

## Abstract

Because of increasing concerns of the engine out emissions from diesel engines, Common rail direct injection system is developed, which offers unlimited possibilities to control the fuel injection rate and to offers potential to meet the stringent emission legislations. This research work presents the development and the experimental investigation of simpler version of common rail direct injection (CRDI) system for a constant speed single cylinder engine. Extensive modifications in the cylinder head for accommodating solenoid valve injector, designing of injection driver circuit and the development of high pressure stage and its controlling are the important development tasks undertaken for this CRDI system. The test engine was operated at a constant speed, constant fuel injection pressure with different start of injection timing and varying engine loads. Injections timing were varied from 25°- 40° BTDC for investigating engine's performance, emission and combustion characteristics. From the results, it was concluded that start of injection is an important parameter in deciding the engine performance, emission and combustion characteristic. Advanced fuel injection showed lower BSFC, BSEC and higher BTE compared to retarded fuel injection timing. There was reduction in engine emissions except NO due to the earlier start of combustion in case of advanced injection timings. There was no significant effect of injection timings on CO emissions. The retarded fuel injection led to poorer combustion results due to shorter ignition delay period.