Development of Dual-Fuel Systems and Stationer Diesel Engine Performance Test Using Diesel Fuel and Gas Product of Gasification Process

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Abstrak

Studying of biomass development as an alternatif fuel in internal combustion engine, the research in dual-fuel system using gas product of gasification process plus diesel fuel as fuels in stationer diesel engine has been done. We focused the research to develop gas fuel mechanism supllier to the engine and tested the stationer diesel engine performance using syngas plus diesel fuel. The syngas got it from rice husk gasification process in Downdraft Gasifier.

The syngas entrance mechanism by using pressure regulator and venturi-mixer plus mixing jet. Then the AFR (Air Fuel Ratio) in dual-fuel system was varied by adjusting the output pressure from pressure regulator such as 1 bar, 1.5 bar, 2 bar, 2.5 bar, 3 bar, 3.5 bar. Electrical load was varied starting to 200 Watt until 2000 Watt with 200 Watt interval. The measurement was done to get air and syngas flowrate, engine time to consume 5.024 ml diesel fuel and temperature of exhaust gas, engine lube oil, coolant, and syngas.

Then the results that were produced are maximum volumetric efficiency is 123.464 % using Mixer plus Mixing Jet, much lower diesel fuel consumption with the highest replacement is 72.461 % at \( m_{\text{syngas}} = 11.96 \) (kg/hour) and electrical load as big as 629.3 (VA). Another results were produced are spesific fuel consumption (sfc) is growth by increasing syngas massflowrate, followed by decreasing thermal efficiency and increasing exhaust gas temperature (except at \( m_{\text{syngas}} = 11.96 \) kg/hr).
Key word: Diesel Engine, Dual-Fuel System, Syngas, Diesel Fuel, Exhaust Gas Temperature.