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FMEA Implementation for Determination Reject Handling Priorities (Case study of PT. XYZ)

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***Abstract*: Reject is one of the waste companies must minimize. From several types of rejects, there are certain rejects which are prioritized to be handled. The method used to determine the priority of reject treatment is Failure Mode and Effect Analysis. In this study, observations were made of data reject or damage to the press process, painting, and assembling. From the results of the study, it was concluded that the highest RPN value of 144 is wrinkle bending and bending rupture, so rejects prioritized for handling are bending wrinkles and bending breaks.**

***Keywords*: FMEA, reject, priority.**

1. Introduction

PT. XYZ is a stove manufacturer that is in the transition process of the ISO 9001 Series Quality Management System, from ISO 9001: 2008 to ISO 9001: 2015. One of the processes required in ISO 9001: 2015 is "risk based thinking" Risk Based Thinking in order to comply with the requirements of ISO 9001: 2015, PT. XYZ needs to plan and implement actions to deal with risks and opportunities. Dealing with risks and opportunities makes it a basis for increasing the effectiveness of the quality management system, achieving better results and preventing negative impacts. In the production process, the risks directly related to the product are rejected.

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Based on the background description of the problem above, the formulation of the problem which is the object of the study in this study is as follows:

1. What are the risks of rejects that occur during the stove production process?
2. Risk of rejecting what is the most priority to be handled?

In order for research to be more focused and relevant, there are a number of limitations set, namely:

1. Research only focuses on the gas stove production division.
2. Research is conducted until the biggest potential risk of rejects that must be handled by the company is found.
3. Research is not carried out to monitor the reject handling of companies.

2. Literature review

A. Risk Based Thinking (ISO 9001: 2015 clause 0.3.3)

Risk-based thinking (which is important for achieving an effective quality management system. The concept of risk-based thinking is implicit in previous editions of international standards, for example implementing preventive measures to eliminate potential nonconformities, analyzing any nonconformities that occur, and taking action to prevent recurrence effect of nonconformity.

In order to comply with the requirements of ISO 9001: 2015, an organization needs to plan and implement actions to deal with risks and opportunities. Dealing with risks and opportunities makes it a basis for increasing the effectiveness of the quality management system, achieving results better and prevent negative impacts.

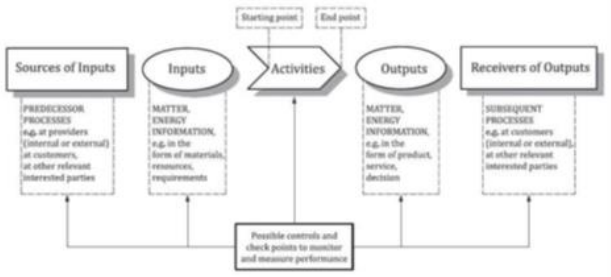

Fig. 1. Schematic description of the elements of a single process

B. FMEA

FMEA method is one method that serves to show the problem (failure mode) that may arise in the system that can cause the system cannot produce the desired output. Analysis using FMEA emphasizes the butt-up approach, which is to start by examining low-level components and forwarding them to a higher level system and considering system failure as a result of all failure methods.

Important parts of the FMEA method are as follows: [1]

1. Failure Mode: to find out how a system can be damaged.

2. Failure Effect: to determine the effect of damage to the system.
3. Cause of Failure: to find out the cause of damage to the system.
4. Risk Evaluation: to find out the most important problems that get priority.

Steps to run FMEA [2]

1. Identify system damage
2. Finding the cause of damage to the system
3. Looking for a result of damage to the system
4. Identify methods for controlling potential damage to the system
5. Determine the severity (damage level) of damage to the system
6. Determine the occurrence (frequency) of damage to the system
7. Determine the possibility of controlling damage (detection)
8. Identify important areas of damage in the system and possible improvements that can be made.

The FMEA process is used to get to know the various mods of failure in the possibility of and the impression commensurate with this failure in the achievement [3]. The final result of FMEA is the type of reject that needs to be prioritized to be handled first. Priority determination based on severity, frequency (occurrence) and possibility of detection (detection). Priority is determined by calculation of the RPN or Risk Priority Number. Rejects that have the highest RPN value will be prioritized to be handled. RPN calculation formula: Severity (S) x Occurrence (O) x Detection (D).

