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Maintenance of Peeler Onion based on Efectiveness

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Abstract. In a manufacturing industry as we are experiencing nowadays, maintenance is one of the required strategies for companies that intend to survive. One of the causes of decreased productivity is the machine often breakdown. Maintenance is an activity carried out to maintain the condition of the engine so that it can carry out its functions properly. In this research, the maintenance procedure taken to treat the onion peeler. The purpose of this research is to find out how the appropriate procedure to treat the onion peeler machine based on its effectiveness. Machine effectiveness is calculated by considering the quality, performance, and availability factors. These three factors were obtained by observing the onion processing business entity in Nganjuk Regency, East Java. The effectiveness is used as a reference to get the cause of machine breakdown. Maintenance is done by considering 5S culture. The results of this study are obtained by the procedure of maintenance of onion peeler which can be easily carried out by the operator continuously.

Keyword: effectiveness, maintenance, peeler, procedure.

1. Introduction

Onion is one of the ingredients that must be present in various processed foods. Onion can be sold in the form of tubers, fried onions, or pasta. Nganjuk is the second largest red onion producing area in Indonesia. The prospect of onion in the world is promising, in which Indonesia plays a role as an world onion exporter [1]. This raises new opportunities for farmer groups to process onion after harvest into fried onions that are ready to be used for complementary cooking. Based on the observations, several farmer groups in the Nganjuk area have started to switch to producing fried onions. One of the factors that causes few farmer to process onions is the absence of appropriate technology that can be used efficiently to process it. Some of farmer have used onion peeler machines, but having some problems such as machine breakdown which causes disruption of the production process. The condition of machine equipment has close relationship with age and intensity usage where the level of damage will have an impact on increasing maintenance costs [2] . Breakdown signs that often occur based on the observations are speed losses and the onion can not be peeled off properly.

Each production system requires a method for maintaining the machine so that it can function optimally when used. Maintenance is the activity of maintaining equipment or machines in good condition to fit their functions. Maintenance is very closely related to quality [3] [4]. There are small and medium-sized companies have not yet realized the importance of doing maintenance. The good maintenance system is no just relying on technicians, but there are operator needs to maintain production

conditions and repair the machine [5]. Some researchers have developed maintenance methods in order to increase company productivity [6] [7] [8] [9] [10]. One of the factors that influence the ups and downs of productivity is the effectiveness. Therefore, it is important to know how effective the machine can be used [10]. The purpose of this research is to find out how the procedure for the maintenance of onion peeler based on the effectiveness.

2. Related Work

Preventive maintenance was widely used by companies in order to increase reliability and economy [11]. Uncontrolled production processes result in defective products that affect production effectiveness [12]. Azizi (2015) uses OEE to determine the efficiency of the machines used. The effectiveness value is used as the basis for analyzing machine damage. The main goal of care is to get a stable production system and minimal costs [13].

Karas, et. al (2016) has described the theory of kaizen which was associated with real examples in the shop floor. It has concluded that the failure of the kaizen was caused of failed training, not solid teamwork, and high management expectations of Kaizen implementation [14]. In addition, the application of kaizen is able to improve product quality, skilled managers, low cost, fast delivery [3]. Kaizen is a continuous improvement [15]. Aurel and Stefan (2015) in their research explained that Kaizen with 5S foundation change the culture and work attitude of employees. Kumar, et.al (2018) has succeeded in applying Lean-Kaizen to a manufacturing company. Lean-kaizen has applied by exploring the cause of the problem through "5why" [16]. Meanwhile, Ishijima, H., et. Al (2014) applied 5S to reduce waiting time. 5S is a tool and method used to manage workplaces with small improvement [16] [17]. This research aims to make the appropriate maintenance procedure for onion peeler based on the effectiveness. Machine effectiveness is calculated using OEE. The maintenance procedure pay attention to kaizen elements which consist of seiri, seiton, shitsuke, seiso, and seiketsu.

3. Overview of System

Maintenance is an activity that must be carried out in order to maintain product quality. No matter how sophisticated the technology used in the production process will not make a profit if there is no maintenance activity. Prevention before damage occurs is better than repairing when it is damaged.

