

Thananchai Tepimonrat 2012: Use of Exhaust Valve Timing Advance together with Early Diesel Injection Technique in a Four - cylinder Diesel Dual Fuel Engine.  
Master of Engineering (Mechanical Engineering), Major Field: Mechanical Engineering,  
Department of Mechanical Engineering. Thesis Advisor: Assistant Professor  
Tanet Aroonsrisopon, Ph.D. 173 pages.

Diesel dual-fuel (DDF) operation is a promising alternative engine operating mode. DDF combustion can achieve lower PM and NO<sub>x</sub> emissions compared to conventional diesel engine operations. However, DDF engine operations suffer from high HC (mainly CH<sub>4</sub>) emissions and poor engine operating stability, especially under low load conditions.

In the current study, Toyota 2KD-FTV a four-cylinder turbocharged diesel engine has been converted into a dual-fuel engine operating under premixed natural gas and common-rail direct diesel injections. Experiments were performed to investigate use of different exhaust valve timings for improvement of low-load DDF operation. For all engine conditions, run at engine speeds of 1900 and 2400 rpm.

Results showed that different exhaust valve timings changed the fractions of EGR and the charge temperature. Advancing the exhaust valve timing was most beneficial for low-load DDF operations. Under these operations, HC and CO were significantly reduced. As the engine load increased, the exhaust timing advance might lead to excessive combustion rates and high NO<sub>x</sub> emissions.

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