



Waste Analysis in the Hot Press Section Using the Qfm (Quality Filter Mapping) Method at Pt. Linggarjati Mahardika Mulia Pacitan

Galuh Ari Nugroho¹, Aan Zainal Muttaqin², Doni Susanto³
^{1,2,3} Faculty of Engineering, PGRI Madiun University

Article Info

Article history:

Received, May 18, 2023
Revised, May 29, 2023
Accepted, Jun 19, 2023

Keywords:

Waste,
Quality Filter Mapping,
Plywood

ABSTRACT

PT. Linggarjati Mahardika Mulia is a company operating in the forestry sector located in Pacitan Regency, producing plywood with thicknesses ranging from 5mm, 8mm, 12mm, 15mm, 18mm. The subject of this research is the cause of waste in the hot press section of the pressing machine. The method used is Quality Filter Mapping because it is a relevant method for finding out the source of problems in the quality of the company's products. The results of this research showed that production in May with the highest percentage of plywood wastage occurred at a thickness of 15mm at 0.24% with a poor glue quality factor, and plywood with a thickness of 18mm at 0.24% for a damaged material factor. In June 2023, the highest wastage occurred in plywood with a thickness of 18mm at 0, 09% on the influencing factor is the quality of the glue is not good.

This is an open access article under the [CC BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.



Corresponding Author:

Galuh Ari Nugroho,
Faculty of Engineering,
PGRI Madiun University,
Jl. Setia Budi No. 85 Kanigoro Village, Kartoharjo District, Madiun-East Java 63118.
Email: galuharinugroho99@gmail.com

1. INTRODUCTION

Quality control is an effort to ensure that results and implementation are in accordance with predetermined plans and satisfy consumers. Quality in industry emphasizes the processes and products produced. Quality can be a suitability for needs which include availability, delivery, reliability, maintainability and cost effectiveness (Hendy Tannady, 2015). Quality control is carried out so that goods are not created that do not comply with specifications or quality standards continuously and can be used to control, select and assess quality, so that consumers feel satisfied and the company does not suffer losses. (Waluyo, 2020) Quality control is a method used to maintain the quality and goods produced so that they conform to product specifications that have been previously determined following company policy. The definition of quality is a product or service that meets the requirements or desires of customers, where customers can use, enjoy the product or service with great satisfaction and become regular customers. (Rahmat, Djafri. 2017).

Plywood production process activities at PT. Linggarjati Mahardika Mulia Pacitan is closely related to hot press machine activities, the hot press section in the plywood production process at the company PT. There are two Linggarjati sections, the first is the HPV section, namely the production section that processes wood material after processing it into sheets which are then dried by pressing using hot temperatures. Next, the second is in the HPP section, this process is the object of researchers to carry out waste analysis in this section, namely the process of pressing plywood material that is half-finished and already in the form of plywood with a certain thickness and then pressed using hot temperatures.

Why is the research conducted focusing on the hot press machine part because waste often occurs which is very detrimental to the Company if it is not handled immediately and the right

solution is sought, the hot press process plays a very important role in the plywood production process at PT. Linggarjati Mahardika Mulia Pacitan, because 80% of semi-finished materials can be said to have passed or not to be determined after going through the hot press process, if the material has been through the hot press process many times but the resulting quality is not suitable then the material will be declared not to have passed and will be used as a base for plywood raw materials. This is what makes the hot press process an object of research for thesis research.

The need for plywood is increasing both in terms of quality and quantity. With effectiveness, efficiency and productivity, the company can find out how plywood product optimization is carried out and can find out the achievement of the targets carried out for the Company. Regarding plywood which is produced by observing and improving the existing production process, from the initial process of raw materials arriving to the final finishing process. The selection of raw materials is also a major factor in controlling plywood production. PT. Linggarjati Mahardika Mulia Pacitan is a company that operates in the field of plywood or plywood production. In the plywood production process, wood is a basic requirement for this company, with good quality wood and avoids damage such as breaking and rotting.

