CHAPTER 1

INTRODUCTION AND GENERAL INFORMATION

1.1 PROJECT BACKGROUND

Machining can be defined as a process that involved removing the material from the work piece and cut it into desired size and shape in form of machining chip. It’s also can be considered as the most essential process in manufacturing processes. Main industry goal’s is to manufacture high quality product, as well as low cost in short time. One of the most important elements in machining is the tools and cost of each tool can be varied and expensive according to their function and endurance.

First step for machining in planning process is starting from selection of cutting tool to know the cutting condition as well as to obtain specific data of tool life, cutting force, surface roughness, chattering and vibration, which is traditionally carried out base on planner experiences and general knowledge which is need to measured and recorded to compare with standard part (regular cutting tool). Besides that, handbook and tool catalogues are used to know standard data of the tool and machine before run the task.

A new cutting tool performance behaviour test can be applied to help businesses gain a competitive edge and it’s also describe all the tool characteristics’. The study of power consumed by the tool helps to find out the life of the tool for maximum productivity, helps to select the capacity of the motor required for the machine and it also helps for designing machine components. Wide of knowledge and have a better understanding about engineering material is essential for manufacturer during development.
To know characteristic of new cutting tool, various experiments should be conducted to obtain cutting tool specifies data to achieve the main general objectives which are to evaluate the power consumption and surface roughness effect of cutting tool due to variation of spindle speed, feed rate, depth of cut and radial depth of cut. To analyze surface roughness and power consumption of coated and uncoated irregular milling tool for optimum parameters in the machining length and machining time to measure the performance and to determine the optimum cutting parameters based on average surface roughness and power consumption result on the milling machine. Performance of machining process depends on the surface smoothness, and power consumption so that it’s become the major topics in process planning and machining optimization in industry to increase the productivity of the product and lowering tooling cost.

1.2 PROBLEM STATEMENT

Quality and efficiency of the product in manufacturing industries is one of the main manufacturer focus and to increase the productivity of the product in Sapura Industry, one larger factor is selection of cutting tools and cutting condition for machining. To know characteristic of new cutting tool, various experiments should be conducted to get optimum cutting tool performance to achieve the main objectives tools to fulfil Sapura’s requirement. This research project focused surface roughness and the power consumption test by FCD 450 cast iron using irregular milling tool coated and uncoated solid carbide. This material was been selected because they can be considered as materials that widely used in Sapura industry for block engine application.

1.3 OBJECTIVE OF THE RESEARCH

1. To evaluate the power consumption and surface roughness effect of cutting tool due to variation of spindle speed, feed rate, depth of cut and radial depth of cut.
2. To analyze surface roughness and power consumption of coated and uncoated irregular milling tool for optimum parameters in the machining length and machining time to measure the performance
3. To determine the optimum cutting parameters based on average surface roughness and power consumption result on the milling machine.
1.4 SCOPE OF STUDY

1) To conduct machining experiment of irregular end mill for coated and uncoated solid carbide end mill Ø20mm by using CNC KE55 Milling Machine.

2) To evaluate the surface roughness and power consumption effect of cutting tool due to variation of cutting conditions such as spindle speed, feed rate, axial and radial depth of cut, machining time and machining length.

3) To analyse and compare surface roughness and power consumption of coated irregular milling tool due to optimum parameter for cutting conditions.

1.5 FLOW CHART

The sequences of works have been planned for this project in order to achieve the project objectives. This flow chart is useful to ensure that all work regarding this project will be carried out as planned and smoothly. The process flow chart is shown in figure 1.1 below. Figure 1.1 shows the process starts by defining the project background and the objectives of the project. Research are done for journal and reading material regarding project, this step is very important to ensure that project run smoothly and to keep the project within its scope. Journal and reading material are review according to the project title and scope.

Procedure and methodology of the project are planned and recorded. In machining and experiment process the material of the project are determined, experiment method and fabrication of the tool are done and the calculation regarding economic value of the tool, if the result and analysis are acceptable and within the project objectives, the data from the machining and experiment are discussed and then concluded. Figure 1.1 show the project flow chart. Whereas Gantt chart can be referred in appendices A.