

Overall Productivity Improvement in Pump Machinery Industry Using 5S

K.Saravanan¹, Dr. S. Thirumurugaveerakumar²

¹Dept of Industrial engineering

²Associate Professor, Dept of Mechanical engineering

^{1,2} Kumaraguru College of Technology, Coimbatore.

Abstract- This study examines if the adoption of 5S in the pump machinery industry that will improve productivity are not. 5S is a lean manufacturing tool. There are the following: Seiri (sort), Seiton (set in order), Seiso (shine), Seiketsu (standardize), and Shitsuke (sustain). 5S serves to optimize and organize the workplace effectively, reducing waste, improving productivity and quality. The company faces the issue of a bad working environment, not maintaining a clean workplace, and improper tool arrangements, which affect productivity. The primary goals of this paper are to provide a better working environment, increase production, and reduce waste for the company.

Keywords- 5S, Productivity, Process effectiveness, Reduce DOWNTIME.

I. INTRODUCTION

This project study is carried out Dharrshini engineering, which is located at Coimbatore, Tamilnadu. They are manufacturers and supplier of horizontal multistage booster pump, water pump testing machine, hydraulic press and also this company faces problem at time of work. The 5S system was developed in Japan by Hiroyuki Hirano in the 1980s. It includes five Japanese words Seiri (sort), Seiton (set in order), Seiso (shine), Seiketsu (standardize), and Shitsuke (sustain). The 5S emphasize waste reduction, efficient workplace organization, better working environment while improving safety and quality. It enables increased productivity and efficiency. 5S is a technique aims to standardization and cleanliness in the workplace. The advantage of 5S is reduced cost, waste reduction, increased productivity, higher quality and safety. 5S methodology can create better working environment, work become safe and comfortable in the organization will further foster continuous improvement.

II. PROBLEM STATEMENT

The company faces problem like workplace is not clean, there is lot of wastes around the area, there is unwanted movements in workplace that impacts production. To reduce non productive time and create more space for store the

inventory. To implement 5S in that industry to enhance the performance of the employer, to create better working condition for the company. Following 5S, it is simple to use and covers the majority the TQM topics.

III. LITERATURE REVIEW

Literature review from the existing body of knowledge has provided the following.

The comprehensive summary of the previous research on the improving productivity using 5S is summarized below. The problems are identified and analyzed which produces proper solution for the process involved

[1]. The productivity and quality are increased by using 5S strategy for the automotive parts manufacturing industries. After 5S implementation fixture setting time is reduced 28% and after sorting eliminates unnecessary items, then more space use for storage. [2]. In the furniture warehouse industry, there is a problem of not having enough space for finished product, 5S tried place for everything and everything in place results in space utilization for raw materials and storage of finished products effectively. [3]. 5S is a system which helps for organization in clean and neat, reduce waste to promote better quality and productivity, reflected on positive effectiveness and overall performance. [4]. This case study focuses on 5S implementation on auto parts industry using a tool AHP (Analytical hierarchy process) that result of reduce waste to improve process performance. [5]. 5S is an workplace organization has reviewed as a effective method on management to improve efficiency and productivity, also recommended extend of 5S to 6S with the inclusion of Safety. [6] 5S are introduced services sector to provide of safe environment and utilize space, improved quality and productivity, then reduce service time and to fulfill customer satisfaction. [7]. 5S in food and beverage industry has help for process growth, better space utilization, cost reduction of product development, prevention of losing tools, reducing time for searching things and improving productivity and efficiency. [8]. A small scale organization faces problem of defects in materials, bad working condition, downtime in

production then 5S practicing and implementing in organization result of reduce downtime, better working condition and delivered of quality materials and increase productivity. [9]. 5S and kaizen are implementing in organization then result of overall improvement of quality and productivity, avoid the unwanted movement in organization, prevention of losing tools and reduce material searching time, make it cleaned workplace. [10]. Productivity improvement by implementing of lean six sigma, ECRS, Work study and 5S in manufacturing sector then improvement warehouse area using 5S result reflected warehouse employer satisfaction of 4.60 points from 3.20

IV. IMPLEMENTATION OF 5S IN INDUSTRY

I researched the company's state at the time of this endeavour. Following that investigation, I searched the literature for appropriate methodologies. And to achieve greater outcomes, I've chosen the 5s approach. The initiative is concentrated on productivity, cleanliness, and quality, as was already indicated. I observed greater results after using the 5s method, which are described below.

- **SEIRI (sort)**

It is the first phase of the 5S methodology. It involves reducing scrap and identifying necessary and unnecessary items. The images show that waste material is kept aside with a red tag on it, and necessary material is stored in other areas. It helps to keep the workplace clean, improving efficiency.



