

# CHAPTER 1

## INTRODUCTION



### 1.1 General information

Engine oil in today market can be divided into two main groups: single-grade and multi-grade oil, which are different by their compositions and their intended purpose in applications. Single-grade lubricant, is used primarily in an environment where there is a minor change in temperature while multi-grade engine oil is used in the opposite environment. However, both are used to reduce frictions between engine components.

Typically, the engine oil composes of lubricating base oil and additive. In multi-grade engine oil, an extra ingredient known as viscosity index improver (VI improver) is added to enhance oil's properties. VI improver helps to widen the usable temperature-range of the engine oil, thus, allowing multi-grade engine oil to be used in environment where temperatures are varied to a great extend. For example, in Canada where winter temperature is around  $-39^{\circ}\text{C}$  and summer temperature is around  $40^{\circ}\text{C}$ .

There are several VI improver type currently being used in domestic industry. During a manufacturing process of multi-grade oil, a single most suitable VI improver is added to the lubricant and the selection of VI improver is based on raw materials' properties (base oil and *etc.*), customer specifications and costs. Consequently, the finished products are low effective, as one VI improver alone cannot satisfy all the requirements. For example, adding star polymer to lubricant improves its low temperature viscosity but sacrifices the shear force tolerance.

## **1.2 Objectives of the research**

The main objective of this study is to determine suitable dual of VI improvers for multi-grade engine oil, by consideration of properties of blended oil and cost of production.

## **1.3 Scope of the research**

1. The VI improvers used in the experiments are those available in domestic market.

2. Samples were tested then compared and contrasted to available domestic products.

3. Maximum of two VI improvers were used to produce VI improver systems.

4. Cost effectiveness of VI improver was also accountable for drawing conclusions. Such costs were quoted at the time of the experiments.