PT. Linggarjati Mahardika Mulia is located in Wonogondo, Kebonagung District, Pacitan Regency, which is one of the companies that can be said to be advanced, this can be seen from the quite increasing demand where the demand for this plywood product can be sent to distributors at least once a day, but this increase is not matched. with good product quality. Plywood produced from the PT. Linggarjati Mahardika Mulia also still experiences many problems such as production defects, caused by machines or employees, the lack of quality of the products produced will have an impact on customer demand which will decrease due to poor quality.

The result of these problems can be that the production system is inaccurate, which will cause losses for the company due to the large number of production defects that occur and time wastage due to rework. Types of waste that exist at PT. Linggarhati Mahardika Mulia is a type of delay or waiting time which is the delay of employees waiting for machines, equipment or machines waiting for maintenance. Apart from that, the type of waste that often occurs is processes because many workers carry out unnecessary activities during the plywood production process, such as chatting too much.fellowworker. Apart from the waste that occurs at PT. Linggarjati Mahardika Mulia, the performance of the quality control department is still not perfect, this can be seen when the plywood production process is carried out, quality control is only carried out when defects occur in the plywood production results, not at every production activity. Even though when a product defect occurs in plywood production, a report is made to the superior or foreman, this can cause frequent defects in plywood product output if control is not implemented in each plywood production process itself.

2. RESEARCH METHOD

1. QFM (Quality Filter Mapping)

Quality filter mapping is a value stream mapping tool that can evaluate several types of waste in the form of defects, overproduction and inappropriate processing. In the research that will be planned, product quality problems that have been identified during operation or inspection of the Quality Filter Mapping are described. This tool is very helpful in identifying where the causes of defects occur and where they are found. (Yasin, Lukmandono. 2021). Quality Filter Mapping can be used as a relevant method to find out the source of problems with product quality in a company. This method also discusses defective goods, overproduction, and also production processes that do not comply with factory standards that have been previously set by the company. The concept of Quality Filter Mapping is as a tool to identify quality problems in products within the company's supply chain. The defects that will be displayed are quality defects in the product that were discovered during the production process. (Yasin, Lukmandono. 2021)

2. Fishbone Diagram

Fishbone diagrams are a method that is often used to determine the causes and effects that can trigger a problem. The Ishikawa diagram is used to determine the cause and effect relationships

contained in a process (Widyahening, 2018). The basic concept of a fishbone diagram is that the fundamental problem is placed on the right side of the diagram or at the head of the fishbone framework. The cause of the problem is depicted in the fish's fins and spines. Several categories of causes of problems that are often used as a starting point include materials (raw materials), machines and equipment (machines and equipment), manpower (human resources), methods (methods), environment (environment). (Surya, Ririh 2021) Said that "fishbone diagrams are seven basic quality tools used to process and analyze data by researchers".

Table 1. Plywood Production Data for May

HPP			
Month	Plywood Used	Ready Plywood Results	Rend HPP
	Inputs	Outputs	
	Vol (m3)	Vol (m3)	(%)
		0.0000	#DIV/0!
03-May	6.7657	6.7657	100.00%
04-May	14,1940	14,1940	100.00%
05-May	3.9294	3.9151	99.64%
06-May	1.9861	1.9718	99.28%
08-May	17.8304	17.8304	100.00%
09-May	37.8113	37.6452	99.56%
10-May	10.2164	10.2164	100.00%
11-May	6.9568	6.9461	99.85%
12-May	30.9170	30.7777	99.55%
13-May	3.6454	3.5811	98.24%
15-May	0.0000	0.0000	#DIV/0!
16-May	14.6863	14.6863	100.00%
18-May	29.4757	28.5469	96.85%
19-May	6.8645	6.8359	99.58%
22-May	0.0000	0.0000	#DIV/0!
23-May	37,1921	36.2491	97.46%
24-May	35.1679	35.0250	99.59%
25-May	22.3349	22.0492	98.72%
26-May	33.0127	33.0127	100.00%
27-May	18.6056	18.0656	100.00%
29-May	0.0000	0.0000	#DIV/0!
30-May	41.9729	40.1154	95.57%
31-May	29.1464	28.8607	99.02%
TOTAL	402.7115	397.8303	98.33%

