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Improvement in Workplace by Using kaizen and TPM

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Abstract: *Kaizen concept is key process to bring together employees to contribute their suggestions for improvement of the not just about manufacturing processes but anything everything in the factory beginning from security to corporate office. This means that "kaizen" is a process of identification of opportunities for improvement, innovation, change, development, transformation by some small healthy improvement or modification of the life style and processes of organization. The radical changes in any organization process talks its seed in small changes and modifications for good (better way of doing things- more economically, efficiently and effectively without generating waste or damage to the environment and setups). Quality and Maintenance of any system are the most valuable parts of an organization. There are two newly added concepts in manufacturing system which are Total Productive Maintenance and Total Quality Management. In this experience of implementing Total Productive Maintenance is shared and investigated for a company manufacturing automotive component.*

Keywords: *Total Productive Maintenance, Total Quality Management, 5-S, Kaizen*

I. Introduction

The concept of kaizen was first introduced in the Japan in 1950 when they found that there was a problem in their current management system and a pending labor shortage. The problem was solved with the help of some workforce. Kaizen has become an important part of Japanese manufacturing system and it is the most important part of it. Useful contribution to the manufacturing success. A kaizen study is structured and focused improvement project using a team which is cross functional to improve a targeted work area in an accelerated timeframe (Farris, 2006). In many Western companies the word kaizen has become more common as it indicates a process of continuous improvement (Chen et al., 2000). The word kaizen is a compound word which involves two concepts, Kai (change) and Zen (good) for better (Palmer, 2001). Kaizen needs attaching great value to the details and common sense to make every employee cleverer in the organization. Kaizen calls for an effort for improvement involving everyone in the industry. Kaizen successful implementation results in healthy atmosphere where everyone in the organization is aware of key goals, objectives and measure of success.

1.1: Objectives

1) To improve overall equipment efficiency (OEE) using quality tools.
2) To help company to improve productivity and ensure safety in company.
3) To give small suggestions to workers in the organization regarding machine maintenance.
4) To improve quality by TPM implementation.
5) Cost reduction.

II. Literature Review

2.1 Definition of kaizen:

The kaizen is being applied in healthcare, government banking and chemical industries. It is Japanese word which means "improvement". The word refers to any improvement, one time, large or small. Basically kaizen is Japanese word which is related to continuous improvement and change for betterment.

2.2 Parts of kaizen:

There are three main parts of kaizen which are as follows:
1. Find problems: Finding out problems and selecting proper kaizen for it.
2. Generating Idea: Define realistic and creative ideas to overcome problems.
3. Decision making and Implementation: Deciding which kaizen implementations are the best and preparing plans for them and then actually implementing as per the plans.

2.3 Team building activity

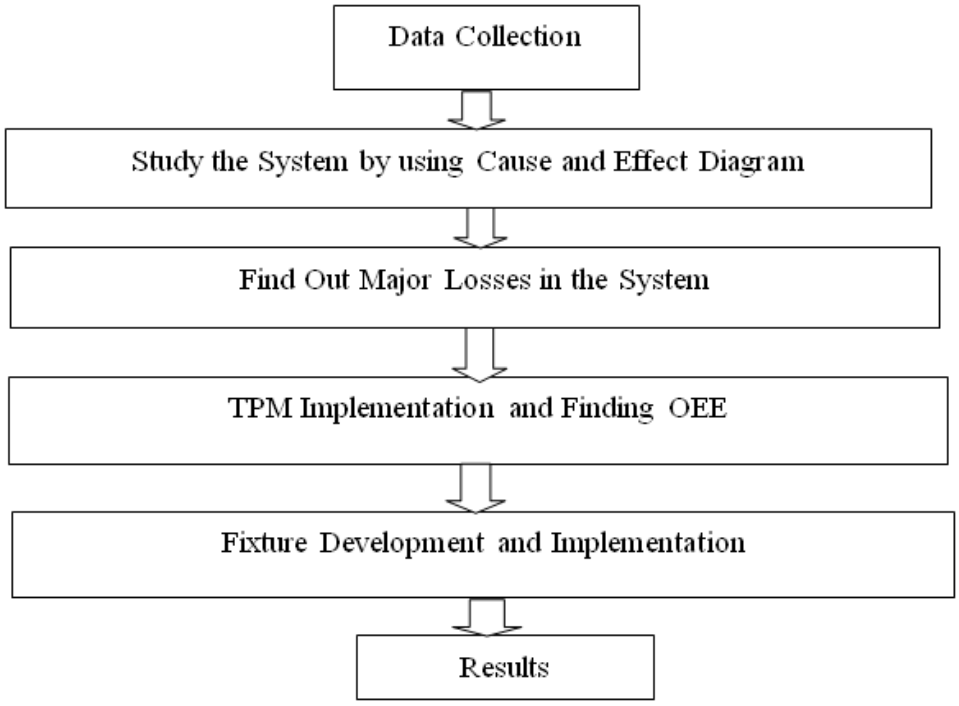
Kaizen meetings held together only for few days like weeks, months. These teams follow below points for finding and implementation of kaizen ideas:

1. Active listening skills
2. Don't demotivate others
3. Make proper agreement
4. Be open in giving ideas
5. Participate in team activities
6. Have fun while performing kaizen activity

Teams do not need all these processes, only two or three will do the work but practicing them is the most important part.

III. Methodology

The literature review suggested that if we use TPM and Kaizen properly, it will result in increase in OEE. The aim was to help small and medium scale industries by TPM principles. Getting started with TPM includes careful planning, design and execution of the business changes needed to achieve the desired improvement goals. OEE is a way to monitor and improve the efficiency of a manufacturing process. Figure shows the methodology to find the root causes of low OEE. In the method used in company the machining cost and cycle time was too high. An appropriate TPM tool was used before and after TPM implementation. To start implementing TPM and Kaizen requires careful planning, design and execution of business changes needed to achieve the desired goals. In order to achieve success, TPM should be used in stepwise manner. The stepwise implementation is shown in following diagram.



