NEW PRESS MACHINE CONTROLLED BY PLC

(PROGRAMMABLE LOGIC CONTROLLER)

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This Report is submitted in partial fulfillment of the requirements for the award of

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Specially dedicated to

my beloved mother, father, brother, sister and friends who have

encouraged, guided and inspired me throughout my journey of education

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APPRECIATION

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Thank you…

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ABSTRACT

New Press Machine is a project to improve previous press machine which have weakness in safety while operating it. This matter creates a lot of problem and at the same time the operators and technician have the higher risk to have an accident in industries. The solution for this problem is a development of a new program of machine which running same operation but the machine is more safety and easy to setup when machine pressing the radio panel using external timer

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ABSTRAK

Project *Press Machine* ini adalah suatu usaha untuk menaik tarafkan "Press Machine" dimana pada mesin yang sedia ada, bahagian ciri-ciri keselamatan kurang dititik beratkan. Jadi ia akan mengundang kepada risiko berlakunya kemalangan ditempat kerja oleh operator dan juruteknik. Penyelesaian untuk masalah ini ialah membuat program yang baru pada mesin dimana mesin berfunsi seperti sedia ada tetapi ia lebih selamat dan senang untuk menukar masa operasi mesin tersebut dengan menekan panel radio dengan penambahan pemasa luar untuk kemudahan operator atau pekerja menukar masa operasi.

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LIST OF ABBREVIATION

AC - ALTERNATING CURRENT

CISC – COMPLEX INSTRUCTION SET COMPUTER

DC – DIRECT CURRENT

I/O – INPUT/OUTPUT

I/O – INPUT/OUTPUT

LAN – LOCAL AREA NETWORK

LED – LIGHT EMITTING DIODE

PC – PERSONAL COMPUTER

PLC – PROGRAMMBLE LOGIC CONTROLLER

RISC – REDUCED INSTRUCTION SET COMPUTER

V – VOLTS

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CHAPTER I

INTRODUCTION

1.1 Project Overview

This Mini Press Machine is a project that is designing a new way to improve the previous press machines in industries which has a few weaknesses in safety while operating it. This matter creates a lot of problem to the operators which have the higher risk to have an accident. This development is the solution for the problem that contain a new program of the machine which running the same operation but the machine is more safety to the operators. Besides that, it will make easier to setup the timer for the operation because this development uses the external timer.

This machine controlled by the PLC. It consists of 5 pneumatic cylinders which each cylinder have their own function. For example, this machine used to press the board of circuit to the casing. So this cylinders has their own function for that operation which are to press the board to casing (for example is television), carry the finished television to the pickup and place section then the last cylinder used to grip and pickup the television.

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This project contains in 2 states of operations which in automatic and manual mode. In automation mode, all the operation will begin automatically after the operators pressed the 2 switch simultaneously. In manual mode, the operator need to press (switch on) in every state condition to complete the operation. That mean, every state operation has their own switch for the operation.

1.2 Objectives of Project

The objectives of this project are:

i. To identify the input and output component like pneumatic, sensor, switch external timer and solenoid valve.

ii. To learn more about the types of pneumatic and its system to be function.

iii. To build a new press machine model that more safety and effective.

iv. To create the press machine that need only one worker to handle the machine process until send it to the set not like other machine that need 2 workers.

1.3 Problem Statement

i. The Press Machine in industries is not safe to use both in automatic and manual mode. In automatic mode, user just use only one switch (one hand) to control the machine although has two switches at the machine. While in manual mode, the operator is not safe to use the machine because the machine can't stop immediately while doing the maintenance job.

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ii. Some other machine need two operator to control the press machine which one operator for control the machine and the other one to take the television after press machine pressed the board to casing. So in this case, the machine should be upgraded that just need one operator to control and handle the operation of press machine. For this solution, it will minimize the cost to pay for the salary of the operator. So the programming will be changed to make sure the press machine more safety to use.

iii. The timing for the press machine to press the component (example the thing to press) is difficult to change and need a long time to modify the program. To settle this problem, this press machine will be designed with external timer. So it will be easier to change the time operation without modify the program.

1.4 Scope of Project

This project contains in 2 states of operations which in automatic and manual mode. In automation mode, all the operation will begin automatically after the operators pressed the 2 switch simultaneously. In manual mode, the operator must to press (switch on) in every state condition to complete the operation

This project was creating in two parts. First, develop the hardware model and second interfacing the model with PLC (Programmable Logic Control). Find suitable program to control the machine and the type of PLC had been chosen to control the machine. For this machine, after press the emergency button, the machine will stop automatically without back to initial state. This will make the machine more safely. To make the machine more efficient, these machines just need one operator to control all the operation.

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This project also created the external timer that easy for the operator to change the timer operations. This facility will give comfortable to the operator because they are unnecessary to modify the program to change the timer. So it will make the working environment so efficient and enhance the productivity.

