for example, as they are far less sensitive to rotation than gas turbines. This is why we are starting to look at vertical take-off and landing (VTOL) vehicles, which can take-off and land like a helicopter but have a cruise speed and range equivalent to a fixed wing aircraft. VTOL technology not only opens up the possibility of urban air mobility – small vehicles for inner-city flight – it could also help reduce infrastructure costs. So, countries that don't have much in the way of runway infrastructure, for example, could bypass having to make that investment in the future as this sort

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of aircraft wouldn't need runways.

What sort of electric propulsion projects is Airbus looking at right now?

In terms of vehicles, we are studying a range of options. One area is small, short-range VTOL urban air mobility demonstrator projects like Vahana and CityAirbus. These would be fully electric aircraft for between one and four passengers. But in the longer term, we're also thinking big: large commercial aircraft. For these larger aircraft, we will likely see hybrid propulsion before going full electric as the power-to-weight ratios for battery technology are still a long way short of what is required. Current batteries would be far too heavy to feasibly fly a large passenger aircraft. With that being said, battery research has perhaps the most investment of any technology in the world right now, so we need to prepare ourselves for a future in which this is possible.

Airbus has already successfully flown both hybrid and full-electric light aircraft…

Exactly. The E-Fan has been a tremendous success and we've learned a great deal from the hundreds of flights made. To give just a couple of examples, this includes the effects of electromagnetism on avionics and how to monitor and manage energy usage in flight. Traditionally, we have a fixed endurance based on how much fuel is left in the tank, but with batteries we need a much more intelligent system as the batteries are more dynamic. Besides the E-Fan, there are also other projects that have deepened our expertise in electric propulsion: our Zephyr high-altitude pseudo-satellite, which holds the record for the longest UAV flight, uses solar-powered batteries. And our helicopter team has also tested a back-up electric motor designed to take over in the event of a turbine failure.

We've already seen several versions of the E-Fan – will you continue to develop it further?

We plan to start working soon on a future demonstrator version, E-Fan X, which would be quite ambitious. It would be powered by a 2-megawatt motor, which is one order of magnitude greater than E-Fan 1.0. To give an idea of what that means: powering a hybrid single-aisle aircraft would

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require surpassing E-Fan X's motor by an additional order of magnitude.

How is Airbus' partnership with Siemens helping to make this happen?

We have a combined team working together in Ottobrunn as part of our E-Aircraft Systems programme. Essentially, the Airbus part of the team is responsible for higher-level integration activities and setting the requirements on performance levels for an electric propulsion system; Siemens is more dedicated to the development of the components inside that system – electric motors, power converters, generators and so on. They have huge skill and an established industrial heritage in this area, so it is a very valuable partnership for us. In 2018, this team will move into our new E-Aircraft Systems Test House in Ottobrunn, which we start building this year. There, we'll be testing components for up to around 20 megawatts of power.

Does it matter to Airbus where electricity comes from to power these vehicles?

That's an interesting question and one that's often absent from the debate. We certainly need countries and power industries to think about making more and more clean energy, because we can promise them one thing: aviation will be ready to use that clean energy.

Sum up the potential for electric propulsion – how important could this technology be?

It has the potential to revolutionise how we use the third dimension, whether it be for urban air mobility, intercity, or transcontinental flight. It could change the shape of the vehicles we use and the type of operations the vehicles are capable of. I really believe there will be a significant benefit for society and the environment.

Geoff Poulton

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