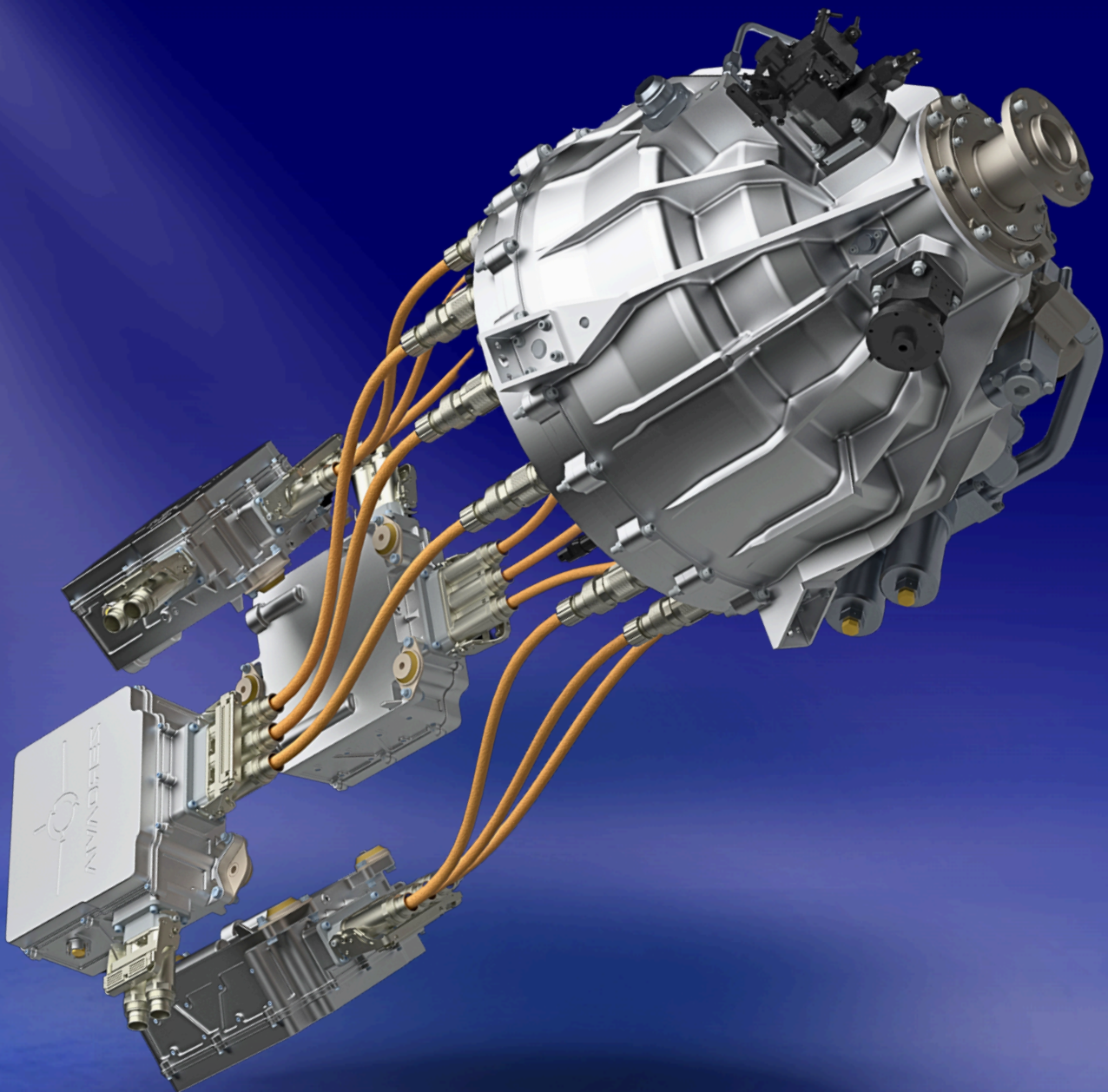


ZEROAVIA

600kW Electric Propulsion System for Aviation



Electric aviation offers enormous potential for enhanced connectivity for people all over the world. Shorter journeys in quiet aircraft. Less disruption of communities and impacts on public health. Freedom from the volatile fuel supply chain.

The opportunity is being seized by innovators developing exciting new aircraft to unlock new advanced air mobility and regional connections. However, realizing the vision of these new platforms is dependent on integrating effective and safe electric propulsion technology. ZeroAvia's 600kW electric propulsion system (EPS) is a breakthrough innovation that can take a generation of new electric aircraft designs off the drawing board and into the air.

