Modelling and Simulation Combustion Chamber HCCI Engine based on Diesel Engine 210cc to get Optimal Compression Ratio and Exhaust Gas Recirculation (EGR) Percentage

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ABSTRACT

Higher fuel usage each year causing fuel shortages. Scarcity makes the higher price of fuel each year. The highest usage is derived from the motor vehicle reaches 70%. It is seen that almost all the transport sector are still using Spark Ignition Engine (SIE) and Compression Ignition Engine (CIE) as a source of motion. In general, SI Engine and CI Engine has a thermal efficiency of about 35% to 40%. Currently being developed with the principle of homogenous Charge Engine Compression Ignition (HCCI), which is predicted to have the potential to be better than SI and CI engine.

The research was done by modeling the shape of the combustion chamber of diesel engine-based HCCI Engine 210cc AVL Fire using the software. In this modeling is done with a variety of compression ratio and Exhaust Gas Recirculation, Compression ratio to be modeled are 1:20, 1:19 and 1:18. Exhaust Gas Recirculation to be modeled is at 20%, 30%, 40% and 50% at each compression ratio used.

From this study, the HCCI engine with a compression ratio of 18 and a percentage of 20% EGR obtain the most optimal results. because the SOI values obtained at 11o BTDC position, then the duration of burning by 37.5oCA and high enough power generated by the fuel needs (SFC) is low. Seen that HCCI engines have a lower SFC values of L48 yanmar diesel engine
specification standards but still have a high enough power at 1900 rpm condition of 3.1125 kW and 0.182 Kg / watt.hour.

Keywords: Homogeneous Charge Compression Ignition engine, Compression Ratio, Exhaust Gas recirculation, AVL Fire, Start of Ignition (SOI), Start of Combustion (SOC).