

DESIGN AND BUILD NEW COLD PRESS MINI MACHINE BY USING PLC

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**I dedicate this to my parent, my lovely family, my friend
and electronic engineering education.**

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ABSTRACT

The development of mini cold press machine is an improvement from already machine. The current machine has a lot of weakness especially from its safety. Furthermore its only can perform one operation is product pressing but for transferring product, its need use the operator to keep the entire product to assembly place. It's will take a time and can reduce the production output.

As the solution, the new innovation of cold press machine will design which its still running a same operation. Beside that, the improvement is this machine has addition operation is pick up and place product. The main is this machine is more safety because the using sensor as a detection for any distortion in operation and use the cover. This machine also uses a pick up and place to transferring the product. The constant frequency of pick up and place operate make the transferring of product is faster and its will increase the productivity the product.

As a result it also can reduce of using the worker for the transferring the product beside may cut off the cost for worker. It will bring more profitability for the industries field.

ABSTRAK

Pembangunan mini cold press machine ini adalah suatu usaha meningkatkan kecekapan dan ciri-ciri keselamatan mesin berbanding mesin yang sedia ada. Terdapat banyak kelemahan pada mesin yang sedia ada terutamanya pada ciri-ciri keselamatannya. Selain itu, ia hanya mampu menjalankan satu operasi iaitu pressing product tetapi tidak mempunyai suatu operasi untuk memindahkan produk ke tempat pengumpulan. Ini akan dilakukan oleh operator dan ia akan mengambil masa sekaligus aka mengurangkan penghasilan produk.

Sebagai penyelesaian bagi masalah ini, inovasi baru telah direkabentuk dimana ia masih menjalankan operasi yang sama dan penambahan operasi bagi bahagian pick up and place serta peningkatan kepada ciri-ciri keselamatannya. Mesin baru ini adalah lebih selamat kerana ia menggunakan sensor sebagai alat pengesan bagi mengesan sebarang objek yang boleh mengganggu pressing operations. Selain itu juga, ia menggunakan pelindung untuk melindungi kawasan operasi semasa ia di jalankan. Mesin ini juga menggunakan pick up and place sebagai alat untuk memindahkan produk ke tempat pengumpulan produk. Penggunaan alat ini dapat meningkatkan kuantiti produk dipindahkan.

Selain itu juga penggunaan mesin ini dapat mengurangkan kos tenaga buruh didalam pemindahan produk dimana ia telah digantikan oleh penggunaan mesin.

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LIST OF SIMBOL

PLC	PROGRMMABLE LOGIC CONTROL
FMS	FLEXIBLE MANUFACTURING SYSTEM
LDN	INPUT LOAD AND NOT
LD	INPUT LOAD
ST	STORE OUTPUT
DC	DIRECT CURRENT

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION OF THE PROJECT

Cold press mini machine is a press machine use the Programmable Logic Controller (PLC) as his controller and pneumatic application as his supply. Beside that it has a pick up and place where its use the dc motor to move the product to assembly place. For this design, this machine built to use for attach stickers and place button to the radio panel. It is fully controlled by PLC. On his design, it's consisting of 5 pneumatic cylinders, where each cylinder has their own function. The cylinder will use to push in and out the pallet to pressing area and to press the radio panel. Then it will carry the finished radio panel to the pick up and place section and there have two cylinders as gripper used to grip the pallet and pick up the radio panel to the assembly place.

This project is conducted to overcome the problem exist at the current machine by enhancing the machine and modify the program. This is to produce a mini machine which is safer to use. It is because at this machine his safety is upgrade from before. Beside that this machine won't be using a conveyor; which it use the large amount cost to install it and with this case it will minimize the conveyer maintenance budget.

1.2 OBJECTIVES

The objective of this is to build low cost cold press machine and its works better from already machine before. The important thing is this machine includes the safety in both modes either in manual or auto mode. The target safety is during compressing the work piece situation in pressing area.

Beside that as the addition, this machine is suitable for studying process for the pneumatic system and programmable logic controller (PLC). It is because this machine cheaper comparing with another machine likes supplying from SMC Company.

1.3 SCOPE OF WORKS

The cold press machine divide to 2 part of construction. The first part is involved in the machine controller where it uses the programmable logic controller (PLC). In this part we are decide to use the NAI S PLC. The either one part is the hardware and pneumatic designing. This machine use 5 double acting cylinder which consists of single rod and double rod, 5/2 way valve, plastic tube, compressor and DC motor. The systems also have start, stop, and reset push button, emergency button and error pilot indicator.

