



UNIVERSITI TEKNOLOGI MARA
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MEC 299

**DEVELOPMENT AND KINEMATIC ANALYSIS OF
QUICK RETURN MECHANISM (WITHOUT CRANK
WHEEL)**

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2020842594

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 of velocity and angular velocity between experimental data and calculation data will be conducted and discussed. For the experimental result, the parameters is measured using tachometer while for calculation data is measured by using formula based on engineering dynamics.

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CHAPTER ONE

INTRODUCTION

1.1 Background Of Study

The project that was planned is actually a concept of quick-return mechanism which is one of a subclass of a slider-crank linkage, with an offset crank. This project also includes the process of design and fabrication of the product.

Quick-return mechanisms feature different input durations for their working and return strokes. The time ratio of a Quick-return mechanism is the ratio of the change in input displacement during the working stroke to its change during the return stroke. In this era, several of basic types of mechanism that included Quick-return mechanism in it. For the application of the mechanism, the Quick-return mechanism was used in sharpeners, planer machine and others that required a load-intensive working stroke.(1)

In mid 1800s, there is one genius that was named Joseph Whitworth invented or changed the cutting method in that era which is took a long of time to be done into a quick-return mechanism. There are three types of quick return mechanism, which is Whitworth Quick Return mechanism, Crank and Slotted Link mechanism and Hydraulic Drive.(2)

For the project, the funds of this project will be getting from UiTM including some of materials that will be use to finish the project. Students also get access to use equipment and machines in UiTM laboratory. The process of the project will be under supervisor's monitor and lab assistant to avoid any undesirable events.

1.2 Problem Statement

The main target of the study is to learn about quick-return mechanism but mostly of student did not get a chances to see the mechanism because of lack of equipment about the mechanism works. This is one of the main reason why students need to build the project in order to give a full knowledge about the quick-return mechanism by using available materials and study of subject dynamic in past semester.

1.3 Objective

The objectives of this project are:

- 1) To design and fabricate a quick return mechanism prototype without crank wheel that simulate relative motion analysis
- 2) To study a kinematic analysis of quick return mechanism through relative motion analysis

1.4 Scope of Work

The scope of work of this study is to design and fabricate based on quick-return mechanism without a crank wheel. The conducted analysis done only limited to kinematic analysis which is relative motion analysis. This project was design by using Solidworks application. The calculation for this project only limited to kinematic analysis. The acceleration and velocity of the linear motion will be measure experimentally using Tachometer. As an instrument, the tachometer is a device used to measure the speed of a rotating object