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Analysis of Furniture Product Quality Control with Statistical Quality Control Methods and Failure Mode and Effect Analysis

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Abstract

PT. Tjakrindo Mas is a manufacturing company based in Indonesia that supports the government, industrial, public, and private sectors. Established in 1984, the company produces home furniture made from various types of wood. During the period from December 2023 to May 2024, the company faced production issues with its furniture products. According to production scheduling data, the furniture production intensity was high, operating 5 days a week. During this period, the highest production rate was for the 2 Door Glass Wardrobe, totaling 5,638 units. However, despite the high production volume, the defect rate for the 2 Door Glass Wardrobe was also high, with 498 defective units, representing a defect rate of 8.83%, which exceeds the company's tolerance standard. The objective of this study is to assess the quality of the Glass Wardrobe product at PT. Tjakrindo Mas and to propose improvements to enhance the product quality. Observations identified that the highest Risk Priority Number (RPN) was associated with the close side rail rupture defect, caused by the operator not being careful when installing the close side rail to the cabinet body, and the work methods used not in accordance with the Standard Operating Procedure (SOP). Recommendations for quality control proposals based on the high RPN value of FMEA Close Side Rail Rupture is to provide supervision and guidance to workers, and Provide briefing to operators about methods that are in accordance with the standard operating procedures (SOP) used by the company.

Introduction

In the era of the Industrial Revolution 4.0, the industrial world is growing very rapidly, manufacturing and service companies are required to give full attention to the products and services produced. The factor that can lead to the success of a company in the midst of intense competition is to prepare the right strategy. One of the strategies that companies must do is to pay more attention to the quality of products and services produced. Quality is a very important factor for companies to provide satisfaction to consumers (Afandi et al., 2022). The better the quality of a product produced, the more marketable the product will be (Utomo and Vitasari in Hidayatullah et al., 2020). PT Tjakrindo Mas is an Indonesia-based manufacturing company that supports the government, industrial, public and private sectors and has been established since 1984. PT Tjakrindo Mas always strives to provide satisfaction to customers with high quality products. Therefore, PT Tjakrindo Mas strives to implement a good and appropriate product quality control system to maintain product quality in accordance with the standards set by the Company. The products produced by PT Tjakarindo Mas are household furniture products made from various types of wood.

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In the period December 2023 to May 2024, PT Tjakrindo Mas received orders for several furniture products, including: Wardrobe, Chair, Bed, and Sofa. Of these products, the product that has many defects is the 2 Door Glass Wardrobe. Based on the results of observations and secondary data from the company, several defects were found that occurred in each production process of the 2 Door Glass Wardrobe, such as: the near side rail was broken due to the assembly process, the wood veneer protruded due to the veneer coating process, the body part cracked due to the cutting process, the sandpaper was not smooth enough due to the sanding process that was not long and evenly distributed, the base cracked due to negligence during the assembly process. The research will focus on the 2 Door Glass Wardrobe Furniture product because based on production scheduling data from the company shows that the furniture product has a high production intensity of 5 days a week. During the period December 2023 to May 2024, the 2 Door Glass Wardrobe product has the highest production rate of 5,638 units. However, with the high production rate of 2 Door Glass Wardrobe, it resulted in a high level of defects in the product which amounted to 498 units, with a percentage of defects of 8.83% which exceeded the company's defect tolerance standard.

With these problems, quality control research was conducted on Furniture Cabinets products using Statistical Quality Control and Failure Mode and Effect Analysis methods at PT Tjakrindo Mas, with the aim of knowing the quality of Furniture Cabinets products and providing improvement proposals to improve the quality of Furniture Cabinets at PT Tjakrindo Mas. Statistical Quality Control method is a problem-solving technique used to monitor, control, analyze, manage, and improve products and processes using statistical methods (Devani in Puspitasari et al, 2022). Thus, it can be used as a tool to prevent defects by rejecting and accepting various products resulting from the production process, as well as efficiency efforts (Prawirosentono in Hangesthi, 2021). Failure Mode and Effect Analysis is a structured procedure to identify and prevent as many failure modes as possible. Failure Mode and Effect Analysis is used to identify the source and root cause of a furniture product quality problem at PT Tjakrindo Mas.

Quality Control

Product quality control is an activity that plays an important role in every company in producing various kinds of products. The purpose of quality control is to reduce the number of defects or product defects, keep the product in accordance with predetermined standards, and anticipate the release of defective products into the hands of consumers or the market. This shows that the quality of products produced by the company must be managed properly so that the products produced can be in accordance with consumer desires so that the company can be maintained. In maintaining the quality of a product, it is necessary to take several actions, namely inspection and review from raw materials to finished products or final products. If there are defective products in the production process, it will affect production costs (Setia et al., 2020). Quality control starts from the input process of raw materials or information sent by suppliers, until the raw materials are processed in the factory conversion stage and then become finished products that are ready to be sent to consumers (Kuswardani and Made, 2020). Quality control is a system that maintains the required level of product and process quality through proper planning, use of equipment that meets standards, continuous inspection, and corrective action when necessary. Therefore, quality control is more than just checking or determining the quality of the product whether it is accepted or rejected (Manik, 2020).

