UNIVERSITI TEKNOLOGI MARA

CAWANGAN BUKIT BESI

MEC 299

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

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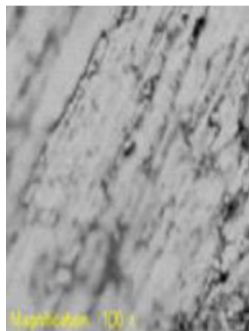
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ABSTRACT

In this era, the use of mild steel material has been widely marketed. Because of its strength, low cost, easy to get and machinability. However, the industry has problems in developing smooth surface mild steel products by using lathe machine for everyday usage. So, in this study, we investigate the relation of the machining parameters can affect the surface integrity of mild steel. Depth of cut, speed rate and feed rate are used. It also to analyse surface integrity of mild steel material. The purpose of the research is to help student or new users of lathe machine about how to produce smooth surface products that use mild steel materials. The method that we use in this project is turning process. After evaluating the results obtained, variance and regression analyses were performed. Based on the analysis of variance, for general purpose machining, use a recommended feed rate of 0.254 mm/min, cutting speed is 550rpm and the depth of cut for mild steel is (0.5-1.0) mm. The method that we use to measure surface roughness by using Ra and RMS calculation. Conclusion is, this project will be very helpful and useful for student and new comers in this industries, because this study will guide them to use the lathe machine properly. It also able to avoid losses to companies related to the manufacture of materials in terms of money and their time.

Expected result from microscope:

https://www.researchgate.net/publication/338953891/figure/fig3/AS:8534572966
95297@1580491484663/Optical-Microscope-images-of-mild-steel-coupon-a-
Polished-mild-steel-b-mild-steel-in.jpg

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CHAPTER ONE

INTRODUCTION

1.0 Introduction

Nowadays, the demand for the lathe machining product is increasing due to material processing and construction such as material manufacturing and many more. The increased quality of a surface formed by a machining process or other surface-generating action is referred to as "surface integrity." It has been discovered in several instances and has a considerable impact on the mechanical properties of the object produced. Surface integrity is crucial for the quality and performance of machined components, and as a result, industry is beginning to understand its significance. As a result, both academia and industry are interested in gathering up-to-date surface integrity information. The three machining parameters that determine the surface roughness of the machined surface are cutting speed, feed rate, and depth of cut.

1.1 Background Of Study

Nowadays, the use of mild steel has become increasingly popular in many areas, such as, in the field of construction and so on. This material so popular in the industry because of their high tensile strength, high impact strength, good ductility and weldability, Good malleability with cold-forming possibilities, and machinable.

The top layer of something is referred to as the "surface". The term "surface integrity" refers to the improved state of a surface produced by a machining process or other surface-generating operation. Cutting speed, feed rate, and cut depth are the three elements that make up the machining parameters. This had an impact on the machined surface's surface roughness. The status of a machined surface's finished surface area is measured using surface roughness. Improved surface finishing is one of the most sought-after business requirements since it boosts wear resistance and minimises friction. Main surface roughness is influenced by the cutting tool, feed rate, and cutting speed, whereas machine tool and uncontrolled surface roughness are influenced by the machine tool.

In the metal cutting business, machining processes in lathe machines, particularly turning processes, are quite basic. For this study we just focused on lathe machine. The manufacturer is in charge of choosing the appropriate machining parameters of lathe machine to achieve a given degree of needed condition, such as surface roughness and tool wear. Cutting Speed refers to the rotational speed, whereas Cutting Velocity refers to the tangential velocity. The feed velocity is usually perpendicular to the cutting velocity, but this is not always the case. The basic goal of feed velocity is to get the cutter closer to the workpiece in order to remove material from a larger area. Depth of cut is the tertiary cutting motion that provides the required depth within the work material to be machined away.

1.2   Problem Statement

The main issue is the student or a new company in the field of material production has difficulties in developing smooth surface mild steel products by using lathe machine for everyday usage. This is due to newcomers lacking knowledge or knowledge about machining parameters used to produce smooth surface mild steel product. Moreover, although a faster process is required to save time and cost, it does not ensure the product's quality in terms of surface roughness. Mild steel material is a hard material, so it is quite difficult to get a smooth surface while machining due to his hard and strong features. That is why this research is conducted to find the suitable parameters for mild steel by using lathe machine and indirectly it can reduce the loss of use of mild steel material as well as cost. So, the main target of the study is to investigates the effect of the machining parameters on the surface integrity of mild. This is because new companies must bear losses because they do not have skilled manpower in operating lathe machines or newcomer to produce products with mild steel elements. This is one of the main reasons why students need to build the project to give a full knowledge of machining parameters on surface integrity of mild steel using lathe machine to factory industry.