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NEW FUELS AND TECHNOLOGIES APPLIED TO PISTON HEAT ENGINES TO REDUCE EMISSIONS AND IMPROVE EFFICIENCY – A REVIEW

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Abstract

The main challenges that existing piston heat engines face due to stringent pollution regulations and an energy crisis must be overcome using novel alternative fuels. Biodiesel, as an unconventional and alternative fuel, is favored among the next generation solutions due to its high cetane number (CN) and elevated oxygen level. Hence, this paper thoroughly assesses the feasibility of using a novel diesel-biodiesel-gasoline (DBG) blend in conventional diesel combustion (CDC) system via the double injection fuel strategy. Additionally, it is demonstrated that exhaust emissions from the reactivity controlled compression ignition (RCCI) process can be minimized by either using a low reactivity fuel (LRF), such as iso-butanol (instead of gasoline), or a high reactivity fuel (HRF), such as biodiesel, in place of diesel fuel, while also optimizing the advanced technologies of the engine design and operational parameters (for example, injection pressure, double injection, or start of injection - SOI) results in a more efficient engine. In short, it is argued that RCCI technology, with optimum engine design and controlled operation on new types of alternative fuels derived from renewable, can be considered an effective and viable solution for reducing engine exhaust emissions and improving efficiency.

Keywords: combustion traits, diesel-biodiesel-gasoline, emissions, performance, reactivity controlled compression ignition

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