Statistical Quality Control

Statistical Quality Control is a statistical method for collecting and analyzing data from inspection results on samples in product quality control activities. SQC is carried out by taking samples from the "population" and drawing conclusions based on the characteristics of these

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samples in statistical inference (Prawirosentono in Hangesthi, 2021). Quality control is often referred to as problem solving, so quality control can be one of the methods in problem solving to improve product quality (Ridman and Zachary in Ratih, 2022).

Histogram

Histogram is one of the statistical methods for grouping data so that the data can be analyzed and its distribution known. A histogram is a bar-shaped graph whose data is grouped into several classes with a certain range. Bar charts are presented by showing tabulated data organized by size (Haryanto, 2019).

Pareto Diagram

Pareto diagrams are a method for managing errors or defects to help focus on problem-solving actions. By using a pareto diagram, it can be seen the priority of the problem that must be resolved so that the priority of problem solving can be known. The function of the pareto diagram is to identify or find the main problems for quality improvement from the biggest problem to the smallest problem (Heizer in Laksana & Febriani, 2022).

Process Diagram

A flow chart is a method that provides an overview of the sequence of operations that need to be performed to complete a task. Flow charts are the first step in understanding a production process, both for service companies and manufacturing companies (Rodiah and Aang, 2019).

Scatter Diagram

Scatter diagrams are used to see the correlation or relationship of a causal factor that is potentially related to a process result quality characteristic (Rodiah and Aang, 2019).

Control Chart

Control Chart is a process control method used to quickly investigate the occurrence of unexpected causes in the production process so that corrective action can be taken before too many units are defective due to production (Rodiah and Aang, 2019). The control chart graph can identify whether the process is running well or not. Control charts have a distinctive feature in determining whether the process is good or not, namely by determining a pair of control limits, the data collected will find the trend of the actual operating conditions (Ulkhaq et al. in Farchiyah, 2021). This graph contains a center line which is the average value of the process quality characteristics corresponding to the controlled state (CL). The two horizontal lines are called the upper control limit (UCL) and the lower control limit (LCL) (Hairiyah et al., 2022).

$$CL = \bar{P} = \frac{\Sigma np}{\Sigma n} \quad \text{.......(2.1) center line}$$

$$UCL = \bar{P} + 3\ \frac{3\sqrt{p(1-p)}}{n} \quad \text{.......(2.2) upper control limit}$$

$$LCL = \bar{P} - 3\ \frac{3\sqrt{p(1-p)}}{n} \quad \text{.......(2.3) lower control limit}$$

Fishbone Diagram

Fishbone Diagram is a diagram that illustrates the relationship between process quality and causal factors. It is usually called the Fishbone Diagram because its shape resembles a fish bone (Sulaeman in Farchiyah, 2021). This diagram consists of a fish head which is always located on the right. In it, events are written that are influenced by the causes written on the fishbone. This event is often the topic or problem to be investigated for causes. On the fishbone, the categories of causes that affect the defect are written. The most commonly used categories are: (1) Man (person), which is the person involved in all production processes; (2)

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Method, which is the method used or the process carried out, procedures, regulations, etc.; (3) Material, which is all the materials needed to carry out the production process; (4) Machine, which is all the machines, equipment, facilities needed to carry out the work; (5) Measurement, which is the method of taking data from the process used to determine the quality of the process; (6) Environment, which is the situation around the workplace such as air temperature, noise level, etc. (Handes et al. in Hairiyah et al, 2022).

Failure Mode And Effect Analysis

Failure Mode and Effect Analysis (FMEA) is one method for evaluating risks in the production process system. FMEA can evaluate and analyze components in the production system so as to minimize the risk or effect of a failure rate or defect (Rizqi & Jufriyanto, 2020). Failure mode is a process that includes defects, conditions outside specifications or changes in the product that cause disruption of the function of the product (Yunan et al., 2020). According to Failure Mode and Effect Analysis (FMEA) is a systematic approach that uses tables to assist in the identification of potential modes of error thought processes and their consequences. FMEA is used to determine the impact of all failures that occur and then prioritize prevention and improvement efforts to determine so that the product results in the next production process can run well and in accordance with customer desires. In general, FMEA has two types, namely process FMEA and design FMEA. In design FMEA, observations focus on product design. While in process FMEA, observations focus on the production process. This FMEA procedure is carried out by paying attention to the RPN (Risk Priority Number) value by minimizing the risk of failure by reducing Severity, Occurrence and increasing Detection capability.

Methods

Research with the title "Analysis of Furniture Product Quality Control with Statistical Quality Control Methods and Failure Mode And Effect Analysis at PT Tjakrindo Mas" was carried out at PT Tjakrindo Mas which is located on Jl. Raya Kepatihan No 186A, Kepatihan Kec Menganti, Gresik Regency, East Java. The research was conducted in December 2023 until the required data was sufficient.the steps taken to solve these problems are by collecting data, processing data, results and discussion and conclusions. At the data collection stage carried out to obtain the data needed to perform data processing obtained through Interviews with Department Heads and field observation Results. The data obtained for this research are as follows: (1) Data on the Total Production of 2 Door Glass Wardrobe Furniture Products for 6 Months; (2) Data on the Number of Defects of 2 Door Glass Wardrobe Furniture Products for 6 Months and; (3) Data on the Type of Defects of 2 Door Glass Wardrobe Furniture Products.

Results and Discussion

Production quantity data and defect quantity data refer to internal data obtained from the company regarding the production of 2 Door Glass Wardrobe. Table 1 presents the production quantity data of 2 Door Glass Wardrobe from December 2023 to May 2024.

