

Chalomsak Tangngam 2011: Design and Testing of a Three-Stage Gasifier With Rice Husk as a Fuel. Master of Engineering (Mechanical Engineering), Major Field: Mechanical Engineering, Department of Mechanical Engineering. Thesis Advisor: Assistant Professor Wichai Siwakosit, Ph.D. 142 pages.

This study is composed of design and testing a three-stage rice husk gasifier. The main purpose is to reduce the amount of tar in the producer gas from the gasifier which is troublesome with the internal combustion engine that runs with it.

The gasifier is consisted of 4 zones which are drying, pyrolysis, combustion, and reduction. The temperature distribution in the combustion zone has been numerically simulated to be use in the design process. The actual temperature, gas composition, and amount of tar have been measured in the testing process.

The results indicate that the temperature in pyrolysis, combustion, and reduction zones are 400-600°C, 800-900°C, and 500-650°C respectively. Percentages by volume of CO₂, O₂, CH₄, H₂, CO, and N₂ of the producer gas measured at the exit port of the gasifier are 14.147 %, 4.069%, 3.406 %, 6.245 %, 19.329 %, and 52.801 % respectively. The amount of tar content has been reduced from the pyrolysis zone to approximately 1050 mg/Nm³ at the exit port, Whereas the volume flow rate of the gasifier is 1202 m³/hr and the system thermal efficiency is 44.908%.

Student's signature

Thesis Advisor's signature