CHAPTER 1

INTRODUCTION

1.1 RESEARCH OVERVIEW

With the significant improvement of computer technology in Numerical Control (NC) for turning operation, the term of NC machining has evolved into Computer Numerically Controlled (CNC) machining. In recent trends, manufacturer demands for robust automated turning manufacturing process system to meet the goals of rapid production, lead time reduction and cost reduction, while manufacturing high quality products at minimum time [10]. The applications of intelligent systems for example Computer Aided Design (CAD), Computer Aided Process Planning (CAPP) and Computer Aided Manufacturing (CAM) have strengthened the relation between design and manufacturing stages.

These intelligent systems are integrated with the manufacturing processes in order to create the detailed information of part design, process planning and machining sequences in CNC turning manufacturing. Through these intelligent systems application, part conceptualization can be transformed into a real part production. CAD system
providing part design detailed information and CAPP channels these information for CAM to manufacture real part.

Process planning is an essential steps in transform CAD design into a real component. A process planning defines the required manufacturing process, strategies of operations, materials and machining tools needed based on CAD design to manufacture the product. A detailed information such as the machines specifications, tool specifications, setup procedure, operation time estimates have to be included in a process plan [23]. Generally, process planning was implemented manually with allocating sources information comprising machine performance, machinability data, existing stock availability, tooling inventories and production efficiency. Therefore, CAPP is a computerized form of process planning developed to support process planner through knowledge management capabilities and decision support tools.

CAD and CAM are the basic tools used in design and fabrication stages in manufacturing processes. Basically, CAD system is related with the design of component, modelling and simulation analysis of the virtual part. After the design is completed, the Computer Aided Process Planning (CAPP) system will transferred the geometry information which captured from the CAD design file with the allocation of machining process planning to the CAM program. The role of CAM program is to support the planning process, control of production, performance management in the manufacturing of the part by generating the machining code to manufacture the part on CNC machine [7]. The main purpose of constructing NC part programs is to instruct NC machine tool with the detailed set of machining commands.

This proposal discusses the development of machining instructions via CAM system particularly for turning operations. There are three important aspects to be considered in turning process planning task requirements. First, the manufacturing time
spent in process planning must be minimized. Next, the produced part quality attributes become a key concern to meet the part accuracy and surface precision. Lastly, production efficiency and machine performance must be improved through process management capabilities and decision making tools. In order to determine the process planning tools improvements, further investigations on the interaction medium between the operator and CAM software system need to be established.

1.2 PROBLEM STATEMENT

Generally during planning stage, many variables have to be defined including cutting parameters, process parameters and machining operations. An important consideration in planning tasks are usually time spend to construct a standard process plan. Additionally, manual process planning needed skilled process planners, longer process planning time spent and has low level of dependability. In order to support the decision making with large volume of data and to optimise the process planning task, the CAPP technology system is use as process simulator to provide an effective machining process plan.

In pursuance to develop an effective machining program for turning operation where experienced process planner is not necessary needed [23]. Therefore with the implementation of good CAPP system, the time require in process planning for machining parts could be minimized. Moreover manufacturing efficiency can be improved provided that CAPP systems were developed correctly.