Table 1. Production Quantity Data and Defect Quantity Data For 2 Door Glass Wardrobes Furniture At PT Tjakrindo Mas

Month	Production Data (Unit)	Cracking Body Parts	Less Fine Sandpaper	Close Side Rail Rupture	Cracked Base	Veneer Bulging	Defect Data (Unit)
December 2023	585	12	10	4	9	13	48
January 2024	751	5	6	4	5	6	26
February 2024	1,063	10	19	8	16	21	74
March 2024	1,074	12	18	10	17	19	76
April 2024	1,032	12	18	11	16	21	78
May 2024	1,133	35	44	32	38	47	196

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Total	5,638	86	115	69	101	127	498

Source: PT jakrindo Mas

Based on Table Above, the Production Quantity Data and Defect Quantity Data for 2 Door Glass Wardrobe Furniture , obtained from observations at PT Tjakrindo Mas, shows the production and defect quantity figures for these wardrobes as presented in the table above.

Histogram

Histogram is a tool used in Statistical Quality Control (SQC) that helps analyze the distribution of data. In Statistical Quality Control, histograms assist in identifying patterns and variations in the production process or product quality

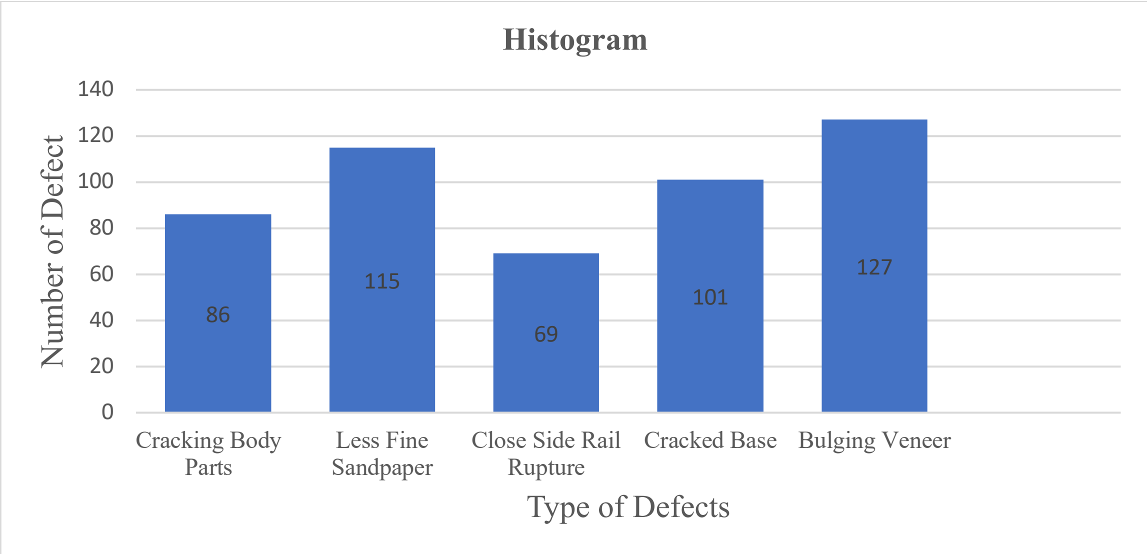

Figure 1. Histogram Types of Defects 2 Door Glass Wardrobes Furniture

Based on the Figure above, the sequence of defect types from highest to lowest values is as follows: bulging veneer at 127 units, less fine sandpaper at 115 units, cracked base at 101 units, cracking body parts at units 86, and close side rail rupture at 69 units

Pareto Diagram

Pareto diagram is a method for managing errors or defects to help focus attention on problem solving actions. By using a pareto diagram, it can be seen the priority of the problem that must be resolved so that it can determine the priority of solving the problem. The function of the pareto diagram is to identify or find the main problems for quality improvement from the biggest problem to the smallest problem. Pareto diagram is a bar shaped graph that is used as an interpretation tool to sort each type of defect from the largest number to the smallest. Then, the percentage of each defect is calculated.

Table 2. Percentage of Defects of 2 Door Glass Wardrobe Furniture Products

Type Defects	Numbe r Defects	Percentage (%)	Percentage Cumulative (%)
Bulging veneer	127	25,5	25,5
Less Fine Sandpaper	115	23,1	48,6
Cracked Base	101	20,3	68,9
Cracking Body Parts	86	17,3	86,1
Close Side Rail Rupture	69	13,9	100
Total	492	100	

