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Application of Statistical Quality Control (SQC) for Product 04G22 on PT. Maruichi Indonesia

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Abstract

PT. Maruichi Indonesia is a foreign manufacturing company from Japan that is engaged in the two-wheeler automotive component industry. One of the types of products produced is type 04G22. In its production, PT Maruichi Indonesi still has defect products. Even though there are not many defective products, this condition that occurs continuously will have a bad impact on the company's financial condition. Therefore, the aim of this research is quality control using Statistical Quality Control (SQC) to monitor the product production process to comply with the standards set by the company. The method used in this study is Statistical Qualitic Control with Check Sheet tools, histograms, Pareto diagrams, and fishbone charts. The results of the study can be seen that the percentage of NG in the pattern defect category is 0.06% and 1.92 in the large hole category, in the pareto diagram the disability NG large hole is 99.96%, as well as the causal diagram. The cause of defects is caused by a work process that is not in accordance with company standard procedures. From the results of the research conducted, the types of damage that often arise in 04G22 products are categorized into the category of pattern defects and large holes. The results of the Statistical Quality Control (SQC) analysis of the data obtained by using control chart analysis shows that the production of product type 04G22 at PT. Maruichi Indonesia is still under control.

Keyword: *Statistic Quality Control (SQC), 7 tools, Quality Control, Defect.*

1. Introduction

PT. Maruichi Indonesia is a foreign manufacturing company (PMA) from Japan which is engaged in the two-wheeler automotive spare parts component industry. PT Maruichi Indonesia produces an average of 1,679,413 products per month consisting of 54 types of two-wheeled automotive spare parts components. The average number of defects in the product per month is 761 products. In carrying out the production process, PT. Maruichi Indonesia has implemented a production quality control system so that every product produced is in accordance with standards, is good, and can also provide satisfaction and comfort to consumers. However, even though this quality control program has been implemented by various companies. However, in reality there are still defective products. Even though the products that have suffered from defects or damage are insignificant, if they continue to exist this will only have a bad impact on the company's financial condition such as losses. Thus, based on the problems currently being faced by the company regarding there are still defective products at PT. Maruichi Indonesia, it is necessary to control product quality. So it is necessary to re-analyze efforts in the application of

quality control implemented by PT. Maruichi Indonesia and by finding out the cause and effect of product defects and finding out solutions to fix them.

Bakhtiar (2013) stated that quality has a different definition depending on the quality that is applied in various dimensions of life which causes differences in perceptions or procedures which then lead to various kinds of quality that vary in application. Control according to Bakhtiar (2013) is an activity carried out to monitor an activity or company performance against a production process that is carried out in accordance with predetermined standards. Sulaeman (2014) states that quality control is a system of verification, maintenance, maintenance carried out by a level or degree of product quality with a clear and thorough planning, with appropriate equipment, continuous inspection with corrective action if needed. to existing problems. According to Nina (2019) Statistical Quality Control (SQC) is a technique in solving a problem that aims to monitor, control, manage and improve products using statistical methods in the hope that it can contribute to the quality of production carried out by a company. In addition, quality control with Statistical Quality Control (SQC) also aims to monitor and identify the production that occurs statistically in order to comply with the standards set by the company (Ruly & Nurrohman, 2013). According to Andrew (2011), Statistical Quality Control (SQC) is a system developed to monitor and maintain the quality value and product quality standards of each production process, at a minimum cost level by using statistical methods to collect and analyze data.

2. Literature Review

2.1 Quality Control

The quality of a product is one of the important keys for companies to influence progress in producing a product and get satisfaction for consumers. The quality of goods or services has specifications such as durability, design, reliability, purity or a combination of these various factors which then shows that one of the factors of quality control depends on its ability (Availability), performance (Performance), reliability (Reliability), and also maintenance (Maintainability). A company that does not pay attention to the quality of its products is tantamount to suicide or does not care about the future of the company, because the quality of a product will affect consumer purchasing decisions. Therefore, quality control is needed to maintain the quality of a product so that it is in accordance with predetermined standards and does not cause defects or damage during the production process.

