

Endoscopic optical visualization technique is a very reliable technique for real-time investigations. In the present study, endoscopic technique was applied to a production grade diesel engine for optical diagnostics of in-cylinder combustion. For the optical investigations using endoscopic technique, engine cylinder head was modified for endoscopic access. Various test fuels (diesel, Jatropha SVO, Jatropha biodiesel and blends, diesohol, diesoline and diesosene) were investigated for their combustion characterization such as in-cylinder pressure, heat release rate, start of combustion, combustion duration etc. In optical investigations, in-cylinder combustion images were recorded using a high speed CCD camera. Spatial soot and flame temperature distributions were analyzed from the combustion images using soot analysis and correlated color temperature methods. Spatial soot and temperature distributions for various test fuels indicated that the luminous regions in the combustion chamber were the prime locations for soot formation. These regions also indicated peak temperature zones in the field of view. This study is unique, where real-time combustion characteristics were determined for various test fuels using endoscopic visualization technique. This study generated valuable information about in-cylinder combustion, which can be utilized for combustion and emission optimization.