

Boonthum Wongchai 2013: Study and Analysis of Engine Vibration, Effect of Using Hydrogen-diesel Dual Fuel. Doctor of Engineering (Mechanical Engineering), Major Field: Mechanical Engineering, Department of Mechanical Engineering. Thesis Advisor: Associate Professor Porranat Visuwan, Ph.D. 126 pages.

Hydrogen is one of the promising alternative fuels that can be used in internal combustion engines in order to reduce fossil fuel consumption and engine-out emissions. In this work, hydrogen is fumigated in to a diesel engine as hydrogen-diesel dual fuel operation with usual diesel fuel injected adjacent to the top dead center. The hydrogen addition is found to change the cylinder pressure characteristics and affect the engine vibration. In effects, the cylinder pressure and the engine vibration in terms of engine acceleration were studied. The single cylinder Kubota RT100 direct injection diesel engine was tested on the engine test bed equipped with engine indicating system and arrays of accelerometers. Hydrogen at various quantities of 0, 5, 10, 15, and 20 lpm was added and mixed with the air at the intake manifold before induced in to the cylinder. The cylinder pressure and the accelerations in x, y, and z directions installed beneath the engine base are measured at constant speeds and various torques.

The experimental results show that the maximum cylinder pressure, the average peak acceleration in all directions, and the peak of the magnitude of the difference between the acceleration vector summations at the engine supports with the hydrogen percentage of i% and the hydrogen percentage of 0% reduced with the increasing hydrogen percentage addition while the coefficient of variation of the maximum pressure increased. Consequently, the needs for optimization between the engine vibration reduction and the maximum pressure variation are prospectus for future work.

---

Student's signature

---

Thesis Advisor's signature