System Overview

ZeroAvia has developed a 600kW EPS for aerospace, designed to be highly efficient and lightweight, with exceptional fault tolerance and industry leading specific power.

ZeroAvia's high-power EPS package includes:

Electric Motor

4x Inverters

Electrical cabling

Thermal
management

The EPS system provides a significant reduction in maintenance costs relative to existing combustion engines, through lower operating temperatures and pressures, with a durable and simplified design.

The 600kW EPS can be seamlessly integrated into various electric aircraft applications, including battery, hybrid and fuel cell electric fixed-wing aircraft, rotorcraft and Unmanned Aerial Vehicles (UAVs), as well as clean sheet airframe designs. ZeroAvia's EPS will enable clean aviation innovators to realize new platforms that can deliver low-cost, zero-emission electrified commuter, sub-regional and urban air mobility.

The 600kW EPS is subject to an ongoing certification application with the FAA and ZeroAvia has received a G-1 issue paper defining the basis of certification.

The power agnostic EPS system comprises four ZeroAvia 200kW continuous power inverters converting DC power to AC to supply ZeroAvia's direct drive electric motor for highly efficient propulsion.

600 kW Electric Motor



660 kW Max
Power



1,900 rpm
Max Speed



Stator core
divided in 4

ZeroAvia's first e-motor is a 660kW max power, surface permanent magnet based high-efficiency machine, specifically designed for direct drive installations mounted to the propeller.

The motor features world-leading stator and rotor technology, designed and produced following aerospace standards, delivering high-power density and weight reduction.

Advanced thermal management via optimized direct motor cooling using industry standard turbine oil enables efficient heat transfer within the motor to allow it to run cooler and for longer, with integrated thermal sensors for coil temperature monitoring.

Its stator core is divided into 4 sections, enhancing fault tolerance and allowing higher input current from the inverters.



Key Features

660 kW max power

Max speed: 1,900 rpm

Power Density 4.5 kW/kg

Permanent magnet, radial flux electric motor

High Torque: 3,250 Nm

Efficiency: 94-96% vs load and speed

Weight: 148 kg

Silicon-carbide Inverter



225 kW Max
Power



HVDC to 3-
phase AC



Power Source
Agnostic

ZeroAvia has developed continuous power silicon carbide inverters which convert high-voltage DC into three phase AC to power and operate with industry leading power density.

The inverters feature several innovations in semiconductor module design, gate driver design, modularity of phase circuits and a high degree of manufacturability. Oil cooling enables reduced integration complexity and the advanced thermal management enables reliable high performance at altitude.

With fully independent torque sharing topology, the inverters are designed to take DC power from various sources, including battery or fuel cells to power an electric motor.

Key Features

225 kW max power

HVDC 400-830 Vdc, LVDC 18-35 Vdc

Power Density 20 kW/kg

DC Source Agnostic

Switching Frequency: 20 kHz

Shock and vibration isolation

Digitally controlled torque, speed and DC power

Weight 10 kg



Fault Tolerance

The system architecture is designed with a 4-way redundancy of the inverters, allowing full power operation in result of single inverter failure.

The redundancy enables safe motor control on reduced power operation and does not impact receiving critical engine data.

The EPS system is designed for either retrofit or linefit into various electric aircraft applications, including:



- Battery, hybrid and fuel cell electric fixed-wing aircraft
- Rotorcraft
- Unmanned Aerial Vehicles
- Clean sheet airframe designs.

An electric powertrain promises:



Reduced
Cost



Reduced
Noise



Reduced
Emissions

Enabling new clean, lower cost routes in the short-range commuter, sub-regional and urban air mobility sectors.

Path to Certification

The scalable 600kW EPS was initially designed as a core part of ZeroAvia's wider ZA600 hydrogen-electric powertrain - designed for up to 20 seat commercial aircraft and concurrently progressing through certification - before attracting interest from other electric aviation innovators.

The 600kW EPS is subject to a certification application with the FAA and ZeroAvia has received a G-1 issue paper defining the basis of certification. The certification progress reflects the maturity of the design and its applicability to aerospace applications.

Using deep vertical-integration, ZeroAvia is designing, testing and manufacturing the EPS in-house for enhanced performance optimization and iteration, leading to accelerated certification. ZeroAvia has opened a 136k sq ft Propulsion Center of Excellence in Everett, WA to produce these electric propulsion systems, in anticipation of commercial readiness in 2025.

ZEROAVIA



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