Quality control is how a technique and activity are carried out in a planned manner to achieve, improve and maintain the quality of a product and service so that it is in accordance with predetermined standards to meet consumer satisfaction. According to Sofjan (2008), quality control is a form of effort to maintain the quality or quality of the products produced, so that they are in accordance with the product specifications that have been determined based on the policy of the company leadership. So that in maintaining product quality, the company must be able to always maintain the quality value of quality of products produced in order to produce products that are in accordance with company management policies.

Quality control if implemented properly will also have a good impact on the value of product quality produced by the company. The quality of the products produced by the company is also determined by various models, sizes, and certain characteristics. The main objective of quality control itself is to ensure that the quality of the products or services produced is in accordance with the quality standards or specifications that have been determined at an economical or lowest

possible cost. Quality control is part of production control, because quality control is part of production control. Control of production both in quality and quantity is a very important activity in a company. This is because all activities in production that are carried out will be controlled, so that the goods and services produced are in accordance with a predetermined plan.

Manufacturing companies that produce vehicle spare parts such as PT. Maruichi Indonesia must have a really mature goal, especially for the quality of goods produced by PT. Maruichi Indonesia with zero defects in the results of each production process. Therefore, in a company, a high commitment is needed to provide and distribute product value to customers as well as control of quality in order to create zero defects or errors close to zero (Hartini, 2012). However, even though the defect level of production results has approached zero, the company must still think about an activity or future plan to re-create a quality that is in accordance with the standards, namely by having clear goals and stages and providing innovation in solving and preventing the problems that will be faced in the production process, so that the company will be able to minimize the occurrence of defective products and can continue to maintain zero defects in its production in the next period (Panji, 2015).

Quality control carried out by companies can vary, some are carried out as a whole (100% inspection) and some are statistical. Statistical quality control is carried out by using a combination of statistical tools found in Statistical Quality Control (SQC).

2.2 Statistical Quality Control

Quality control can be carried out by various methods such as Statistical Quality Control (SQC). According to Heizer and Render (2016) Statistical Quality Control is "A process used to monitor standards, making measurements and its being produced taking corrective action as a product or service is being produced". That is, a process used to monitor standards, make measurements and take corrective actions while a product or service is being produced and ensure that the actual performance carried out is as planned.

According to Rully & Nurrohman (2013) the purpose of Statistical Quality Control (SQC) is to supervise products so that products can comply with the standards set by the company. This SQC method plays an important role in ensuring product quality by means of testing and evaluation and information in data used in controlling and improving a production process. According to Dorothea (2003) quoted by Bakhtiar, Tahir, Hasni (2013), statistical quality control is a technique used in controlling, managing and identifying processes in the form of services and manufacturing using statistical methods. SQC is a technique used in problem solving to monitor, analyze, control, and improve products and production processes in statistical methods.

SQC has the ability to describe process abnormalities, see patterns of increasing / decreasing trends in the process, so that corrective action can be taken and even preventive action before the problem will occur. SQC can have a good impact on quality control of products because it works effectively in areas where a production process is ongoing so that deviations from a product to be worked on can be prevented as early as possible (Andrew et al., 2011).

A tool in the implementation of quality control is one of the tools to detect the causes of deviations beyond control in the production process and how to take corrective actions. According to Jay Heizer and Barry Render (2006: 263-268), there are 7 quality control tools, namely check sheets, flowcharts, cause and effect diagrams, pareto diagrams, histograms, control charts, scatter diagrams. The following are tools from Statistical Quality Control:

1. Check Sheet, check sheet or check sheet is a tool used to collect and analyze the data obtained into a table that contains data on the number of goods produced and the type of discrepancy along with the amount produced.
2. Scatter Diagram, Scatter diagram or also called a correlation map is a diagram that describes the relationship between existing factors, whether these factors have a strong correlation or relationship or not.
3. Cause and Effect Diagram, a cause and effect diagram or what is also called a fishbone diagram is used to show and analyze the main factors that affect quality or that cause quality mismatches in a product. The main factors will be visible and detailed through the arrow lines in the shape of a fishbone on the cause and effect diagram or fishbone diagram.
4. Pareto Diagram (Pareto Diagram), Pareto diagram is a tool in the form of bar and line graphs used in comparing event categories arranged by size, from the left is the largest to the right is the smallest. This diagram is useful for identifying defects in a product and defects that often occur in order to focus on the factors that have the greatest influence in the occurrence of these defects.
5. Flowcharts. Flowcharts are simple diagrams that show a process or system using boxes and lines, where the boxes and lines are interconnected. These diagrams are intended to assist in understanding a process because they are excellent tools in explaining the steps in a process.
6. Histogram. The histogram is a tool in the form of a bar chart which is used to show the distribution of existing data. Using a histogram can show the characteristics of a data that has been divided into several classes that have been arranged based on size.
7. Control Charts, control charts are a graphical tool that describes quality improvements. This control chart is used to monitor and also evaluate whether a process is under quality control using statistical methods, this is intended to solve a problem and produce quality improvements. According to the data, the control chart is divided into two categories, namely the attribute control chart and the variable control chart.
Although this study aims to identify and analyze the causes of defective products in the production process that occur at PT. Maruichi Indonesia using Statistical Quality Control (SQC).

