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Application of 8D methodology for productivity improvement in assembly line

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ABSTRACT

Productivity rate means the number of products produced for a specific amount of time. For an industry to meet the customer demands on time, the productivity rate should be high. This research paper deals with the application of the 8D methodology for increasing the productivity by reducing the cycle time of the process in a wheel and rim assembly line. The 8D methodology is problem-solving eight disciplinary methods which help in identifying, analyzing, providing solutions and eliminating the reoccurrence of the problems. This paper deals with identifying the root cause of the problem and providing the solutions and also to prevent reoccurrence of the problem. This paper also deals with Value Stream mapping and Cause and Effect Diagram for analyzing the problem. This methodology helps to identify and solve the problem through the simplest approach by a step by step procedure.

Keywords— Productivity Improvement, 8D Methodology, Value Stream Mapping, Cause and Effect Diagram

1. INTRODUCTION

This case study is about Wheel Manufacturing Company located in Chennai. In this company, the wheels for Agricultural vehicles and Earthmover equipment or vehicles are produced. The material used for manufacturing wheels is Mild Steel. The rim and the disc are assembled together by pressing and welding process to produce wheels. Production of wheels deals with a series of steps. The flow of the process from start to end is depicted as a flowchart.

The first process deals with cleaning the rim and the disc to remove the dirt or rust or oil. In next process, the disc is pressed into the rim by a hydraulic press. Submerged Arc Welding process is used to weld the rim and disc. Date of manufacture, serial number and batch number is marked on the rim and the run out test is carried out followed by valve guard welding.

Then the wheel is dressed to correct the welding errors and the final inspection check is done then the wheels are dispatched in pallets.

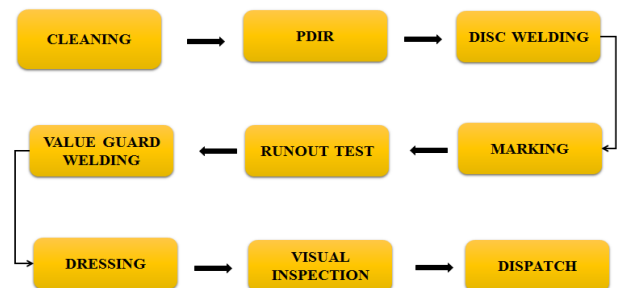


Fig. 1: Process flow chart

2. INTRODUCTION TO 8D METHODOLOGY

The 8D methodology is eight disciplinary step by step problem-solving methodology which can be used to find the root cause of the problem, to identify the cause for the problem, prevent the reoccurrence of problems. It was introduced by Ford Motor Company in the late 1990s. This method helps in identifying, analysing and providing solutions in a step by step procedure. This method is effective to provide both short term and long term solutions to the problems. This methodology is mostly used in the automotive and manufacturing industries.

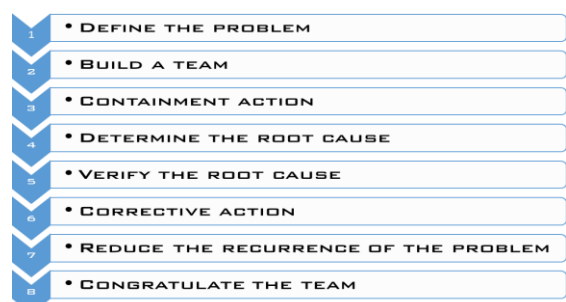


Fig. 2: List of 8Ds

3. CASE STUDY

STEP 1: Define the problem

This step helps to create a complete problem statement. This is done by 5 why methodology by questioning why at each stage to find the root cause and the effect of the problem. In this case, the increase in inventories was identified at the end of the process. Then the 5 why analysis was done to identify the root cause of the inventories to create a problem statement.

STEP 2: Build a team

After a problem has been identified and the problem statement has been created a team should be formed to take the necessary actions to solve the problem. The team should include members from production, transport, machine management, line designer. After a team has been formed each member from the team analysis the cause of the problem in their field.

STEP 3: Containment action

This step deals with sudden or temporary solutions to reduce the increased cycle time. It is a step that limits a problem's extent and establishes normal operations until the root because is defined and permanent corrective actions are implemented. It restrains the effects of any problem. Inventories are one of the major cause for increased cycle time. For continuing the processes without stopping the line, the same process was carried out by branching the process. Proper arrangement of products in conveyor saves space and reduces material movement time which further reduces handling time while process branching.

STEP 4: Determine the root cause

This step involves the investigation and identification of the problem. This is done with the help of Value Stream Mapping and Brainstorming.

STEP 4.1: Value stream mapping

Value Stream Mapping is a tool used to map the process from the supplier end to the customer end. It includes the process time of various process along with sub-processes, Inventories after each process and the transfer of data. It is used to create a current state of production and helps in making a future state. It helps to identify the increase in inventories after each step and helps to find the process which is over timed.

