Work study in core manufacturing industry

[1]Shital Bhosale, [2]Akash Mohite, [3]Omkar Mane, [4] Akshay More, [3]Aniket Koli,
[1]Asst.Professor, [2,3,4,5] Student
[1]Mechanical Engineering Dept,
[1]JSPM Narhe Technical Campus, Pune, India

Abstract : This work is intended to study the cycle time and existing method of different work stations and suggesting improved method for the same so as to reduce the cycle time and to improve productivity at Company. The importance of this work is directly related to the reduction of the inefficient time and increasing the productivity. The new approach of studying the operations by video work study techniques. The advantages of this project lies in the improvement of the productivity by reducing the cycle time, smooth flow of components for assembly, reducing the worker fatigue, suggesting new methods and installing it. This project highlights the advantages of adopting such an efficient process.

***IndexTerms* -Work Study, Method Study, Stop Watch Etc.**

I. INTRODUCTION

This company is Manufacturer and supplier of sand core which is use in casting process. When demand is high of this product, then the firm has to increase productivity. This work takes initiative to implement method study techniques to improve the work process in order to meet the demand. In production department there is some unwanted work process is done which is taking extra time, extra effort as well as increasing the cost of product and worker affected some unwanted fatigue, so the industry not able to improve productivity. One of the most powerful tools to eliminate this and improving productivity is work study. The study examined the problems associated in the production in the perspective of work study which can reduce the production time & unwanted fatigue.

Role of Work Study in Improving Productivity is in order to understand the role of work study we need to understand the role of method study and time study. Method study (also sometimes called Work Method Design) is mostly used to improve the method of doing work. It is equally applicable to new jobs. When applied to existing jobs and existing jobs, method study aims to find better methods of doing the jobs that are economical and safe, require less human effort, and need shorter make- ready / put-away time. The better method involves the optimum use of best materials and appropriate manpower so that work is performed in well-organized manner leading to increased resource utilization, better quality and lower costs. It can therefore be stated that through method study we have a systematic way of developing human resource effectiveness, providing high machine and equipment utilization, and making economical use of materials.

Time study, on the other hand, provides the standard time, that is the time needed by worker to complete a job by the standard method. Standard times for different jobs are necessary for proper estimation of

- Manpower, machinery and equipment requirements.
- Daily, weekly or monthly requirement of materials.
- Production cost per unit as an input to better make or buy decision.
- Labor budgets.
- Worker's efficiency and make incentive wage payments.

By the application of method study and time study in any organization, we can thus achieve greater output at less cost and of better quality, and hence achieve higher productivity.

II PROBLEM STATEMENT

The company is a manufacturer and supplier of sand cores. An increase in demand must be complemented by the capability to increase productivity. The production department was identified to have certain work processes that could be made reductant, as these steps consumed extra time and extra effort, in addition to increasing the cost of its product. Moreover, these processes resulted in worker's fatigue, which proved as a damper to improvement of productivity.

III.OBJECTIVES

1) Better design of plant equipment and buildings.

2) Less fatigue or workers by avoiding unnecessary movements of manpower.

3) Better working conditions and environment for workers/employees.

4) To have more effective utilization of materials, machines and manpower and money.

5) Better Product quality.

6) Efficient and fast material handling equipment.

7) Leads to standardization, rationalization, simplification and specialization.

8) Efficient planning of the section.

9) Streamlined working procedures

10) To find the most economical way of doing the work/

11) To plan the training programs for the workers for the new methods.

