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Analysis & Process Mapping for Fitment of Foot Brake Valves to Visually Aid Assembly Process

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Abstract

As organization come under increasing demand to satisfy the needs of customer in today's industrial environment. More number of customers demanding that manufacturers quickly respond to their wants and needs by delivering quality products on time. This type of environment will create close bonding with customers. In this paper attempt has been made to reduce the difficulty in the process chart for the fitment of foot brake valves in order to promote ease of assembly. In the existing method lot of confusion are occurring while performing assembly process that leads to deviation in the assembly line. Hence attempt has been made to develop a process chart for assembly of brake foot valve in order to standardize the process.

Keywords: Brake foot valve, Assemblyline, work standardization, Eco friendly environment.

INTRODUCTION

As organizations are in tremendous pressure to increase the productivity of organization. The company always looks for one common issue is all about increasing the quantity of production by having highly skilled labors within the organization. More and more customers demanding that manufacturers quickly respond to their wants and needs in order to deliver quality products in time. Today most of the manufacturing companies are gearing up towards work friendly environment in order to reduce the fatigue stress of worker. In this paper case study on brake foot valve was conducted in a leading automotive manufacturing industry situated in south Tamil Nadu India. The type of products produced by them was buses, trucks etc. Hence in this paper attempt has been made to work with assembly of brake foot valve in truck chassis frame.

OBJECTIVE OF THE STUDY

To reduce the assembly difficulty constraints in the guide chart for the fitment of foot brake valves in the truck chassis and thereby promoting the ease of assembly.

Need For the Study:

The existing process map for the foot valve for the assembly process is having some confusion which results in various types of problems in the assembly line. Here the operations followed are analyzed and studied to find out the variations in the existing mapping and possibilities to produce the clear guide chart. So, if the process are standardized then the confusion are eliminated there by promote the work friendly environment for the labors.

LITERATURE REVIEW:

Introduction

There are various types of methodologies being followed in several companies to optimize the quality of the product produced and also the maintenance in the industry. Some of the tools or methodologies which are used in the industries are as given below:

1. 5S Methodology
2. FIFO
3. Gemba kaizen
4. Total production maintenance
5. Total quality management
6. Value stream mapping

5S METHODOLOGY

The 5S Method is a standardized process aims for properly implemented creates and maintains an organized, safe, clean and efficient workplace. Improved visual controls are implemented as part of 5S to make any process non-conformance obvious and easily detectable. 5S is often one element of a larger Lean initiative and promotes continuous improvement. The 5S list is as follows:

Seiri / Sort: Separating of the essential from the nonessential items.

Seiton / Straighten: Organizing the essential materials where everything has its place.

Seiso / Shine: Cleaning the work area.

Seiketsu / Standardize: Establishing a system to maintain and make 5S a habit.

Shitsuke / Sustain: Establishing a safe and sanitary work environment (Safety).

The 5S Principles are recognized in many industries as effective tools for improving workplace organization, reducing waste and increasing efficiency. Organizations should be careful to not allow the 5S Principles to become viewed as the whole of the company's improvement efforts. Otherwise it could become the end goal of your company's improvement process instead of a key part of a larger continuous improvement journey. The greatest benefit from using 5S is realized when it is part of a larger initiative and the entire organization has adopted its principles. 5S is more than a system; it is a business philosophy and should be integrated into the organization's culture. Make work easier by eliminating obstacles.

Figure 1. 5S Frame work Methodology

FIFO: (First In First Out)

The FIFO method follows the logic that to avoid obsolescence, a company would sell the oldest inventory items first and maintain the newest items in inventory. Although the actual inventory valuation method used does not need to follow the actual flow of inventory through a company, an entity must be able to support why it selected the use of a particular inventory valuation method.

GEMBA KAIZEN

Gemba - short version

The real place or the specific place. Usually means the shop floor and other areas where work is done.

Gemba - long version

Gemba is a Japanese term meaning "the actual place" or "the real place". Japanese detectives call the crime scene gemba, and Japanese TV reporters may refer to themselves as reporting from gemba. In business, gemba refers to the place where value is created; in manufacturing the gemba is the factory floor. It can be any "site" such as a construction site, sales floor or where the service provider interacts directly with the customer.

Total Production Maintenance

In industry, total productive maintenance (TPM) is a system of maintaining and improving the integrity of production and quality systems through the machines, equipment, processes, and employees that add business value to an organization.

