UNIVERSITI TEKNOLOGI MARA

CAWANGAN TERENGGANU

MEC 299

DEVELOPMENT AND KINEMATIC ANALYSIS OF SCOTCH YOKE (CRANK WHEEL)

MUHAMMAD AFIF BIN ZAWAWI

2020876798

SUPERVISOR :

HAIZUAN BIN ABD RAHMAN

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ABSTRACT

The Scotch Yoke Device is a very simple mechanism for converting a slider's linear motion into motility motion and vice versa. A sliding bar, a yoke on the bar with a slot cut out, and a smaller bar connected to the yoke and attached to the slippery bar by a pin via the yoke slot are the components of this device. The smaller bar is pushed to slip up and down within the yoke slot as the bar slides back and forth, creating a motion movement. This motion connection also holds true in reverse; when the pin commences a rotating movement, the slider creates a reciprocal or back and forth movement. In use, the reciprocating portion is directly attached to the sliding bar or yoke through a slot that contacts the spinning part's pin. The motion of the Scotch Yoke Mechanism is such that when driven by an eccentric or crank, the mechanism produces pure simple harmonic motion. These graphs have a perfect wave shape since velocity and acceleration are derivatives of the displacement time curve. Scotch Yoke Mechanism is commonly used in high oil and gas pipeline management valve actuators. Although it is no longer a prevalent metalworking equipment, rudimentary shapers still employ Scotch yokes. [1]

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CHAPTER 1

INTRODUCTION

1.1 Background of study :

The Scotch Yoke is a mechanism for converting the linear motion of a slider into rotational motion of a crank or vice-versa. [15] The piston or another reciprocating half is directly linked to a slick yoke with a groove that contacts a pin on the spinning half. Given a constant motility speed, the form of the piston's motion may be a pure wave over time. This mechanism is a mirror image of the double slider crank mechanism. It's now known as a scotch yoke since, in America, a "scotch" was a slotted bar that was put underneath a collar on a string of well-drilling equipment to assist them although a community was being added. Russell Bourke used this technology in the internal combustion engine known as the Bourke thirty engine in 1940. And we are employing this method for the following reasons: The Scotch yoke mechanism is used to convert crank action into slippery motion. The horizontal component of the link slides or reciprocates in the fixed link as the crank revolves. When one of the slippery links of a double slider-crank chain is fixed, a Scotch yoke mechanism is formed. The scotch yoke mechanism has fewer moving parts and is more suitable for sander operation than the slider crank system. This device is often found in high-pressure oil and gas pipelines. It is now utilised in a variety of internal combustion engines, including the Bourke engine, the SyTech engine, and other hot air engines and steam engines. [1]

1.2 Problem Statement

The primary goal of the research is to learn about the scotch yoke mechanism, although most students did not get the opportunity to examine how it works due to a lack of equipment. This is one of the primary reasons why students must construct the project in order to have a thorough understanding of the scotch yoke mechanism utilising readily available components.

1.3 Objective

- To design a new scotch yoke with crank wheel using cad software which is solidworks
- To fabricate scotch yoke with crank wheel using the material in the workshop
- To make kinematic analysis

1.4 Scope of work

The scope of work for this fyp is to design a new scotch yoke with crank wheel using cad software which is solidworks.Then,also to fabricate the final design that we get from sketching.Futhermore,the last scope of work is to make kinematic analysis base on the final design that we fabricate.

1.5 Expected Result

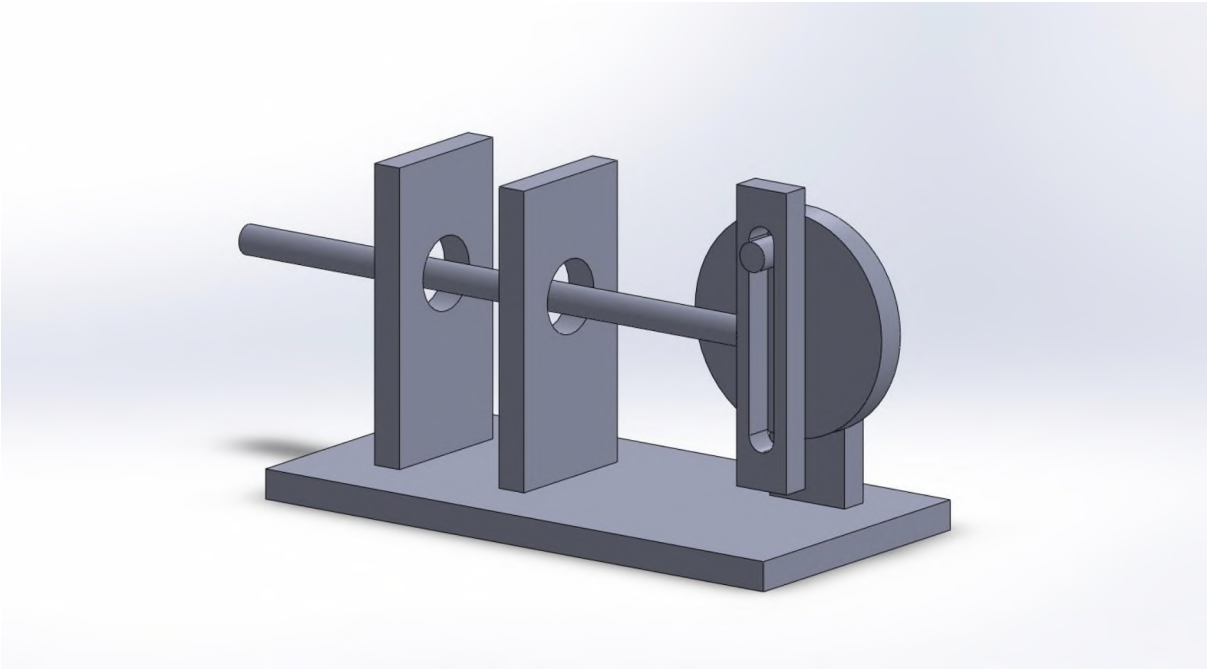

Figure 1 Expected result