The methodology of flow chart is shown in above figure. If in case company find it difficult to compact with other teammates in industry but are unaware of exact reason, the study proceeds with getting all the data. Based on available data, the analysis was carried out using cause and effect diagram. The major losses in the industry were calculated with the help of pareto chart for better changes. Before industry was not using any TPM activity but after it was suggested to use TPM and kaizen in the system. The new fixture and kaizen tool was introduced to reduce setup time is well. After using Kaizen and TPM , the results were collected and evaluated with available data.

IV. Collection of Data and Analysis

4.1 Finding out Overall Equipment Efficiency of machines:

SR.NO.	MACHINE NAME/NO.	%OEE
1	HMC 1	88
2	HMC 2	90
3	HMC 3	76
4	HMC 4	70
5	HMC 5	80
6	HMC 6	78
7	HMC 7	48
8	HMC 8	70
9	HMC 9	70
10	VMC 1	58
11	HMC 10	64
12	HMC 11	64
13	HMC 12	70
14	HMC 13	72
15	HMC 14	68
16	HMC 15	68
17	HMC 16	68
18	HMC 17	68
19	HMC 18	88
20	HMC 19	62
21	HMC 20	68
22	HMC 21	66
23	HMC 22	64
24	HMC 23	51

4.2 Reasons of Low OEE using cause and Effect Diagrams:

Root cause analysis is a problem solving technique used to identify the main source of error of the problem. The completed representation of low OEE and low performance has shown in figure. In this, various factors which are responsible for low OEE is considered, i.e. Man, Machine, Material and Method. The reasons for low OEE were listed. A systematic approach to increase OEE to acceptable level was attempted using TPM and 5S technique. From the root cause analysis for reduced OEE, the bottleneck machine problems were identified and fallowing remedies has been suggested in order to improve the Effectiveness. The major loss is job setting time which can be avoided by proper design and development of hydraulic fixture.

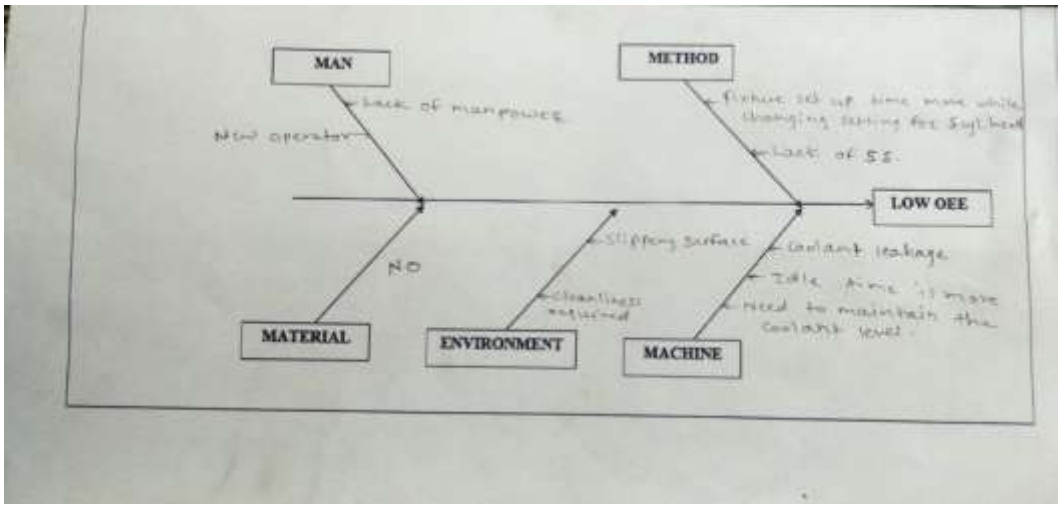


Fig. Cause and Effect Diagram

4.3 Kaizen and TPM Implementation:

4.3.1 Use of Customized Spanner

Before

After

Here two diagrams are shown which indicates spanners used for loosening and tightening of bolts on fixture while mounting job. In the first figure we can see that Allen Key is used for fixture. While changing fixture for 5 cylinder head from 4 cylinder head, we need to make some changes in fixture i.e. we need to use one additional hole for 5 cylinder head. So while changing this fixture, the Allen key slips from the hands of worker as oil is sticke to the hands of worker. So they find it difficult to loose or tighten the bolts and this process takes lot of time. Also the space provided for holding Allen Key is also very less and there is no proper grip on Allen key.

In the second figure, we designed a spanner which has long handle in order to get proper grip and it doesn't slip from the hands of worker. This specially designed tool reduces time of producing job as there are large no. of 5 cylinder head jobs.

V. Conclusion

By using autonomous maintenance concept, breakdown loss was reduced by 5%. We used hydraulic fixture in some Machines which helps to reduce cycle time by 10-30 seconds also productivity increased from 42 parts to 48 parts per shift . Material loading and unloading was done quickly. For every cycle, parts are clamped with the same clamping force, eliminating variables and improving process stability. It helps you identify the root cause of the problem. It helps you finding bottlenecks in the process. It helps you identify ways to improve the process. It helps you when team members are fighting and blaming each other for any problem. It improves communication between operator and management. It helps to improve Overall Equipment

Effectiveness. By using combined tool for drilling and chamfer, the time for producing job is reduced also it lowers the tooling cost. Also in some dry cutting machines lot of dust is get produced. It is necessary to be exhausted from the worker surrounding. Hence use of Dust Collection System is mandatory in some cases.

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