Hybrid Electric Propulsion Systems for Skydiving Aircraft

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Objectives
- Show viability of novel hybrid electric and all-electric aircraft concept for skydiving missions.
- Push forward investment in new electrical propulsion technology equipped light commuter category aircraft.

Introduction
Skyddiving is a popular aviation sport throughout the world. Hundreds of thousands of people are active in approximately 1000 centres worldwide [1]. The United States Parachute Association alone recorded 36,770 members at the end of 2014 [2]. Continuing airworthiness of ageing legacy aircraft is a maintenance safety challenge. Legacy aircraft also possess unsatisfactory emissions qualities. Great opportunities exist for new paradigm aircraft type. Case study uses novel ‘Air Ute Pty Ltd’ [3] conceptual design for investigation of an alternative aircraft type for this application, including trade-off studies with a new analytical model.

Mission
a. Carriage of minimum eight parachutists (loads), to a height of 4000m with a duty cycle of 3 to 4 loads per hour.
b. Configurable for freight transport role.

Hybrid Electric system weight and performance comparison analysis

Conclusions Summary
- A Hybrid Electric skydiving lift aircraft has been found to be viable using current state of the art Electrical Propulsion System technology from an aerodynamic standpoint.
- An All-Electric propulsion system is feasible given the condition that the battery is replaced or recharged for each mission.
- The time to climb for a fully electric example is acceptable and the improvement over a non Flat Rated powerplant operating to the prescribed altitude is very significant.
- Engine emissions can be reduced or eliminated for this aircraft mission without hindering performance or economic utility.


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