UNIVERSITI TEKNOLOGI MARA CAWANGAN TERENGGANU

MEC299

DEVELOPMENT AND KINEMATIC ANALYSIS OF QUICK RETURN MECHANISM (WITH CRANK WHEEL)

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ABSTRACT

Quick Return Mechanisms is mechanical mechanisms that convert rotational motion to linear motion and vice versa. Applications are widely used in most mechanical machines. The aim of this study is to design and fabricate a well-functioning Quick Return Mechanism A relative motion analysis (kinematic analysis) will be conducted to design a well-functioning mechanism. Then, the procedure of this study will be extended to experimental use once the fabrication of the mechanism is completed. As a conclusion of this study, a comparison between experimental data and calculation data will be conducted and discussed.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.0 Background of Study

For this final year project, I have to study about design and fabrication of quick return mechanism with crank wheel. A quick return mechanism is a mechanism that converts rotational motion into reciprocating motion [1]. Quick return mechanism shows that the time required for the working stroke is greater than the return stroke. It results a big increase in machining productivity. It is commonly used in machine tools such as shaping machines, power-driven saws, and other applications that require a working stroke with heavy loading and a return stroke with light loading. The offset crank-slider system, the crank shaper device, the double crank mechanism, and the Whitworth mechanism are among the quick return mechanisms described in the literature.

1.1 Problem Statement

The problem statement for this project is student did not understand how did quick return mechanism is working. Usually, there are the tools that have quick return mechanism in the lab on the machine but the student cannot see it in detail. So, for this project the quick return mechanism has to be made with the same concept but the new innovative design by student. Then, student need to fabricate the product to perform that product and make sure its function. To understand the concept, some calculation needs to be made. For example, the velocity, acceleration, rotational velocity and acceleration[2].

1.2 Objectives

The main objectives of this project are:

a) to design a new quick return mechanism with crank wheel using CAD software which is Solidworks.
b) to fabricate the quick return mechanism with crank wheel using the materials available in the workshop and make kinematic analysis about it.

1.3 Scope of Work

The scope of work of this project are to design and fabricate based on quick return mechanism with crank wheel. Student must do brainstorming idea to choose the best result instead of just sketching one time. Method that use for brainstorming idea is morphological chart and Pugh method. Student must sketch the expected result. Then, the 3-dimension design was created by using solid work. Student will be able to imagine how the project will be working like. Some parameter can be calculated after the 3-dimension design has done. The calculation involves angular velocity, angular acceleration, translational velocity and acceleration. Then, the student must think about the material selected. Then, fabrication will be started. This involves process like cutting, shearing, stamping, forming, punching and welding [3].