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Implementing effective work study techniques towards enhancing productivity in painting industries

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Abstract: Many countries have joined in the competition. to capture the global market, it is required to improve the productivity in small scale industry there are many factors that affecting the productivity of manufacturing organization. The most tackled issue is how to improve the productivity. Work study technique is one of the best productivity improvement techniques. Work study is defined as it is a generic term, which is used in the examination of human work, systematic recording and critical examination of existing and proposed ways of doing work, as means of developed and apply easier and more effective method and reducing cost, and to measure the time spent by an average worker to complete a given task. In this research paper od productivity improvement in small scale industry, some changes in painting section have been suggested using time study technique which leads to productivity improvement, reduction in process time, production cost, labour cost.
Keywords: flow process chart, proposed method cycle time, labour cost, process time, work study.

I. Introduction

In India, small scale industry plays a significant role for the economic development of country. The growth of any industry largely depends on minimizing excess work and productivity improvement. To minimizing extra work, we have to understand the definition of production and productivity according to bates and Parkinson's "production is organized activity of transforming resources in to finished product in the form of goods and services". Production helps to create product by transforming of raw materials. In simple word "Production is any activity directed towards the satisfaction of peoples".

Productivity is the ratio between output (final product which is to be manufactured in the industry) to input (raw material). Productivity is the key to maintain competitiveness, at both the organization and country level.

Productivity=OUTPUT/INPUT

The concept of productivity is concerned with how efficiency good and service are produced and the created by the production process. If a product is made at the low cost with high quality and can be sold competitively in the market at a price higher than its cost of production. The objective of productivity is to maximize output and minimize input.

There are many tools to improve the productivity but the work-study is most important tools that can helps to increase productivity. Work study was widely known for years as method study. "work study is a generic term for those techniques particularly method study and work measurement as shown in figure, which is used for systematic investigation of all factors, which effect the productivity and efficiency. The objective of work study is to improve productivity of men, material and machine. The work study is used to determine the best suitable method for performing operation to eliminate the wastage.

The method study is systematic recording a critical examination of existing and proposed ways of doing work as a means of developing and applying easier and more effective methods and reducing costs. This Research aims to improve the productivity in small scale industry by reducing extra time and reducing the fatigue to worker by applying work study.

Objectives of Research

- To identify areas for potential productivity improvement.
- Calculate all process time and reduced extra time.
- Reduced wastage.
- Evaluate the level of awareness of the work study for productivity improvement and the productivity priorities.
- To improve utilization of resource.

Methodology

Step by step procedure is very important in any process for improving productivity, there are number of techniques in industrial engineering and engineering tool for eliminating waste and improve productivity Among all these techniques that we opted for work study techniques which is work measurement and method study Work study method is to reduces work content to particular product, we try to develop a frame work for our work, this helps to accomplish our research work in systematic manner.

In this study first we select the industry with specific product we observed all the particular operation with the help of stop watch After observing all the operation, identified the existing problem, After Identifying problem, we suggest a new method or process for particular work, when our proposed method applied to this particular production section, the productivity has been improved.

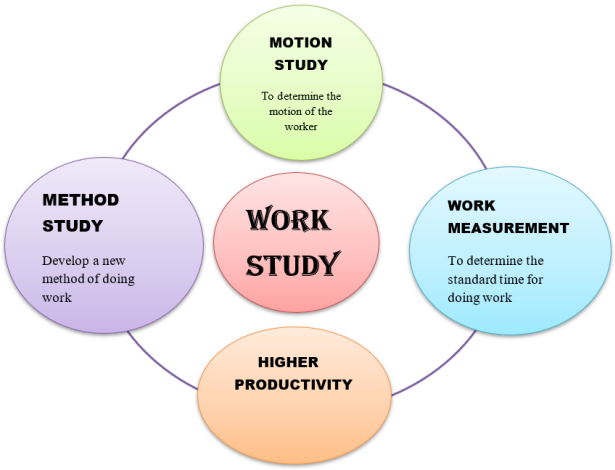

Fig 1. Work study

II. Problems Occurred in existing process

After deep study and observation of existing process and collection of data about process and time required to compete process. Every factor is discussed with all a labour, engineers and higher-level management and also recording of all process time individually the problem faced in existing process are

Problem: In the existing plant the problem occurred in painting section as these steps consumed extra time and extra effort, moreover, these processes resulted in workers fatigue, which proved as damper to improvement of productivity problem occurred in painting section.