3. Research Methodology

The data needed in this study is data on the number of production with product type 04G22 at PT Maruichi Indonesia from March to July 2020 at the stage of the kensa (visual) process with the type of defect with large holes and pattern defects. The method used in this study is to use the Statistical Quality Control method with the tools used in data processing, namely check sheets, histogram, pareto charts, control charts and fishbone charts.

4. Results and Discussion

4.1 Check Sheet

Based on observations made on the production of PT Maruichi Indonesia for the period March-July 2020, the amount of production, the number of defects and types of defects that often occur in the production of type 04G22 products can be seen in Table 1. Based on the data shown in Table 1, it can be seen the percentage of NG the defect category was 0.06% and 1.92% in the large hole category.

Table 1. Data Monthly Check on production Type 04G22 Period March - July 2020

Month	Number of	Number of	Type of defects

	production	defects	Pattern Defect	Large Hole
March	16.138	217	21	196
April	12.842	362	7	355
May	9.255	516	0	516
June	30.011	316	22	294
July	20.404	346	2	344
Total	88.650	1.757	52	1.705
Percentage NG %			0,06	1,92
Contribution NG %			2,96	97

Source: Processed Data, 2020

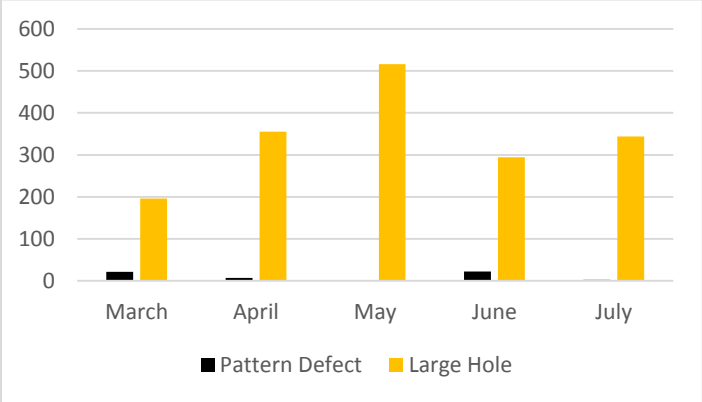

Figure 1. Defects histogram that occurred in March-July 2020
Source: Processed Data, 2020

Table 2. Percentage of each type of defect in product type 04G22

No.	Type of defect	Total	Percentage (%)	Cumulative (%)
1	Pattern Defect	52	2,96	2,96
2	Large Hole	1.705	97	99,96
Total		1.757		

Source: Processed Data, 2020

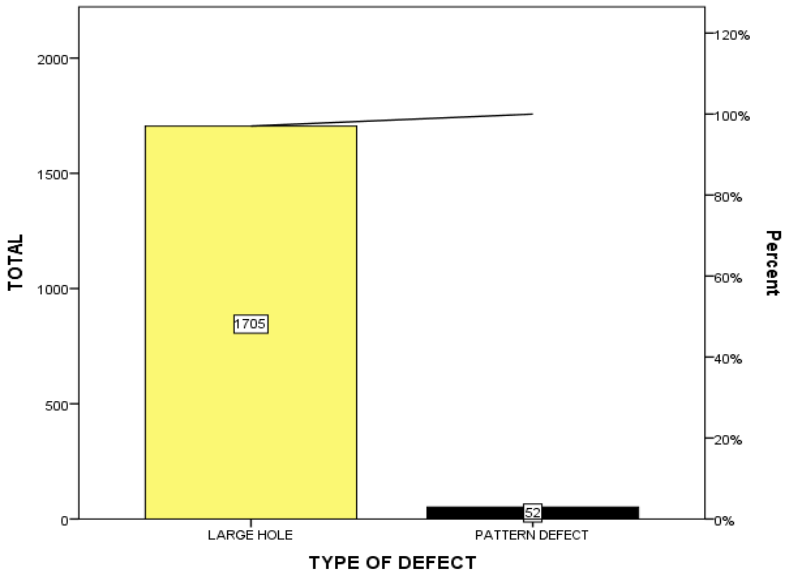

Figure 2. Pareto diagrams for each type of product defect type 04G22
Source: Processed Data, 2020

