

Effect of injection system parameters on overall performance of a small diesel engine

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Abstract

Limited fuel capacity and pollution are major concerns in the automobile industry. The combustion, performance, and emission characteristics are important considering the engine's overall performance. In the present paper, an experimental investigation was carried out on a small diesel engine to analyze the effect of injection system parameters on all measurable characteristics. The conventional diesel engine injection system was retrofitted with a common rail diesel injection (CRDI) system. The injection system parameters such as injection pressure, start of pilot injection timing, the start of main injection timing, and quantity of fuel injection percentage during the pilot and the main injection period were considered in the study. With the use of the CRDI system, it was observed that mean effective pressure and cylinder pressure were increased compared to the conventional diesel engine. There was a decrease in the peak value of the HRR and RoPR curve and simultaneously an increase in the width of the curve. MGT inside the combustion cylinder was also decreased. The retrofitted CRDI system shows higher thermal efficiency with good fuel economy as well as found a considerable reduction in carbon monoxide (CO) and smoke percentage. Overall, the considered injection system parameters deliver a significant improvement to the overall attributes of the small diesel engine.