

## Development of Automated Control System for Kuih Penderam Stamping Machine

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**Abstract.** It is essential to design a control system for stamping process in *Kuih Penderam* production. The main problem is how to produce the *Kuih Penderam* due to high demand but low in energy consumption. The objective of this study is to convert the system of *Kuih Penderam* stamping process from manual system to automatic system. The system is consists of the software and components to be used. There are few components that have been use on designing the automatic system which is PLC systems, compressor, sensors, connectors and push buttons. The results of the reliability for the system shows that all the LED lights are function when the signal is connected to the PLC system on the circuit in a direct connection. This case show every components testing is working properly.

### Introduction

This research was done to help the process of stamping *Kuih Penderam* that can be more effectively and save labor. There are several challenges that must be faced. The challenge is to ensure that the new development of *Kuih Penderam* machine in reducing the energy consumption. The control system is designed to be more effective in terms of production time. This is because a producer could achieve a high production rate besides of saving a labor cost by using this new invention. Current method used is too manually which are requires a high number of trained worker which unable to achieve high production rate. Therefore to reduce the cost of labor intensive, the machine was designed to replace the manual method to an automatic machine.

Small and Medium (SME) Industry in Batu Pahat area produces *Kuih Penderam* by using manual stamping method. There are a few things that can be discussed on manual and automatic stamping process. Both methods have their advantages and disadvantages towards the making process. In a manual stamping process, it does not require an operating cost and high control system, no maintenance requires, easy to handle and does not required skill worker with high salary. But, it require high energy consumption, using a lot of time to complete the demand, sometimes they can't reach the production target pertime and uneven result produce due to human mistakes.

In automatic stamping process, it will produce a quality product in terms of hygiene and safety. It can increase the production rate because this machine can reach the target in time. It also can reduce the human energy consumption and not require high skill workers. The product must be better than previously method because this machine does not involve human mistakes. For disadvantages, it requires high cost preparation and handling, high skill worker due to frequently maintenance and require large working layout for operation control.

According to Chapman [1], automated means design, build and implement an automatic machine. The machine that can produce a lot of volume and quality products to reduce costs is the dream of every engineers. To produce control systems for *Kuih Penderam* machine, machine design is the first step in designing so that all components can work properly after admission control systems.

system. The cylinder is a component that will move a particular part at that particular time. Each cylinder movement will also be influenced by time and sensor set to suit the area.

Circuit wiring PLC was made after the program control system has successfully passed. PLC connection or wiring circuit is the result of a preliminary analysis of the control system. Circuit is the link between the components of the PLC being used. The circuit also includes pneumatic and electrical components. Each component of the output and the input to the circuit PLC has the address specified on the ladder diagram. If the wiring in the circuit is not in accordance with a predetermined address, operating system will not operate. Wiring can be done in short if there is no problem on the components used. This analysis is intended to ensure that the control system can be constructed and operated in accordance with a predetermined plan.

Test of the movement focused on moving the cylinder mechanism stamping machines. This test is performed to determine the most appropriate time of the control system that was done on the cylinder. The testing process was done after the PLC program had been transfer and works well. Time was set on the program and exchanged for the testing process.

**Results and Discussion**

**Reliability Analysis.** For the development of this system, PLC system reliability test analysis is important because one of the main objectives is to test the system to ensure they are operating properly. Each component in the PLC system is successfully tested using a multimeter and circuit direct connection. Ladder Diagram PLC system is done using CX-Programmer and simulation is done using Automation Studio software.