1.5 Project Methodology

This project was carried out in two main phases, which were the fabrication of model and interfacing the model with Programmable Logic Controller. The idea to proposed and done this project comes from the experiences that have got during industrial training program.

While working as technician at production engineer department there are many problem had occurred at the assembly line. Some of the problems that can be seen were at the press machine puncture test machine, and AM/FM machine.

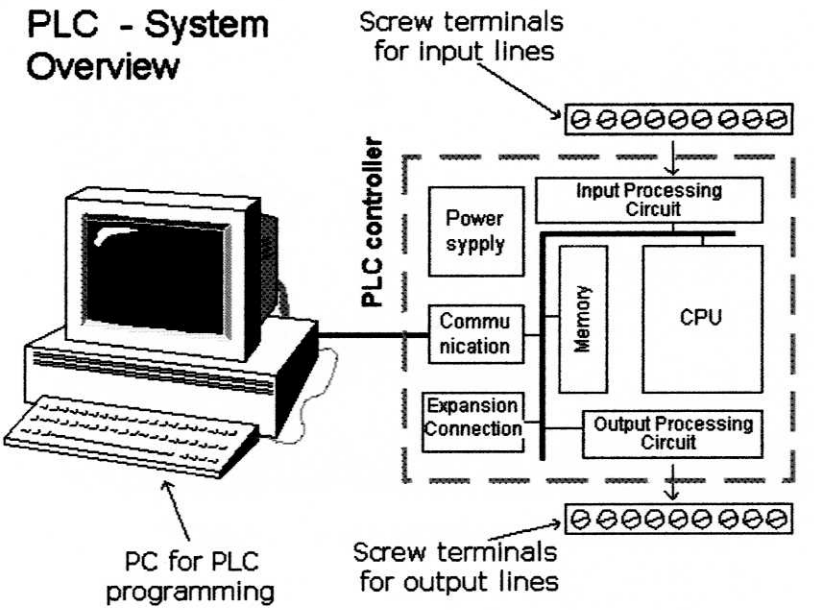

Figure 1.1 The PLC System Overview

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Press machine had been chosen because it not uses external equipment that exists on the puncture test machine and AM/FM machine. In addition it didn't need high voltage like puncture test that need 11 KV so that product can be test There are several problems that can be found at the machine:-

i. Machine can't stop immediately in auto mode, in automatic mode; user can only use one hand to operate the machine although there are two switches at the machine.

ii. Time for machine to press the panel radio is difficult to change and need a long time to check and modify the program.

Discussions with supervisor about title that going to be proposed, problem at the machine, equipment that going to be used and make proposal from its point of view. Discussion also been made with group member to overcome the problem; discuss how added function of machine because I have to program the controller of the cold press machine to achieve the objective.

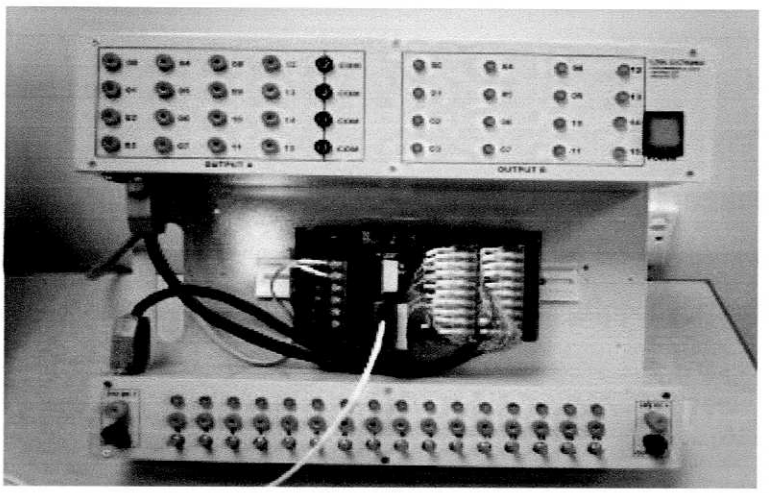

Figure 1.2 The Example of OMRON PLC

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Find suitable program to control the machine is finds and PLC had been chosen to control the machine. The main factor of using PLC because of the experience that been getting during industrial training. OMRON had been choose because this PLC that been familiarized while doing troubleshooting at the factory.

