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Maintenance of Pressing and Touch Cutting Equipment with the Pneumatic System of Subang State Polytechnic

Adhan Efendi¹, M. Zainul Ihsan², Yohanes Sinung Nugroho³, Annisa Oktaviani⁴

^{1,2,4}Department of Maintenance and Repair Mechanical Engineering, Politeknik Negeri Subang Brigjen Katamso Street No. 37 (Belakang RSUD), Dangdeur, Subang, Jawa Barat 41211

³Department of Mechanical Engineering, Politeknik Negeri Bandung Gegerkalong Hilir Street Ds. Ciwaruga, Bandung, Jawa Barat 40012

Corresponding author: adhan.efendi@gmail.com

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ABSTRACT

This study aims to make a preventive maintenance plan for tofu presses and cutters with a pneumatic system with the methods carried out namely inspection, small repair, medium repair and overhaul (ISMO). The preventive maintenance time on presses and tofu cutters with this pneumatic system is carried out with this type of maintenance on a monthly and annual basis. The research stages of implementing preventive maintenance on tofu presses and cutters with a pneumatic system includes literature studies, making maintenance schedules and expert validation. Components carried out preventive maintenance on the mechanical system which includes the frame, drive system, compressor and blades. data collection using observation and documentation. data were analyzed descriptively quantitative. The results showed that the preventive maintenance of tofu presses and cutters with a pneumatic system was intended to maintain the condition of the tools as well as to extend their service life and streamline the production process.

Keywords: Preventive Maintenance, ISMO, Tofu Press, Cutter

INTRODUCTION

Tofu is one of the processed soybean products that has a fairly broad market segment. Added by [1] tofu is produced by utilizing the nature of protein, which will clot when reacted with acid (vinegar). Clumping of protein by vinegar will take place quickly and simultaneously in all parts of the liquid soybean juice, so that most of the water that was originally mixed in the soybean juice will be trapped in it. The trapped water can be removed by applying pressure. The greater the pressure applied, the more water can be removed from the protein clump. The clumps of protein are then referred to as tofu.

The process of making tofu on a home scale is generally still done in the traditional or manual way, especially in the process of squeezing or pressing soybean juice. The process of squeezing or pressing soybean juice from tofu dregs requires a lot of energy and a long process. To help the process of squeezing soybean juice to be more effective and efficient, a tofu press will be developed simultaneously with a tofu cutting machine using a pneumatic system. In the process of using tofu presses and cutters with this pneumatic system, of course, it requires maintenance. It aims to extend the service life and streamline the production process. Maintenance is an activity that is directed at the goal of ensuring the functional continuity of a production system so that the system can

be expected to produce the desired output [2][3].

Maintenance is divided into two types, namely planned maintenance and unplanned maintenance. In planned maintenance, it contains types of maintenance such as corrective maintenance and preventive maintenance. Meanwhile, in unplanned maintenance, it is divided into emergency maintenance and improvement maintenance [3][4]. Added by [5] Preventive maintenance is a maintenance activity that is carried out before the occurrence of failure or damage to a system or component, which has previously been planned with systematic supervision, detection, and correction, so that the system or component can maintain its functional capabilities. Preventive maintenance is a maintenance action that aims to prevent the occurrence of damage whose tendency to damage has been known or can be predicted in advance.

Through the use of good preventive maintenance procedures, where there is good coordination between the production and maintenance departments, the following will be obtained: (1) Production time losses can be minimized, (2) Expensive repair costs can be reduced or avoided, (3) Interruptions to the planned schedule of production and maintenance time can be eliminated or reduced [6]. Tofu is a food that is rich in nutrients [7]. Tofu is also a food that is consumed regularly by the

community [8]. Tofu is famous on the island of Java as a cheap food [9][10].

Based on the results of direct observations of visits and interviews to the Subang district, there are still several things that need to be developed, one of which is making a routine maintenance schedule so that the pneumatic press and tofu cutter can always be used in a safe and optimal condition. Occupational safety and health factors are things that need to be considered in the machine maintenance process [11].

RESEARCH METHOD

This research is a type of development research. The data obtained were analysed descriptively qualitatively. The stages of the research are as follows.

