

Master's Thesis Defense Announcement
Mechanical and Aerospace Engineering Department
University of Texas at Arlington

CONCEPTUAL GAS TURBINE HYBRID ENGINE DESIGN FOR HIGH
SPEED RAIL LOCOMOTIVE PROPULSION

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Abstract

The modern experimental jet train developed by Bombardier Transportation was designed to partner with the present day electrified Acela high speed trains. The Jet train would provide transportation to areas (Rural etc.), as well as transcontinental capabilities to existing towns and cities where electrified propulsion units are not feasible. The Bombardier Jet Train utilizes petroleum-based fuel, diesel engine power, and multiple turboshaft engines, for higher speeds. The Pratt and Whitney PW150 engine design parameters will be used to develop the Conceptual Hybrid Turbo Shaft Engine (CHTS).

The newer Conceptual Hybrid Turbo Shaft Engine (CHTS) should increase engine performance, lower specific fuel consumption, and extend traveling distance by at least 12 percent. The CHTS will be capable of operating at altitudes of at least 6000 feet, with the least amount of degradation in performance. The (CHTS) design shall incorporate a Superconducting Magnetic Energy Storage (SMES) Coil, which will reduce trip time and improve fuel efficiency. Modeling of the CHTS is based on four design engineering criteria; Design, Development, Test and Evaluation (DDT&E). The design phase is dictated by customer (Civilian), functional requirements (Environmental adaptability, structural integrity, performance output, fuel efficiency, horsepower, thrust and vehicle integration etc.).