IV.WORK STUDY

Layout with current situation or before work study

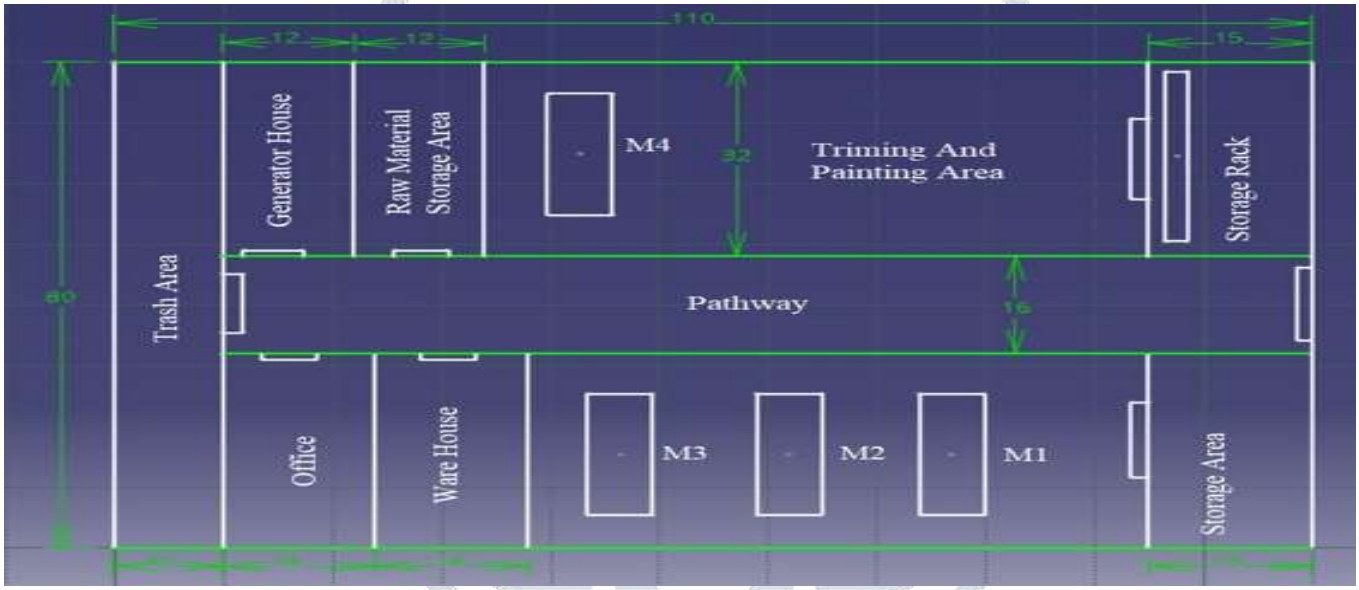

Fig.01.Layout of the core shop

Above figure shows the layout of the accurate core shop where we visited for doing the work study. We first talk with the workers and try to understand that what problem is workers facing during doing the job. After that we visit the different department of the shop for more exploration. After long talk we know all the problems facing the workers during doing the job. The layout and the method are not efficient on which they are working. So, then we decided to study the layout and understand where we can do the changes, add something useful and also utilize the workers to different workplaces which avoids the idling of the workers. Now we doing, try and error method for making the production process as smooth as possible and try to utilize the workers for avoiding the idling of the worker and doing the different jobs at a time which is not happening at before.

Problems with current layout:

With current layout there is more problems where we observed while transportation, trimming, work space, storage area and the working methods of worker. This step consumes extra time and effort and also, in addition to increasing the cost of its product. Moreover, these processes resulted in worker's fatigue. Use of unnecessary materials, space and idling of the workers also consume time and effort.

Transportation: It consumes more time and also it increases the fatigue of the workers. In one shift worker need to transport many times raw material from storage area to machines.

Trimming: In trimming section all workers doing the trimming job by sitting on the floor which will increase the fatigue of the worker and increase the complexity of doing the job.

Work space: The work space was not utilized properly and every time when we transport and even when we walk the little obstacles mounted on the floor.

Storage area: The storage area is not efficient proper storage racks not available there. And the finished products does not place properly.

Damage of cores: Due to storage of cores on the floor near the core making machine and at the core storage area the chances of damage of core will increases.

Wastage of sand: When we remove the cores from the core making machine and after removing the core from the machine, we need to remove the raiser and runner by trimming process and during this process some amount of sand will get waste.

Ergonomics: When the workers doing their job by sitting on the floor it will cause the fatigue of the workers and due to this the efficiency of the worker will decreases.

