5 Why Analysis Implementation To Detect Root Cause Of Rejected Product (Study At Aerospace Industry)

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Abstract: Purpose this paper is to detect the root cause of rejected product at aerospace industry. The rejected product is a minor defect that find in machining process. We found 1.47% of rejected product and it is higher than acceptable level. 5 why analysis was used to detect the root cause of rejected product in order to provide effective solution for this problem. There are four type of problem that focused in this research i.e. Total Damage, Incorrect, Mismatch, and Undercut. Based on 5 why analysis we found the root cause of total damage is there was not standard adjustment of speed between new machine and real system and we propose corrective action is making standardization for adjustment of speed between new machine and real system, the root cause of incorrect is there was no discipline in doing job and we propose corrective action is training and supervision for programmer, the root cause of mismatch is there was no appropriate strategy to make clamping system in tolerance and we propose corrective action is training about strategic strategy, and last the root cause of undercut is there were not coordination and standardization and we propose corrective action is carrying out coordination between unit and make configuration standard.

Key Words: Rejected Product, Root Cause, 5 Why Analysis, Corrective Action

1. Introduction

Problem is a situation that is unsatisfactory and causes difficulties for people and system. In everywhere, every time, and every place the problem will be appeared as a circumstance of process and system. Sometimes we found problem that need a solution immediately, however some people or industry didn't know or realize how to solve the problem. At aerospace industry, we found a defected product in machining as a serious problem that must solve immediately. At Aerospace industry, there are two types of rejected product i.e. mayor defect and minor defect. Mayor defect will be returned to warehouse, but for minor defect will be further handled and placed as rejected tag (RT). It is around 1.47% in machining we found rejected tag and must decrease it to achieve 0%, because it's deal with safety.

To overcome this problem, we propose 5 why analysis to detect root cause of the rejected product in order to provide effective solution. Why we propose 5 why analysis?. According to Gangidi (2019) 5 why analysis enables to identify deeper root cause(s) that may spawn across multiple groups within an organization. Besides that, according to Sandes and Pawan (2014) the 5-Why method of root cause analysis requires you to question how the sequential causes of a failure event arose and identify the cause-effect failure path. 'Why' is asked to find each preceding trigger until we supposedly arrive at the root cause of the incident. Based on two researcher we certainly sure that this approach will be provide insight into deeper causes of the rejected product. Further, Doggett (2005) stated tools that help groups and individuals identify potential root causes of problems are known as root cause analysis tools.

2. Methodology

There might be a number of problems hindering its real system. In order to highlight the hidden circumstance, we applied 5 Why analysis (Ohno, 1988, 2001) to explore problem and root cause. Basically, the 5 Why analysis is a logic diagram depicting the cause and effect relationship for searching root cause and generating the intermediate or final task (Wee and Simon, 2009). 5 why analysis is an iterative and interrogative technique that use to find the cause-and-effect relationships underlying a particular problem. The goal of the technique is to determine the root cause of a defect by repeating the question "Why?". Each answer forms the basis of the next question. The stage of 5 why analysis depicted in Figure 1 as following.

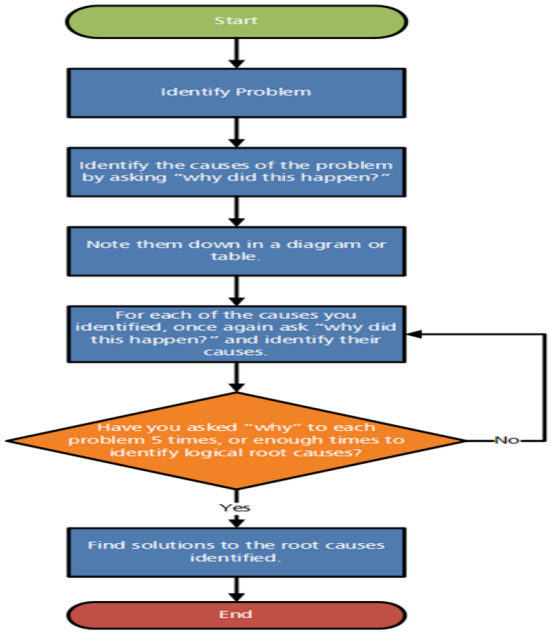

Figure 1. 5 Why Analysis Methodology

Based on Figure 1, there are six stage to carry out 5 why analysis as comprehensive methodology, i.e. (1) we must identify the problem, (2) identify the causes of the problem by asking "why did this happen?" (3) Note then down in a diagram or table, (4) For each of the causes that identified, once again ask "why did this happen?" and identify their causes, (5) Repeat ask "why did this happen" until 5 times, and (6) Find solution to the root causes identified.