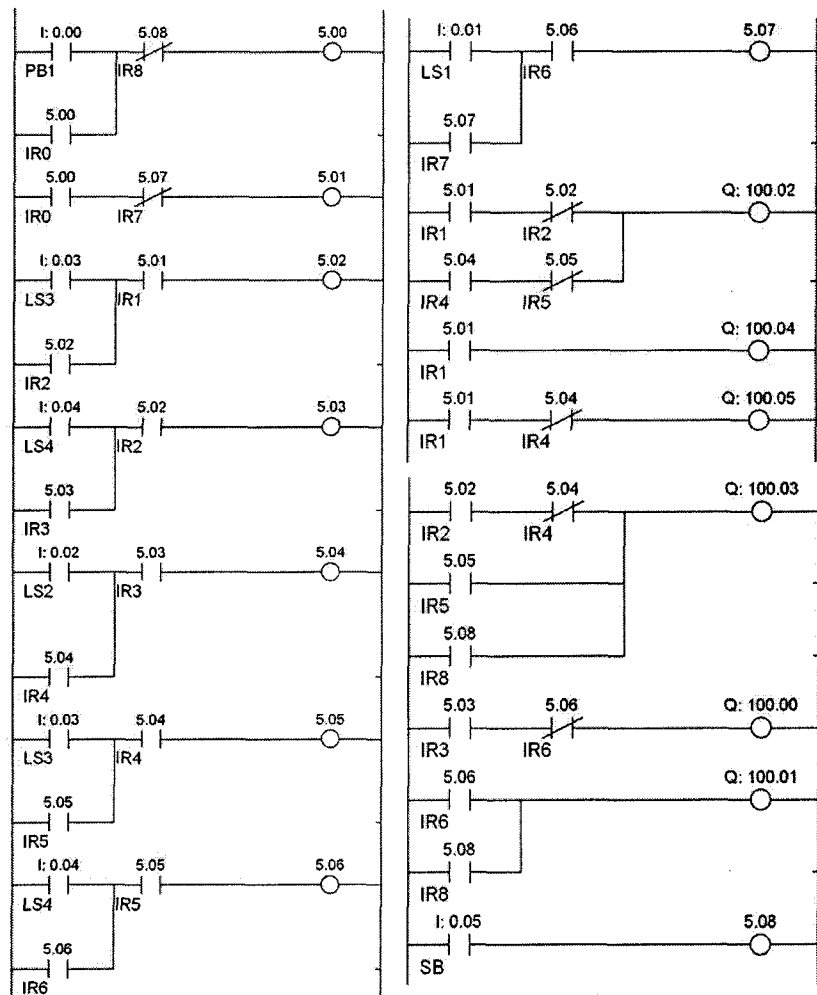


Fig.1 Ladder Diagram for development of stamping process in Kuih Penderam

place. Each test was done for a 7 times to get the accurate value of time taken. Table 1 showed the data for production time against automatic and manual stamping process takes place for one cycle stamping process. From Table 1, a graph has been constructed to compare a production time taken for both methods as shown in Fig. 3. From the graph shown, time taken for manual stamping process is higher than automated stamping process which is 6.0s for automatic method and 29.0s for manual method. This data has proved that manual method takes a long time to achieve a high demand of production.

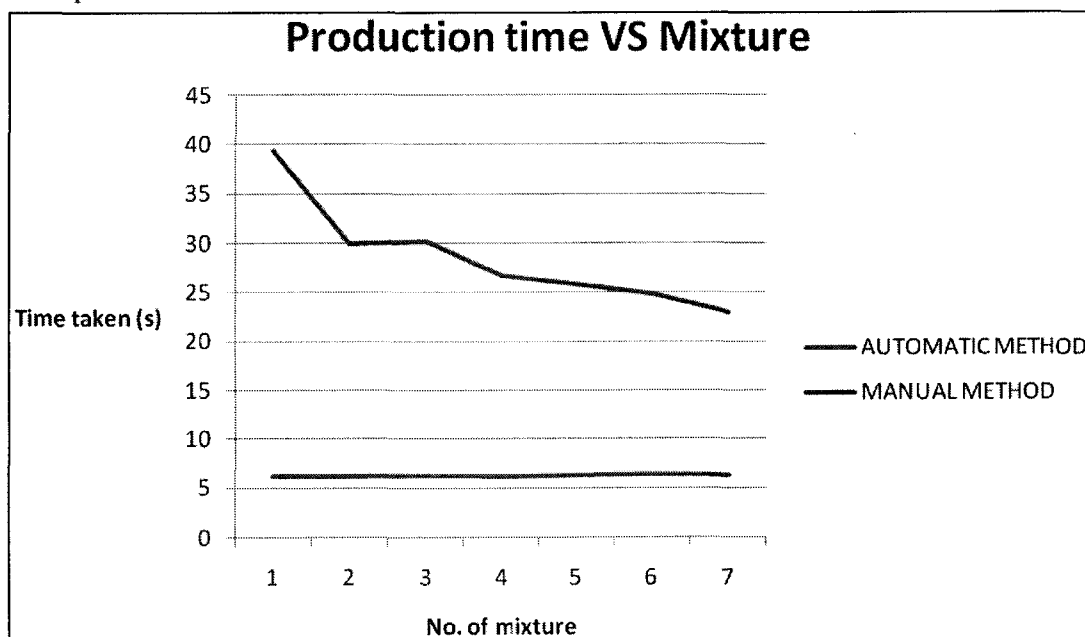


Fig. 3 Comparison of production time for manual and automatic method

### Conclusion

As a conclusion:

- i. Reliability test is important to test the controller system to ensure they are operating properly method.
- ii. Production time for automatic method is better than manual method.
- iii. This study indicates the important of controller system in producing a Kuih Penderam stamping machine that can improve and reduce the production time.

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