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The implementation of POSW in the packaging process at PT. SOS to Minimize Waste Defects with the 4M1E Lean Manufacturing Method

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Abstract
This research aims to improve product quality in the packing process by optimizing the use of kaizen POSW at the finishing stage of the packing process. The main focus of this research is to identify the main causes of the frequent flow out of NG products and find effective solutions to improve work methods and maximize checking goods at the time before the packing stage. The methods used include analysis of the production process, minimizing the level of defects, and the implementation of evaluation-based continuous improvement. The results of the study show that periodic checks can be carried out on each machine conveyor by applying POSW history problems that have occurred and can reduce the level of NG goods that enter the pallet. Thus, this research makes a real contribution in improving production efficiency and final product quality in the packaging process.

Keywords: POSW, Waste Defect, Waste Motion, Lean Manufacture

Introduction

The automotive industry has an important role in preparing quality products to meet consumer needs, including periodic checking methods used in the industrial world. In this process, the quality of the goods is often affected by the quality level of the goods at the time of the after-process. Suboptimal checking can lead to the escape of production defects such as neck defects, burries, pecok & NG dents. This problem not only increases the rate of rejected products but also results in resource waste and higher production costs. Efforts to improve quality and efficiency in the checking process are the main concerns in various sectors. One of the approaches used is to optimize the checks in each machine conveyor by each operator and work method to reduce

disability pass rate. For example, research in the automotive industry shows that attention to periodic checks and stop call and wait adjustments to improve production output and reduce the escape of production defects. In addition, the study of tool design modification in the manufacturing industry also emphasizes the importance of innovation in the production process to achieve a higher level of efficiency. This approach is becoming increasingly relevant due to the high consumer demand for high-quality products due to competitive prices. This study aims to evaluate the production packaging process by focusing on periodic checks on each production machine conveyor as one of the critical stages in reducing the rate of passing defects of goods. This research is expected to provide practical solutions that can be applied in the production and packaging industry to achieve the target of more efficient and competitive packing finishing.

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Research on minimizing the escape of production defects and efficiency in the packaging process, especially in the field of production, has been carried out a lot. Here are some literature reviews relevant to this study:

1. Improving Production Check Facilities

   Berto's (2022) research shows that modification of the POSW design of a tool for the stage of checking the results of the production process that can be able to help by remembering/reviewing the history of problems that have occurred can reduce the pass rate by up to 98%. In the study, changes in the completeness of the POSW output process succeeded in reducing the passage of NG products during the process. This study emphasizes the importance of using POSW tools used to ensure that the checking process runs optimally.

2. Defect Management in the Production Process

   A study on the production of railway bogies by ITS (2016) highlights the importance of reducing waste, especially defects, to improve production efficiency. Using the Defect Per Million Opportunities (DPMO) analysis method, this study shows that the level of defects can be reduced by improving work procedures and checking goods periodically. This approach is relevant in the context of checking, where it is timely to always check production goods at the beginning, middle, and end of the process.

3. Utilization of Changes & Completion of POSW Facilities Provided

   Study on PT. SOS has shown that the use of POSW history problem is able to increase the yield of better production goods so as to minimize errors in checking a product. This study highlights the importance of POSW parameters such as accuracy, precision in checking to ensure consistent and quality process final results.

4. Why Why Analysis

   "Why-Why" analysis is a simple technique used to find the root cause of a problem by asking the "why" repeatedly, usually up to five times or until the root cause is found. This method aims to dig deeper than just treating symptoms, so that the solution applied can prevent the problem from recurring. It is usually implemented visually in a tree diagram or table that shows a cause-and-effect relationship. Why-Why analysis is often used to identify the cause of machine failure or product defects.

5. Fish Bone Diagram

   An Ishikawa diagram (also called a fishbone diagram) is a diagram that shows the cause of a specific event. This diagram was first introduced by Kaoru Ishikawa (1968). The most common use of Ishikawa diagrams is to prevent product defects and improve product quality. Ishikawa diagrams can help identify factors that significantly influence an event.

   A fishbone diagram will identify the various potential causes of a single effect or problem, and analyze the problem through brainstorming sessions. The problems will be broken down into a number of related categories, including people, materials, machines, procedures, policies, and so on. Each category has a reason that needs to be outlined through a brainstorming session

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Method

This research was conducted using a combination research method. Combination research is research that combines quantitative and qualitative research procedures and techniques in simultaneous or sequential research. This method combines two approaches in one study. The qualitative method itself is a research method that uses narratives or words in describing the meaning of each phenomenon, symptom, and certain social situation. While the Quantitative Method is a research that uses data in the form of numbers and science to answer the provisional conjectures of a research.

