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Quality Control in Plastic Injection Manufacturing at PT. Minebea Accesssolution Indonesia The Number of NG Scratch

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Abstract
The company is critical in quality, namely a lot of NG (Not Good) is sent to the Assembly, the type of NG (Noot Good) that is sent a lot is NG (Scracth) in the TG1 R/L Base part affects the cycle time in the production process on the assembly line to analyze and find out the root cause of the problem, we use 4M (Man, Machine, Method, Material) analysis and PDCA silkus. It was found that the root of this problem is the lack of implementation of 1 QC Inplant that understands the standard quality of products in plastic injection manufacturing, dirty dies, lack of maintenance of dies (molds) and the existence of a high workload which was originally the number of machines operated by 1 operator 2 machines, now it is 4 machines 1 operator, so there is a lack of operator time in checking the product, Before the repair of defective products reached 25%/month and the yield decreased to 8%/boaln after implementing the repair. The improvement steps include, the addition of 1 QC inplant who understands the quality standards on the product, the addition of check seet cleaning dies, and further training to machine operators. This study concluded that the improvement was effective even though it was not 100%, in identifying and controlling factors that affect quality in the production process in each shift.

Keywords: Quality control, PDCA, 4M, SPC

Introduction

The plastic injection industry is one of the manufacturing sectors that is highly dependent on efficiency and quality in its production process, many plastic injection manufacturing companies are looking for ways to increase production capacity, including at PT. Minebea Accesssolutions Indonesia, in the PO (Plastic Injection) department, this certainly adds to the challenge in ensuring consistent product quality, the quality of plastic injection products is highly dependent on monitoring process parameters Without adequate monitoring, there is a risk of increased product defects that can have an impact on customer satisfaction and cost efficiency. The problem that occurred was NG (Noot Good) Scratch on the TG1 Part Base type, this NG problem was found in the final Inspection in the Assembly Line Process, the impact was in the form of loading and production cycle time increased, and re-sorting of the relevant section to ensure the assembled part was OK, Therefore it is important to identify an effective analysis method to find out the root cause of this problem, This situation requires a comprehensive approach to identify the root of the problem and design a solution that can be implemented effectively analyzed using 4M (Man, Machine, Method, Material) and Silkus PDCA This study aims to find out where the root of this problem arises, and aims to reduce the defect scracth that occurs in the part type Base TG1, this research is expected to provide a real

solution to overcome bottlenecks in the production process in the assembly line and become a reference for other plastic injection manufacturing industries to help reduce product defects and improve quality consistency in plastic injection manufacturing.

Plastic Injection Molding is one of the most common methods in the manufacturing process to make plastic products or components in bulk. This process uses a special machine to print plastic by injecting raw materials into a mold that has the shape according to the desired product, Asembly Line is a production process in which a product is assembled sequentially through a series of workstations. Each station is designed to perform a specific task, and the product moves from one station to the next until the assembly process is complete. This process is often used in mass production to improve efficiency and consistency. Fishbone Diagram, also known as Ishikawa Diagram or Cause-and-Effect Diagram, is a management method used to identify and organize the possible cause and effect of a problem. This diagram is shaped like a fishbone, where the main problem or effect is in the fish's head, and the various categories of causes, spread towards the fish's backbone. The PDCAM Method Plan Do Check Action or commonly known as the PDCA method is a repetitive improvement activity to find a solution to a problem. The PDCA method is a cycle used to determine the results of changes that have been applied to a product, process, or system.