Problem occurred in painting section are as:

- More time required for dry the paint or primer when not properly weather condition or not given the proper time for drying the job
- Wastage of colour due to unproper air pressure of spray gun
- Quality of painting is not good because of do not proper mixing of thinner in paint
- More time required to fill the spray gun with colour time to time
- The quality of painting affected due to the unproper cleaning of the job (the oil stain remains on the job)
- The air tube is leakage at some point and due to this wastage of air
- More time required to clean the gun after completing the primer and to fill again gun with the colour (because of insufficient no of spray gun)

A flow process chart is prepared for existing method, in this process chart we are symbol operation, transportation, delay inspection and storage and also used combined activity. As shown in table no 1.

Table 1. Sample of existing flow process chart

SR NO	Activity	Symbol	Observed Time
1	Transformation of job from machine section to painting section		15 min
2	Arraigning all job properly		10min
3	Cleaning the job by using cloth		21 min
4	Apply primer on one side of job		13 min
5	Apply primer on other side of the job		13 min
6	Allow to dry		11 min
7	Mixing of thinner in paint manually		15 min
8	Apply paint in corner side of the job with the help of spung		31 min
9	Visual inspection		10 min
10	Paint on one side of the job by using spray gun		35 min
11	Fill the spray gun with colour		10min
12	Apply paint on other side of the job		35 min
13	Allow to dry		20 min
14	Inspection of painted job		10 min
15	Transfer all completed job to storage		15 min
16	Store all the finished goods		10 min

PROCESS	SYMBOL	FREQUENCY
OPERATION		9
TRANSPORTATION		2
INSPECTION		2
DELAY		2
STORAGE		1
COMBINE OPERATION & INSPECTION		0

III. Improvement in process

After the completion of time study, it was observed that due to the use of spray gun there is more time required to fill the spray gun with colour, this result in high idle time for eliminating this, we are suggesting the use of airless spray painting instead of manually operated spray gun. Because airless spray-painting having production rate it neglects the delay time. Second improvement is proper mixing of thinner in paint as per the given proportion (i.e., 400ml of thinner for 1lit of paint); Arrange the colour mixer for proper mixing of colour and thinner. And also suggested the use of hydra crane for transportation of job from machine section to painting section which reduced the extra time and extra worker required for the transportation. The proposed flow process chart as shown in table no.

Table 2. sample of proposed flow process chart

SR NO	Activity	Symbol	Observed Time
1	Transformation of job from machine section to painting section		8 min
2	Arraigning all job properly		10 min
3	Cleaning the job by using sand paper		10min
4	Apply primer on one side of job		8 min
5	Apply primer on other side of the job		8min
6	Allow to dry		11 min
7	Mixing of thinner in paint by using colour mixer machine		5 min
8	Apply paint in corner side of the job with the help of brush with visual inspection.		20 min
9	Visual inspection		0.00min
10	Paint on one side of the job by using air less spray gun		20 min
11	Fill the spray gun with color		0.00min
12	Apply paint on other side of the job		20 min
13	Allow to dry		20 min
14	Inspection of painted job		10 min
15	Transfer all completed job to storage		15 min
16	Store all the finished goods		10 min

Process	Symbol	Frequency
Operation		8
Transportation		2
Inspection		1
Delay		2
Storage		1
Combine operation & inspection		1