After finding many findings that NG products often pass in the machine finishing process, the researcher immediately conducted SCW (Stop-Call-Wait). Stop, stop the activity that is being carried out, because they find abnormal conditions. Call, immediately notify the boss about the abnormal condition that occurred. Wait, wait for further instructions from your superiors, and don't take action yourself. After conducting SCW, the researcher traced all processes before the final inspection post. It was found that the first time NG history appeared was after the blanking process. The data used in this study is sourced from direct observations, interviews with operators and superiors from bending enghine, and recording data on the emergence of NG products, namely smooth necks in products. By identifying the problem using the Fishbone Diagram method, it is known that the cause of the appearance of the smooth neck of the product part is caused during the blanking process.

In the next stage, the researcher proposed several improvements, and conducted training for operators on Standard Operating Procedures in an effort to eliminate smooth necks on product parts. Process Activity Mapping (PAM) is used to identify lead time and productivity, both physical and information flows. The last stage is to evaluate using the Waste Waiting cycle on the repairs made, to see the results of the improvements implemented to eliminate the problem of frequent leakage of the NG poduk.

Result and Discussion

This research focuses on automotive manufacturing companies, precisely in the Packaging department. The research was carried out because it was found that there were abnormal conditions in the Visual Check Final Inspection process.

1. Initial identification.

The series of parts manufacturing process is an important series of processes in an automotive manufacturing company. Where the series of processes for making the part goes through several processes, including: die stamping blanking-bending-triming-pierching-final inspection. In this series of processes, various kinds of problems were found, one of which was the accumulation of workpieces in the visual part of the Checkman.

The first step in this study is to observe directly, and conduct interviews with operators and supervisors of the process line, because the first appearance of accumulation is found in this process. After direct observation and interviews, the researcher managed to collect data and find other factors that support the cause of this problem of work waste accumulation. The data was processed using fishbone diagrams.

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2. Fishbone Diagram.

The results of the fishbone diagram method used in this study are useful for finding out the main causes and supporting factors that cause problems that often occur in NG products (flowout). This can be seen in Figure .1

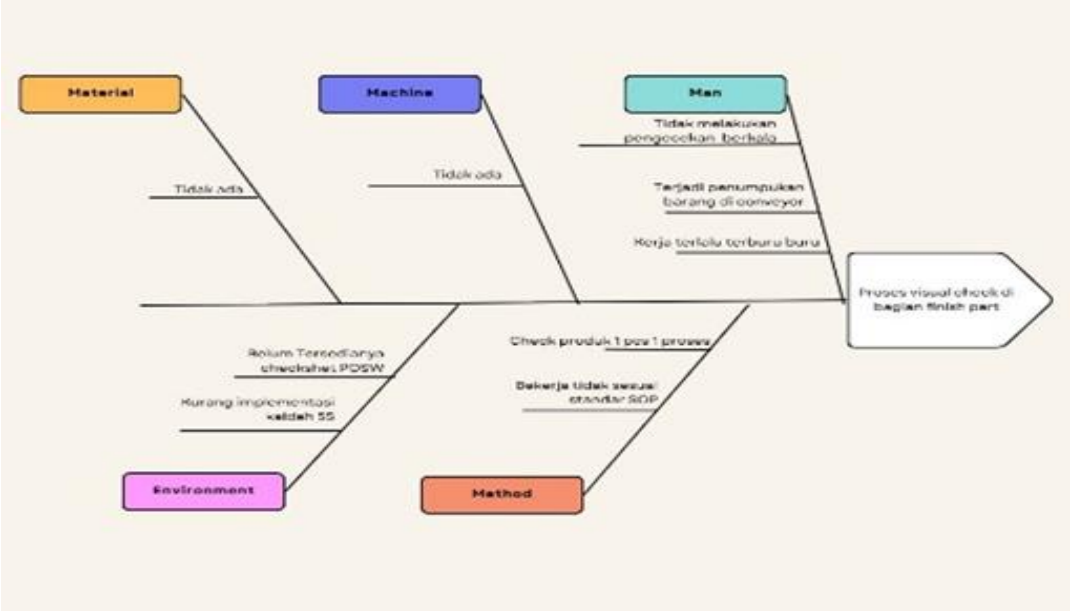

Figure 1. Diagram Fishbone

The following is an explanation of the Fishbone Diagram above:

1. Man (Operator)
   The lack of understanding of operators to understand in the process in accordance with existing SOP standards and also the lack of understanding of checkmen on the visual check of after-process products affects the level of work accuracy.

2. Machine
   For the engine part, there was no problem with the problem. This is because the condition of the production machine is always in good condition because before the process the operator has ensured that the machine is in good standard condition.

3. Material
   Steel Material Quality: The composition of the material used (60% Aluminum + 40% Steel) has the potential to have less impurity than Aluminum. So there is a potential where the product is defective at any time. At the blanking stage.

4. Method (Metode Kerja)
   Non-Optimal Checking Process: After the after-process is less than optimal in checking the product, the working process, the standard operation process, the operator is too hasty in the

process so that he does not pay attention to the product of the goods that will be processed on the next machine.

