

ABSTRACT

The aim of this study is to design and develop of high efficiency biomass gasifier stove for thermal application that suitable for using in small and medium enterprises. Studying in this study comprises of two phases the first phase is to design and construct biomass gasifier stove and the second phase is to conduct the performance testing of developed biomass gasifier stove. The operating in the phase of design and construction of biomass gasifier stove comprises of the series of three main tasks. Starting from determining of the concept design of biomass gasifier stove, technology selection and then design by considering from the concept design and the engineering principle of gasification technology. The technology that be selected for using in design and construction the gasifier is a cross draft technology. The advantage of a cross draft technology over another gasification technology is that it can operate by using natural draft and can feed biomass fuel continuously. For the performance testing, the operation with three kinds of biomass for instance wood chip of eucalyptus, coconut shells and wood twigs. From the study found that there are three main parameters that show the performance of the biomass gasifier such as starting time for operation, fuel consumption rate and heating value of syngas produced from biomass gasifier stove. From the operation of biomass gasifier stove with three kinds of biomass shows that the starting time for operation of biomass gasifier stove depends on biomass feed. The duration of the starting time for three kinds of biomass feed is in the interval of 10-20 minute and coconut shell takes the shortest time. The fuel consumption rate is in the interval of 7.6-8.2 kilogram per hour in which eucalyptus consumes the least amount of fuel. And the heating value of syngas produced from three biomass gasifier stove is not much different in which the coconut shell produced syngas with the highest calorific value.

Keywords: Biomass Gasifier Stove, Concept Design, starting time for operation, fuel consumption rate and calorific value.