

Implementation of 5S Methodology in Manufacturing Industry : Case Study

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Abstract:- 5S is a systematic technique used by organizations comes from five Japanese words; Seiri (sort), Seiton (set in order), Seiso (shine), Seiketsu (standardize), and Shitsuke (sustain). This system helps to organize a workplace for efficiency and decrease wasting and optimize quality and productivity via monitoring an organized environment. the problem industry deals with is bad working environment, messy tool setting, inefficient process flow. Here, the company cannot meet customers' demands and works inefficiently, because everyone in the company is not used to a clean working environment and all inventory interrupted the process flow. Therefore the main objective of this research paper is to help the company to rearrange and reset the working environment and to increase the production rate. After implementing the 5s methodology in the company the production rate of both parts increased by 7% and 15% respectively.

Keywords:- 5S Methodology, Improving Production, Processes Charts, etc.

I. INTRODUCTION

Shree Renuka Manufacturing industry is a smallscale industry. It is situated at MIDC, Akkalkaot road, Sholapur. The company manufactures four to five types of jobs or parts. The industry is established in 2008. The company installed in 66'0" ×79'06" area. This is very small as required for five different types of job manufacturing. The company has many different types of machines. Two fully automatic CNC machines, two semi-automatic machines, two retro fit CNC machines that means company have total six CNC machines. Also two small size lathe machines and two big size lathe machines are installed in the company. One VMC machine is also available there in the company. One hydraulic power press is used in inspection department for inspection of manufactured jobs or parts. There are seven drilling machines are available in the company. One milling machine, one centring and facing machine and one number and punching machine is there for different operations. All departments are not separately place or situated. And because of this company faces problem at the time of work.

Lean thinking represents a set of principles and techniques for the identification and elimination of waste in manufacturing and administrative processes. 5S is a technique originated from Japan and it was first developed by Hiroyuki Hirano in 1980s. It include five Japanese words Seiri(Sort), Seiton(Set in order), Seiso(Shine), Seiketsu(Standardize) and Shitsuke(Sustain). The 5S philosophy focuses on simplification of the work environment, effective workplace organization, and reduction of waste while improving safety and quality. It allows the enhancement of efficiency and productivity. The 5S technique is a structured program to systematically achieve total organization cleanliness and standardization in the workplace. The benefit of 5S technique is improvement in productivity, quality, health and safety. Through 5S methodology, the management can create an environment where quality work is comfortable, clean and safe in the organization and it can ensure the compliance to standards and will further foster continuous improvement.

➤ *Names of Manufactured Parts in Company:-*

1. TATA MPFI TURBO CAM SHAFT
2. LOP BODY

II. OBJECTIVE OF CASE STUDY

- To create more space for storage
- To create more space for finished jobs
- To increase productivity
- To improves workers safety
- To improve quality of product
- To reduce non-productive time

Here in this company, The company want to increase productivity with high quality. The company faces lots of problems like much time was wasted in set up than the machining time. Due to the misplacement of material and most of the materials get lost. So to increase the productivity it is necessary to reduce the non-productive time. This study would like to show that 5S is a good management practice to create a performance improvement plan and a great work environment for employees where the companies are deal with poor performance problems. There is a need to follow the method according to its framework to be easy to use and allow a practical and comprehensive measurement and also to cover most aspects of total quality management.

III. LITERATURE SURVEY

The chapter presents the 5S method as a tool for Continuous improving lean management processes, where we want to create a highly efficient, clean, and ergonomic working environment. The 5S method is presented as a collection of 5 simple Rules, and at the same time.