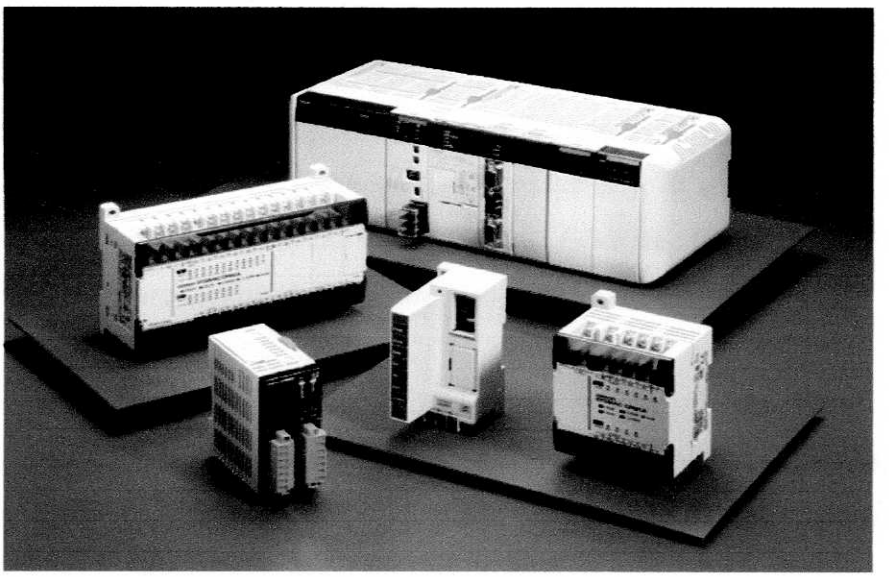

Figure 1.3 The Latest Version of OMRON PLC

1.6 Thesis Outline

This Press Machine is difference with the existing Press Machine in industries because this machine using the external timer operation. So it eases to change the time. Besides that, this machine also completed with the gripper (pickup unit) to take the components after pressed.

This thesis is divided into 4 chapters to provide the understanding of the whole project. Chapter 1 is introduction of the overview for this project. It's also contains the objectives, problem statement, scope and project methodology.

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Chapter 2 focused about the literature review that contains the study of the project that will be created. More than 60 percent of the source for the study got from the internet. Besides that, it's also get from the book, e-books, journal and many more. This study is focused especially on all method used in this project.

Chapter 3 covers up all the project methodology and explains the project implementation to achieve the goal. This chapter specifically discusses about the method or procedure to finish the project successfully. It's also containing the flowchart that will be follows by the student. It will show step by step to finish it. The hardware and software technical details are also explained in this part.

Chapter 4 explains the result and discussion of this project. In this chapter, it's also show up the analysis of the project that has been created. It's also containing the picture or photo for the current result for this project.

Chapter 5 will concentrated about the conclusion and the suggestion for the project. In the conclusion part, it will show whether the objectives were achieved or not. Then the important part of this chapter is the suggestion part. It's important in case to upgrade the project in the future.

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CHAPTER II

LITERATURE REVIEW

2.1 Programmable Logic Controller (PLC)

Automation of many different processes, such as controlling machines or factory assembly lines, is done through the use of small computers called a programmable logic controller (PLC).

This is actually a control device that consists of a programmable microprocessor, and is programmed using a specialized computer language. Before, a programmable logic controller would have been programmed in ladder logic, which is similar to a schematic of relay logic. A modern programmable logic controller is usually programmed in any one of several languages, ranging from ladder logic to Basic or C.

Typically, the program is written in a development environment on a personal computer (PC), and then is downloaded onto the programmable logic controller directly through a cable connection. The program is stored in the programmable logic controller in nonvolatile memory. Programmable logic controllers contain a variable number of Input/Output (I/O) ports, and are typically Reduced Instruction Set Computer (RISC) based. They are designed for real-time use, and often must

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withstand harsh environments on the shop floor. The programmable logic controller circuitry monitors the status of multiple sensor inputs, which control output actuators, which may be things like motor starters, solenoids, lights and displays, or valves. The programmable logic controller has made a significant contribution to factory automation.