Objective

One of the main objectives of TPM is to increase the productivity of a factory and its equipment with a modest investment in maintenance. Total quality management (TQM) and total productive maintenance (TPM) are considered as the key operational activities of the quality management system. In order for TPM to be effective, the full support of the total workforce is required. This should result in accomplishing the goal of TPM: "Enhance the volume of the production, employee morale and job satisfaction." The main objective of TPM is to increase the Overall Equipment Effectiveness (OEE) of plant equipment. TPM addresses the causes for accelerated deterioration while creating the correct environment between operators and equipment to create ownership.

OEE has three factors which are multiplied to give one measure called OEE

Performance x Availability x Quality = OEE

Each factor has two associated losses making 6 in total; these 6 losses are as follows:

Performance = (1) running at reduced speed - (2) Minor Stops

Availability = (3) Breakdowns - (4) Product changeover

Quality = (5) Startup rejects - (6) Running rejects

The objective finally is to identify then prioritize and eliminate the causes of the losses. This is done by self-managing teams that solve problem. Employing consultants to create this Culture is common practice.

Total Quality Management

Industry believes that quality begins and ends with the customer. This means identifying customer needs and comprehensively meeting them. For the company, quality is not just conformance to drawings or specifications but ensuring customer satisfaction and further Customer satisfaction and further Customer Delight. This belief forms the basis of its approach to Total Quality Management (TQM). Quality Assurance methods like Advanced Product Quality Planning, Statistical Process Control Techniques, and Effective Tool Management System, Process capability Improvements, Preventive Maintenance, Producer Control and Small Group Activities form the backbone of the system approach adopted.

Value Stream Mapping

A value stream map illustrates the flow of materials and information from supplier to customer. Value stream mapping (VSM) is a lean manufacturing technique used to analyze, design, and manage the flow of materials and information required to bring a product to a customer. VSM helps identify waste and streamline the production process. The first step in value stream mapping is to create a current state map. This map can help identify waste such as delays, restrictions, inefficiencies, and excess inventories. These are then eliminated in the ideal state map, which gives the organization a working plan to achieve lean efficiency.

Problem Definition and Proposed Methods

Data Collection and Analysis

The first step in analyzing any process for the scope of improvement is to understand the current status of the process "what is the current problem". Only by understanding the present status of the process we can plan for improvements. Data collection is the first step for this.

Fitting Of Brake Foot Valves

The brake foot valves can vary for each and every models both in the type and also number and too in position. There are more than eight to ten different types of valves in air brake system. These includes Relay valve, Modulator valve, Quick release valve, Pressure release valve, lift control valve, single check valve, etc., Its number and position are random depending upon the model.

Product Model

We collected the data for some of the following models:

Goods

- 1618 TIPPER
- 2518 XL
- 3718 LA
- 3718 LA (T)
- BOSS

Passenger

- 210 VIKING
- 222VIKING
- 210 CHEETAH
- 12 METRE
- LYNX 4.2

CAUSE AND EFFECT ANALYSIS

- The existing 3D guide chart is over furnished and it will project the detailed information but is somewhat difficult to understand and work by the procedure contained in it by the shop floor labors.
- The picture portraits the valves are not clear when the chart is locked from the distance