It is a tool that allows you to control the workplace visually. The history of the 5S tool originates from Japanese philosophy, namely the five basic elements of the system: Seiri (selection), Seiton (systematization), Seiso (cleaning), Seiketsu (standardization) and Shitsuke (self-discipline).[1]

1. On the basis research it can be stated, that introducing the 5S rules bring the great change in the company, who implemented this method in their organisation, for example: process improvement by costs' reduction, increasing of effectiveness and efficiency in the processes, maintenance and improvement of the machines' efficiency, production time reduced, safety increasing and reduction of the industry pollution, proceedings according to decisions.[2]
2. 5S is a TQM technique used by organizations comes from five Japanese words; Seiri (sort), Seiton (setin order), Seiso (shine), Seiketsu (standardize), and Shitsuke (sustain). This system helps to organize a workplace for efficiency and decrease wasting and optimize quality and productivity via monitoring an organized environment. It also provides useful visual evidences to obtain more firm results. The effectiveness of 5S implementation on organizational as well employees performance
3. A small scale industry plays an important role in Indian economy. In an organization. The prime importance is given to the quality and productivity. Since a problem come across due to the defects in materials, down time in production, working conditions, and housekeeping etc.
4. Small scale industries play an important role in Indian economy. It has emerged as powerful tool in providing relatively larger employment next to agriculture. It contributes more than 50% of the industrial production in value addition terms and generate one third of the export revenue. Global markets are continuously changing and demanding product of high quality and low cost. Such products can be produced using lean manufacturing, a management philosophy that aimed to reduce all types of wastes at all levels of product manufacturing so as to reduce product cost.5S is a basic lean manufacturing tool for cleaning, sorting, organizing and providing necessary groundwork for work place improvement.

IV. IMPLIMENTATION OF 5S METHODOLOGY IN COMPANY

For this project I have study the existing condition of the company. After that study I done the literature survey for suitable methods. And for better results I have select the 5s methodology. As mentioned above the project is focused on productivity, cleanness, and quality. After implementing the 5s strategy I found the better result which are explained bellow.



