BLItz: A Distributed Electric Propulsion Commuter Aircraft

2015-2016 NASA ARMD Design Challenge

University of Virginia Aircraft Design Team A

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Team Leader: Christina Kaminsky

Aerodynamics Leader: Callum Novak

Propulsion Leader: April Anlage

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2015-2016 UNIVERSITY OF VIRGINIA AIRCRAFT DESIGN TEAM A

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ABSTRACT

Stricter environmental regulations and higher fuel costs have spurred research into improved aircraft efficiency. One concept currently under investigation is distributed electric propulsion (DEP), wherein thrust comes from many electrically powered propulsors that can be operated independently rather than through heavy mechanically linked systems. BLItz is a 19-passenger DEP regional commuter aircraft designed to reduce operating costs and exceed NASA's Environmentally Responsible Aviation Project goals of fuel burn, NOx emissions, cruise efficiency, and reduced takeoff and landing distances for the N+3 timeframe. BLItz, which derives its name from boundary layer ingestion (BLI), will take the aviation industry by storm.

BLItz is flies at a cruise altitude of 20,000 feet at a speed of 250 miles per hour. Through a combination of BLI, a blown wing, DEP, and a high aspect ratio wing, it achieves higher aerodynamic efficiency and reduced fuel consumption compared to other aircraft in its class. Its propulsion system is made up of two wingtip turboelectric generators which transmit electrical power to eight fans partially embedded in the wings, augmenting lift and reducing noise.

Slated for entry into service in 2025, BLItz captures 90% of the target market with an average mission range of 877 miles but a maximum range of 1,107 miles. Its conventional tube-and-wing structure makes it easy to manufacture and increases its passenger acceptance. Despite its conventional appearance, BLItz takes advantage of advancements in materials science to reduce overall structural weight by over 11% compared to traditional all-aluminum construction. BLItz will revolutionize the regional commuter market in terms of performance, efficiency, and environmental footprint.