How a High-Temperature Superconducting Magnetic Energy Storage System Can Be Implemented in Vehicles as an Exceptionally Eco-Friendly Power Supply

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Global warming is a significant environmental threat, and vehicles contribute to it greatly. This project not only aims to design a power supply that does not contribute to global warming but also has the power supply design harnessing the same technology as the L0 Series (one of the most eco-friendly magnetic levitation trains globally). As a result, this project proposes a high-temperature superconducting (HTS) magnetic energy storage (SMES) system that can be implemented in vehicles as a power supply. Implementing the SMES system design in vehicles could make them more efficient and eco-friendly. Since superconducting coils circulate an infinite direct current when they are at their critical temperature, they essentially behave as infinite power sources with zero resistance and no heat dissipation as long as a cryocooler is on. A prototype was built for this project, demonstrating how the SMES system would work if it were to be created. Just as the primary and secondary sides of the prototype communicate through an electromagnetic field via relays, the primary and secondary sides of the SMES system communicate through an electromagnetic field via a transformer. Because the prototype worked, this project designed SMES systems that can be implemented in cars, submarines, and spacecraft using cryocoolers, HTS coils, step-down transformers, radiation shields, magnetic shields, and loads. The car would include an inverter, a full-bridge rectifier, and AC motors. The submarine would require a compression chamber and DC motors. The spacecraft would require solar panels, actuators, and a plasma thruster.

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