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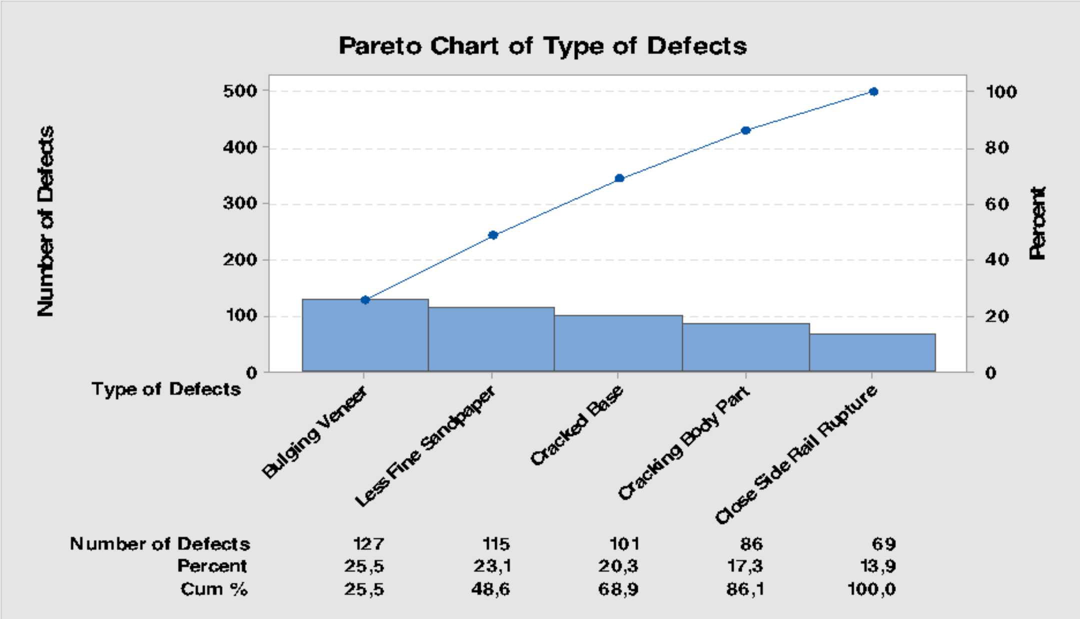

Figure 2. Pareto Diagram Types of Defects 2 Door Glass Wardrobes Furniture

Calculated In the Figure above, it can be seen the percentage of defects in 2 door glass wardrobe furniture products, where it is known that bulging veneer has a percentage of 25.5%, less fine sandpaper has a percentage of 23.1%, cracked base has a percentage of 20.3%, cracking body parts has a percentage of 17.3%, and lose side rail rupture has a percentage of 13.9%. From the results of the Pareto diagram, it is known that the highest percentage of defects is bubbling veneer. The defect that occurs is due to the coating of veneer which functions to make the wood material flatter and shinier in the finishing process has an error due to the coating of too much veneer than needed which causes the verner to appear bubbles and the surface of the material becomes uneven.

Process Diagram

Process diagram is a statistical quality control tool that serves to provide an overview of the production process and also to explain the steps in making a product.

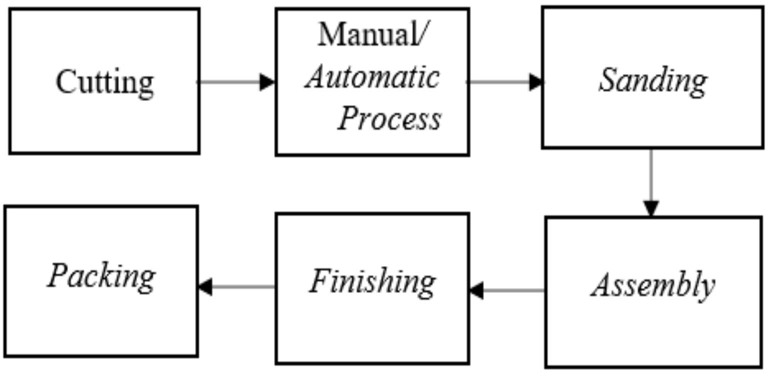

Figure 3. Process Diagram 2 Door Glass Wardrobes Furniture

In the cutting process where the main material in the form of solid wood which has a large size will be cut into the required size through the cutting process with a Cut off saw machine. The manual process of processing wood material from the previous process will be processed according to the parts of the item / item because the process for each part item will have a different process. In this process, the 2 Door Glass Wardrobe Furniture Item from the first process will go to the spindle machine, to make a special shape on the solid wood according to the planned shape, which is the 2 Door Glass Wardrobe parts. After the solid wood is

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formed, it will go to the drilling machine using a counter sink drill machine to make threads, solid wood will be formed according to the design, so that jointer, bolts, accessories and nuts can be installed. Next is the sanding process, the item will be sanded using a sanding pad, to smooth the rough wood fibers. Followed by the assembly process, which is the process of assembling or assembling. In this process, several parts/items of the cupboard in the form of cupboard doors, cupboard bases, cupboard shelves etc. will be assembled/united into one complete cupboard and also the installation of cupboard handles and cupboard decorations. Followed by the assembly process, which is the process of assembling or assembling. In this process, several parts/items of the cupboard in the form of cupboard doors, cupboard bases, cupboard shelves etc. will be assembled/united into one complete cupboard and also the installation of cupboard handles and cupboard decorations. Followed by the finishing process at this stage the assembled 2 Door Glass Wardrobe product will be coated with veneer using mdf / plywood panels which serves to protect the surface of the base material from damage, impact, scratches and increase resistance to moisture and temperature changes in 2 door glass wardrobe products. After that, painting will be carried out on the product, followed by the final process, namely the packing process which is the process of packaging the finished product.

Scatter Diagram

Scatter diagram is a type of graph used to display the relationship between two numerical variables. Each point on the scatter diagram represents one observation with coordinates (x, y) determined by the values of the two variables. Thus, a scatter diagram serves to show the relationship/correlation between the number of production of 2 door glass wardrobe furniture and the number of defects of the defect type.

