

## Documents

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**Comparative Experimental Analysis and Performance Optimization of Single-Cylinder DI and HCCI Engine with Series Catalytic Converters**

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**Abstract**

The stringent norms imposed by the government to reduce emissions to the environment have forced all engine manufacturers to reduce engine emissions. Carbon monoxide and NOx emissions from diesel engines are topics of significant consideration. This causes climate change and natural calamities. The current paper focuses on the comparative performance optimization of single-cylinder engines in DI and HCCI mode fitted with custom-designed catalytic converters in Series configuration using Taguchi regression Analysis based on experimental results obtained for series combination. The present work tested a diesel engine in both DI and HCCI modes with catalytic converters in series configurations with various monolith lengths and compression ratios. The test results are then analyzed using the Taguchi method and regression analysis. Overall, BTE is higher for HCCI mode than DI mode with the series arrangement of catalytic converters in the 24% to 35% range. Meanwhile, BSFC is lower for HCCI mode, in the 20% to 64% range. Hydrocarbon emission is higher, starting from 15% to 48%. The NOx emissions are lower for lower load, but on full load, they are more than those in DI Mode. CO emissions are also Higher for HCCI mode in the 12% to 30% range. © 2024, Semarak Ilmu Publishing. All rights reserved.

**Author Keywords**

DI engine; HCCI engine; regression; series catalytic converter; Taguchi method

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