The Evaluation of Fuel Cells for Ship Application

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Student Presentation

Summary
This project's purpose is to evaluate the use of fuel cells as a power source for use in a dc electric ship propulsion system.

The majority of ships running in the world's oceans and waterways today are powered by diesel engines. Oil is a limited resource, the use of which is not environmentally friendly. Fuel prices fluctuate daily with a general upward trend in the past few years. The accidental leakage and dumping of oils overboard has caused terrible effects on marine environments worldwide. On top of this, increasing amounts of fossil fuel combustion have been linked to devastating global environmental effects through emissions of green house gases.

A fuel cell utilizes basic electrolytic properties of oxygen and hydrogen molecules to produce electricity. The transfer of electrons between the molecules can be used to supply dc power. The supplied electrical power will be continuous as long as both oxygen and hydrogen flows are maintained and constant. The only waste byproduct produced by this ideal system is pure water. Unlike batteries that also use this fundamental principle, this cell will not degenerate over time. This hypothetically provides a permanent electrical power supply needing minimal support, and requiring only the provision of a fuel and oxygen supply.

The project includes the construction of a scale working model of a solid oxide fuel cell. The design also involves selecting, as well as implementing the necessary safety requirements, including sensors and relief valves.

A series of tests will be conducted to evaluate the power output and the corresponding fuel input. The level of power output would then be extrapolated to that required for the full scale propulsion system under the study. These results will be used to determine the fuel cell system that may be required to run a ship's propulsion system. This will include the fuel cell size and arrangement, as well as the required fuel tank sizes.

From the analysis of the measured and extrapolated values, it will be determined whether the use of fuel cells will be feasible in the near future for ship propulsion. This utilization of fuel cells would allow for a large savings in fuel costs, a better overall efficiency of ship operations, and a more environmentally sound ship propulsion method.

References

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