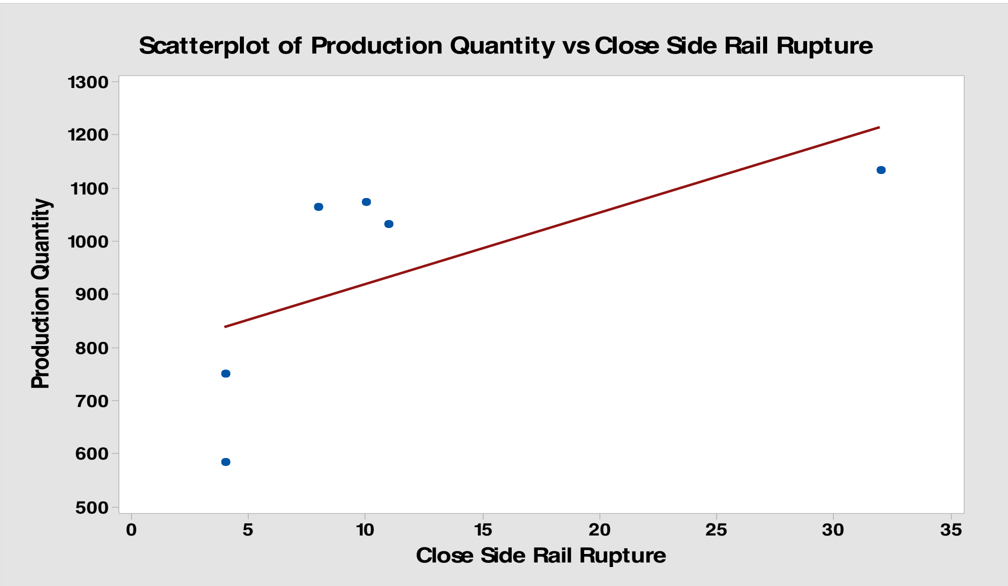

Figure 4. Scatter Diagram Of Production Quantity Against Close Side Rail Rupture

The Scatter diagram above shows that the regression line has a direction from left to right with the position of the points around the regression line so that there is a positive relationship between the production quantity variable and the close side rail rupture variable, based on this graph it can be concluded that the higher the production quantity, the higher the impact on the type of close side rail rupture defect.

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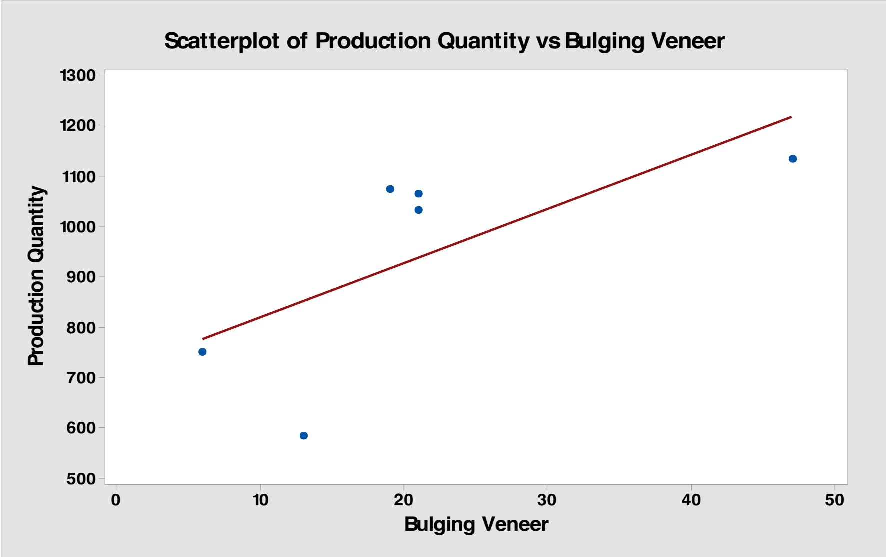

Figure 5. Scatter Diagram Of Production Quantity Against Bulging Veneer

The Scatter diagram above shows that the regression line has a direction from left to right with the position of the points around the regression line so that there is a positive relationship between the production quantity variable and the Bulging Veneer variable, based on this graph it can be concluded that the higher the production quantity, the higher the impact on the type of Bulging Veneer defect.

Control Chart

Control chart has a function to see whether the defect data is within reasonable limits or not so that an analysis can be made of product defects. The control chart used in this study is the P control chart. Its purpose is to describe the parts that are rejected because they do not match the desired tolerance limit by the production quantity.

$$P1 = \frac{np1}{n1} = \frac{4}{585} = 0{,}006838$$

$$\bar{p} = \frac{\sum np}{\sum n} = \frac{69}{5.638} = 0{,}012238$$

$$UCL = \bar{P} + 3\ \frac{\sqrt{\bar{P}\,(1-\bar{P})}}{n} = 0{,}012238 + 3\ \frac{\sqrt{0{,}012238\ (1-0{,}012238)}}{585} = 0{,}025876$$

$$LCL = \bar{P} - 3\ \frac{\sqrt{\bar{P}\,(1-\bar{P})}}{n} = 0{,}012238 - 3\ \frac{\sqrt{0{,}012238\ (1-0{,}012238)}}{585} = -0{,}001399$$

If the value of the proportion of defects of a subgroup is above the UCL or below the LCL, it will be counted as out of control data. $\bar{p}$, LCL and UCL can be seen in Table below.

