Abstract

Modern diesel engines are more expensive, complicated, and emit high nitrogen oxides (NOx) and particulate matter (PM). Simultaneous control of soot and NOx emissions in diesel engines is quite challenging and expensive. For addressing this issue, Gasoline compression ignition (GCI) engine technology is being developed, which is a futuristic engine technology that takes advantage of higher volatility, and higher auto-ignition temperature of gasoline and higher compression ratios (CR) of a diesel engine simultaneously to take care of soot and NOx emissions without compromising diesel engine like efficiency. GCI engines can efficiently operate on low octane gasoline (RON of ~70) with better controls at part load conditions. However cold starting, high CO and HC emissions, combustion stability at part load, and high combustion noise at medium-to-full load operations are some of the challenges associated with GCI engine technology. In this experimental investigation, two-cylinder production grade diesel engine was modified into the GCI engine. Major modifications were done in the engine management system and fuel injection pump. Test engine was operated on different load conditions with varying pilot injected quantity and injection timing at constant engine speed. FIP, injection strategy, injection timing and pilot injected quantity was optimised for the stable GCI engine operation. Combustion, performance and emissions characteristics of GCI engine on optimized test conditions were analysed and compared with the baseline diesel combustion. Lower NOx and PM emission with similar baseline diesel engine efficiency is achieved for GCI engine at optimised conditions. However, a stable combustion was not achieved at low load condition.

Keywords: IC engines, GCI **e**ngine technology, Combustion control, Low octane gasoline, Oxides of nitrogen (NOx), Particulates.