IV. Calculations

Total time required for 10 job =274 min
Cycle time = time required to complete 10 job * 2
= 274 min * 2
= 548 min
Before implementation 548min required to complete 20 jobs per day.
Time required to complete 1 job=27.4 min
Time required completing 20 jobs in one
day=548 min
In one month= 16,440 min

After implementation the productivity increased

Total Time required for 10 job =168min
Cycle time =336 min
Time required to complete one job=16.8 min
Time required completing 20 jobs in one day=336
min in 1month (for 30 days) =10,080 min

Saving time per job= Time required to complete 1 job before implementation - Time required to complete 1 job after implementation
= 27.4 – 16.8
= 10.6 min
Total saving time in 1 day =212 min
One month saving time=16,440 min - 10,080 min
=6,360 min

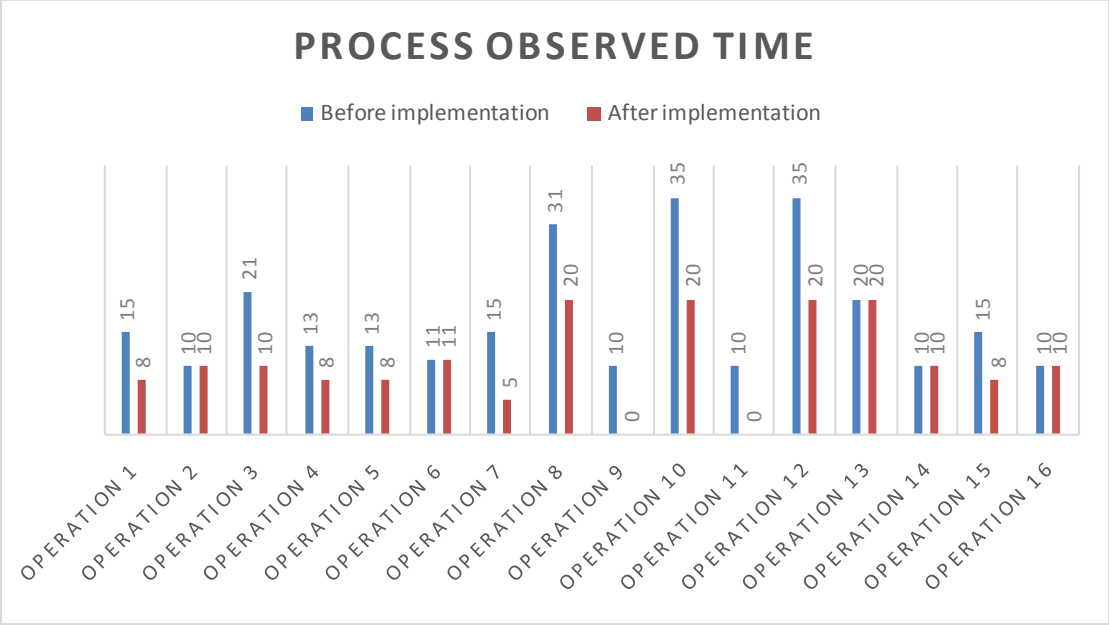

Fig 2. Graphical representation of observed time

V. Conclusion

In this proposed research work the existing process are examined critically with method study. It is observed that there is problem occurred in painting section which cause less productivity and fatigue to the worker. The main aim of the research work is to examine all the process carried out in the industry and suggest some improvement in process also suggest some new equipment for improving production. In this research work the existing process are examined critically with work study and method study. It is observed that there is a problem in painting section cause of some improper operation management and old machine is used for painting purpose and there is chance for improvement. Various method study tools are applied and flow process charts flow diagram has been prepared and also the time variation in existing and proposed process shows by graphical representation which is shown in fig 2, and there will improve the existing

process by suggesting the used of airless spray painting in case of spray gun and also some small changes are suggested like use of sand paper for cleaning of jobs which helps for improving the quality of paint as well as improved productivity. By implementing the proposed method cycle time is reduced from 548 min to 336 min by reducing cycle time 212 min (1hr52 min)

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