UNIVERSITI TEKNOLOGI MARA
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MEC299

THE EFFECT OF MACHINING PARAMETERS ON SURFACE INTEGRITY OF ALUMINIUM MATERIAL USING LATHE MACHINE

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SEM MARCH AUGUST 2022

ABSTRACT

This project purpose is to observe surface integrity of aluminium with combination of certain speed cut,depth of cut and feed rate. In addition, this project involve with lathe machine The performance of a traditional lathe machine is nearly entirely determined by how quickly it cuts the workpiece; the faster the material is turned, the more finished products may be produced in a given amount of time. The machine's productivity is very high. High productivity requires a high rate of metal removal, lowering manufacturing costs and reducing operation time. Although a faster process is required, it does not ensure product quality in surface. This project looks into the relationship between machining parameters on aluminium material that can effect surface surface integrity. Constant cutting speed, three values of depth of cut, and four values of feed rate, three parameters were chosen. The objectives of this project is to see how machining parameters like depth of cut, cutting speed, and feed rate affect surface integrity. Next, the parameters that affect on surface finish and cutting force were studied. The surface integrity then will be observed using metallography method under the optical microscope for detailed and clear image. Based on observation that just done before, we can obtain expected result which is low surface roughness.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

Aluminum is an frequently used material in the industrial industry, particularly in the automotive and aeronautics sectors. Aluminum replaces steel in many situations due to its great corrosion resistance, light weight, and easy fabrication. Aluminum's qualities can be improved in terms of strength, hardenability, weldability, and machinability when alloyed, making it useful in a variety of applications. Aluminum alloy is often come in cast or wrought form before performing secondary processing to transform the materials into their desire purpose.

The machining method is frequently used to cut the material according to the appropriate shape in order to produce exact aluminium components. Surface integrity is essential during machining because it affects the quality of the surface profile, appearance, dimensional precision, tolerance, and wear resistance of the components. Many factors influenced surface integrity, including cutting settings, workpiece material qualities, and cutting tool characteristics.

Machining operations, specifically turning operations, are very basic in the metal cutting industry. The manufacturer, operator, or technician is responsible for selecting the right machining parameters to accomplish a specific level of required conditions such as surface roughness and tool wear, depending on knowledge and established factory regulations. To achieve the desired geometrical shapes and dimensional tolerances, the machining settings and process of composite materials are required. Cutting speed is the highest of a cutting tools or work piece's respective velocities. The depth of cut is the distance the cutting tool enters the work piece, while the feed rate is the number of rotations the tool makes.

Surface roughness is a way of observe the state of a machined surface's completed surface area. Improved surface finishing is one of the most wanted criteria in business, since it increases wear resistance and reduces friction. Surface roughness effects can be divided into two categories: main and spontaneous surface roughness impacts. Cutting tool geometry, feed rate, and cutting speed contribute to main surface roughness, whereas machine tool and uncontrolled

variations in the machining process, such as tool wear, dynamic unbalance of the machining system, and chip formation, contribute to spontaneous surface roughness.

1.2 Problem Statement

The most important aspect of machining is surface finish, which is measured by the quality of the machining. In order to improve surface quality, it is essential to choose suitable and ideal machining parameters during the machining process. Machining is one of the most difficult aspects of working with composite materials. Increased hardness and heat stresses during machining of these materials result in reduced tool life, diffusion, and dimensional instability. Finding and adjusting the most effective machining parameter could be the most effective technique to improve product quality in terms of surface roughness. [10]

1.3 Objectives

The main objectives of this project are:

1. To investigate effects of machining parameter towards surface roughness
2. To analyse the surface roughness result from lathe machine