

**Development of a Particulates Filtration System for Biomass Gas of
Oil-Palm Fronds**

by

Muhammad Aizuddin Bin Rusdi

Dissertation submitted in partial fulfillment of

the requirements for the

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(Mechanical Engineering)

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CERTIFICATION OF APPROVAL

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Approved by,

(Ir. Dr. Shaharin Anwar B Sulaiman)

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

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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 unspecified sources or persons.

MUHAMMAD AIZUDDIN BIN RUSDI

ABSTRACT

This report basically discuss about the research regarding development of gas cleaning system for Biomass Gas of Oil Palm Fronds. As for now there are no findings about biomass product of oil palm fronds, normally in biomass gases there will be some of the product that will effect the combustion engine either reducing its efficiency or shorten the life of the combustion engine. The objective of the research is to identify the product that will affect the internal combustion engine and also to develop a gas cleaning system. The studies are focused in developing the filter base on the information gain from the literature review regarding the emission of other biomass product. From that it is assume that the product of oil palm fronds will release about the same particulate as in the literature review. The study also include on deciding the type of filter to be implement for the gas cleaning system, for standard condition the filter will have many stages of filtration. The first filter usually will filter out the larger particle. The study identify that the largest product from the gasifier are ash and dust. As for the first filter the author proposes to use cyclone filter since it is widely use for biomass filtration. The study involve on designing and modelling of cyclone using AutoCAD, meshing in GAMBIT and run the simulation in FLUENT. All these method are important to simulate in actual condition. The main result that are been gauge are the flow velocity variation in the filter. The velocity variation then been match with the settling velocity of ash and dust. From the calculation the steeling velocity of ash and dust are 3.6077×10^{-4} m/s and 2.2328×10^{-7} m/s where the simulation velocity variation are from 9.84×10^{-8} m/s to 0.57 m/s which satisfy the condition. The study also include the testing of the fabricate filter. From the testing the effectiveness of the filter are been calculated where yields result of 81.72%.

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