UNIVERSITY TEKNOLOGI MARA

CAWANGAN TERENGGANU

MEC299

PRESSURE CONTROL PROCESS

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ABSTRACT

Final year project consists of the research and study on the use of pressure control process in industry which basically about the experiment of pressure control with suitable controller and equipment. The main reasons why the project should be done is to investigate how the pressure control system work and its characteristic for both inflow and outflow control. This project can also be made as reference for future experiment and study in order to give the detail knowledge about this process of control in industry. In this project, the concept of pressure control with working fluid and the algorithm of PID controller will be used. The final result should be able to achieved the objective which is to study the control of pressure in the vessel and most importantly to observe the characteristic for both inflow and outflow control. Experimental phase is one of the processes that play a big role in this project. Throughout the process, the experiment will be held until it complies with the objective and meet the expectation result of the project. Several process of research will be done in order to increase the knowledge and success rate of this project which involve what kind of study that should be use, what kind of data collection method, and data variables should be use.

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CHAPTER 1

INTRODUCTION

1.0 Introduction

This project is about an application of control process which focusing on controlling the pressure inside vacuum chamber. Pressure control are one of the important processes that generally use in a lot of modern industry such as manufacturing, piping and boiling. This project will also serve as teaching instrument or manual in any school or university for their own research and studies.

This project, or basically this experiment will be held at UiTM laboratory in order to access the equipment and software called PCT53. This experiment will also be done under the supervision of the lab assistant to avoid any unwanted issues and as the guide to use the equipment.

1.1 Background of Study

This project is focused on the control process with pressure as variable using a software on PC that connected to an equipment called PCT53. For the information, PCT53 Pressure Control Process is an equipment consists of a combined sump tank assembly together with an electrical connection box, mounted on a common base plate. This process is free standing without the need of permanent water supply or drain connection.

PCT53 is a pressure control process using water and air in combination as working fluid which will be pumped to the upper sump tank from the lower sump tank where the water stored. The upper tank is compressed from the atmosphere so that the air inside the vessel is compressed as the water fill in. There are two outlets where the water drains from the vessel, main outlet where the flow is continuous and second outlet incorporates a solenoid valve (SOL) that allows the flow to be started or stopped under remote control. In this project, we are going to research on the result of pressure control by proportionally varying pump speed (inflow control) and pressure control by time-proportioned opening of a solenoid valve (outflow control).

1.2 Problem Statement

With the purpose to understand the operation of pressure control process in industry using the PCT53 equipment and PID controller method, observation of the pressure inside the vessel must be done while controlling the flowrate of water from the water pump and solenoid valve. In instance, for inflow control, what is the correct control input in varying the pump speed in order to obtain the constant pressure while for outflow control, what is the correct input for time-proportioned varying the opening and closing of solenoid valve in order to obtain the constant pressure.

1.3 Objective

The main objective of this project are:

1. To control the air pressure in the vessel at the required value by using inflow control and outflow control.

2. To determine the characteristic of the data obtain from both control using PID controller

1.4 Scope of Work

1. Researching on the use of PCT53 and its software before planning the experiment.

2. Offer several options of setting such as pump speed, fluid flowrate, and PID settings

3. Planning the experiment procedure for both control before beginning the actual experiment.

4. Determined the result obtain from the both control process in a shape of graph and table.