

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Cryogenic becomes one of the most suitable coolants (cutting fluid) to replace the flood type coolants that already available at almost conventional lathe machine nowadays. Most of CNC lathe machine equipped with soluble oil which is a type of flood coolant. From the research that already done by researcher such as Mirghani I. Ahmed, Yakup Yildiz, etc., cryogenic will enhance lathe machine cutting tool life better than what a flood coolant can do. Cost and set up time can be reduce because cutting tool is the critical part of lathe machine that always breaks. The objectives of this project is to equip a conventional lathe machine with a cryogenic coolant system by fabricate it from the cryogenic dewar/cylinder to the nozzle. Three different machining environments will be done to compare the chips produced as the evidence of goodness of cryogenic coolant.

1.2 PROJECT BACKGROUND

Lathe machine is the most common machine in a manufacturing plant. Usually, a small plant used conventional lathe machines in their metal cutting process. The conventional machine needs good skills operator to handle it so that the metal that been cut will result fine finish surface. Even a good skills operator handle it, machine breakdown still might be happen. The critical part that usually breaks at the machine is the cutting tool. Higher feed rate and excessive forces applied are some of the causes

that contribute cutting tool to break. A flood type coolant system already installed with a conventional machine when brought from its factory. The coolant gives a little help to decrease the percentage for the cutting tool to break. So, a type of mist coolant system would necessary considered as the replacement for the flood type coolant system because of its ability to enhance cutting tool life better.

1.3 PROBLEM STATEMENTS

The general purpose for any project is to find solutions on a certain problems. It's also gives main idea how the project to be completed. For this project, the problems that need to be solved are:-

- 1) Any manufacturer wants to reduce cost and time taken to complete a product but gives better quality products and increases the outputs.
- 2) Manufacturer tends to upgrade their machines to compete with the new machine with new technology.
- 3) Lathe machine cutting tool can easily break and needs to enhance its tool life.

1.4 PROJECT OBJECTIVES

Every works must come out with its own objectives so that its will achieves the goal successfully. For this project, the objectives are:-

- 1) To design a cooling system for a lathe machine.
- 2) To fabricate the cooling system that use cryogenic as the coolant.
- 3) To test the lathe machine operates with its newly installed coolant system.
- 4) To analyze the cutting tool wear and workpiece surface roughness.

1.5 PROJECT SCOPES

The general scopes for this project are:-

- 1) Do the literature reviews on lathe machine, coolant or cutting fluid and nozzle.
- 2) Choose the cryogenic coolant type for the project study. Interest in nitrogen gas (N_2) for the cryogenic coolant.
- 3) Develop Gantt chart and flow chart for this project.
- 4) Design the coolant nozzle by using SolidWork software.
- 5) Nozzle holder designed by using SolidWork software.
- 6) Coolant hose arrangement designed to the coolant system.
- 7) Fabricate designed coolant nozzle by using lathe machine and drilling machine.
- 8) Fabricate nozzle holder by using milling machine.
- 9) Test the coolant system with three different machining environments.