4.2 Histogram

Based on the data from the results of the checks carried out, the defect histogram consisting of large holes and pattern defects from March-July 2020 can be seen in Figure 1. Figure 1 shows that large hole defects occur more frequently every month and almost often occur, whereas for pattern defects are very rare, even at all. The total defects for Large holes are 1,705 and for pattern defects are 52.

4.3 Pareto Chart

The percentage of each type of defect that occurs in the production of Type 04G22 per month starting from March-July 2020 is shown in Table 2 and for the Pareto diagram for each type of defect that occurs in Type 04G22 products is shown in Figure 2, which shows that the production of type 04G22 is from months March-July often causes NG Large Hole defects of 99.96%. Thus, the repair process is prioritized on the type of defect NG Large Hole.

Table 3. Data Defects Overall

Month	Number of products	Number of defects	Proportion	UCL	P□□	LCL
March	16.138	217	0,013	0.2324	0,025	-0.0183
April	12.842	362	0,028	0.2324	0,025	-0.0183
May	9.255	516	0,056	0.2324	0,025	-0.0183
June	30.011	316	0,011	0.2324	0,025	-0.0183
July	20.404	346	0,017	0.2324	0,025	-0.0183
Total	88.650	1.757	0,125	0.2324	0,025	-0.0183

Source: Processed Data, 2020

Tabel 4. Data NG Large Hole

Month	Number of products	Large Hole	Proportion	UCL	P□□	LCL
March	16.138	196	0,012	0.2324	0,025	-0.1832
April	12.842	355	0,028	0.2324	0,025	-0.1832
May	9.255	516	0,056	0.2324	0,025	-0.1832
June	30.011	294	0,010	0.2324	0,025	-0.1832
July	20.404	344	0,017	0.2324	0,025	-0.1832
Total	88.650	1.705	0,123	0.2324	0,025	-0.1832

Source: Processed Data, 2020

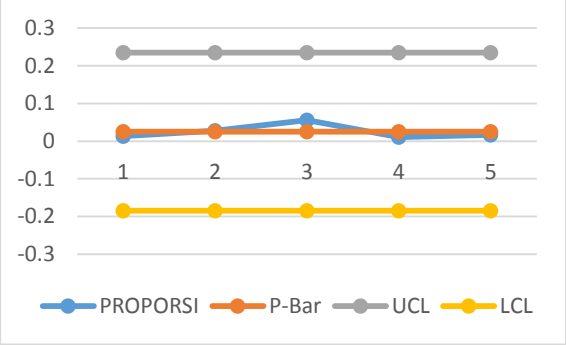

Figure 3. Control chart graph total total number of defects
Source: Processed Data, 2020

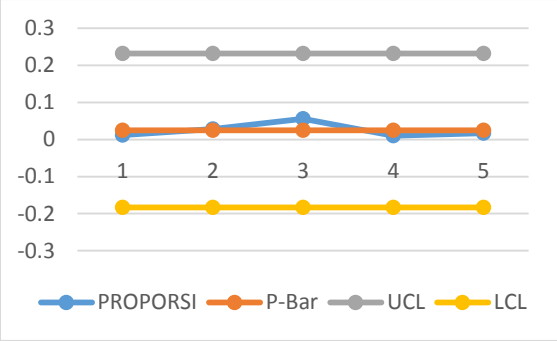

Figure 4. Control chart chart NG Large Hole
Source : Processed Data, 2020

4.4 Control Chart p

The use of control chart p is to see the mismatch of proportions whether there are deviations or defects from various types of items analyzed. The control p chart for the total of all defects arising in the production of type 04G22 in March-July 2020, is shown in Figure 3 and thecontrol chart p for NG Large Hole in production type 04G22 is shown in Figure 4.

