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TIME AND MOTION STUDY FOR DCM MILL WORKER

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ABSTRACT

The purpose of this study is the time and motion study and work sampling has been workers to measure the productivity of the various activities in DCM cotton mill. The parameters such as the time and motion are to identify value added and non-value added activities to reduce cost and increase the productivity. Better working methods boost efficiency and decrease fatigue in workers of cotton yean manufacture. The study was done on two machine i.e. finisher D/F and slub attachment in cotton mill. All the activities and number of activities done on the machine was categorized like operation, inspection, delay, storage, transport etc. The analysis of whole activity observed and flow process chart were made, total distance travelled during the whole activity for one hour was measured.

Keywords*: Cotton mill, time and motion study, flow chart*

1. INTRODUCTION

The time and motion study provides techniques to analyze in detail an operation or task, measuring which activities add value and how to minimize and eliminate the ones that don't add value or are considered a waste. Through time and motion study of a manufacturing process, it is possible to calculate its capacity and increase its efficiency and productivity, making the organization more competitive to the point of having lower production costs, offering a quality product at a lower price to the customer. By utilizing the time and motion study, a better way to perform the operations of a process can be developed. To each operation, standard time and motion study emerged as an opportunity for the company to increase its productivity, reducing the operators' fatigue and effort. (Cury and Saraiva,2018).

DCM Textiles is a Spinning Mill Located in Hisar (Haryana) engaged in the manufacturing of 100% grey cotton yarn & mélange yarn in the count range of 12s to 40s, mainly for knitting use. The raw material used by DCM textile is cotton. Cotton can be purchased from various states like Haryana, Punjab, Rajasthan, Gujarat, M.P., Maharashtra and A.P. The unit has a line of new generation machines having a capability of producing good quality yarn. The machines are from various renowned manufactures. The modernization drives it to further enhance the competitive edge of the unit by importing Cards, Auto corner, TFO and installing new ring frames. So, I analyze only two machine for easy and effective study i.e Finisher D/F and slub attachment in cotton mill.

Time and Motion study method in order to increase production and identify any improvement that could be made through identifying the process that involving manpower as the main reason and state the time standard in order to achieve the objectives of increasing the production and decreasing the cost. This study is using systematic observation, interview with discussion and stopwatch time study. By stating the time standard for the process involving manpower, production rate increase and the cost will be less. Other than that, proposal for improvement could be made in order to enhance the effort to achieve the main objective of any business organization in the world (Bon and Daim, 2010).

Papers illustrate that the time study is more important from the beginning of the manufacturing process in setting standard time and to advance them continuously. Time study and motion study can be applied to various sectors like manufacturing, service and medical. In an aerospace industry using MOST time study technique Overall Equipment Efficiency (OEE) can be improved from 84.32% to 88.94%. The main objective of time and motion study is to identify value added and non-value added activities to reduce cost and increase the productivity. It's also helpful to (Nallusamy and Muthamizhmaran, 2015).

Time and motion study and work sampling has been employed to measure the productivity of the various construction activities and the paper discusses its application to the various phases of erection of steel structure such as installation of purlins, installation of primary beams and installation of secondary beams on the arrival slab of an airport. The parameters such as efficiency, productivity, tool time, support time and idle times are observed. Motion corrections and time corrections are applied. It is expected that employing lean concepts to construction will help in increasing productivity and reduce risks (Prakash et al.,2020).

The present trend toward increased efficiency in all kinds of skilled work has brought about a widespread interest in motion and time study. The term "time study" and "motion study" have been given many interpretations since their origin. Time study, originated by Taylor was mainly used for rate setting; and motion study, developed by the Gilbreths, was largely employed for improving methods, one group saw time study only as a means of determining the size of the task that should constitute a day's work, using the stop watch as the timing device. Another group saw motion study only as an expensive and elaborate technique for determining a good method of doing work. Today the discussion of the comparative value of using either the one or the other of the two techniques has largely passed; industry has found that motion study and time study are inseparable, as their combined use in many sectors now demonstrates (Bhargo et al., 2014)

2. METHODOLOGY

There are several methods that will be used to achieve research objectives. Observation and collecting data is needed. The complete field data collection will be taken before it will be used for data analysis. The data collection will be executed until it fulfills the objective requirement.

Locale of the Study: - Hisar district from DCM cotton mill will be selected purposively for the survey work.

Data Collection: This research requires to collect data that are related to the time during the work process occurs, the movement or distance for each process by the following methods.

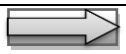
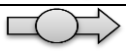
1. Systematic Observation
2. Stopwatch Time Study
3. Process Chart

Systematic Observation: Systematic observation means researcher are required to observe the whole work process in that industry, then select and focuse on which process or job in that is required to be studied. Based on the observation, is needs to record everything happens in each process from the start to finish the work process.