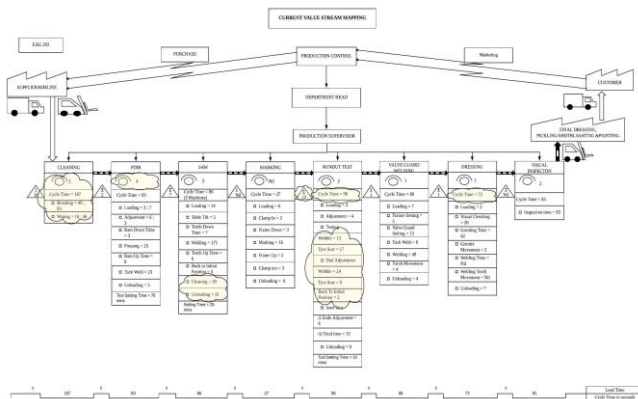


Fig. 3: Current value stream mapping

STEP 4.2: Brainstorming

Brainstorming is a method which is used to find all the possible causes of the problem. Generally, these are done in groups and are listed in bullets.

- Standard setting not available
- Initial inspection not done
- No effective use of storage space
- Rejection rate increased

- Lock of spare parts
- Lack of proper training
- Tool failure
- High processing time due to improper methods
- High attending time due to unavailability of tools
- No monitoring of waiting time
- Lack of skill
- Not using the updated equipment
- Machine not updated as per need
- Tool replacement
- Lack of necessary tool /equipment
- Lack of concentration/governance
- Time-consuming method /process
- Less user-friendly equipment
- Improper storage area

STEP 5: Verify the root cause

This step involves verifying the root cause of the problem. This is done by cause and effect diagram. The major causes were divided into four categories- man, machine, method and material.

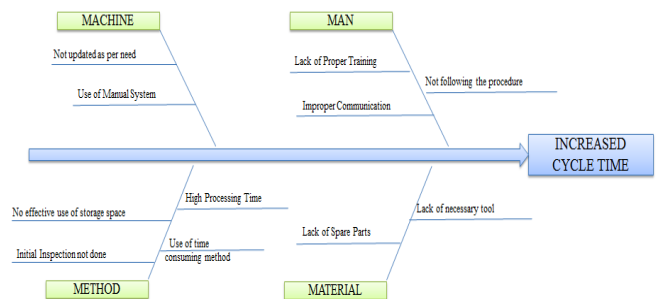


Fig. 4: Cause and effect diagram

STEP 6: Corrective actions

This step deals with the identification and implementation of corrective actions. Also, a future value stream mapping has been created after eliminating the possible causes for the problems. This is an imaginary process mapping considering the result of the solutions.

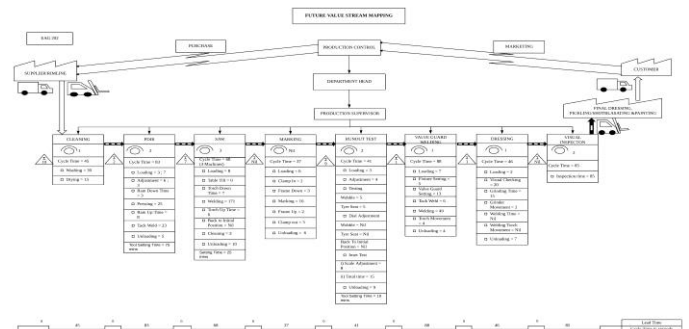


Fig. 5: Future Value Stream Mapping

STEP 7: Reduce the recurrence of the problem

The solutions have to be implemented to prevent the recurrence of the problem. The workers in the line should be aware of the changes done to the line and necessary training must be provided to cope up with the new changes. The countermeasures listed are a long term solution.

STEP 7.1: Solutions

- Suction pipes can be used to remove flux from the wheels in Submerged Arc Welding process to reduce the Cleaning time.
- Robotic Arms can be used in product movement in SAW so that it reduces handling time.

- Concentric and Runout Measurement Machine can be used instead of Dial Gauge to improve accuracy and to reduce testing time and eliminate Dial Adjustment in Run out process.
- Washing Machines can be used for Cleaning the wheels so that it reduces the cleaning time and also reduces cause for defects.

STEP 8: Congratulate the team

The last step of the 8D methodology is congratulating the team. All the members in the team and the respective workers in the assembly line should be congratulated by the management department after the success of the project. Also, an 8D report must be made with the past and present conditions.

4. CONCLUSION

In this research paper, the root causes for the decrease in productivity rate was identified with the help of 8D

methodology. The root causes were analysed and then the counter measures were implemented. The process time for each process was taken after a month and it was observed that the process time nearly matched the time in the Future Value Stream Mapping. Thus the productivity rate was increased by decreasing the total cycle time of all the process and the customers were satisfied by on-time delivery.

5. REFERENCES

- [1] 8D Methodology and Its Application, Lalit Kumar Biban.
- [2] Application of “8D Methodology” for the Root Cause Analysis and Reduction of Valve Spring Rejection in a Valve Spring Manufacturing Company: A Case Study, T. S. M. Kumar and B. Adaveesh
- [3] Application of “8D Methodology” for Minimizing the defect in Manufacturing Process: A Case Study, P.S.Atre, A.P, Shah
- [4] The 8D Methodology: An Effective Way to Reduce Recurrence of Customer Complaints? Carlos A. Riesenberger and Sérgio D. Sousa