Table 2. Plywood Production Data for June

HPP			
Month	Plywood Used	Ready Plywood Results	Rend HPP
	Inputs	Outputs	
	Vol (m3)	Vol (m3)	(%)
01-June	43.4910	43.0445	98.00%
02-June	5.9548	5.9548	100.00%
05-June	33.8188	33.3497	98.61%
06-June	41.4299	41.1013	99.21%
07-June	35,1858	34.9714	99.39%
08-June	34.4606	34.4606	100.00%

09-June	35.6144	34.4571	96.75%
10-June	36.7147	35.3382	96.25%
12-June	13.3420	13.0363	99.73%
13-June	43.2939	43.2428	99.91%
14-June	30.4991	30.2526	99.19%
15-June	29.2143	29.0804	19.54%
16-June	24.2192	24,1907	99.88%
17-June	38.2947	38.1590	99.65%
19-June	24.7098	24.4240	98.84%
20-June	72.2448	71.6647	99.17%
21-June	66,1891	65.8016	99.41%
22-June	53.9325	53.8146	99.78%
23-June	46.9275	46.8775	99.89%
24-June	32.6853	32.6674	99.95%
26-June	40.3833	40.3833	100.00%
27-June	35.2912	35.2912	100.00%
30-June	24.8997	24.8643	99.86%
TOTAL	842.8064	836.6980	99.91%

3. RESULTS AND DISCUSSION

A. Quality Filter Mapping

Table 3. Percentage of Waste in May

No.	Waste Factor	Percentage of Each Thickness					TOTAL
		5mm	8mm	12mm	15mm	18mm	
1	Wet Ingredients	0.00%	0.00%	0.00%	0.16%	0.16%	
2	Damaged Material	0.00%	0.00%	0.00%	0.16%	0.24%	
3	Less Hot Temperature	0.00%	0.00%	0.00%	0.20%	0.08%	
4	Wrong Timer	0.00%	0.00%	0.00%	0.08%	0.08%	
5	Bad glue quality	0.00%	0.00%	0.00%	0.24%	0.20%	
TOTAL May							1.60%

Table 4. Percentage of Waste in June

No.	Waste Factor	Percentage of Each Thickness					TOTAL
		5mm	8mm	12mm	15mm	18mm	
1	Wet Ingredients	0.00%	0.00%	0.00%	0.00%	0.00%	
2	Damaged Material	0.00%	0.00%	0.00%	0.00%	0.00%	
3	Less Hot Temperature	0.00%	0.00%	0.00%	0.00%	0.00%	
4	Wrong Timer	0.00%	0.00%	0.00%	0.00%	0.00%	
5	Bad Glue Quality	0.00%	0.00%	0.00%	0.00%	0.09%	
TOTAL June							0.09%

According to data obtained using the Quality Filter Mapping method on the percentage of wastage on hot pressing machines, the highest record of the type of plywood thickness that experienced wastage was 15mm thickness plywood with a percentage of 0.24% for poor glue quality factors, and 18mm thickness plywood with percentage of 0.24% in damaged material factor in May.

According to data processing that has been carried out using the QFM method, it was found that the type of plywood that experienced the most waste was plywood with a thickness of 18mm, amounting to 0.09%, with the factor influencing waste being poor or poor glue quality in June.

