Review of Process Implementation by Using Lean Manufacturing in Chemical Industry

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Abstract: A Manufacturing defects or errors are always the key concern of any manufacturing and chemical industries. The Lean management is dedicated to the improvement of productivity, efficiency, quality and in general of business. GEMBA Kaizen, 5S and Six-sigma remain the foundation of lean Six-Sigma Management System. Those tools for cleaning, sorting, organizing and providing the necessary groundwork for improvement and preventing the small errors and problems of machines, man and management as well as reduction of rework and variation with better process control. Now a day, all the Chemical manufacturing industries are moving in the direction of Errors free production with higher Safety provision. After applying Lean management, we can achieve better result as per reduction in cost and good working environment with less human errors and cycle time reduction. Lean methodology also increases better SHE (safety, health, and environment) standard of any organizations. Six Sigma Methodology is basically used to reduction in variation, rework and give better Process Control. In chemical Industry, Tablet defects can come from any of the unit operation and from the tablet press. The processing and granulation of powder is often the source of defect. On the other hand, Sticking, Poor flowing and mixing, Less Hardness and die-punches are among the most mutual problem during Tablet Manufacturing.

Index Terms - Gemba Kaizen, Lean Manufacturing, Pareto Analysis, Cause and Effect Diagram (RCA), Six Sigma, etc.

I. INTRODUCTION

UPL Limited (officially known as united phosphorous limited), is an international company started its operation in year 1969. It was an almost 49 years ago, they had started as a small scale unit to manufacturing Red phosphorous. Being largest manufacture of agrochemical in India, they offer wide range of product that includes Insecticides, Fungicides, Herbicides, Fumigants and etc. UPL have 23 manufacturing sites and customer base in 123 countries all over the world. The company has marketing in 25 countries including America, Europe, Africa, besides in all states in India. Presently, they amongst the top first rank agrochemical industries in the world. But a safety is most important things to carry out and working with Zero Defect causes and error. A Manufacturing defects or errors are always the key concern of any manufacturing and chemical industries.

Nowadays more number of Industrial Accidents Occurs due to Human Error. There are some methods to prevent such an industrial accident and the most effective method is to develop the human behavior by giving particular training for the work, conducting behavioral based study to reduce the accident rates and to improve the safe environment in industry. From the various studies, we can clearly say that, one of the causes for initiation of industrial accident is poor management system such as policy, safety systems etc. For improving the safety culture and behavior of the employee, industry needs to provide training, education, meeting, review etc. For this purpose, the industry is in the position to spend money for the following aspects; Training, Education Meeting. Communication also plays a major role in accident because the performance of communication from top level to low level management is very poor.This paper deals with Potential causes of accident and rework and Productivity improvement with better process yield

II. LITERATURE SURVEY

Dr. JA doshi et. Al [1]**:-** To Minimization of defect and rework is an important factor ensuring the quality of product. It indicates eliminating non-value added activity like rework, man hour spent on rework and taking effective measures will enhance the net profit, saves time and improve overall quality of product.

A.P Chaple et. Al [2]**:-**kaizen and why-why analysis are the effectives tools for improving the effectiveness of procurement process. Kaizen is also help to reduced higher lead time, paper work and good employee morale.

Singh jagdeep et. Al [3]**:-** Kaizen is a Philosophy that needs the involvement of all people in the company .It should be placed on reduction in throughput time, addition of work station to meet the Takt time and elimination of unnecessary activities.

Chakravorty, S. et. Al [4]:- The tools of the LSS Practice enriched the efforts towards waste reduction and rework reduction .LSS was proved to be a valuable tool in the case of systematic waste reduction objectives. The 80/20 rule of the Pareto analysis was used to identify the most important causes of waste and rework.

Tarba Larisa. et. Al [5] Quality Control Tools might improve process performance by reducing product variability and improves production efficiency by decreasing scrap and rework. Pareto chart and Cause and effect diagram are used to identify and evaluate different defects and causes for these defects responsible for rejection/rework of materials at different stages in the process.