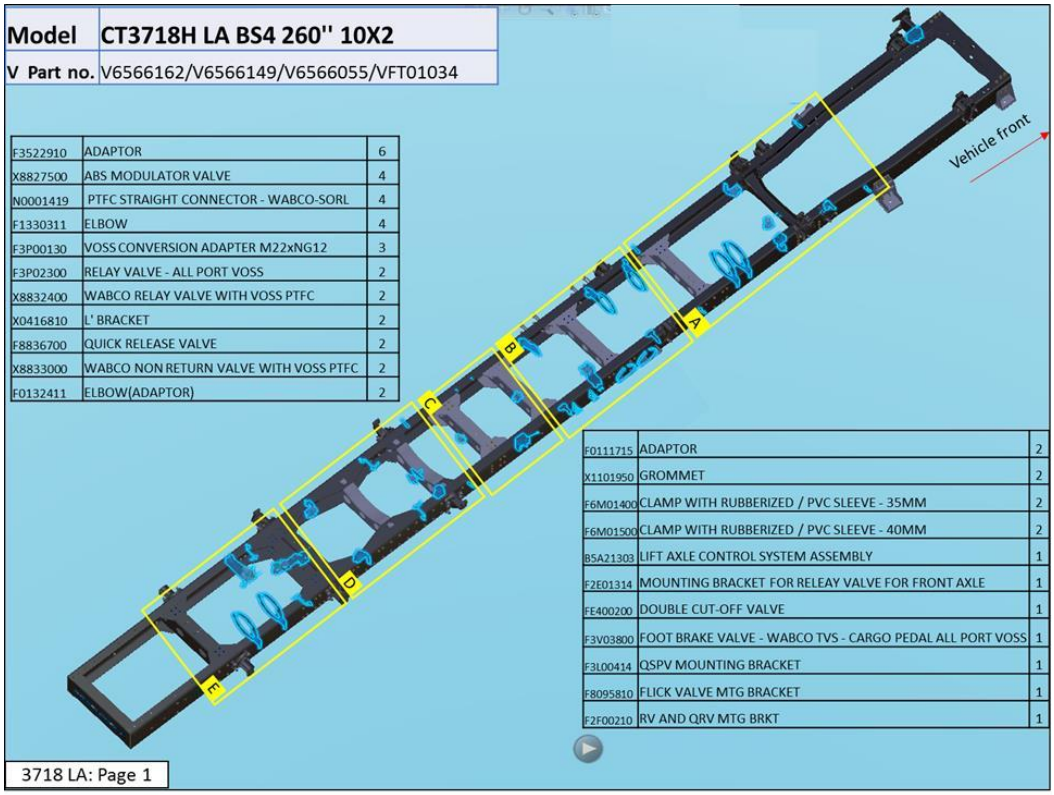

Figure 2. Existing Model

- The previous one is not having any differentiation for the different types of valves.
- It is fully furnished with overwhelming information to the labor but sometimes its

Positive becomes its drawback, it will not that much easy to understand for the new

Worker easily.

Proposed Methods

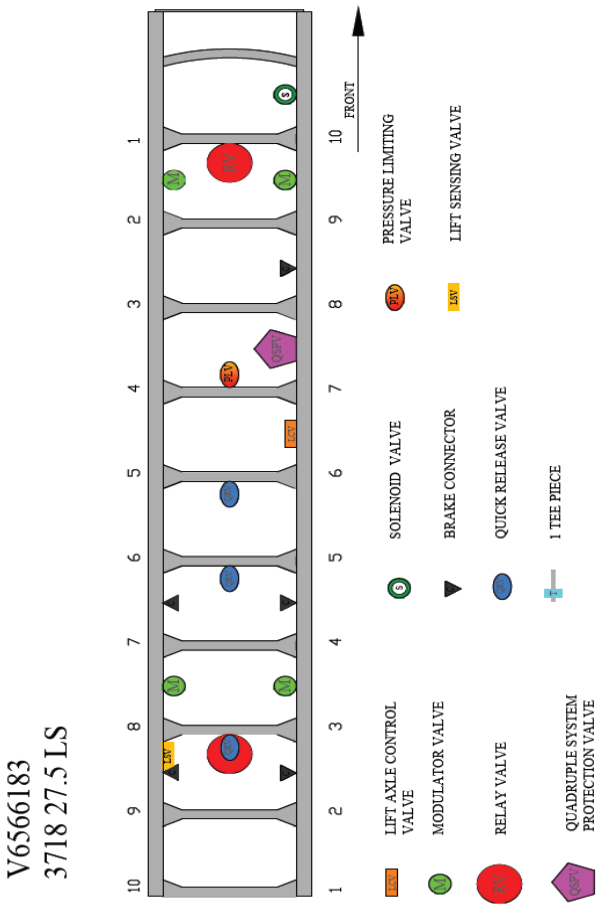

Figure 3. New Proposed Model

Advantages of the New Chart:

- The frames of the vehicles are projected in the two dimensions instead of three dimensions for easy identification.
- The numbers are given on the upper and lower positions of the cross bars in the frame for the easy positioning of the valves**.**
- Each of the valves is given separate colors for the good understanding and easy identification from the distances.
- And also the different types of valves are given different symbols and various colors.
- In addition the abbreviated names of the valves for printed on the symbols.
- For the ease of the workers all the models are having the same orientation of the projected charts.
- In the FIFO rack, under the trolley of the valves placed each one is projected with the

Color which is mentioned in the chart for the synchronizing and also to reduce the assembly time.

CONCLUSION

Based on the methods proposed and analysis done till date in the industry the following results can be obtained in the mapping of foot brake valves. Improving the guide chart to the simplest form thereby according to the decrease in the assembly time and also creates the work-friendly environment. Organized shop floor with the effective arrangement of the materials, mapping chart and work process. Reduces the labor fatigue, productivity rate of the plant can be increased thereby the shop floor becomes work-friendly. According to the plan of action, the above methods will be suggested to the industry with their mentorship and above said results will be achieved during the future implementation.

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