Fig 1:- TATA MPFI TURBO CAM SHAFTUSED IN LOP BODY



Fig 2:- TATA ZEST/ TEYAGO CAR ENGINE USED IN PUMP

➤ For Tata MPFT Turbo Camshaft

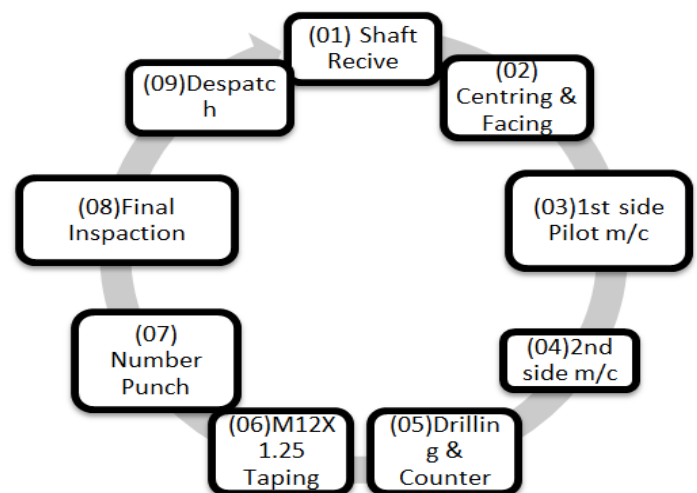


Fig 3:- Process Flow Chart

➤ For Lop Body Component

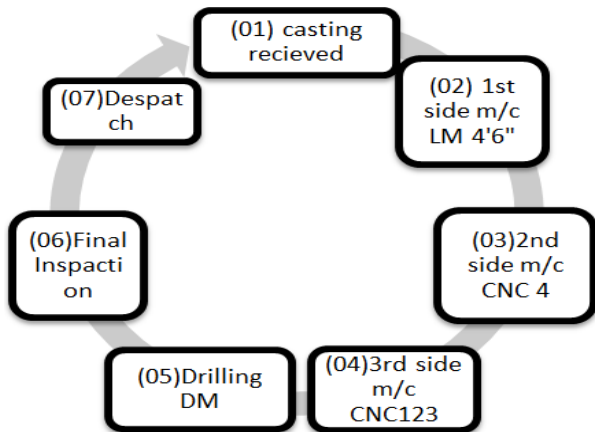


Fig 4:- PROCESS FLOW CHART

V. IMAGES OF 5S IMPLEMENTATION IN INDUSTRY SEIRI

➤ Images of 5S Implementation in Industry Seiri



Fig. 5:- Red tag area



Fig. 6:- unnecessary material storage

Seiri is the first step of 5S methodology. It is the waste reduction step. The function of this step is separating necessary and unnecessary things and eliminating waste material. The above images show that the before and after situation of the workplace. The image shows the waste material is kept aside with red tad on it and the unnecessary material is stored in other area. Seiri helps to maintain the clean workplace and improve the efficiency of searching and receiving the things, shortens the time of running.

➤ Sieton

- Picture before implementation of seiton



Fig 7:- Rack in store room in unorganised condition

- Picture after implementation of seiton



Fig 8:- Rack in store room after sorting.

- Picture before implementation of seiton



Fig 9:- not in right order

- Picture after implementation of seiton



Fig 10:- in right order

- *Picture before implementation of seiton*



Fig 11:- not in right order

- *Picture after implementation of seiton*



Fig 12:- in right order

Seiso is the one of the steps of 5S methodology. It is related to clean and shine the workplace. In this step we clean and sweep the workplace and machinery. During cleaning we have checked the cleanness of machines, source of light, workplace area and preventing maintenance of the machinery and equipment. After sorting it is necessary to clean workplace. From above images, we can see that the racks, table, tool holders are cleaned.

➤ *SEISO*

- *Picture before implementation of seiso*



Fig 13:- Uncleaned workplace

- *Picture after implementation of seiso*



Fig 14:- cleaned workplace

- *Picture before implementation of seiso*



Fig 15:- Uncleaned workplace

- *Picture after implementation of seiso*



Fig 16:- cleaned workplace

- *Picture before implementation of seiso*



Fig 17:- Before

- *Picture after implementation of seiso*



Fig 18:- After

Seiso is the one of the steps of 5S methodology. It is related to clean and shine the workplace. In this step we clean and sweep the workplace and machinery. During cleaning we have checked the cleanness of machines, source of light, workplace area and preventing maintenance of the machinery and equipment. After sorting it is necessary to clean workplace. From above images, we can see that the racks, table, tool holders are cleaned.

➤ *STANDERDIZE*



Fig 19:- Notice Board



Fig 20:- 5S POSTER



Fig 21:- TOOL BOX



Fig 22:- DISPATCH

➤ *Sustaine*

Sustain is last and very important stage of 5S methodology. It is all about the metal and physical discipline of employees and workplace. The name itself shows that it is long lasting effect of all other 4S steps implementation. To achieve the sustained step we have to co-ordinate with employees, store keeper, engineers, manager, etc.

VI. RESULT AND DISCUSION

of 5s. This time values gives the idea about where the time is wasted in the processes.

The bellow tables (1,2 ,3 &4) for both TATA MPFT TURBO CAMSHAFT AND LOP BODY shows the process effectiveness chart before and after implementation

➤ For Tata MPFT Turbo Camshaft

SR. NO	OPERATION	TIME INTERVAL (MIN)	TIME INTERVAL (TRANSPORTATION) (SEC)
1.	FORGING RECEIVE	00	5 MIN
2.	CENTERING AND FACING	3 MIN&30 SEC	60 SEC
3.	1ST SIDE CNC M/C	3	60 SEC
4.	2ND SIDE CNC M/C	5MIN & 30 SEC	60SEC
5.	DRILL TAP	4	60SEC
6.	NUMBER PUCH	2	60 SEC
7.	FINAL INSPECTION	5	120SEC
8.	DISPATCH		
	TOTAL TIME REQUARE	23 MIN	12 MIN