B. Fishbone Diagram

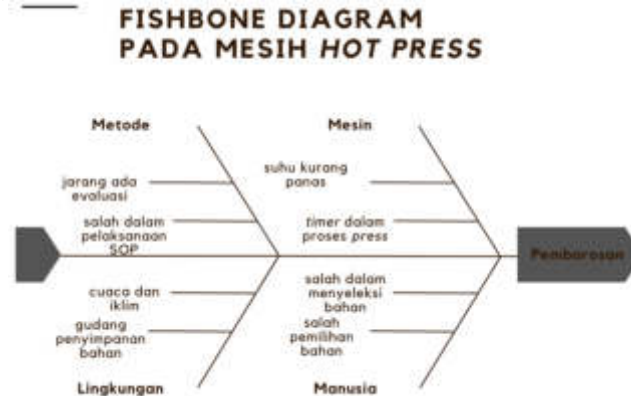


Figure 1. Fishbone Waste Diagram for Plywood Production

Based on the fishbone diagram image above, it can be concluded that the causes of waste include the following;

1. Machines have an influence on waste on hot press machines at PT. Linggarjati Mahardika Mulia, namely that there are several obstacles such as insufficient heat which results in the pressing process being less than optimal and requiring the pressing process to be repeated or additional time. Apart from that, when the timer is set incorrectly due to an error which results in the type of thickness and the time required for the pressing process not being suitable which can result in defects in the plywood product.
2. The role of humans in the plywood production process, especially in the PT hot press machine. Linggarjati Mahardika Mulia is very important, this is because the hot press department often makes mistakes in selecting materials that are still wet versus those that are dry so that the pressing process takes a long time and repeatedly to get results that meet company standards.
3. The frequent occurrence of waste or waste in the hot press section is not far from the company's role in always checking employee performance, at PT. Linggar Jati Mahardika Mulia still lacks strong evaluation of employees to comply with the company's SOPs, employees are often found who violate the company's SOPs which in the end can be detrimental to the employees themselves and the company. SOPs that are often violated are not wearing masks, not using PPE according to the rules set by the company, which in the end can also be detrimental to the company.
4. The environment has a big influence on the plywood production process at PT. Linggarjati Mahardika Mulia, because the factory location is in the mountains of Pacitan Regency. Because the storage area for raw wood materials that have just arrived from traders is placed on the ground and is open without a wooden cover, it can result in the quality of the wood that will be used for plywood production material decreasing, if it is directly exposed to rainwater and heat, this can cause losses. for the company if the wood that has been purchased cannot be used for plywood production.

4. CONCLUSION

Conclusions that can be drawn from the problem of wastage or waste in PT hot press machine parts. Linggarjati Mahardika Mulia based on the findings of the data analysis that had been carried out previously, the impact of wastage or waste that occurs in the plywood production process is not very significant, however, if it is not handled seriously it can result in big losses for the company. It can be seen from the results of data analysis using the QFM method that the largest percentage of waste in the hot press section is 15mm thickness plywood with a percentage of 0.24% in the bad glue quality factor and 18mm thickness plywood with a percentage of 0.24% in the damaged material factor in the month May 2023. Meanwhile, in June 2023, the largest percentage of wastage in PT

plywood products. More specifically, the author can draw conclusions from the research that has been carried out as follows; To reduce the level of waste at PT. Linggarjati Mahardika Mulia requires evaluation of employees, especially in the hot press section, to always maintain company SOPs to avoid continuous waste. The factor that causes waste or waste in the plywood production process, especially in the hot press section, is the machine factor, the plywood is not maintained properly and correctly and there is a lack of routine maintenance on the machine, because the wood used as the main material for making plywood is also easily rotted and rotted when exposed to it. rainwater and direct heat from the sun. Based on the waste analysis that has been carried out in the discussion, improvements are needed in the plywood production process for the 15mm and 18mm thickness types because these two types of thickness often experience product defects in PT plywood production. Linggarjati Mahardika Mulia Pacitan