Deshpande. V et. Al [6] The Execution of the statistical process control can be done and the process variation can be reduced to achieve the higher quality products. After these study we can learn that only using simply tools such as basic quality control tools – 7 QC Tools can improve good quality in product and hence it reduces the waste of rework and improves in productivity.

Xue wan get. Al [7] Lean manufacturing and Six Sigma in industries, has a dramatic change in the industry process and quality of the product produced. This was also denoted as Lean Six Sigma (L6σ). This L6σ can be implemented to any kind of industry, for better performance, L6σ is a continuous improvement tool for advancement. Lean six sigma make powerful union with reduction of variations and wastes.

Shah A. et. Al [8] Defects in the tablets can arise during manufacturing processes, storage or transport. These visual defects can reduce the acceptability by the users and effectiveness of the product. To resolve common defects at the tablet press, and to identify the root cause of each and finally resolve the defect before it reaches the tablet press.

Rajesh Kumar Mehta et. Al [9] the successful Lean Manufacturing System implementation needs integration and instantaneous implementation of Lean elements along with proper sequence. The survey also proposes the detailed implementation Road Map which gives a unified theory for Lean Manufacturing System implementation. The employee perception can be achieved through training and awareness by defining road map, metrics and measurement.

U. Dombrowski, et. Al [10] To apply Lean Kaizen analysis, is was help to reduced man motion, lead time and idle time by standardizing valves for various operations. Improved visual and quality of workplace. Also improve safety and maintenance activity.

K Sadashivappa, et. Al [11] Lean is seen as a highly versatile tool and is adopted over a various range of work environments as seen in earlier works of research. It was used to improve the manufacturing throughput time and also Reduce rework/manufacturing costs.

Deros, B.M., et. Al [12]The beyond review indicates that factors such as communication between the top management and its employees, clear strategy, the need of a personnel who can champion the implementation of Kaizen in a company, having good knowledge and provide employees with certain level of empowerment are important to ensure a successful Kaizen implementation.

Karaulova, T. et. Al [13] A new framework for continuous improvement of production process allows improvement in product throughput and product delivery to a customer. In the FMEA, the weight of each failure type was assessed with Risk Priority Number (RPN) by calculating Severity, Occurrence and Detection ratings. Further, these RPN values showed most critical failures in the production process.

U. Nimkar. et. Al [14**]** to apply a combination of Lean methodologies to a Textile Industry, which was successfully achieved. Methodologies such as PDCA cycle, 5S and 5W2H were combined departing from the PDCA cycle, producing excellent results solving just one problem, proving that the methodology can be extended to other identified problems and improve efficiency and productivity in a controlled way, without the risks of making large scale.

Foster.s.t et. Al [15**]** The results will come out after apply Kaizen methodology, it reduce consumption and cost with increase productivity. It also reduce the delivery time and increase flexibility in meeting customer requirement.

Abhijit Chakraborty et. Al [16] positively implementation of Kaizen and 5S process, there will also use as productivity improvement with better safety standards. It can also increase working culture for employees

III. RESEARCH GAP

- After the study of all above Research paper, they were observed Lack of Knowledge, Improper Training of work and operation and also awareness about safety with best Precaution
- The Lean Tools like 5S and GEMBA Kaizen are the Finest Practice for Avoid Unless Activity with high amount of Productive Work and save process Time with better Customer Satisfaction.
- The Six Sigma Methodology were also used to reduction in variation and rework with better Process Control Through Pareto and Root Cause analysis

IV. CONCLUSION

In This Research intended to apply a combination of Lean Six Sigma Methodologies to an agro chemicals industry, which was effectively achieved. By using Effectives techniques such as, GEMBA Kaizen, Six Sigma, PHA(Process Hazard Analysis), RCA (Root cause analysis) benefits were recorded in the area as reduced cycle time, Reduces cost, Improve Process Yield, Improve Plant utilization Rate with better efficiency of the product and also help to Rework Reduction in Manufacturing of product. The Problems occurs during Tablets Manufacturing such as Sticking, Poor Flowing and mixing, Less Harness and Chocking were identify by Root cause of each and lastly resolve the defects before it reaches the RTM (Rotary press tableting machine) machine

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