UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DESIGN AN INDUSTRIAL ROBOT MILLING MACHINE APPLICATION USING ABB IRB 120

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electrical Engineering Technology (Industrial Automation and Robotics) with Honours.

by

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APPROVAL

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Electrical Engineering Technology (Industrial Automation and Robotics) with Honours. The member of the supervisory is as follow:

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ABSTRAK

Pada zaman kini, teknologi semakin hari semakin berkembang dengan pesat tidak mengira di dalam bidang elektrik, elektronik, telekomunikasi, mekanikal mahupun pembuatan. Terdapat pelbagai ciptaan dan inovasi yang lahir dan telah diaplikasikan di dalam kerja harian kita. Inovasi yang paling ketara ialah menggabungkan antara dua teknologi dan menjadikan satu aplikasi. Untuk projek ini, ia merupakan gabungan dua teknologi yang berbeza iaitu antara robot dan mesin pengilangan menjadi satu aplikasi dalam sistem pembuatan yang dapat memudahkan kerja pengilangan yang kompleks. Teknik pengilangan ialah kaedah memotong, mengisar dan membentuk blok daripada bahan logam, kayu, plastic dan lain-lain menggunakan alat pemutar. Selain itu, ia juga merupakan salah satu teknik yang digunakan di dalam sistem pembuatan yang sering diaplikasikan pada industri di serata dunia. Projek ini mengaplikasikan kerja pengilangan menggunakan robot ABB IRB 120 daripada perisian simulasi. Tumpuan dalam simulasi ini adalah untuk menyediakan titik pergerakan bagi bentuk bahan kerja secara automatik. Bahan kerja pengilangan juga telah direka bentuk menggunakan perisian reka bentuk. Walaubagaimanapun, pembangunan projek ini merupakan di dalam peringkat awal serta reka bentuk motor gelendong yang akan dipasang pada robot merupakan dalam skala kecil bersesuaian dengan saiz robot.

ABSTRACT

Technologies are growing rapidly day by day involving electrical, electronics, mechanical and manufacturing field. There are many inventions and innovations are born and have been applied in our daily routine. The most significant innovation is a combination between two technologies and applied on industries. This project is a combination between two different inventions which are industrial robot arm and milling machine to apply in manufacturing system for facilitation of complex manufacture process. Mechanical milling is a method of cutting, grinding and shaping a block of metal, wood, plastic and other uses rotating tool. The project applies the milling work using ABB IRB 120 robot in simulation software. The focus of this simulation is to provide the path for milling movement automatically. The work piece for milling has also been designed using CAD/CAM design software. However, the development of this project is in the early stages and the designation of the spindle motor to be mounted on the robot was on a small scale compatible with the size of the robot.

DEDICATION

So here I'm again adding more colors to my life of sin,

Adding more beautiful meaning to resolve the things,

Adding more stress to make all the changes,

So I can turn my life and change it back on to the right lane.

We had every change from A to Z while we wish you were live for eternity.

From all the mess and all the fuss,

Pretend to forget this how to us.

Feels like something else of what I could be in years,

Oh, my brothers and sisters please forgive me for all the tears,

For all the hard times that I've cause in the past 4 years

And to my angel, thanks to you, respect to you.

I know I only miss you. I won't be here without you.

Thanks for all the fun, thanks for all the joy,

Thanks for all the years that we all enjoy.

I've done my time, I had my days, I had it all.

I pray for you, Allah bless you all.

Allah bless you all.

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Z	-	Zone
V	-	Velocity
g	-	Gram
kg	-	Kilogram
m	-	Meter
mm	-	Millimeter

LIST OF ABBREVIATIONS

3D	3 Dimensional
TCP	Tool Centre Point
NC	Numerical Control
CNC	Computer Numerical Control
PLA	Polylactic Acid
ABS	Acrylonitrile, Butadiene and Styrene

CHAPTER 1

INTRODUCTION

1.0 Introduction

Milling machine is one of the well-known machinery operations for production. Manufacture is an application of physical methods to produce parts or products that involve set up of multiple parts. Robot arm or articulated arm is currently famous for doing any particular job or application including milling operation. This articulated arm robot can make a better performance than current milling machines since the milling machines can only move in Cartesian while robot arm can moves with an addition roll, pitch, and yaw. Thus, this project is using the ABB IRB 120 to develop a milling robot. In this chapter, a briefing of overall process and overall project will be stated as an introduction to the other next chapters. This chapter is including a project background for the history of this project, problem statement, objectives, project guideline and briefing of the main components.

1.1 Milling Machines

A union of machinery, tools, power, and labor elaborate the processes to accomplish manufacturing. In this new era that technologies are increasing rapidly, a process of machines that includes engineering process can be implemented to ease human labor. The process of milling machine is involves from electrical power converting into mechanical power to use for manufacturing. Milling is the function of machining in which a work part is fed past a rotating cylindrical tool with numerous cutting edges to get rid of excess medium of the work piece. The existence of first milling machine is found on 1818 created by Eli Whitney in United States. The first milling machine was served as a prototype is then has been improved and innovated until now.

1.2 Robots

A robot is a general-purpose programmable machine that set by a computer or guided by an external control device to autonomously run an intricate series of actions. The regulations of the robots can be used by external device or embedded within. The creation of robots is constructed to take on human form but most robots are machines designed to achieve task with no regards of their appearance. The prominent feature is the robot's mechanical arm or manipulator, which their behavior and designation are referred as animal-like or human-like. The main purpose of developing a robot is to help human labor to replace their work which in repetitive working such as packaging, dirty place like at a landfill and also in hazard such as in radioactive or hot place.