

Distributed Electric Propulsion (DEP) has increased the design space for aerospace vehicles, especially those categorized as eVTOL (Electric Vertical Take-Off and Landing). This new class of vehicles not only looks different from the typical airplane or helicopter, but functions differently as well. A robust understanding of how the vehicle is controlled in both nominal and off-nominal modes will frame the approach to certification for private and commercial VTOL aircraft.

Embry-Riddle Aeronautical University's Eagle Flight Research Center (EFRC) is researching how the various methods of DEP thrust control apply to larger eVTOL vehicle operation. Researchers will utilize a mixture of flight dynamic simulation and physical testing in collaboration with FAA experts in rotorcraft handling qualities certification. Outcomes of the research include the characterization of various DEP thrust and moment control methods and how this maps to certifiable vehicle-level attributes like handling qualities in nominal and degraded flight modes. A prototype will be built and tested showing the ability of a quad-rotor vehicle to continue flight after the loss of thrust by failure of one rotor.

It is anticipated that a better understanding of the DEP units will help inform the process of certification for the emerging market of urban air mobility vehicles. The data obtained from testing will be utilized to define the possible performance parameters, which will aid in developing appropriate means of compliance for advanced fly-by-wire N-rotor eVTOL vehicles.