1) Determination of Severity [4]

Severity damage to the system is used as a consideration in determining the level of seriousness of the effects of damage that occurs on the system. Severity damage to the system can be divided into 10 scales, while the categories used are as follows:

1. Scale 1 for damage with minor effects
2. Scale 2-3 for damage with low effects
3. Scale 4-6 for moderate (moderate) damage
4. Scale 7-8 for damage with high effect (high)
5. 9-10 scale for very high damage

2) Determination of Frequency (Occurrence) [5]

The frequency of damage can be determined based on the time period. Occurrence is divided into 10 scales, while the categories used are as follows:

1. Scale 1 for damage that is unusual or rare
2. Scale 2-3 for damage with low frequency (low)
3. Scale 4-6 for moderate frequency damage (moderate)
4. Scale 7-8 for high frequency damage
5. Scale 9-10 for damage with very high frequency (very high)

3) Determination of possible controls (Detection)

Determination of possible controls or detection divided to 10 scales, while the categories used are as follows:

1. Scale 1-2 for damage that has a very high chance of control.
2. 3-4 scales for damage that have high control opportunities.
3. Scale 5-6 for damage that has moderate (moderate) control opportunities.
4. Scale 7-8 for damage that has a low chance of controlling.
5. Scale 9 for damage that has a low chance of controlling.
6. Scale 10 for damage that has the opportunity to control erratically or even out of control.

3. Data analysis

From Quality Control monthly report, known many reject on production process. The report shown on Fig. 2.

Table 1
Severity and occurrence

DEFECT	S	CAUSE OF DEFECT	O
PRESS			
Upper Plate TES broken	9	stopper changed	2
		setup not centre	3
		unskilled	2
Drawing 1T pecah	8	raw material not suitable	2
		dies worn out	2
		cussion not flat	2
Body kerut	8	raw material not suitable	6
		too much oil	6
ASSY			
body scratch	6	handling	1
		screw driver slip	3
dense glue	5	raw material not suitable	5
dull screw	3	raw material not suitable	5
PC			
thin paint	6	spray not flat	10
		spray gun choked	6
spotted paint	6	dirty plate	10
		dirty powder coating	7
		dirty environment	4
defective paint	6	crash	10
		friction	10
WELDING			
bending wrinkles	8	raw material not suitable	1
		plastic pad is broken	9
bending break	8	raw material not suitable	1
		unskilled operator	3
thickness not suitable	6	raw material not suitable	1

Table 2
Determine risk priority number

NO	Process	Potential Failure Mode	Potential Effect of Failure	Sev	Class	Potential Cause(s)/ Mechanism(s) of Failure	Occ	Current Process Control Detection	Detec	RPN
1	PRESS	Upper Plate TES broken	100% product reject	9		stopper changed	2	check preventive maintenance dies	4	
				9		setup not centre	3	check material placement	4	
				9		unskilled	2	training	6	
		Drawing 1T broken	100% product reject	8		raw material not suitable	2	checksheet material	2	
				8		dies worn out	2	check penempatan benda kerja	4	
				8		cussion not flat	2	check penempatan benda kerja	4	
		Body wrinkle	100% product reject	8		raw material not suitable	6	checksheet material	2	
				8		too much oil	6	check QC	1	
2	ASSY	body scratch	100 % product rework	6		handling	1	check QC	1	
				6		screw driver slip	3	check QC	1	
		dense glue	partial rework	5		raw material not suitable	5	material placement	4	
		dull screw	long lead time, unefficient process	3		raw material not suitable	5	checksheet material	2	
3	PC	thin paint	100 % product rework	6		spray not flat	10	check QC	1	
				6		spray gun choked	6	check QC	1	
		spotted paint	100 % product rework	6		dirty plate	10	check QC	1	
				6		dirty powder coating	7	check QC	1	
				6		dirty enviroment	4	check QC	1	
		defective paint	100 % product rework	6		crash	10	check QC	1	
				6		friction	10	check QC	1	
4	WELDING	bending wrinkles	100% product reject	8		raw material not suitable	1	checksheet material	2	
				8		plastic pad is broken	9	checksheet material	2	
		bending break	100% product reject	8		raw material not suitable	1	checksheet material	2	
				8		unskilled operator	3	training	6	
		thickness not suitable	100 % product rework	6		raw material not suitable	1	checksheet material	2	

After knowing many reject on production process, the next step is count severity and occurrence. Result of Severity and Occurrence shown in Table 1.

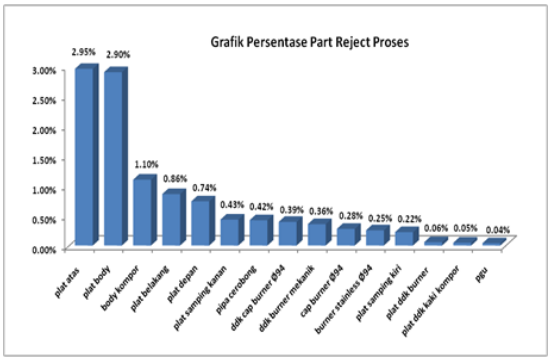

Fig. 2. Reject process

Next step after determine severity and occurrence are counting detection and RPN. Result of RPN are shown in Table 2.

4. Conclusion

This paper presented, the FMEA implementation for determination reject handling priorities with a case study of PT. XYZ.

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