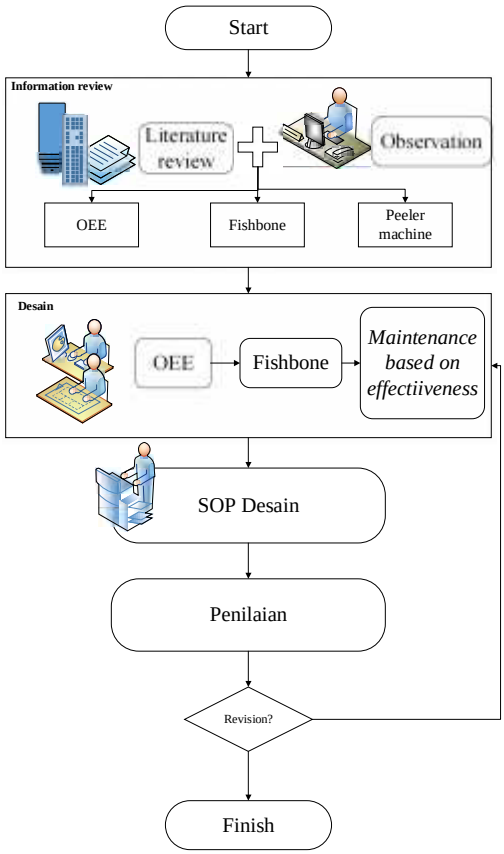

Figure 1. research method

This paper aims to develop maintenance procedures by considering the value of machine effectiveness. The steps in this research are starting from the information gathering stage. Information that is used as a reference in making the onion peeler machine maintenance procedure from the literature study and observation to the business group that uses onion peeler. Then, the next step is design phase, which is taking data to calculate the value of the effectiveness of the machine using OEE. The effectiveness value is the basis for developing maintenance procedures. The results of the procedure are then assessed with experts. If there is no revision, the maintenance procedure can be used immediately. However, if there are still revisions, the experiment will be repeated starting from the design stage.

4. Experimental setup

The maintenance procedure use 5S that based on the value of machine effectiveness. The formulation of preventive maintenance maintenance procedures is carried out by calculating the value of machine effectiveness. Based on the OEE result, the cause analysis of the of machine failure is using “5 why” which is applied into the fishbone diagram. The following is the OEE result where the data is taken based on the sampling for 3 months.

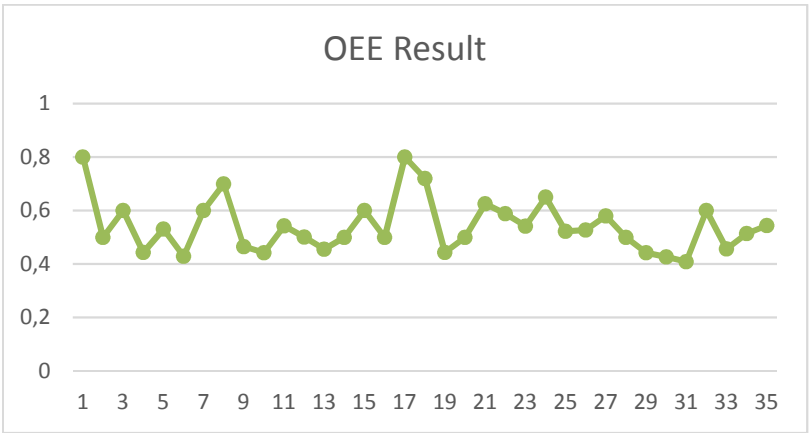

Figure 2. OEE result

The OEE standard based on the Japan Institute of Plant Maintenance is 85%. OEE values less than 85% indicate that the equipment is not effective to produce output.

Fishbone diagram or it can be called a causal diagram to look for a problem that occurs completely. This diagram is widely used by many parties in identifying cases of problems. In this case the author uses a fishbone diagram to look for problems from the Losses in the production process. In this fish bone diagram to find the root of the problem using the 4M concept (Man, Method, Material, Machine) so that later it can be concluded easier and more efficient in pursing existing problems.