Table 3. Calculation Result of Attribute Control Chart on Close Side Rail Rupture

Month	**Production Quantity**	**Close Side Rail Rupture**	**p**	**$\bar{p}$**	**UCL**	**LCL**
December 2023	585	4	0.006838	0.012238	0.025876	-0.001399
January 2024	751	4	0.005326	0.012238	0.024275	0.000202
February 2024	1,063	8	0.007526	0.012238	0.022355	0.002122
March 2024	1,074	10	0.009311	0.012238	0.022303	0.002174
April 2024	1,032	11	0.010659	0.012238	0.022506	0.001971
May 2024	1,133	32	0.028244	0.012238	0.022038	0.002439
Total	**5,638**	**69**	-	-	-	-

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Based on the calculation results of Table above, the control chart of the P attribute on the close side rail rupture can be seen through Figure 6 below.

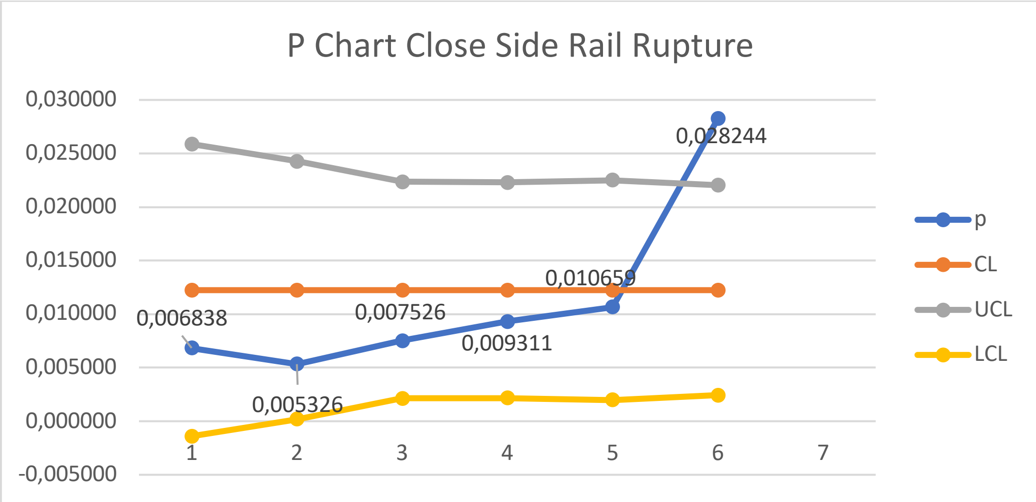

Figure 6. Control Chart P Close Side Rail Rupture

Based on Figure above, it can be seen that there is one value of the proportion of defects outside the control limits, namely in May 2024. This can be caused by abnormal variation during the process which can be influenced by several factors.

$$P1 = \frac{np1}{n1} = \frac{13}{585} = 0{,}022222$$

$$\bar{p} = \frac{\sum np}{\sum n} = \frac{127}{5.638} = 0{,}022526$$

$$UCL = \bar{P} + 3\,\frac{\sqrt{\bar{P}\,(1-\bar{P})}}{n} = 0{,}022526 + 3\,\frac{\sqrt{0{,}022526\,(1-0{,}022526)}}{585} = 0{,}040931$$

$$LCL = \bar{P} - 3\,\frac{\sqrt{\bar{P}\,(1-\bar{P})}}{n} = 0{,}022526 - 3\,\frac{\sqrt{0{,}022526\,(1-0{,}022526)}}{585} = 0{,}004121$$

If the value of the proportion of defects of a subgroup is above the UCL or below the LCL, it will be counted as out of control data. $\bar{p}$, LCL and UCL can be seen in Table below.

Table 4. Calculation Result of Attribute Control Chart on Bulging Veneer

Month	**Production Quantity**	***Bulging Veneer***	**p**	**$\bar{p}$**	**UCL**	**LCL**
December 2023	585	13	0,022222	0,022526	0,040931	0,004121
January 2024	751	6	0,007989	0,022526	0,038770	0,006282
February 2024	1.063	21	0,019755	0,022526	0,036179	0,008872
March 2024	1.074	19	0,017691	0,022526	0,036109	0,008942
April 2024	1.032	21	0,020349	0,022526	0,036383	0,008669
May 2024	1.133	47	0,041483	0,022526	0,035751	0,009301
Total	**5.638**	**127**	**-**	**-**	**-**	**-**

Based on the calculation results of Table above, the control chart of the P attribute on the Bulging Veneer can be seen through Figure 7 below.

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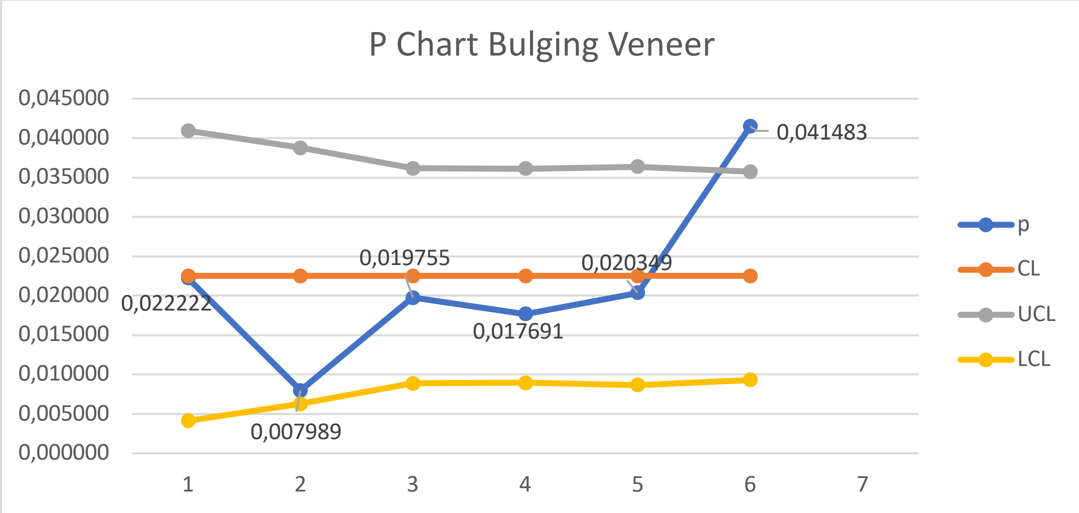