5. Environment (Lingkungan Kerja)
   Process area condition: There is no POSW to remind the checkman in the visual check process. Implementation of 5S rules: Kaizen does not include 5S rules in the production process for operators.

3. Repair Stage
   The repair stage was carried out because several causes of frequent leakage of NG products had been found. The improvement is aimed at minimizing the NG product to the packing stage, and eliminating the accumulation of workpieces (obstacles) in the visual checkman process. In addition, it eliminates the problem of passing to maintain the number of quality standards that have been set.

4. Why's
   The results of the identification of the cause of waste waiting in the production process that have been depicted in the fishbone diagram are then further identified using the "5 whys" to find out the root cause of each factor.

Table 1. Five Why's

It	Factor	Why1	Why2
1	*Man*	Less Thorough	Less monitoring
2	*Machine*	-	-
3	*Material*	Lack of quality of raw materials	Reduction in the quality of material content
4	*Methode*	Not optimal in checking	Operators are in a hurry to check
5	*Environment*	Incompleteness regarding 5S	No/no related POSW is not yet available

Designing Improvement Proposals

Kaizen or also known as Kaizen Teian is a comprehensive company system that is carried out in the context of continuous improvement to achieve better conditions day by day. The purpose of kaizen is to eliminate or reduce unnecessary activities by implementing several proposals as in the following table:

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Table 2. 5W1H

What	Cause: Good finish that is not up to standard and lack of precision in Manpower. In addition, the process often accumulates goods on the conveyor Improvement Targets: Periodic Checks, Addition of POSW and marking with directional lights, yellow, green. On each conveyor
Where	In the Production Line area.
When	During the production process.
Who	Manpower processes as well as Checkman.
Why	Because there is less than maximum checking in each process
How	By improving the POSW kaizen, it can improve quality and minimize waste defects and motion. Based on the actual process in the field, the percentage of waste defects and motion in the process area is still too high. Therefore, the addition / repair (Kaizen) of POSW is carried out, especially in the coveyor packaging area. In order to minimize the leakage of NG products at the Finish Part station storage area to the consumer

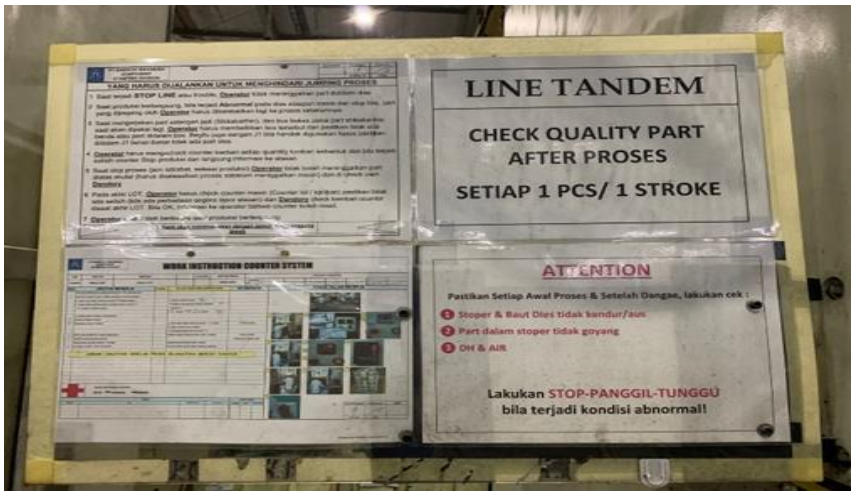

Figure 2. Addition of POSW checking every 1 pcs/1 stroke

Based on figure 2 above, the operator is required to check every 1 Pcs / 1 Process and also work according to the SOP that has been determined.

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Figure 3. Addition of Red, Yellow and Green Lights

Based on figure 3 above, the conveyor has three colors, namely red, yellow and green which is interpreted as follows:

1. Green :The operator continues to carry out the production process.
2. Yellow :The operator adjusts the speed to the process in front of him.
3. Red : When the flow of goods has reached the red position, the operator is required to STOP first until the flow of goods is in the green area

Conclusion

Waste defect and motion are the most dominant wastes that occur in the production process that cannot meet the costing and kaizen costing targets. There are several root problems from each of the causative factors, namely that POSW has not been improved in the packaging production area, there is no kaizen that meets the standards. Increasing the number of production by minimizing waste defects and motion can be done by applying Kaizen with the Lean Manjufacture Method,

These problems can be solved by making a draft proposal to improve the production process. The draft proposal is based on the root cause obtained from the identification results using fishbone diagrams and 5 Why's. The proposal in this study is to make Improvement (Kaizen). In the conveyor area, the improvement (Kaizen) machine in the packaging conveyor can minimize the percentage of waste defects and motion in the packaging process so that the costing and kaizen costing targets are achieved.

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