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Design and Fabrication of Eco-Pulse Engine Components Cleaning System: An Eco-Friendly Electrolysis Based Technology Using Non-Toxic Chemicals

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Abstract

Gasoline is one of the traditional toxic and flammable solvents that is used to clean engine parts, which may result in substantial risks to the mechanics and the environment. This study proposes novel eco-pulse engine components cleaning system that utilizes a low-toxic solution of hydrogen peroxide, vinegar, and biodegradable laundry detergent. To perform electrolysis, the system is electrically powered in addition to vibration, thermal activation and fluid circulation. This combination of processes is integrated to improve cleaning efficiency, especially in unreachable engine and parts geometrics. Six Sigma DMAIC framework was conducted to optimize the process of the system and reduce the hazard and the operational costs. The system does not require specialized disposal procedures, as the cleaning agents are reusable across multiple cleaning cycles. This novel system aligns with the environmental standard (ISO-14001) and provides a sustainable, scalable alternative for engine components cleaning in automotive and industrial environments.

Keywords
Eco-Pulse, Engine, Components, Electrolysis, Non-Toxic Chemicals