Figure 7. Control Chart P Bulging Veneer

Fishbone Diagram

Cause and effect diagram (Fishbone Diagram) is a diagram that illustrates the relationship between process quality and causal factors. The cause and effect diagram serves to identify the most frequent defect factors in each type of defect. At this stage, the fishbone diagram is used to identify the causes of the defects of close side rail rupture and bulging veneer defect.

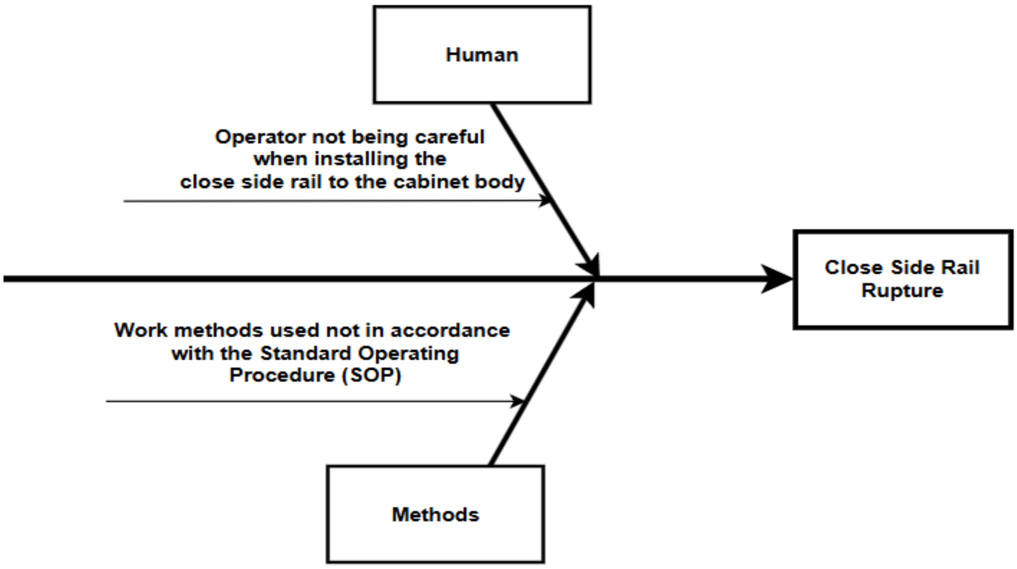

Figure 8. Fishbone Diagram Close Side Rail Rupture

Based on Figure above, it can be seen that the causes of problems are reviewed from human factors and methods. The following is a description of each cause of the problem: 1) The cause of the defect was observed from a human perspective due to the operator not being careful when installing the close side rail to the cabinet body; 2) The cause of defects observed in terms of methods is caused by the work methods used not in accordance with the Standard Operating Procedure (SOP).

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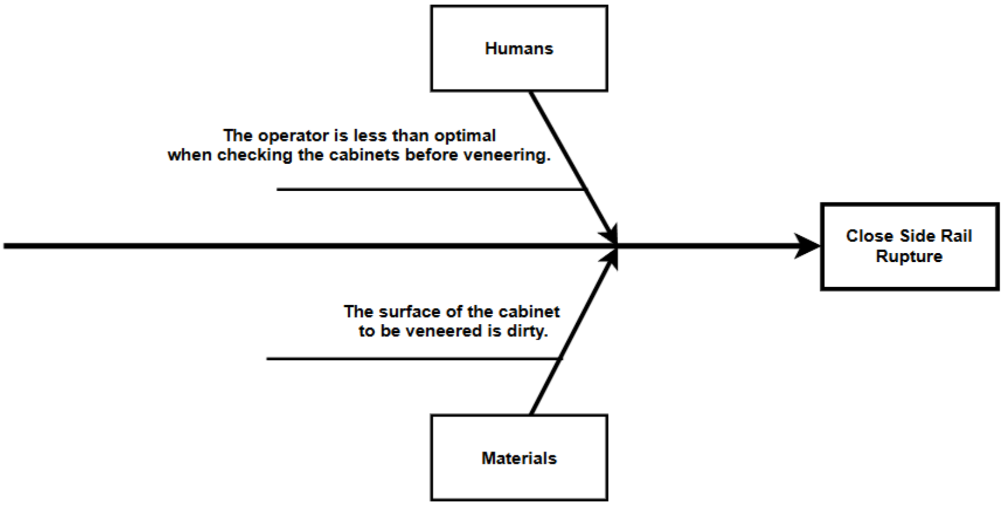

Figure 9. Fishbone Diagram Bulging Veneer

Based on Figure above, it can be seen that the causes of problems are reviewed from human factors and methods. The following is a description of each cause of the problem: 1) The cause of the defect was observed from a human perspective due to The operator is less than optimal when checking the cabinets before veneering; 2) The cause of defects observed in terms of methods is caused by The surface of the cabinet to be veneered is dirty.

