CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION.

Coated and uncoated carbides are widely used in the metal-working industry and provide the best alternative for most machining operations. When machining using carbides under typical cutting conditions, the gradual wear of the flank and rake faces is the main process by which a cutting tool fails. It carried out tool wear investigations on some cutting tool materials. Plotted tool life curves using the flank wear criterion and obtained that the tool life of carbides decreased quickly at higher speed.

The flank wear in carbide tools initially occurs due to abrasion and as the wear process progresses, the temperature increases causing diffusion to take place. Actually, the fact that abrasive wear may occur in metal cutting is not surprising since there are many hard abrasive particles present in metals, especially in steel.

The use of coolant to increase tool life is an issue with many differing views. In contrast, others have found that coolant promotes tool wear in machining. The inherent brittleness of carbides renders them susceptible to severe damage by cracking if sudden loads of thermal gradients are applied to their edge. The better performance of carbides was obtained under dry cutting.

Milling is the most common form of machining, a material removal process, which can create a variety of features on a part by cutting away the unwanted material. Nowadays, most of the carbide cutting tools are coated whether with CVD or PVD hard coatings. PVD–TiAlN-coated-carbide tools are used frequently in metal cutting process
due to their high hardness, wear resistance and chemical stability they offer benefits in terms of tool life and machining performance. However, we will compare the performance of coated carbide cutting tool with uncoated carbide cutting tool (uncoated-WC/Co) while dry milling process.

1.2 PROBLEM STATEMENT

There are many factors that affect the performance of cutting tool especially when dry machining. Nowadays, there are many type of cutting tools invented by manufacture engineers to overcome the problem. As an example the coated and uncoated carbide cutting tools. This two cutting tools have their advantages and disadvantages. We try to investigate the best cutting tool whether coated or uncoated carbide cutting tool for dry machining Aluminum Alloy. Surface roughness is often a good predictor of the performance of a mechanical component, since irregularities in the surface may form nucleation sites for cracks or corrosion. Although roughness is usually undesirable, it is difficult and expensive to control in manufacturing. Decreasing the roughness of a surface will usually increase exponentially its manufacturing costs. This often results in a trade-off between the manufacturing cost of a component and its performance in application.

1.3 OBJECTIVE.

The objective of this project is to investigate the performance of coated and uncoated carbide cutting tool while dry machining Aluminum Alloy in term of surface roughness.
1.4 SCOPE OF PROJECT

The identified scope of this project is as follows:-

1.4.1. Milling the Aluminum Alloy with both cutting tools (coated and uncoated) using milling machine.
1.4.2. Machining the Aluminum Alloy with various cutting speed.
1.4.3. Getting the surface roughness using perthometer.
1.4.4. Analysis data using Response Surface Methodology.
1.4.5. Review data.