Stopwatch Time Study: Stopwatch time study is the work measurement to determine the baseline for future improvement. It is also used to analyze a specific process by qualified workers in an effort to find the most efficient ways in terms of time.

Process Chart: Process chart is used to show facts as Operation, inspection, storage and delays that occur in the work process, where it was happened when the process moves from one process to another process until it is finished. Each fact can be represented by symbols, where it is used to describe the process steps.

Symbols of different Activities:

Activity	Symbols
Operation	
Inspection	
Transport	
Delay	
Storage	
Operation and inspection	
Change point	
Transport and inspection	
Operation and transportation	

3. RESULT AND DISCUSSION

This study is carried out for DCM cotton mill in Hisar district to draw the results of time and motion of the worker in mill for two machines i.e., Finisher D/F and Slub Attachment.

A) Finisher D/F

The observation of all activity has to done by worker. There were number of operation, inspection , delay, changing point, transportation and also two activities were done simultaneously.

1. Operation

- Start spinning machine
- Joining of sliver
- Worker clean the floor
- Worker cleaning near by the machine
- Cleaning the equipments
- Takes to fill a spinning can
- Joining the sliver and starting machine
- Worker clean the floor
- Cleaning the equipments
- Worker clean the floor

2. Inspection

- Inspection by worker
- Inspection the machine
- Inspection by worker
- Worker note the register R.S.B. for cans number

3. Transport

- Move on empty cans one place to another place
- Carrying filler cans from one place to near by machine
- Taking empty cans from another place
- Place the filled cans near the machine
- Worker move the sliver filled cans one side to another side
- Left the filled cans and move to left it near the machine
- Moving of cans by the worker
- Worker move the filled cans again left nearby the machine
- Worker move the sliver cans one side to another side
- Taking empty cans from another place

4. Delay

- Delay in work because of sliver breaks
- Breaking of sliver in machine

5. Operation and inspection

- Start machine again
- Stop the R.S.B.(unirolls) machine then check it
- Checking of machine

6. Change point

- Filled one cans and own start second cans fill
- Cans fill it automatically replaced another cans

7. Operation and transportation

- Arranging of cans
- Rearranging of cans

FLOW PROCESS CHART OF THE ACTIVITY:

	ACTIVITY	SYMBOLS	TIME TAKEN
1.	Start spinning machine		10:55am
2.	Move on empty cans one place to another place		1:06 sec.
3.	Inspection by worker		55 sec.
4.	Carrying filler cans from one place to near machine		1:10 sec.
5.	Delay in work because of sliver breaks	D	30 sec.
6.	Joining of sliver		
7.	Start machine again		10 sec.
8.	Taking empty cans from another place		1:05 sec.
9.	Worker clean the floor		2:15 sec.
10.	Inspection the machine		30 sec.
11.	Place the filled cans near the machine		1:30 sec.
12.	Stop the R.S.B.(unirols) machine then check it		2:30 sec.
13.	Worker cleaning near by the machine		55 sec.
14.	Worker move the sliver filled cans one side to another side		1:25 sec.
15.	Cleaning the equipments		1:10 sec.
16.	Left the filled cans and move to left it near the machine		2:10 sec.
17.	Takes to fill a sliver cans		30 sec.

18.	Filled one cans and own start second cans fill	2:30 sec.
19.	Breaking of sliver in machine	3:15 sec.
20.	Joining the sliver and starting machine	
21.	Inspection by the worker	25 sec.
22.	Moving of cans by the worker	1:30 sec.
23.	Cans fill it automatically replaced another cans	10:30 sec.
24.	Arranging of cans	2:30 sec.
25.	Worker note the register R.S.B. for cans number	4:45 sec.
26.	Worker move the filled cans again left nearby the machine	1:40 sec.
27.	Worker clean the floor	5:39 sec.
28.	Worker move the sliver cans one side to another side	2:35 sec.
29.	Rearranging of cans	3:16 sec.
30.	Checking of machine	4:20 sec.
31.	Cleaning the equipments	1:35 sec.
32.	Taking empty cans from another place	1:06 sec.
33.	Worker clean the floor	45 sec.

Table: 1

SUMMARY SHEET		
Sr.no.	**Activity**	**Total no.**
1.	No. of operation	10
2.	No. of inspection	4

3.	No. of transport	10
4.	No. of delay	2
5.	No. of operation and inspection	3
6.	No. of change point	2
7	No. of operation and transport	2
8.	Total distance moved	716 steps
9.	Total time	1 hour

It was observed from Table 1 that duration of the study was one hour and total distance travelled during one hour while doing activities were 716 steps. It was also observed that total numbers of operation during the activity were 10, 4 times inspection were done of the activity by the worker, transportation of the can's from one to another were done 10 times, 2 times activity were stopped due to breakage of sliver, changing of the can's were also done i.e. 2 times , 3 times operation + inspection were done simultaneously and operation and transportation were also done simultaneously 2 times.

