UNIVERSITI TEKNOLOGI MARA

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# CAWANGAN TERENGGANU

## MEC299

# INVESTIGATION ON DYNAMIC MOTION OF FOUR BAR CHAIN


**DAIM ASMIZAN BIN SHAMSUDIN**

**2020887526**

**SUPERVISOR:**

**ABDUL RAHIM BAHARI**

## ABSTRACT

Final year project consists of the investigation and analysis of four bar chain mechanism. Mechanisms are means of power transmission as well as motion transformers. The main reasons why the project should be done is to solve the problems to determine all lengths of links of the planar four-bar linkages whose curve passes through a given coupler curve or some given discrete points. A four-bar mechanism consists mainly of four planar links connected with four revolute joints. The input is usually given as rotary motion of a link and output can be obtained from the motion of another link or a coupler point. Straight line motion from four bar linkages has been used in several ways as in a dwell mechanism and as a linkage to vehicle suspension. This project studies the straight-line motion obtained from planar four-bar mechanisms and optimizes the design to produce the maximized straight-line portion of the coupler point curve. The equations of motion for four different four-bar mechanisms will be derived and dimensional requirements for these mechanisms will be obtained in order to produce the straight-line motion.

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# CHAPTER 1

# INTRODUCTION

## 1.0 Introduction

A four-bar mechanism consists mainly of four planar links connected with four revolute joints. The input is usually given as rotary motion of a link and output can be obtained from the motion of another link or a coupler point. Straight line motion from four bar linkages has been used in several ways as in a dwell mechanism and as a linkage to vehicle suspension. Four-bar linkages are widely used in mechanical devices due to their simple structure, ease of manufacturing, and low cost. The path synthesis of planar four-bar linkages has been studied with a variety of methods.

The UiTM laboratory dynamic access to the equipment and machines that will be employed in this project. The completion of this project will take place at the UiTM laboratory Dynamic. To avoid any problems, the procedure will be carried out under the observation of assistant engineer.

## 1.1 Background of Study

The implementation of the four-bar chain in everyday life is the primary subject of this research. A four-bar linkage is a versatile machine component that can convey motion or provide mechanical advantage. Four-bar linkages can also be used to create function generators. Low friction, higher weight carrying capacity, ease of production, and operation reliability despite manufacturing tolerances make them superior to other mechanisms in some applications. The four-bar linkage is also the most basic linking mechanism, with pieces of it appearing in many more complex processes. As a result, a basic understanding of its properties is necessary. [1]

## 1.2 Problem statement

Investigation of four-bar linkages is to determine all lengths of links of the planar four-bar linkages whose curve passes through a given coupler curve or some given discrete points. The problem has always been a longstanding difficult and challenging task because it is high polynomial degree and highly nonlinear. The solution methods to the problem can be broadly divided into two classes, direct method and indirect method. The direct method is to deduce the parameters of the mechanical linkages according to the kinematics principle.

## 1.3 Objective

1. To investigate motion of four-bar chain mechanism by using relative motion analysis.

2. To find the linkages that ensure same input output relationship or coupler curve geometry.

3. To come to an understanding of the times taken for the outstroke and in stroke via draw the graph and draw the locus of the follower for different length of crank, coupler and follower.

4. To calculate velocity and angular velocity using relative motion analysis.