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University of California Davis | Undergraduate Senior Design

Design of a Theoretical Four-Seat, All-Electric, General Aviation Aircraft

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Team 151

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Abstract

This paper describes the design of an all-electric aircraft meeting the 2020 E-GA NASA ARMD Design Challenge specifications as well as required FAR regulations. It discusses considerations such as energy storage, required supporting infrastructure, maintenance, specialty costs, and viability of the design. The team designed a 4-seat, twin engine, low-wing, GA aircraft, designated Bladessa. The aircraft cruises at 135 knots over a range of 520 nautical miles, and is designed for operational service by 2020. The design makes use of lightweight composite structures and high energy density lithium ion batteries to attempt meeting the design goals. With a maximum takeoff weight of 4260 pounds, a battery weight of nearly 2300 pounds, and a maximum payload weight of 700 pounds, the aircraft is sufficiently stable and maneuverable to fly under a wide variety of passenger/baggage combinations. Aerodynamics, combined with fuselage design, focused on achieving high natural laminar flow to decrease drag. The performance and efficiency of the aircraft's 270 horsepower motor were optimized to provide the required power without deviating far from its continual power capabilities. The report ends with an analysis of the current state of electric aircraft and what might feasibly be capable of entering the general aviation market in 2020.