Method

This research was conducted using quantitative and qualitative research methods in simultaneous or sequential research. A qualitative method of research which is an inquiry process (question/investigation) regarding the understanding of something to obtain data, information, texts of respondents' views using various methodologies in a social or humanitarian problem or phenomenon. While the quantitative method is the research used While the quantitative method is a research that uses data in the form of numbers to answer research questions. Stop, stop the activities that are 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 SWC, the researcher sequenced all processes before the final inspection in the assembly line, it was found that the first appearance of NG (Noot Good) Scracth in the part type Base TG1 was in the stock of parts in PO (plastic injection) before the assembly line process, the data used in this study was sourced from the results of direct observations, and interviews and direct interviews with machine operators, and the supervisor of the PO (Plastic Injection) Section and recorded the data of the findings of the appearance of NG (Noot Good) Scracth on the BaseTG1 part type, by identifying the problem of using the Fishbone Diagram method, it is known that the emergence of NG (Noot Good) Scracth on the type part Base TG1 is from the Palstic Injection (PO) process. Scracth defect at the beginning of the machine to do injection, add check seet cleaning dies, and further training to machine operators, to increase knowledge of methods on how to pack parts on buckets and check parts so that they do not escape. The last stage is to evaluate using the PDCA cycle on the improvements that have been made, to see the results of the improvements that have been implemented to reduce the NG (Noot Good) Scracth problem in the type parT Base TG1.

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Result and Discussion

This research focuses on automotive manufacturing companies, namely in the plastic injection department. This study was carried out because it was found that there were abnormal conditions in the final inspection process, the findings were NG (NootGood) Scracth which was found in the type part Base TG1, and as a result the product was pending and repaired, could not proceed to the next process. Initial Identification The series of making Base TG1 is an important process assembly, before entering the assebbly line process, where the process assembly from plastic pellets to parts is the beginning of the material coming from WHP (Ware House Part) PO (Plastic Injection) Checking parts by the machine operator by sampling + packing parts to the bucket The first step in this study is to observe directly and conduct interviews with machine operators and supervisors of the PO (Plastic Injection), due to the appearance of NG (Noot Good) Scracth in the type type Base TG1, after observing the process directly and interviewing, the researcher managed to collect data and find factors that support the cause of the NG (Noot Good) Scracth problem in the type part Base TG1, and the data was processed using a fisbone diagram

Diagram Fishbone

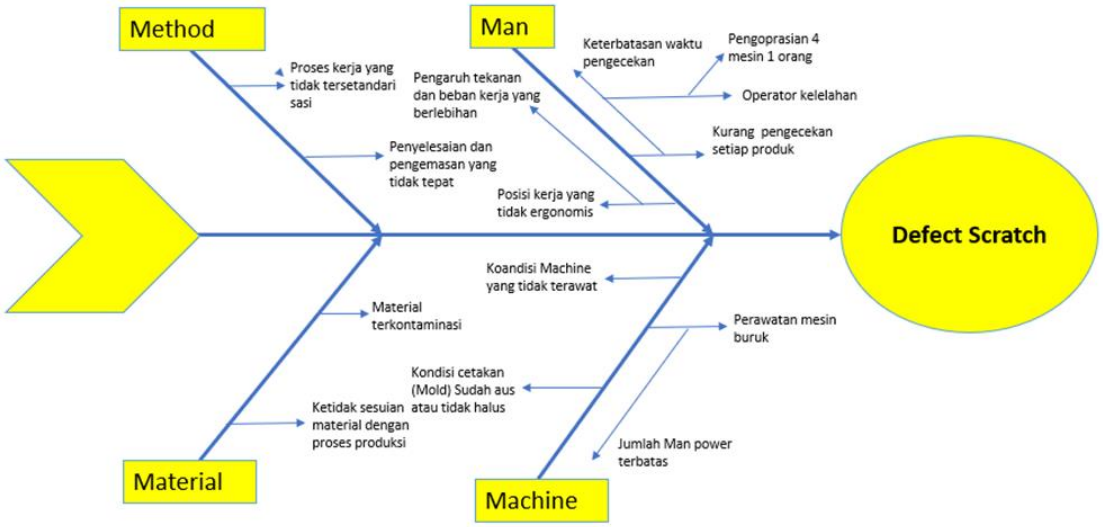

Figure 1. Analysis of Scracth Defect Contributing Factors

The following is an explanation of the fisbon diagram above:

Man (Operator) There is an addition of a Convior so the operator is a little less space (narrow), the operator is in trouble so there is a lack of checking the parts produced by the machine, the time limit to check each part, the factor of that is the fatigue of the operator because of running 4 machines at once Machine (Machine) Visual of the dirty machine lack of machine maintenance at least once a week is mandatory to be done, the operator of the machine is in trouble so that the machine is given is carried out, defect factor in the part is the Dies (Mold) that are dirty and rusty, so the part will be defective after the injection process is completed Method (Working method) Operators lack training on product quality and sample limits, OK

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and NG (Noot Good) packing (massing) parts are not neat and rushed because of fast cyle time Material Difference in the material that is injected one hopper one machine, resulting in material incompatibility, and the material is contaminated with the previous material. Repair Stage The repair stage is carried out because several causes of scracth defects in the Base TG1 type part have been found, repairs are carried out to eliminate the occurrence of NG (Noot Good) Scracth in the Base TG1 type part, and eliminate obstacles or accumulation (pending) of NG (Noot Good) scratch products, and eliminate re-sorting again by the PO (Plastic Injection) section, besides that it also aims to maintain the quality that has been determined by the Cycle company PDCA At this stage, the PDCA cycle is used as a method to find out the results of changes in the production process, system, and maintenance that have been applied, the following is an identification using the PDCA cycle method:

1. Plan

The first action in the improvement plan is in the PO (plastic injection) area, which is to interview the machine operator and section supervisors, to collect data and determine what improvements must be made.

2. Do (Implementation)

After making an improvement plan for the findings that occurred in the area concerned, the next step is to conduct an analysis using a 4M fisbon diagram with the aim of analyzing what are the possibilities that cause the problem to occur and implementing the improvement proposal.

3. Check

After taking several corrective actions against the findings that occurred in the area in question, the next step is to re-examine whether the corrective action is running according to the purpose or not and ensure that the results of the repairs carried out are on target Action (adjustment) After several corrective actions have been taken, and re-checking the repair results, it can be known that the problem of NG (Noot Good) appearing in parts Type Base TG1 has been eliminated even though it is not 100% completely lost. The next step is to maintain the quality and productivity that has been achieved, to prevent the recurrence of the same problem, the company establishes a new SOP for the department concerned after providing a proposal for improvement by including the improvements that have been made in the company's standardization.

No	Taun 2024		
	Bulan	Ktegori NG	Presentasi NG
1	Juli	burry	15%
		Shorl Mold	4%
		Scratch	20%
		Bubble	6%
2	Agustus	burry	16%
		Shorl Mold	5%
		Scratch	23%
		Bubble	4%
3	September	burry	8%
		Shorl Mold	6%
		Scratch	21%
		Bubble	2%
4	Oktober	burry	10%
		Shorl Mold	5%
		Scratch	26%
		Bubble	5%

Figure 1. NG (Noot Good) Scracth's findings found in July-October 2024

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From figure 1, it can be concluded that after several repairs and maintenance, the NG (Noot Good) Scracth problem has disappeared even though it is not 100%, and there is no checking sorting from the PO (Plastic Injection) section member visual check at the final inspection station on the assembly line. This result has been carefully observed for 1 month after the improvement. Based on the data before and after the repair, this study can be stated to have been successful even though not 100% NG (Noot Good) Scracth has disappeared, but it should be noted that regular maintenance and checks by QC Inplant on each, work tools, and supporting elements of the machine's operation. In order to be able to produce effective, efficient productivity, and not repeat the same problems. And don't forget to always remind the operator periodically to understand and do work according to the SOPs that have been set.

