CHAPTER I

INTRODUCTION

1.1 BACKGROUND

The development of motor fuel in the automotive world today is increasing. Combustion engine is a type of engine utilizing heat energy from the combustion process in the cylinder into mechanical energy. Motor fuel composed of the major components that have an important role, such as crankshaft, connecting rods, pistons, valves, camshaft and cam chain.

The piston is a component that functions as a suppressor and receiver inlet air pressure of combustion in the combustion chamber. The piston is connected to the crankshaft through the piston (connecting rod), so that the power generated after combustion can be channeled. In piston ring fitted separating the two parts of the piston and the cylinder liner. Piston rings are made of cast iron or steel used as a suppressant mixture and the radial direction to the cylinder wall to form a seal.

Piston ring is divided into two basic types, namely the compression ring and oil ring. Ring compression is normally mounted on the top and consists of two rings. It basically serves as a compression ring seal to prevent air or gas in the combustion chamber into the crankcase. Oil ring is mounted on the bottom and a single ring that serves to control coating of lubricating oil on the cylinder walls and drain back into the crankcase oil. In general piston rings also serve to channel the heat to the cylinder.

Piston and ring on motor fuel are often damaged along the length of usage. Lack of lubrication can cause piston ring wear, excessive gas pressure can result in the ring cracked, other than that the gas pressure fluctuates rapidly can result in scratched the surface of the ring.

Defect in the piston ring will causes oil comes into combustion chamber and mixed with fuel when entering the combustion process, so that the oil will be rapidly reduced and result in engine failure. It is needed a method to detect without dismantling defective piston rings, so as to prevent an engine system failure. With this method and the mechanical condition of the working machine or system can be observed periodically. If any part of the engine failure functional, it can be detected and identified to be treated. The cost will be more efficient, because no others part get damaged.

1.2 FORMULATION

From the above description may be taken formulation of the problem, which is how to detect damage to the piston rings on one cylinder four-stroke engine based on the vibration characteristics.

1.3 PROBLEM LIMITATION

In order for the discussion of this research is not widespread, given the extent of the problem as follows:

1. Engine tested in no-load conditions or in neutral gear position.

2. Damage is assumed to occur only in compression piston rings, the other components well conditioned.

3. In this research, author only calculated magnitude of signal energy

1.4 OBJECTIVES

The purpose of this study is:

1. Detecting the damage piston rings that occur in a single-cylinder four-stroke engine.

2. Assessing the energy vibration signals generated when the damaged piston ring components.

3. Analyzing the affection of decreasing signal energy to others involved parameters

1.5 BENEFITS OF RESEARCH

The benefits of this study was to predict maintenance activities, which is detect functional failures or damage of the piston rings on one cylinder four-stroke engine, so the condition can be monitored.

1.6 SYSTEMATICS OF WRITING

Systematics of writing consists of:

a. Chapter I. Introduction, provides background research, problem formulation, problem definition, objectives and benefits of the research, as well as systematic writing.

b. Chapter II. Basic theory, contains a literature review related to the four-stroke engine, piston rings, piston ring damage type, vibration sense, characteristics, vibration sensors, proximity sensors, time domain, the crank angle domain, the signal energy, amplitude, and comparative analysis of the reference signal.

c. Chapter III. Research Methodology, which examined the components, machinery, and measuring instruments used in the study, the research and implementation of the study consisted of the preparation of the vibration test equipment and vibration signal processing.

d. Chapter IV. Data and analysis, vibration signals contain data obtained from the DSO (Digital Storage Oscilloscope), this data is then processed using a excel script in order to get the energy graph display. Damage analysis is based on the graphic display.

e. Chapter V Conclusion and Suggestion. The research contains of research conclusions and suggestions related to this research as well as to subsequent researchers.