Modification of a Single-Cylinder Internal Combustion Engine of an Electric Generator Using Hydrogen as Fuel

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Hydrogen is one of the most abundant elements in the universe. Since it is not found in a pure state, it was obtained through electrolysis. Electrolysis was performed with the catalyst Potassium hydroxide due to its effectiveness. This project focuses on evaluating the technical and economic feasibility of modifying a single-cylinder internal combustion engine of a 2,000W inverter electric generator by implementing a hydrogen generator. Using the electrolysis method to obtain hydrogen, the objective is to analyze how this modification can maintain energy performance and reduce pollutant emissions. The system design includes a hydrogen generator powered by a 12V battery and a saline solution to induce electrolysis, allowing the injection of gas into the engine intake. Additionally, a microcontroller with sensors was integrated to monitor exhaust gases and hydrogen levels, to have a remote monitoring system based on microcontrollers. The microcontroller is associated with a Wi-Fi network, which allows data to be uploaded to the cloud in real-time and maintain constant monitoring. The microcontroller has the ability to send notifications if it detects high temperatures to protect the engine. In Hydrogen I and II, fuel cost savings of 31% were achieved, while Hydrogen III and IV achieved 19% savings. All experimental groups maintained the same performance without emitting CO2 or CO. Hydrogen as a fuel maintained its efficiency while reducing emissions by 100%, demonstrating that the modification was effective. This approach aims to offer an efficient hybrid system, reducing emissions and increasing the generator's lifespan in residential and work applications.

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