3. Result

1. Percentage of Rejected Tag

Based on observation in machining process, in the 2020 we found the average of rejected tag percentage around 1.476%, described detail in Table 1 as follow. Based on Table 1, the average of rejected tag percentage was over standard. For sake of safety, it is prohibited that aerospace industry produced rejected product. This industry has stated that percentage of rejected product must achieve 0%.

Table 1. Percentage of Rejected Tag

Month	*Grand Total RT (Unit)*	*Machining Production Total (Unit)*	*Persentage RT / Month (%)*
January	42	6.799	0.618%
February	34	5.583	0.609%
March	50	5.257	0.951%
April	72	4.730	1.522%
May	127	4.931	2.576%
June	84	4.152	2.023%
July	87	4.132	2.106%
August	116	4.337	2.675%
September	106	5.224	2.029%
Oktober	106	7.647	1.386%
November	55	5.926	0.928%
Desember	42	3.665	1.146%

Grand Total	**921**	**62.383**	**1.476%**

2. Type of Rejected Tag

There are four types of rejected tag, i.e. *Total Damage*, *Incorrect*, *Mismatch*, and *Undercut*. Total damage is the form of the part destruction, the part profile unformed in milling process. Incorrect is the form of dimension failure, the part profile unsuitable with drawing. Mismatch is the form of incompatibility between picture and material part make in milling process. Meanwhile, undercut is the form of failure cutting too deep and over the tolerance, the part profile in milling process unsuitable.

3. Five Why Analysis

As explained above, there is 5 why question to explore the root cause of rejected product. Table 2 until Table 5 describe 5 why analysis, start with question followed by answer until we find root cause and propose corrective action for each problem. Table 2 describe 5 why analysis to determine root cause of total damage and propose corrective action for eliminate total damage. Table 3 describe 5 why analysis to determine root cause of incorrect and propose corrective action for eliminate incorrect. Table 4 describe 5 why analysis to determine root cause of mismatch and propose corrective action for eliminate mismatch, and Table 5 describe 5 why analysis to determine root cause of undercut and propose corrective action for eliminate undercut.

Table 2. Root Cause of Total Damage

Problem: Total Damage
1st Why Why did damage total happen? **Answer** Error in program
2nd Why Why did error in program happen? **Answer** Cutting speed was too high
3rd Why Why cutting speed did was too high? **Answer** Programmer set speed was too high
4th Why Why did programmer set speed too high? **Answer** Programmer didn't know the characteristics of new machine
5th Why Why didn't programmer know the characteristics of new machine **Answer** Programmer used theoretical standard of machine speed without adjustment with real system
Root Cause There was not standard adjustment of speed between new machine and real system
Corrective Action Making standardization for adjustment of speed between new machine and real system

Table 3. Root Cause of Incorrect

Problem: Incorrect
1st Why Why did incorrect happen? **Answer** There was a different perception of type of aircraft
2nd Why

Why did a different perception of type of aircraft happen? **Answer** There was not detail inspection
3rd Why Why did not inspect in detail? **Answer** Programmer took a general assumption
4th Why Why did programmer take general assumption? **Answer** Programmer wanted to finish job earlier
Root Cause There was no discipline in doing job
Corrective Action Training and supervision for programmer

Table 4. Root Cause of Mismatch

Problem: Mismatch
1st Why Why did mismatch happen? **Answer** Distance between contour and hole inappropriate
2nd Why Why did distance between contour and hole inappropriate happen? **Answer** Programming strategy was not suitable with this problem
3rd Why Why did programmer make unsuitable strategy? **Answer** Support system didn't help to make it appropriate
4th Why Why did support system not help to make it appropriate? **Answer** Error in clamping system
5th Why Why did error in clamping system happen? **Answer** There was out of tolerance
Root Cause There was no appropriate strategy to make clamping system in tolerance
Corrective Action Training about strategic strategy

Table 5. Root Cause of Undercut

Problem: Undercut
1st Why Why did undercut happen? **Answer** Error in program
2nd Why Why did error in program happen? **Answer** There was difference drawing data configuration between programmer and quality
3rd Why Why did difference drawing data configuration happen?

Answer Programmer made it happen
4th Why Why did programmer make difference configuration? **Answer** There was not process standardization
5th Why Why was not process standardization? **Answer** There was lack of coordination between unit
Root Cause There were not coordination and standardization
Corrective Action Carried out coordination between unit and make configuration standard

4. Conclusion

The example using 5 why analysis presented in this paper intends to give us a reference for implementing 5 why analysis in industry. On doing the 5 why analysis the root cause of the problem is found and corrective action is taken to resolve it. Root cause of problem might be because of human, material, machine, method, environment, and so on. The '5 whys' analysis is a process that begins with identifying problem and writing it on a piece of paper. This is followed by asking why the problem happens and writing the answer below where the problem was written

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