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Optimization of Suitable Ethanol-Gasoline Blend for Single Cylinder Four Stroke Spark Ignition Engine Operated with Variable Compression Ratio and Advanced Ignition Timing

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Abstract:

In the last twenty years, the automobile revolution took place in India due to rapid urbanization. Annual crude oil consumption in India crossed the 200 MMT oil and cost spent on import of crude oil crossed Rs.8,00,000 crore. This is an alarming situation for searching for alternative fuel. India started the Ethanol Blending Program in 2003 with the implementation of 5% ethanol into pure gasoline. The objective of the Ethanol Blending Program was to reduce expenditure on the import of crude oil and create awareness among the Indian peoples for alternative fuel. Ethanol is an alternative fuel from the alcohol group that offers significant potential for increasing the compression ratio of the SI engine. Ethanol fuel has a high-octane number and high latent heat of vaporization. These properties of ethanol are very useful to improve the thermal efficiency of the engine and to reduce exhaust emissions. To take the advantage of these properties of ethanol, this research work was carried out with an increasing percentage of ethanol in the ethanol-gasoline blend (5%, 10%, 15%, and 20%). Experiments were carried out with variable compression ratio and advanced ignition timing on Single-cylinder four Stroke spark Ignition Engine. Performance parameters thermal efficiency, BSFC were measured for variable compression ratio and advanced ignition timing with blends. The test result indicated that brake thermal efficiency increased with varying ethanol percentage in the blend and reduced BSFC. The optimum blend for a Single cylinder Four Stroke SI engine is E10 and the Compression ratio is 7.5.

Keywords: Ethanol, Performance, High compression ratio, Blends, Ignition timing.