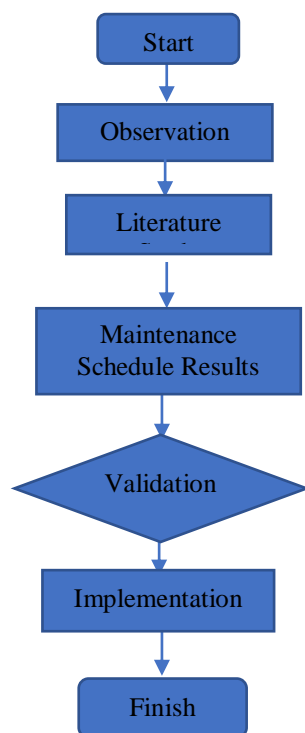


Figure 1. Research flowchart

Figure 1 shows researchers made observations about maintenance on similar tools and then strengthened by various journals about tofu cutting tools. The data obtained is in the form of a schedule that has been agreed upon by the experts. Validation is carried out by experts in the field of engine maintenance with the criteria for the suitability of the type of maintenance on components with the ISMO method.

RESULTS AND DISCUSSIONS

Observation

This observation was carried out to find information about the tofu press and cutter with a pneumatic system. The initial method used was a direct visit to the tofu factory in the district. Subang and conducted interviews with the tofu makers, the results of the interviews conducted at the tofu factory were the lack of awareness about the maintenance of the tools used, especially the tofu presses [12], so that periodic maintenance of the tofu presses was necessary.




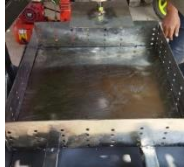




Figure 2. Conventional tofu pressing and cutting tool






Component Identification

The initial step in the maintenance process after the observations made by the author is the identification of components which is done by dividing each main component to be carried out maintenance.

There are 4 main parts, namely the frame, drive system, compressor and blades [13]. The following is the classification of the components of tofu presses and cutters with a pneumatic system.

Table 1. Component classification

No	Part Name	Component Name	Component Image
1	Frame	Frame Surface	
		Mold	
		Sewer	
		Welding connection problem	
2	Drive System	Pneumatic Cylinder	
		Solenoid	

		Air Filter	
		Pressure Control Valve	
3	Compressor	Compressor Oil	
4	Knife	Pressing Plate	
		Cutting knife	

Maintenance Schedule Results

The results of making this maintenance schedule plan are the total time in 1 year needed in the maintenance process of Tofu Pressing and Cutting Tools with a Pneumatic System, namely inspection (1008 minutes), and small repair (150 minutes). With the time required for each of the main components, namely, the framework system (inspection 312 minutes, small repair 30 minutes), the drive system (428 minutes inspection, small repair 0 minutes). Compressor (inspection 24

minutes, small repair 120 minutes), knife (inspection 144 minutes, small repair 0 minutes).

Main Frame

The main frame of the tofu press and cutter with this pneumatic system is the main frame that will support the load from the pneumatic system and components that exist in electric cars, including: installation holder plate, tofu mold, tofu drawer, tofu press plate, press plate press, pneumatic tubes, drains, tofu cutting blades and other supporting components. The following is

the maintenance schedule for the frame parts every 4 months.

Maintenance schedule is made every 4 months. This is the result of the expert who believes that the tofu cutting tool is not

always used and the machine's performance is also not too heavy so the ISMO method is carried out on the components that will be damaged.

Table 2. Frame maintenance schedule

Part	Job	July-Oct	Tools and Materials		Tool Protect
			Inspection	Small Rep	
Frame	Checking the Cleanliness of the Mold	I ₃₂	Tools: Brush, Wire brush Material: Cleaning cloth		Plastic apron, Rubber gloves, boots
	Checking Condition of Frame Surface Cleanliness	I ₃₂	Tools: Brush, Wire brush Material: Cleaning cloth		Plastic apron, Rubber gloves, boots
	Checking the Condition of Sewer Cleanliness	I ₃₂	Tools: Brush, Wire brush Material: Cleaning cloth		Plastic apron, Rubber gloves, boots
	Checking the Condition of Welding Connections	I ₈ S ₁₀	Tools: Brush, Wire brush Material: Cleaning cloth	Tool : Welding Machine, Slag Hammer, Wire Brush, Grinder Material : Stainless Electrodes, Grinding	Plastic apron, Rubber gloves, boots, mask

Drive System

The drive system is one of the main parts of the tofu press and cutter with a pneumatic system. Some of the components contained in this drive system include

pneumatic tubes, solenoids, air filters and pressure control valves. The following is a maintenance schedule for the drive system every 4 months.