Fig 1:- Before Sort



Fig 2:- After Sort



Fig 3 :- 5S RED TAG

- **SEITON (set in order)**

It is the second phase of the 5S methodology. It helps to arrange the remaining tools, equipment, and materials in a logical and easily accessible manner. Develop a standardized storage system for all items, ensuring they are labelled and stored in designated locations. This method helps employees quickly find what they need, reducing search time and increasing efficiency.



Fig 4 :- Before Seiton



Fig 5 :- After Seiton

- **SEISO (Shine)**

Seiso is the third phase of the 5S methodology. It involves cleaning the workplace. It has to do with sweeping and cleaning the machines and racks. Regular cleaning helps maintain a safe and health environment and ensures that everything is in proper working condition. The above images show that machine waste is cleaned.



Fig 6 :- Not cleaned workplace



Fig 7 :- Cleaned workplace



Fig 8 :- Before Seiso



Fig 9 :- After Seiso

• **SEIKETSU (Standardize)**

The fourth phase of the 5S methodology is to standardize. This step entails developing a set of standards and processes for upkeep of the workstation. The previous three processes should be documented, and a regular schedule for their execution should be established. This includes creating visual management systems, labelling, and documentation to ensure consistency and sustain the improvements over time.



Fig 10 :- Notice board

• **SHITSUKE (sustain)**

The final stage and important of 5S methodology. In order to successfully complete the previous four steps and continuously improve the workspace, this step entails fostering a culture of continuous improvement. This involves regular training, audits, and continuous improvement efforts to keep the workplace organized and efficient.

V. RESULTS AND DISCUSSION

The process effectiveness for horizontal multistage booster pump is shown in below tables of 1, 2 before and after the use of 5S. This time values give the idea about where the time is wasted in the process.

• **For Horizontal Multistage Booster Pump**

SR.NO	OPERATION	TIME TAKEN (MIN)	TIME TAKEN (TRANSPORTATION) (SEC)
1.	STAMPING	1 MIN 34 SEC	30 SEC
2.	CAPACITOR BOX FITTING	7 MIN 10 SEC	30 SEC
3.	MOTOR ASSEMBLY	11 MIN 58 SEC	10 SEC
4.	PUMP ASSEMBLY	14 MIN 56 SEC	6 SEC
5.	TESTING	7 MIN 36 SEC	173 SEC
6.	FINISHING	10 MIN 58 SEC	156 SEC
7.	PRESSURE KIT	13 MIN 48 SEC	223 SEC
8.	PACKAGING	3 MIN 33 SEC	30 SEC
TOTAL REQUIRE TIME		71 MIN 33 SEC (1 HR 11 MIN)	658 SEC (11 MIN)

Table 1 :- Process effectiveness of Before 5S

SR.NO	OPERATION	TIME TAKEN (MIN)	TIME TAKEN (TRANSPORTATION) (SEC)
1.	STAMPING	1 MIN 10 SEC	30 SEC
2.	CAPACITOR BOX FITTING	6 MIN 17 SEC	15 SEC
3.	MOTOR ASSEMBLY	10 MIN 54 SEC	10 SEC
4.	PUMP ASSEMBLY	13 MIN 18 SEC	6 SEC
5.	TESTING	5 MIN 50 SEC	157 SEC
6.	FINISHING	9 MIN 10 SEC	108 SEC
7.	PRESSURE KIT	12 MIN 10 SEC	183 SEC
8.	PACKAGING	3 MIN 11 SEC	15 SEC
TOTAL TIME REQUIRE		62 MIN (1 HR 2 MIN)	524 SEC (8 MIN)

Table 2 :- Process effectiveness After 5S

S R N O	PRODU CT NAME	PRODUCTI ON BEFORE 5S (PUMP/DA Y) IN 8 HRS SHIFT				PRODUCTI ON AFTER 5S (PUMP/DA Y) IN 8 HRS SHIFT				CAPACITY OF PRODUCTI ON (PUMP/DAY)	
		DAYS				DAYS				AVG	
		1	2	3	4	1	2	3	4	BEF ORE	ACT ER
1	HORIZO NTAL MULTIS TAGE BOOSTE R PUMP	4	4	5	5	6	7	6	8	4	6

Table 3 :- Quantity of Production

Time reduction of assembly for horizontal multistage booster pump

$$= 1 - (\text{Time Taken on after 5S} / \text{Time Taken on Before 5S}) * 100$$

$$= 1 - (4244/4951) * 100$$

$$= 15\%$$

Productivity Improvement

$$= 1 - (\text{Before 5S Production} / \text{After 5S production}) * 100$$

$$= 1 - (4/6) * 100$$

$$= 33\%$$

VI. CONCLUSION

From the calculation of the productivity of horizontal multistage booster pump is seen that the productivity which is the reduction of wasting time is about 15% percent were decreased using 5S. The Production of horizontal multistage booster pump is increased upto 33% by implementing of 5S. Then productivity is increased in pump machinery industry and better working environment were created.

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