Figure 3 and Figure 4 show that there are no deviations outside the control limits, everything is under control so there is no need for revisions or recalculations in the production process.

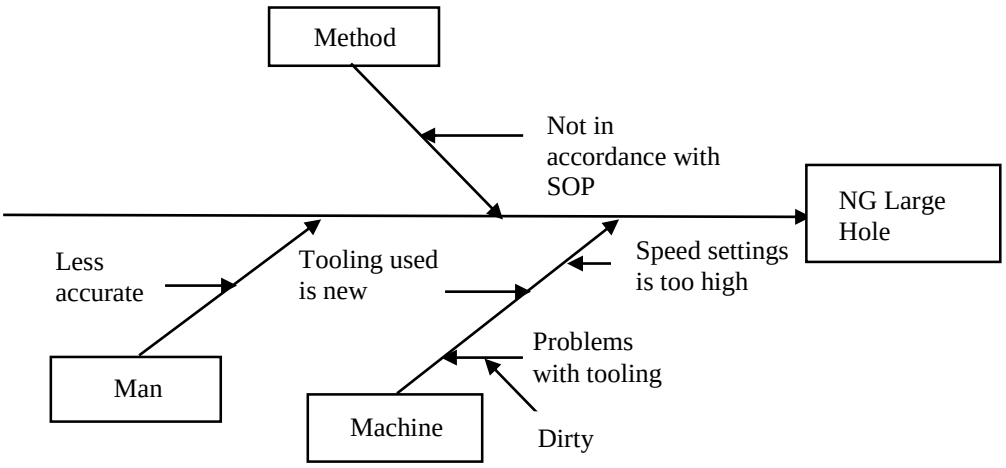

Figure 5. Fishbone Chart NG Large Hole

4.5 Fishbone Charts

In the Pareto Chart, it can be seen that the most common types of defects occur so that a corrective step is needed to reduce the occurrence of these defects. A diagram fishbone is a tool used to determine the factors that are the main causes of defect in a product. In Figure 5, you can see the main factors causing the NG Large Hole on product 04G22.

The occurrence of Large Hole NG is caused by several factors, these factors are related to humans (man), method (method), and machine (machine). The cause of disability from human factors is due to the lack of thoroughness in human resources in carrying out the process.

The cause of defects from the method factor is the process that is not in accordance with the company's standard procedures. The cause of defects from machine factors is due to problems with the tooling used, such as dirty, unclean cleaning processes and new tools that have not been sanded so that the hole is bigger than the standard stipulated by the company. Besides that, the speed setting that is too high is also a cause of defects in the 04G22 product.

Discussion

Based on the results of the analysis obtained, it can be found that the similarities of the research conducted with the research conducted by Sulaeman (2014) with the title "The Role of Quality Control using the SQC method and cause and effect diagrams to reduce defective products in Ozi Aircraft Models". The similarity found is that defective products are influenced by quality control carried out by the company and by using the SQC method the authors can see which production is outside the control limits and still within the control limits based on statistically processed data. The same thing was stated by Bakhtiar (2013) that quality control is one way to identify and control the causes of deviations or defective products that occur with statistical tools. From the results of the Fishbone Diagram analysis carried out, Tool Factor is one of the most dominant factors and has a major influence on defects that often occur in manufacturing industrial companies, Sulaeman (2014).

5. Conclusion

Conclusion

Based on the results of research carried out, the types of damage that often arise on 04G22 products are categorized into the category of pattern defects and large holes. The results of the Statistical Quality Control (SQC) analysis of the data obtained using control chart analysis show that the production of type 04G22 products at PT. Maruichi Indonesia is still under control. From the results of the histogram analysis shows that the product type 04G22 every month has large Hole defects. In the Pareto diagram the most frequent damage occurs in the large hole category. Factors that cause NG Large Hole are the lack of thoroughness in human resources in carrying out the work process, work that is not in accordance with company standard procedures, tools that are still new and problems with the tools used.

Suggestions

Based on the results of research conducted using Statistical Quality Control (SQC), the company must pay more attention to Quality Control during the production process so that it can minimize the occurrence of defective products such as carrying out maintenance and machine inspection before carrying out the production process and always re-ensure that the tools that have been used are still in good condition and in accordance with the standards.

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