

# Wear Resistance of Palm Mid-olein in Medium Temperature

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The purpose of this study is to investigate the frictional behaviour and wear behaviour of palm mid olein at medium temperature. The frictional behaviour and wear behaviour of palm mid olein was analysed for temperature of 40°C, 55°C, 70°C, 85°C and 100°C. The frequency speed is set up to 2Hz. The result of the experiment showed that the coefficient friction of palm mid olein was lower which is 0.0289 compared to other lubricant at 100°C, give the palm mid olein a better lubricity performance. Palm mid olein showed a less total wear on alumina ball and aluminium plate surface when compared to other lubricants at 100°C.

**Keywords :** palm mid-olein, linear tribotester, friction, wear scar diameter, lubricant film

## 1. Introduction

Researchers are seeking a way to reduce the usage of mineral products by producing alternate sources, such as vegetable oils. As an alternative lubricant source, vegetable oils can play a crucial role in partially substituting petroleum-based lubricant because they have several benefits over base lubricant, which are regenerative, environmentally sustainable, biodegradable and less harmful [1]. The aim of this research is to introduce palm mid olein oil as an alternative source of lubricant oil in industrial applications.

## 2. Methods

Linear reciprocating tribotester is used to obtain the frictional behaviour of test oil and high-power microscope is used to observe wear behaviour on alumina ball and aluminium plate. WinDucom software would calculate the coefficient of friction of test oil and Isolation Lite software used to capture image and measure the wear on ball and plate surface

## 3. Discussion

Palm mid olein has the lowest coefficient of friction (0.0289) at 100°C, as shown in Figure 1. Abdulbari & Zuhan stated that the polar heads of the fatty acid chains chemically bind to metal surfaces, allowing monolayer film production, with the nonpolar ends of the fatty acids orientated away from the metal surface [2]. Palm mid olein also shows the smallest wear scar on alumina ball surface (936.4µm) as shown in Figure 2 at 100°C due to the formation of monolayer film in the palm mid olein helps to reduce the wear scar diameter when the alumina ball surface has a contact with aluminium plate [3] while SAE 10W-40 shows the smallest wear scar on aluminium plate surface (1132.2µm).

Based on the findings above, Palm mid olein showed a better lubricity compared to SAE 10W-40 engine oil at 100°C where coefficient of friction of palm mid olein is 0.0289 while coefficient of friction of SAE 10W-40 engine oil is 0.0942. Wear scar diameter on alumina ball

surface and wear scar width on aluminium plate surface for all lubricants shows an increasing value. However, the total value of wear for palm mid olein is lower compared to other lubricants. This shows that the temperature of the lubricants also give impact to the performance of lubricants.

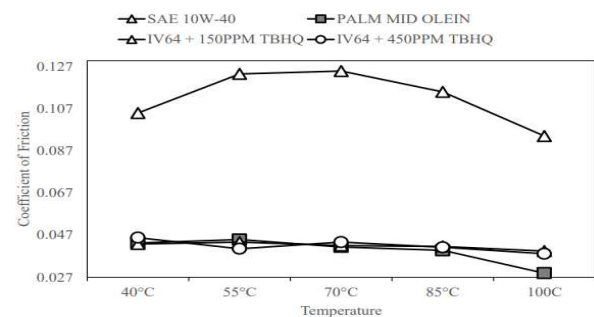


Figure 1 : Coefficient of friction against temperature

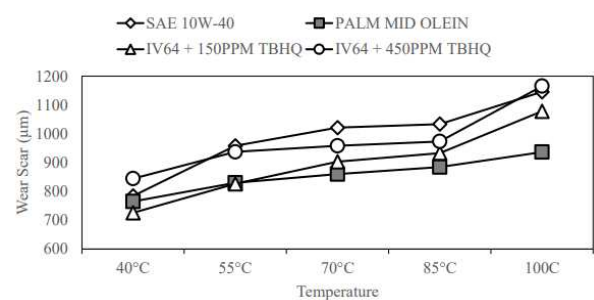


Figure 2 : Wear scar diameter on surface of alumina ball against temperature

## 4. References

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