

## **Homogeneous Charge Compression Ignition Combustion: Challenges and Proposed Solutions.**

### **ABSTRACT**

Engine and car manufacturers are experiencing the demand concerning fuel efficiency and low emissions from both consumers and governments. Homogeneous charge compression ignition (HCCI) is an alternative combustion technology that is cleaner and more efficient than the other types of combustion. Although the thermal efficiency and emission of HCCI engine are greater in comparison with traditional engines, HCCI combustion has several main difficulties such as controlling of ignition timing, limited power output, and weak cold-start capability. In this study a literature review on HCCI engine has been performed and HCCI challenges and proposed solutions have been investigated from the point view of Ignition Timing that is the main problem of this engine. HCCI challenges are investigated by many IC engine researchers during the last decade, but practical solutions have not been presented for a fully HCCI engine. Some of the solutions are slow response time and some of them are technically difficult to implement. So it seems that fully HCCI engine needs more investigation to meet its mass-production and the future research and application should be considered as part of an effort to achieve low-temperature combustion in a wide range of operating conditions in an IC engine.

**Keyword:** HCCI, NO<sub>x</sub>, emissions