Thermal Study of Gasifier Based Biomass Cookstove

by

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Dissertation submitted in partial fulfillment of
the requirement for the
Bachelor of Engineering (Hons)
(Mechanical Engineering)

September 2011

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CERTIFICATION OF APPROVAL

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A project dissertation submitted to the
Mechanical Engineering Programme
Universiti Teknologi PETRONAS
in partial fulfilment of the requirement for the
BACHELOR OF ENGINEERING (Hons)
(MECHANICAL ENGINEERING)

Approved by:

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September 2011

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecific sources or persons

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NURUL AISYAH BINTI MOHD ZIN

ABSTRACT

Biomass fuels have had been crucially important especially for people with limited access to other energy sources. Biomass energy technology such as gasifier is increasingly receiving attention as a promising renewable energy source because of the ever rising costs of fossils fuels especially diesel, and kerosene. Furthermore, fossil fuels adversely contribute to air pollution and global warming. Gasifier-based biomass cookstoves are 2-3 times greater efficiency than traditional cookstoves that use direct combustion method. The gaseous products of the cookstove are also relatively clean and environmental friendly. The purpose of this project is to characterize the basic operating properties of a gasifier-based biomass cookstove using different types of biomass fuels. These characteristics include the stove's efficiency. All this information is very crucial as a reference for designing an improvement on current gasifier cookstove. Three different types of fuels are used in the experiment: oil palm frond, dry leaves and pressed sugarcane. The efficiency of the stove was tested using water boiling test. Other characteristics such as its ignition time and time required to boil certain amount of water were also observed in this project. Based on the experiments result, oil palm frond has the highest thermal efficiency and the best fuel to be used on Chemaco cookstove among the three fuels. Unfortunately, the stove did not capable of performing simmering phase of water boiling test. The design of gasifier-based biomass cookstove must be perfected to increase its efficiency to ensure maximum energy can be harvested from fuel used.

ACKNOWLEDGEMENT

The author of this project would like to take this opportunity to acknowledge and thank everyone that has given her all the supports and guidance throughout the whole period of completing this final year project. Firstly, many thanks to the university and the Final Year Project coordinators for providing the author with all the initial information required to begin the project.

The author would also like to acknowledge the endless help and support received from her supervisor, Ir. Dr Shaharin Anwar Sulaiman throughout the whole period of completing the final year project. His sincere support and continuous guidance helped the author in overcoming all the hurdles that came during the progress of this project are very much appreciated.

The author would also like to thank the lab technicians in UTP, especially technician in Chemical and Mechanical Engineering Departments, for their endless support in terms of the preparation and guidance during the lab experiments for this study. Their continuous support and help throughout the whole period of experiments are very much appreciated.

Finally the author would like to express her gratitude's to her fellow colleagues for their help and ideas throughout the completion of this study. Thank you all.

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