Table 3. Drive system maintenance schedule

Part	Job	July-Oct	Tools and Materials		Tool Protect
			Inspection	Small Rep	
Drive System	Pneumatic Tube Condition Check	I ₃₂	Tools: Brush, Wire brush Material: Cleaning cloth		Plastic apron, Rubber gloves, boots
	Solenoid Condition Check	I ₃₂	Tools: Brush, Wire brush Material: Cleaning cloth		Plastic apron, Rubber gloves, boots
	Air Filter Cleanliness Check	I ₈₀	Tools: Brush, Wire brush Material: Cleaning cloth		Plastic apron, Rubber gloves, boots

Compressor

The compressor is the most important part of the press and tofu cutter with a pneumatic system because the compressor

will work to provide pressure in the form of air to move the drive system. The following is the compressor maintenance schedule every 4 months.

Table 4. Compressor maintenance schedule

Part	Job	July-Oct	Tools and Materials		Tool Protect
			Inspection	Small Rep	
Compressor	Oil Condition Check	I ₈	Tool : 22mm Wrench, Pliers Material : Cleaning cloth , Oli		Plastic apron, Rubber gloves, boots
		S ₃₀	Tool : 22mm Wrench, Pliers Material : Cleaning cloth , Oli		Plastic apron, Rubber gloves, boots

Cutting Knife

The knife is one of the main parts of the tofu press and cutter with a pneumatic system. Some of the components contained

in this knife section include a pressing plate and a cutting knife. The following is a maintenance schedule for the drive system every 4 months.

Figure 5. Cutting Knife Maintenance Schedule

Part	Job	July-Oct	Tools and Materials		Tool Protect
			Inspection	Small Rep	
Knife	Pressing Plate	I ₁₆	Tools: Brush, Wire brush Material: Cleaning cloth		Plastic apron, Rubber gloves, boots
	Cutting Blade	I ₃₂	Tools: Brush, Wire brush Material: Cleaning cloth		Plastic apron, Rubber gloves, boots

Evaluation

In the process of making plans, schedules and maintenance instructions do not always run smoothly due to the lack of references to journals and books about presses and tofu cutters with this pneumatic system, especially in their maintenance. Research [14] reinforces the above opinion that the preventive maintenance schedule is suitable for use on appropriate tools that are not used for more than 8 hours of operation [15].

The making of the schedule plan that the author proposes for validation has been revised several times by the validator related to the rationality of the maintenance time and the maintenance schedule that should be in accordance with the use of the

tool, if it is appropriate then the schedule plan is valid.

CONCLUSION

The conclusions obtained from the maintenance of tofu pressing and cutting machines with a pneumatic system are the results of making this maintenance schedule plan are the total time in 1 year required in the maintenance process of the Tofu Pressing and Cutting Tool with the Pneumatic System, namely inspection (1008 minutes), and small repair (150 minutes). With the time required for each of the main components, namely, the framework system (inspection 312 minutes, small repair 30 minutes), the drive system (428 minutes inspection, small repair 0 minutes). Compressor (inspection 24

minutes, small repair 120 minutes), knife (inspection 144 minutes, small repair 0 minutes). Maintenance instructions are made in accordance with the planned maintenance schedule, for the main components to be carried out maintenance, namely: frame, drive system, compressor, and blades. To carry out the equipment maintenance instructions, you must use personal protective equipment (PPE) and prepare tools and materials to be used, the work is carried out according to the instructions that have been made, such as: cleaning the pressing plate, replacing the air filter seal, and others.

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