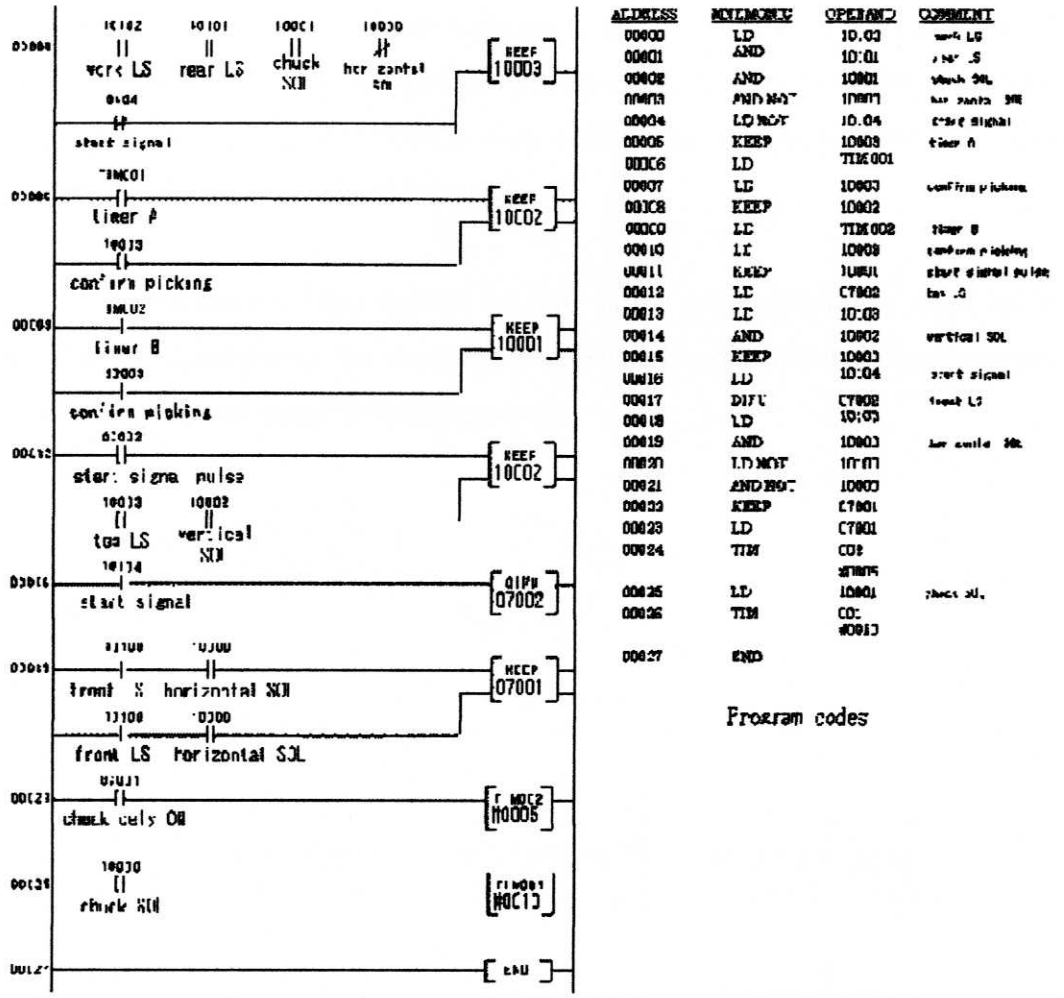

Figure 2.1 The example of Ladder Diagram and the Program Codes for PLC

Earlier automation systems had to use thousands of individual relays and cam timers, but all of the relays and timers within a factory system can often be replaced with a single programmable logic controller. Today, programmable logic controllers deliver a wide range of functionality, including basic relay control, motion control, process control, and complex networking, as well as being used in Distributed

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Control Systems. Digital signals yield an on or off signal, which the programmable logic controller sees as Boolean values. Analog signals may also be used, from devices such as volume 3 controls, and these analog signals are seen by the programmable logic controller as floating point values.

There are several different types of interfaces that are used when people need to interact with the programmable logic controller to configure it or work with it. This may take the form of simple lights or switches or text displays, or for more complex systems, a computer of Web interface on a computer running a Supervisory Control and Data Acquisition (SCADA) system.

Programmable logic control or PLC is the most commonly used industrial automation technique in the world. It is universally applied for factory automation, process control and manufacturing systems.

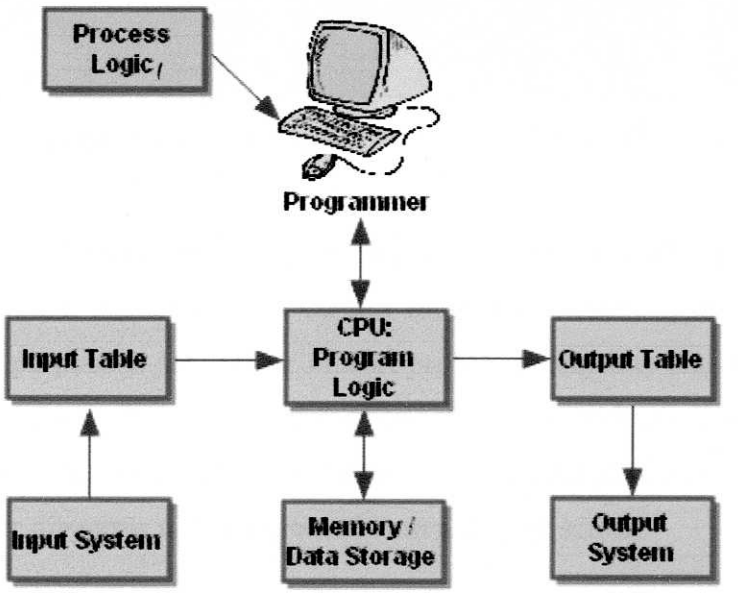

Figure 2.2 The Block Diagram of PLC Operation

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