The hardware part involves the works of drilling, milling and designing the pneumatic diagram for this machine. The designing of this machine involve the safety criteria where it using the area sensor to detect the weird things from pressing area. Beside that the using of two buttons to operate this machine help to avoid the operators hand enters in pressing area.

To have a lower cost of machine construction, we use the alternative material that can be replacing the original material. Also the material is easier to find and get it. The material will choose from the local material where it's is cheaper and easy to make renovation especially during the placement of equipments and connections.

The safety features for this station is two buttons must push together to running it. That is to protect user against any risk of accident and demonstrates a safety device widely used in this type of application.

1.4 PROBLEM SOLVING

1.4.1 Problem Statement

Already machine is not safety to use either in manual mode or and in automatic mode. In manual mode, the machine is not safety because it's can't stop the operations immediately. It is dangerous especially while doing maintenance job because the each movement of machine must be check one by one. So as the safety for the maintenance technician, the movement will can stop using the emergency button, same as in automatic mode. In automatic mode, user can use just one hand to handle the machine although have two switch at the machine. It maybe will evaluate by operator soon to put the selofan tape to stick the button or anything else at this button to make sure this machine running continuously. It becomes give a high risk to the operator such as unaware during operated the machine and expose to industrial accident.

Another problem is panel radio (product) is late to transfer from machine cold press to assembly part because transferring process is doing in manual by operator. The time of transferring is also not constant. So its will bother the process to increasing the quantity of product. Also it needs another operator to do that works and it mean the addition of cost to pay the worker for company.

1.4.2 Problem Solving

This machine operation is similar with the Flexible Manufacturing System (FMS). So the sequence operation of FMS has learned and understood first and tries to matching some improvement related with our machine. Beside that some investigation made at a company by visit the company to more clear about already machine. From that machine we try to understanding about its function and all equipment at the machine with one purpose to produce new model machine with more better and more safety for prevent accident to user (worker). Beside that the entire electronics component like sensor and switch for control/handle pneumatic system will study their function to match its using in our machine soon. The investigation also made to use console Programmable Logic Control for key in this program from ladder diagram to PLC (Programmable Logic Control). The chosen type that will use is NAI S PLC.

CHAPTER 2

LITERITURE REVIEW

2.1 INTRODUCTION

To develop the mini cold press machine, we are making some research with a related field especially in the Programmable logic controller (PLC) for our machine controller. More than that, we are learning about gripper and his type. It helps us to make some griper in our machine to pick up the work piece and place it at assembly place. The research also includes component that will be use on the machine like sensor. Beside that the studying in pneumatic field gives the guide line during in the pneumatic wiring, selection of pneumatic material like valve, cylinder, tube and all equipment which related with pneumatic.

2.2 Programmable Logic Controller (PLC)

More recently electricity has been used for control and early electrical control was based on relays. These relays allow power to be switched on and off without a mechanical switch. It is common to use relays to make simple logical control decisions. The development of low cost computer has brought the most recent revolution, the

Programmable Logic Controller (PLC). The advent of the PLC began in the 1970s, and has become the most common choice for manufacturing controls.

PLC has been gaining popularity on the factory floor and will probably remain predominant for some time to come. Most of this is because of the advantages they offer.

- Cost effective for controlling complex systems.
- Flexible and can be reapplied to control other systems quickly and easily.
- Computational abilities allow more sophisticated control.
- Trouble shooting aids make programming easier and reduce downtime.
- Reliable components make these likely to operate for years before failure.

Ladder logic is the main programming method used for PLC. As mentioned before, ladder logic has been developed to mimic relay logic. The decision to use the relay logic diagrams was a strategic one. By selecting ladder logic as the main programming method, the amount of retraining needed for engineers and trades people was greatly reduced. Modern control systems still include relays, but these are rarely used for logic.

A relay is a simple device that uses a magnetic field to control a switch. When a voltage is applied to the input coil, the resulting current creates a magnetic field. The magnetic field pulls a metal switch (or reed) towards it and the contacts touch, closing the switch. The contact that closes when the coil is energized is called normally open. The normally closed contacts touch when the input coil is not energized. Relays are normally drawn in schematic form using a circle to represent the input coil. The output contacts are shown with two parallel lines. Normally open contacts are shown as two lines, and will be open (non-conducting) when the input is not energized. Normally closed contacts are shown with two lines with a diagonal line through them. When the input coil is not energized the normally closed contacts will be closed (conducting).