

Study of Effects for Diesel Engine Operation Parameters on Soot Emission

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ABSTRACT

This study indirect 4-cycle turbocharged engine with intercooler, adapted Taguchi Methods to investigate the relationship between engine operation condition and emission of smoke and NO_x of a Mitsubishi 4M40-2AT1 2385 c.c.. In addition, the optimized operation parameters for improving air pollution of diesel engine can be found out. The first part of our study was static Taguchi Methods to analyze the interactions of various operation parameters, in order to investigate the effects of operation data to air pollution such as soot emission and NO_x and consequently minimized the effect. Next, The dynamic Taguchi Methods for injection timing was used next to find out the effect of injection timing on air pollutions such as smoke and NO_x emission. The determination of air pollutions tested under transient testing procedures (US FTP, Transient Cycle testing procedures) and static testing procedures by engine dynamometer in accordance with domestic regulations. The results revealed when the US FTP, Transient Cycle procedures are applied, the sulfur content in diesel and intake temperature are relevant to the soot emission and NO_x emission. The maximum improving can reach 28.9% (static property) and 30.0% (dynamic property). When the testing procedures in accordance with domestic regulation are applied, exhaust pressure and maximum injection capacity became the major factors relevant to air pollution. The maximum average improving can reach 43.8% for soot emission. The result inconsistency was attributed to different operation data setting which was caused from different procedures.

Keywords : Diesel engine, Smoke emission, Taguchi Methods ; Optimization, Relevance.

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