Drawback of the layout:

- 5S are not maintaining properly.
- Manpower utilization is not good.
- Method used for doing the job is not proper.
- Storage of the core is not maintaining properly.
- Fatigue of the manpower is more.

V. LAYOUT AFTER WORK STUDT

Trimming area:

1. Trimming:

   The cores are finally finished after baking and before they are finally set in the mould. The fins bump or other sand projections are removed from the surface of the cores by rubbing or filing. After cores are ejected from the machine there might be some material on the edges that need to be polished away. This process of removing extra material from edges is called trimming. Trimming is done manually by using files and polish paper.

Fig.02 - polishing paper

Fig.03 - file

Table for trimming:

In a company the trimming operation was done by sitting on the floor by the workers. This reduces the efficiency of the worker to do the job and increases the fatigue of the workers. This will affect the reduction of the production. So due to this we try to reduce the fatigue of the workers and try to increase productivity by suggesting the table and chair to do the job.

Doing the trimming operation on the table will increase the efficiency of the workers, and reduce the working time. It is more important to suggest the right dimensions of the table and chair, if that will not happen then the result will not be desire.

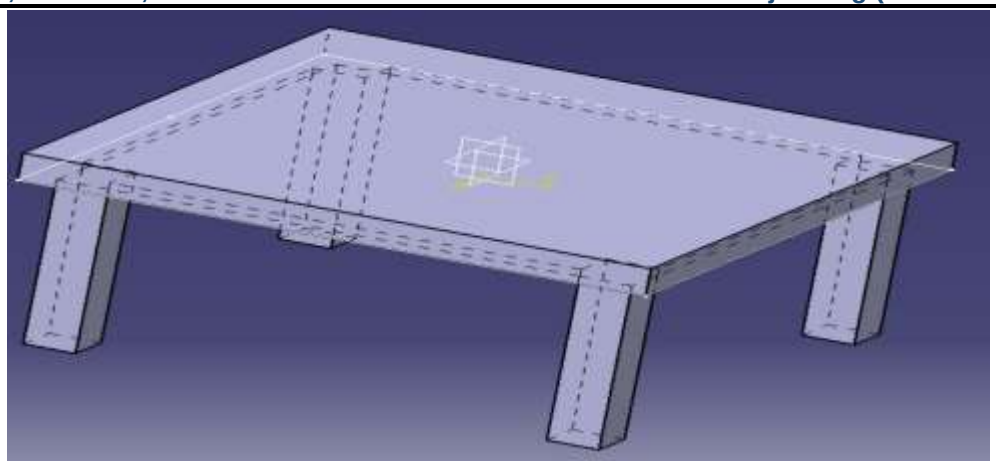

Fig.04. 3D CATIA view of the table

For best comfort of the workers, we give the dimensions of the table shown below:

Length = 6 feet

Width = 6 feet

Height = 2.5 feet

And the standard height of the chair is 1.5 feet

Where the height of the table is 2.5 feet that is the standard height of the table.