Table 1:- Processes Effectiveness Before Implementation of 5S

SR NO	OPERATION	TIME INTERVAL (MIN)	TIME INTERVAL (TRANSPORTATION) (SEC)
1.	FORGING RECEIVE	00	3 MIN
2.	CENTERING AND FACING	2 MIN& 30 SEC	30 SEC
3.	1ST SIDE CNC M/C	3	30 SEC
4.	2ND SIDE CNC M/C	5MIN & 30 SEC	30SEC
5.	DRILL TAP	3MIN	30SEC
6.	NUMBER PUCH	1MIN 30 SEC	30 SEC
7.	FINAL INSPECTION	3 MIN	90SEC
8.	DISPATCH		
	TOTAL TIME REQUARE	18 MIN	7 MIN

Table 2:- Processes Effectiveness after Implementation of 5S

➤ For Lop Body

SR NO	OPERATION	TIME INTERVAL (MIN)	TIME INTERVAL (TRANSPORTATION) (SEC)
1.	CASTING RECEIVE	00	2MIN
2.	1ST SIDE LM M/C	2	60 SEC
3.	2ND SIDE CNC M/C	2MIN & 40 SEC	60SEC
4.	3RD SIDE FINISH M/C	2MIN 15 SEC	60SEC
6.	DRILLING	5 MIN	60 SEC
7.	FINAL INSPECTION	2MIN	60 SEC
8.	DISPATCH		
	TOTAL TIME REQUARE	12MIN 55 SEC	7 MIN

Table 3:- Processes Effectiveness Before Implementation of 5S

SR NO	OPERATION	TIME INTERVAL (MIN)	TIME INTERVAL (TRANSPORTATION) (SEC)
1.	FORGING RECEIVE	00	2MIN
3.	1ST SIDE LM M/C	1	30 SEC
4.	2ND SIDE CNC M/C	2 MIN	30SEC
5.	3RD SIDE FINISH M/C	1 MIN 30 SEC	30SEC
6.	DRILLING	4MIN	30 SEC
7.	FINAL INSPECTION	1 MIN	60SEC
8.	DISPATCH		
	TOTAL TIME REQUARE	9 MIN 40 SEC	5 MIN

Table 4:- Processes Effectiveness after Implementation of 5S

SR NO	PRODUCT NAME	PRODUCTION BEFORE (JOBS/DAY) IN 10 HRS							PRODUCTION AFTER (JOBS/DAY) IN 10 HRS						CAPACITY OF PRODUCTIVITY (JOBS/DAY)	
		DAYS							DAYS							
		1	2	3	4	5	6	AVG	1	2	3	4	5	6	AVG	
1	TATA MPFT TURBO CAMSHAFT	150	155	145	165	175	160	158	185	180	175	190	185	175	182	200
2	LOP BODY	200	198	205	211	235	220	212	235	240	235	200	235	240	231	250

Table 5:- Quantity of Production

This is the final step of my project. I took the before and after observation in the numerical format. And got better results after implementing the 5s methodology in the industry.

SR NO	PRODUCT NAME	PRODUCTION BEFORE (IN %)	PRODUCTION AFTER (IN %)
1	TATA MPFT TURBO CAMSHAFT	79	91
2	LOP BODY	84.8	92

Table 6:- Production Rate

VII. CONCLUSION

We have concluded that, The 5S is an effectiveness to manage tools and materials which can improve housekeeping, environmental conditions and health and safety standards and increase productivity and quality. In this firm, the 5S sort stage eliminates unused, unwanted material from the storage room which reduces clutter. Set in order allocates space for each components, due to this it give more space for storing more material and tools and results in reduction in searching time. Also 5S reduce the searching time and improve the production and quality of the products. Also the by using 5S technology, the employees and organization become self-disciplined.

- From above data after implementation of 5s methodology it is found that the non-productive time is decreased.
- The productivity of the company is increased by 11% for Tata MPFL turbo cam shaft.
- The productivity of the company is increased by 7.2% for lop body.

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