Failure Mode and Effect Analysis

This stage is the stage of the improvement strategy for the identification of the results of the fishbone diagram. The purpose of implementing Failure Mode and Effect Analysis is to prevent problems in the production process and products.

Table 5. Failure Mode and Effect Analysis Close Side Rail Rupture

Modes of Failure	***Effect of Failure***	**S**	***Cause of Failure***	**O**	***Current Control***	**D**	**RPN**
Close Side Rail Rupture	Caused the 2 door glass wardrobe furniture product to have to do a new close side rail replacement process because the close side rail connecting the doors on the wardrobe broke and could not be reused, which had an impact on increasing excess production costs	5	The operator not being careful when installing the close side rail to the cabinet body	6	Provide training on the assembly of close side rail cabinets to workers to improve skills so that workers achieve a higher standard of accuracy.	7	210
			The work method used during the installation of the close side rail is not in accordance with the standard operating procedures (SOP) applied by the company.	5	Conduct a demonstration of the close side rail installation method in accordance with the Company's Standard Operating Procedures (SOP) used by the company and carry out regular supervision and add visual aids, such as diagrams or step by step guides at each work station, so as to strengthen the	6	150

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					techniques used by workers.		

Source: PT jakrindo Mas

Table 6. Failure Mode and Effect Analysis Bulging Veneer

Modes of Failure	***Effect of Failure***	**S**	***Cause of Failure***	**O**	***Current Control***	**D**	**RPN**
Bulging Veneer	Causing the 2 door glass wardrobe furniture product to have to do the veneer resurfacing process because there is a layer of veneer that is less adhered to the surface of the wardrobe which results in increased time and excess labor	4	The operator is less than optimal when checking the cabinets before veneering	6	Adding a Standard Operating Procedure (SOP) so that the operator checks again before the veneer coating process.	5	120
			The surface of the cabinet to be veneered is dirty.	5	Briefing the operators to check the cleanliness of the cabinet surface before veneer coating.	4	80

Source: PT jakrindo Mas

Based on the results of data processing using statistical quality control (SQC) using a pareto diagram, the percentage of bulging veneer defect is 25,5% and close side rail rupture defect is 13.9%. The relationship or correlation between the type of bulging veneer defect and the production of 2 door glass wardrobe furniture on the scatter diagram shows that the bulging veneer defect has a positive relationship where an increase in the number of 2 door glass wardrobe furniture production results in an increase in the number of bulging veneer defects, and the relationship or correlation between the type of close side rail rupture defect and the production of 2 door glass wardrobe furniture on the scatter diagram shows that the close side rail rupture defect has a positive relationship where an increase in the number of 2 door glass wardrobe furniture production results in an increase in the number of close side rail rupture defects. The P attribute control chart shows that the type of bulging veneer defect is out of control so that the cause of the problem is identified and recommendations for improvement are proposed. For the cause of the problem of the bulging veneer defect The operator is less than optimal when checking the cabinets before veneering and The surface of the cabinet to be veneered is dirty. The P attribute control chart shows that the type of close side rail rupture defect is out of control so that the cause of the problem is identified and recommendations for improvement are proposed. For the cause of the problem of the close side rail rupture defect, The operator not being careful when installing the close side rail to the cabinet body and The work methods used not in accordance with the Standard Operating Procedure (SOP).

The calculation of the RPN value of the type of bulging veneer defect with the cause of the defect is that The operator is less than optimal when checking the cabinets before veneering is 120 in the medium value RPN category, so the treatment is still in an effort to make improvements. Then the RPN value with The surface of the cabinet to be veneered is dirty.

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is 150 in the medium RPN category, so the treatment is still in an effort to make improvements. The calculation of the RPN value of the type of close side rail rupture defect with the cause of the defect is that The operator not being careful when installing the close side rail to the cabinet body is 210 in the high value RPN category, so improvements must be made immediately at this time. Then the RPN value with The operator not being careful when installing the close side rail to the cabinet body and The work methods used not in accordance with the Standard Operating Procedure (SOP) is 150 in the medium RPN category, so the treatment is still in an effort to make improvements.

Conclusion

Based on research that has been conducted at PT Tjakrindo Mas, it is concluded that the type of defect data obtained from the company shows that there are 5 types of defects that occur during the production process of 2 door glass wardrobe furniture. Bulging veneer with a percentage of 25.5%, less fine sandpaper with a percentage of 23.1%, cracked base with a percentage of 20.3%, cracking body parts with a percentage of 17.3% and close side rail rupture with a percentage of 13.9%. Recommendations for quality control proposals based on the high RPN value of FMEA Close Side Rail Rupture is to Provide training on the assembly of close side rail cabinets to workers to improve skills so that workers achieve a higher standard of accuracy, and at a medium RPN value by Conduct a demonstration of the close side rail installation method in accordance with the Company's Standard Operating Procedures (SOP) used by the company and carry out regular supervision and add visual aids, such as diagrams or step by step guides at each work station, so as to strengthen the techniques used by workers.

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