UNIVERSITI TEKNOLOGI MARA

PERFORMANCE OF PURE PALM OIL AND PALM OIL ESTER AS LUBRICANT

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MSc

May 2019

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Dissertation submitted in partial fulfillment
of the requirements for the degree of
Master of Science
(Mechanical Engineering)

Faculty of Mechanical Engineering

May 2019

ABSTRACT

The use of renewable resources is one of the alternatives to overcome the dependencies on mineral oils. Vegetable oil and esters produced from vegetable oils are potential biodegradable lubricant. The use of palm oil as refine palm olein and industrial palm oil ester bio-based which are palmester 2083 trimethylolpropane trioleate and palmester 2090 trimethylolpropane trioleate as lubricants was investigated. The physical characteristics of both lubricants such as viscosity, viscosity index (VI) and acid value were determined through viscosity test. The tribological properties of all lubricants which included coefficient of friction and wear characteristics were tested by using four ball machine and pin on disc machine. The test was implemented using 40 kg of load for four ball test and 50N for pin on disc friction test. Wear scar diameter and coefficient of friction of palm oil ester bio-based were analysed and compared to palm olein. The coefficient of friction of palmester 2083 trimethyolpropane trioleate obtained was 34.4% higher and 5% reduction in wear scar diameter compared to palm olein while palmester 2090 trimethyolpropane trioleate obtained 30% better coefficient of friction and 4 .5% reduction in wear scar diameter compared to palm olein. However, palm olein showed better worn surface than other lubricants. Palm olein also provided better lubrication through friction test by using pin on disc machine as it transited mixed lubrication regime to elastohydrodynamic lubrication regime at low coefficient of friction. As a conclusion, palm olein has good anti wear properties compared to both palmester lubricants but the coefficient of friction for all lubricants shows contra result for four ball test and pin on disc test.

ACKNOWLEDGEMENT

In the name of Allah, the Most Gracious and Most Merciful.

Firstly, I wish to thank Allah s.w.t for giving me the opportunity to embark on my Msc and for completing this beautiful and challenging journey successfully. It takes some time to complete this journey but it is definitely a memorable journey to be remembered in the future. It would not have been possible without the warmest support, help and guidance from many people around me. I would like to extend my genuine appreciation to all of them.

First of all, I would like to show my genuine gratitude to my supervisor, Ts. Dr. Mohamad Ali Bin Ahmad for his patience, constant help, encouragement and guidance throughout this project. I am truly grateful for the criticism and helpful idea, without which this work would not have been possible to complete.

My appreciation goes to all staffs in Faculty of Mechanical Engineering who provided the facilities and assistance during this project. Their kindness and positivity in helping me along this journey are something I cannot repay.

Special thanks to my colleague, for giving me constant moral support from day one until I completed this journey and helping me throughout this project. I would also like to acknowledge my friends and colleagues at Faculty of Mechanical Engineering for their support, help and encouragement.

Finally, this thesis is dedicated to my family members especially my parents who have provided me endless spiritual and material support to educate me. My appreciation also goes to my siblings; who always encourage me to do better each day to complete my master journey. Without their support, I will not achieve my dream. This piece of victory is dedicated to all of you. Alhamdulillah.

To those who helped and contributed in this research indirectly, your kindness and support throughout this journey means a lot to me. May Allah repay you with His blessing. Thank you very much.

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