CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Motorcycles are two-wheel vehicle that powered by internal combustion engine either two-stroke or four-stroke. According to the latest statistics in Table 1.1, motorcycles population has increase about 11.6% from 54,619 units in January 2011 to 60,956 units in January 2012.

Table 1.1: Population of Motorcycle in January 2012

<table>
<thead>
<tr>
<th>Engine Capacity (cc)</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 cc or under</td>
<td>7076</td>
</tr>
<tr>
<td>51 – 125</td>
<td>1817</td>
</tr>
<tr>
<td>126 – 250</td>
<td>8086</td>
</tr>
<tr>
<td>Over 250</td>
<td>43977</td>
</tr>
</tbody>
</table>

Source: Malaysia Automotive Institute (MAI), 2012

These populations show that many people in Malaysia usually use motorcycle as their transportation. A power source for motorcycle is internal combustion engine. Internal combustion engine is combustion that occur in the combustion chamber by ignite the mixture of compress of air and fuel. The combustion produce power can move the motorcycle from one place to another.
Other than produce power as a power source to move the motorcycle, it is also produce emission of NOx and CO$_2$ gas that dangerous to humankind and environment. All manufacture of engine especially automotive engineer in this world doing research on improvement of internal combustion engine for both CI and SI engine. Their researches focus on the improvement power of the engine, decrease emission of NOx and CO$_2$ gas and fuel consumptions.

There are many parameters that can increase the power of the engine such as change the size of the bore of the cylinder block and change the cylinder head to performance standard. Nowadays, researcher want to increase the performance the engine without change the bore size, but change other parameter that have relation before the combustion chamber and after it. The important variables that can increase the performance of the engine are gas flow through the four-stroke engine, and discharge coefficients of flow within four stroke engine (Blair, 1999).

Gas flow through four-stroke engine is process of into, through, and out of an engine. The gas involve is unsteady which the pressure, temperature, and gas particle velocity in a duct are variable with time. In the case of exhaust flow, the unsteady gas flow behavior is produced because the cylinder pressure falls with the rapid opening of the exhaust valve or valves. This gives an exhaust pipe pressure that change with time. In the case of induction flow into the cylinder through an intake valve whose area change with time, the intake pipe pressure alters because the cylinder pressure is affected by the piston motion causing volumetric change within that space.

1.2 PROBLEM STATEMENT

In performance of racing engine, each parameter is very important to get the best engine performance. Investigations of the engine performance characteristics, especially for power and torque need to considered. The characteristic are gas flow through and discharge coefficient of flow in four-stroke engine. There are two parameters that usually involve in the gas flow thought engine, intake and exhaust valve.
1.3 PROJECT OBJECTIVE

a) To study the effect of the variable exhaust design length to the performance of the engine.
b) To obtain high power and torque at low speed of engine (rpm) based on the change of exhaust parameter.

1.4 SCOPE OF PROJECT

a) Literature review on the performance of 200cc engine and below based on the exhaust parameter change.
b) Design and fabricate variable exhaust length for engine Modenas GT128.
c) Test the engine performance by utilizing engine dynamometer.
d) Plot graph of the engine performance.