

Fuel Cell Powered Segway™
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Project Summary

Many professionals in government, military and industry are adopting the Segway Human Transporter (HT) to increase their mobility, productivity and efficiency. However, many HT applications could benefit significantly by increasing the Segway's effective range between charges. The Department of Defense's (DoD's) Fuel Cell Test and Evaluation Center (FCTec), operated by Concurrent Technologies Corporation (CTC), in conjunction with the U. S. Army Engineer Research and Development Center, Construction Engineering Research Laboratory (ERDC/CERL), opted to demonstrate to the commercial community the benefits of fuel cell power as an alternative to carrying additional batteries. The base unit of this hybrid configuration is a standard Segway HT e Series model. The power system consists of a 40-cell 700-watt, Manhattan Scientifics, Incorporated, proton exchange membrane (PEM) fuel cell fueled with compressed hydrogen.

The fuel cell and stored hydrogen fuel approximately doubles the Segway's range by recharging the batteries and providing power to the traction motors during operation. Various other components, designed, assembled and integrated by CTC, are required to control the fuel cell, manage the power delivered to the Segway, and maintain the fuel cell's performance between operations.

The fuel cell system enclosure replaced the right baggage compartment and contains the fuel cell, three DC/DC power converters, current and voltage monitoring on two custom designed I/O boards connected to a basic stamp controller, a small air compressor, two solenoid valves, and custom designed cathode air valves that retain moisture in the stack between operations. A two-liter hydrogen bottle is stowed behind the front cargo bag. The fuel cell system and hydrogen storage adds only 32 pounds to the Segway leaving 43 pounds of cargo capacity.

The project's primary goal is to demonstrate a less than one (1) kW fuel cell application.

CTC is an independent, nonprofit applied research and development professional services organization that provides management and technology-based solutions to a wide array of clients representing state and federal government as well as the private sector. Established in 1988, CTC operates from 34 locations throughout the United States with a staff of over 1,200 employees.

The DoD's Fuel Cell Test and Evaluation Center is a National Resource facility for the independent, unbiased testing and validation of fuel cell systems for both military and commercial applications. Located at CTC's Environmental Technology Facility, in Johnstown, Pennsylvania, the FCTec was established through a

collaborative effort between CTC and the U.S. Army Engineer Research and Development Center's Construction Engineering Research Laboratory (ERDC/CERL). ERDC/CERL is the U.S. Army Corps of Engineers' R&D organization. The FCTec's primary goal is to significantly accelerate the development and commercialization of fuel cell systems.

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Fuel Cell Test and Evaluation Center