REFERENCES

- [1] AL Rucitra and J Amelia. (2021). Quality control of bottled tea packaging using the Statistical Quality Control (SQC) and the Failure Mode and Effect Analysis (FMEA)
- [2] Almer Panji Pradana, Mochammad Chaeron, M. Shodiq Abdul Khanan (2018) "Implementation of Lean Manufacturing Concepts to Reduce Waste on the Production Floor".
- [3] Amjad B. Abdulghafour, Salman H. Omran, Mohaned S. Jafar, Murtadha M. Mottar, Osamah H. Hussein. (2021). Application of Statistical Control Charts for Monitoring the Textile Yarn Quality
- [4] AE Widyahening. (2018) "Using Fishbone Diagram Learning Techniques in Improving Students' Reading Skills".
- [5] DK Sari1, D Hetharia, D Saraswati and R Marizka. (2018). Design of Flat Shoes Quality Control System using PDCA (Case Study at PT DAT)
- [6] Desi Isabela, Meriastuti Ginting (2018) "Minimizing Product Defects in PT XYZ's Injection Molding Process Using Quality Filter Mapping".
- [7] Dina Anggraeni Resphaty, (2021). Minimizing Waste on the Production Line with the Lean Manufacturing Concept
- [8] Dinda Tria Pratiwi, Ines Rizkiyah, Mega Nilam Sari, Fini Zanuvar Utami, Karina Rahmi Putri, and Akhmad Nidomuz Zaman. Waste Analysis in the Plywood Production Process.
- [9] [9] Dr. Novianty Djafri, M.Pd.I. Dr. Abdul Rahmat, S.Sos.I., M.Pd. 2017. INTEGRATED QUALITY MANAGEMENT TEXTBOOK
- [10] Evi Febianti, Yusraini Muhami, Latifa Dewi Prameswari, Shanti Kirana Anggraeni, Ratna Ekawati, Nuraida Wahyuni, (2023). Minimizing Waste in the Tofu Production Process Using the AHP and Valsat Methods.
- [11] Fatima Sari Ritonga, Syahrul Humaidi, Zuriah Sitorus. (2022). Synthesis of Carbon from Yellowfin Tuna Fishbone to Remove Iron (Fe) Metal in Well Water from Bandar Setia
- [12] Feby Ayu Lestari, Nining Purwatmini, (2021). Quality Control of Textile Products Using the DMAIC Method.
- [13] Feraldo Kusuma Artono Putra, Rr. Rochmoeljati. (2023) Analysis of Waste in the Bok Travo Production Process Using the Value Stream Mapping Method at PT. XYZ
- [14] Hendy Tannady. 2015. Quality Control
- [15] Ira Revita, Akhmad Suharto, Ahmad Izzudin (2021) "Empirical Study of Product Quality Control at Convection Vieyuri"
- [16] Lukmandono, NLP Hariastuti, Suparto and DI Saputra. (2019). Implementation of Waste Reduction at Operational Division with Lean Manufacturing Concept
- [17] Muhamad Yasin, Lukmandono (2021) "Implementation of Quality Filter Mapping (QFM) for Hot Press Parts Using Lean Manufacturing to Eliminate Waste".
- [18] Nabila Lufhfiyanasary Surya, Kirana Rukmayuninda Ririh (2021) "Work Accident Risk Analysis Using the HIRARC Method and Fishbone Diagram on the Production Floor of PT DRA Component Persada"
- [19] Ni Kadek Ratna Sari, Ni Ketut Purnawati (2018) "Analysis of Quality Control of the Milk Pie Production Process at the Barong Milk Pie Company in Denpasar City"

- [20] Prof. Dr. Agustinus Purna Irawan, IPM. 2017 Manufacturing Product Design and Development.
- [21] Susanti Sundari, Alip Gempito, Putri Endah Suwarni (2021) "Identification of Waste in the PT. SSS Palm Kernel Oil Screening Unit"
- [22] Susanti Sundari, Alip Gempito, Putri Endah Suwarni.(2021). Identification of Waste in the PT.SSS Palm Kernel Oil Filter Unit
- [23] Thifali Dhiwanhgkara, Lukmandono (2021) "Implementation of Lean Manufacturing Using the Value Stream Mapping Method and Failure Mode and Effect Analysis Approach to Reduce Production Waste."