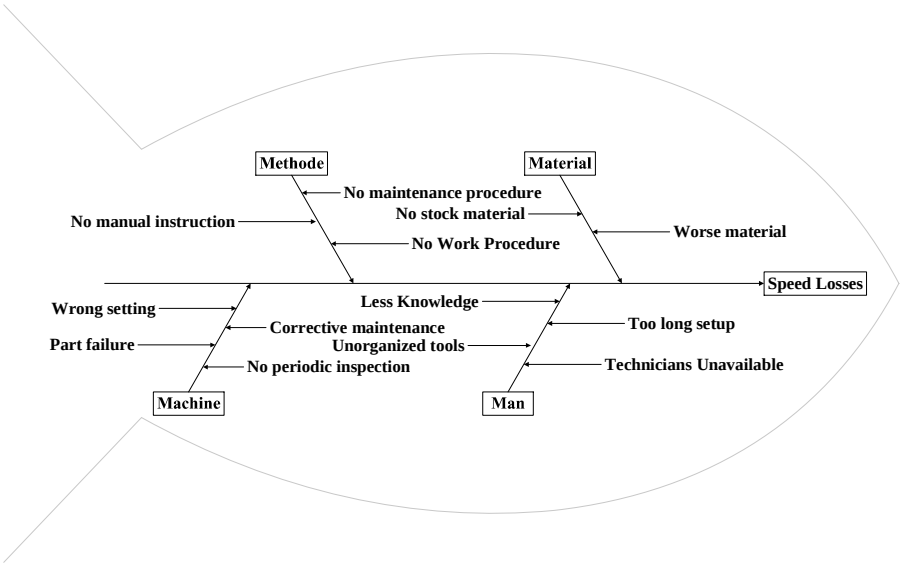

Figure 3. fihsbone diagram

Based on the diagram, there was a problem with the method which caused low rotation. It causes of bad lubrication and no operator inspection. It makes decrease the speed and disrupt the production process. In addition, it appears that the absence of maintenance procedures that can be performed by the operator causes speed losses.

5. Result and discussion

The maintenance planning of this reasearch used 5s which was based on machine efectiveness. The implementation of 5S culture also aims to increase the value of machine effectiveness. This culture produced the value of small repairs but continuously, low costs, guarantees the progress of the program that provides long-term returns. Here was a flowchart of machine maintenance procedures using 5S.

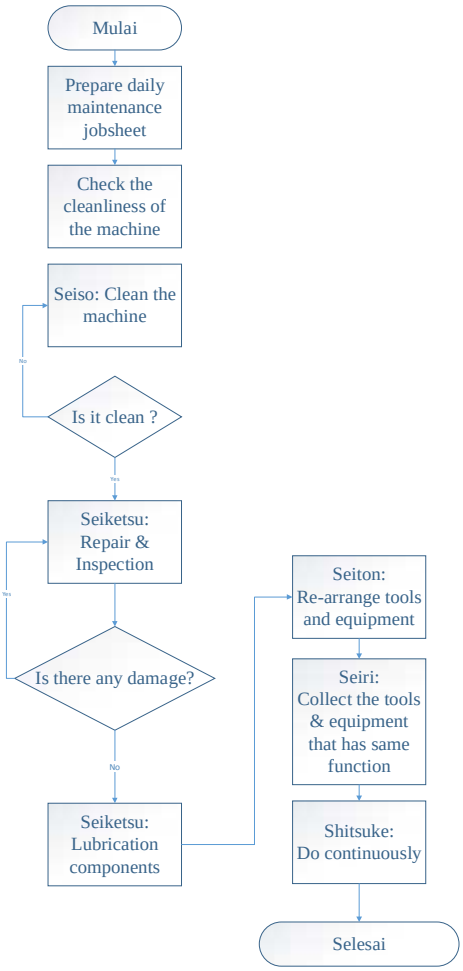

Figure 4. maintenance procedure

The maintenance activity used in this study refer to the concept of preventive maintenance using 5S adopted from Kaizen

6. Conclusion

This paper studied a maintenance planning peeler onion machine procedure. Maintenance planning procedure applied 5S which adopted kaizen concept. Based on OEE result, the effectiveness of peeler machine under the Japan Institute standard. The lowest OEE value was analyzed using fishbone diagrams in order to find out the causes of problems. The cause of machine breakdown was speed losses. The maintenance procedure was made to overcome the same problems include seiri, seiton, seiso, seiketsu, and shitsuke.

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