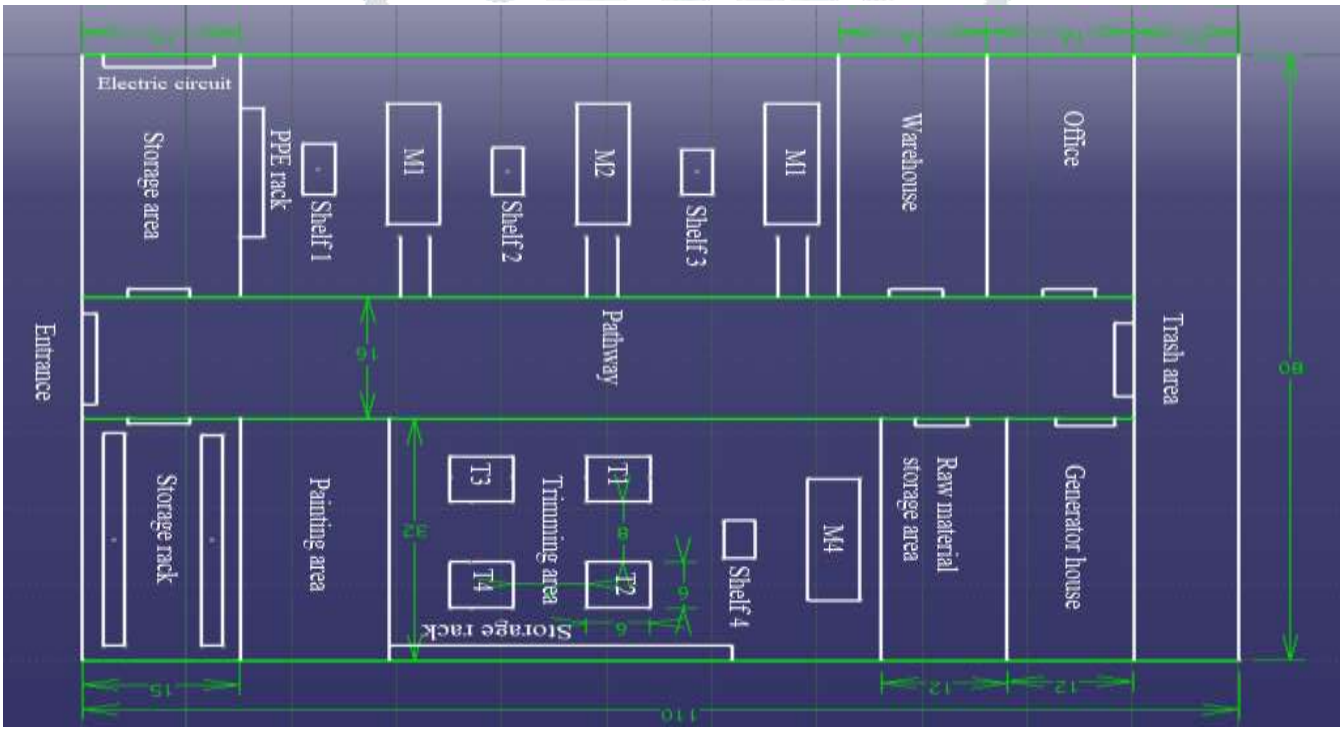

Fig 05. Layout of the accurate core shop with tables showing in the layout

VI.CALCULATIONS

Information collection and record:

In this method record the relevant facts about the job by direct observation and discussion with supervisor and worker collect such additional data may be needed from appropriate source.

A) Core production

2min 57 sec cycle time =177 sec

The machines manufacture 2 cores in one cycle.

Core production by one machine in one shift.

Shift working hour = 7 hours 30 minutes

= 450 minutes

= 27000 sec

number of cycles = 27000/177

= 153 cycles

Number of cores = 153*2 = 306 cores

Number of cores produced in one shift by four machines:

306*4 = 1224 cores

Number of cores produced in 3 shifts by all four machines:

1224*3 = 3672 cores

VII. RESULTS AND DISCUSSION

Table for saving of cores per year in different sections where we did the work study and due to work study increase of company total profit.

Section	Core saved per year	Profit per year
Trimming	-	8,64,000
Storage area	3,432	3,99,360
Storage of cores near the core making machines (Shelf)	1,872	2,17,776
Reduction of sand waste by using net	1,248	145,392
Company total profit	6,552	16,26,528

By using work study, we saved the cost of accurate core shop by Rs.**16,26,528** per year.

VIII.CONCLUSION

Work study gives lot information about existing method and this information helps to find out drawback and possible improvement in existing method. By eliminating drawback and improvements are found and adopted into a new method, it is better method. This better method increase productivity, reduces worker's fatigue, reduce the losses and improve the quality.

During the study of the process of the core manufacturing plant, existing processes are examined critically with method study & layout technique. It is observed that the core plant is not using optimum layout and there are chances for improvement. Various layout and method study tools are applied and flow process charts and existing layout has been prepared. New layout is used to reduced production cost, process time, cost and energy consumption. With the help of recorded observation and discussion with manager of the company, improved layout and flow process chart and new methods are suggested.

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