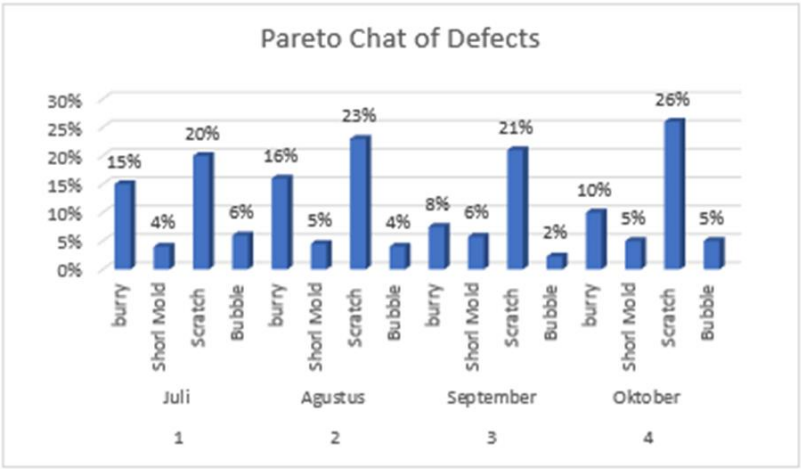

Figure 2. Diagram Pareto

Data collection is before there is an improvement in the production process of the PO (Plastic Injection) division, namely taking product data from July-October, by observing the products that failed the injection division, namely Burry, scracth, Mold sahort, and buble based on the results of data collection in the NG scracth category which occurred the most

No	Taun 2024		
	Bulan	Ktegori NG	Presentasi NG
1	November	burry	3%
		Shorl Mold	2%
		Scratch	8%
		Bubble	3%

Figure 3.Table 2 NG Data for the Last 1 Month After the Proposed Improvement

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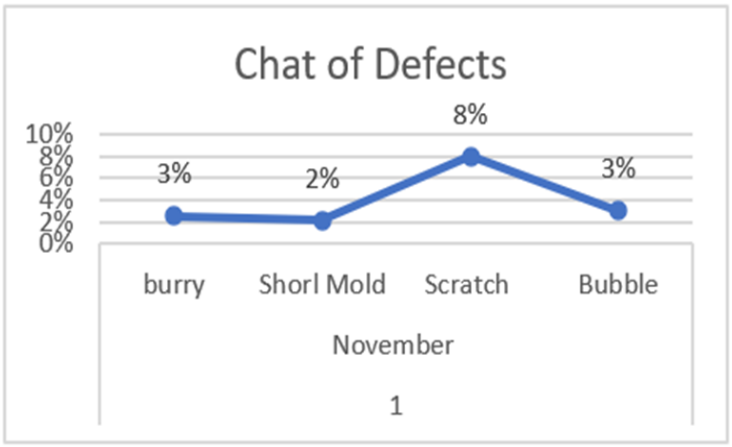

Figure 4 . DPMO PFC (Front Cover Panel) Rating

Conclusion

This study has identified the causes of NG (Noot Good) Scracth problems in the type part Base TG1 and provided suggestions and improvements to processes, tools, and operator understanding in the manufacturing industry sector. The study was conducted by collecting data from 4 months before the repair, data was obtained that the type part in the Base type was found to be a problem in the form of NG (Noot Good) Scracth problems as much as 25% of the products made/month After the repair was applied, data was obtained that the NG (Noot Good) Scracth problem was found to be 8% of the products made/month The purpose of this study was to identify the problem of the appearance of NG (Noot Good) Scracth in the base TG1 type part with the workload of the machine operator and making repairs to eliminate the appearance of NG (Noot Good) Scracth and obstacles (process buildup) that occur at the final inspection station in the Assembly line process. Addition of 1 inplant QC who understands the quality standards of the product 2. Addition of check seet cleaning dies. Further training to machine operators. The results of this study were declared successful even though it was not 100%, this is evidenced by the results of the data after repairs and maintenance, which showed a reduction in NG (Noot Good) Scracth in the type part Base TG1 and automatically eliminated the accumulation of work processes at the final inspection station in the Aseembly line process.

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