B) SLUB ATTACHMENT

All the activities which was going on the machine under the categories of operation, inspection, transportation, delay, operation and transportation:

1. Operation:

- Operation the machine
- Cleaning of the machine to the pressure pipe
- Again start operation
- Rejoin the yarn and again start work
- Fill the yarn for bobbin frame
- Clean the floor for pressure pipe
- Restart the operation
- Pressure pipe for clean the floor and machine
- Again start the machine
- Again fill the yarn for bobbin frame

2. Inspection:

- Worker inspection the yarn binding then machine
- Inspection for the worker
- Inspection for the worker
- Inspection for the worker

3. Transport:

- Worker yarn bobbin fill from the bobbin frame
- Move the worker again
- Worker move for cleaning

4. Delay:

- Delay due to cleaning
- Work delay because breakage of yarn for bobbin
- Delay of work due to cleaning
- Delay work due stop the machine by mechanics

- Take a break for the worker

5. Operation and inspection:

- Worker check the wax coating role in machine

6. Operation and transport:

- Worker fill the yarn for bobbin frame
- Worker remove empty bobbin &putting filling bobbin in the ring frame
- Worker move for clean the floor and machine by pressure pipe

FLOW PROCESS CHART OF THE ACTIVITY:

ACTIVITY	SYMBOLES	TIME TAKEN
1. Operation the machine		10:10 am
2. Worker inspection the yarn binding then machine		1:10 sec.
3. Cleaning of the machine to the pressure pipe		4:25 sec.
4. Delay due to cleaning		
5. Again start operation		30 sec.
6. Worker yarn bobbin fill from the bobbin frame		5:20 sec.
7. Work delay because breakage of yarn for bobbin		1:35 sec.
8. Rejoin the yarn and again start work		
9. Workers fill the yarn for bobbin frame		3:10 sec.
10. Move the worker again		2:25 sec.
11. Fill the yarn for bobbin frame		4:40 sec.
12. Inspection of the worker		
13. Delay of work due to cleaning		
14. Clean the floor for pressure pipe		6:05 sec.
15. Worker move for cleaning		
16. Restart the operation		1:20 sec.

17. Worker remove empty bobbin &putting filling bobbin in the ring frame — 3:30 sec.
18. Delay work due stop the machine by mechanics — 10:30 sec.
19. Pressure pipe for clean the floor and machine — 5:25 sec.
20. Worker move for clean the floor and machine by pressure pipe
21. Inspection for the worker — 1:20 sec.
22. Again start the machine — 30 sec.
23. Take a break for the worker — 3:35 sec.
24. Inspection for the worker — 20 sec.
25. Worker check the wax coating role in machine — 2:45 sec.
26. Again fill the yarn for bobbin frame — 5:10 sec.

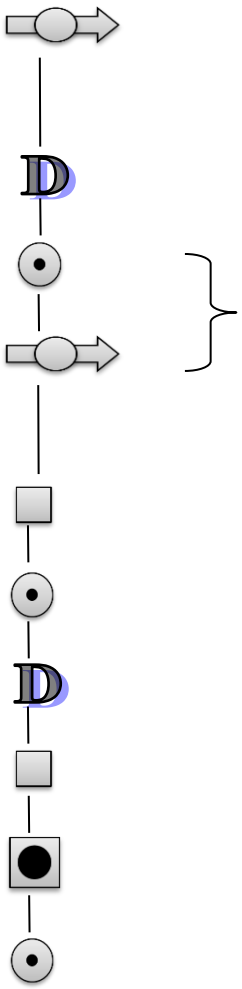


Table: 2

SUMMARY SHEET		
Sr.no.	**Activity**	**Total no.**
1.	No. of operation	10
2.	No. of inspection	4
3.	No. of transport	6
4.	No. of delay	5
5.	No. of operation and inspection	1
6.	No. of operation and transport	3
8.	Total distance moved	219 steps
9.	Total time	1 hour

It was observed from Table 2 that duration of the study was one hour and total distance travelled during one hour while doing activities were 219 steps. It was also observed that total numbers of operation during the activity were 10, 4 times inspection were done of the activity by the worker, transportation of the workers for yarn bobbin fill from the bobbin frame from one to another side were done 6 times, 5 times activity were stopped due to breaking of yarns and mechanics, 1time operation and inspection were done simultaneously and operation and transportation were also done simultaneously 3 times.

4. CONCLUSION

The time and motion study is to identify value added and non-value added activities to reduce cost and increase the productivity. The motion and time study during the working of worker were analyzed and reported. During first activity worker done by more operation and transportation in mill. They work continue without taking any rest. I would advise that one more worker should be kept in this works so that the workload on the worker will be less and the work will also be more. Then second activity slub attachment two workers are work in to slub attachment machine one worker are observed numbers of operation and delay of machine is more. During the activity delay more due to mechanics repairing the machine. Then delay of machine less the work productivity. The observation of all activity has to done by worker. There were number of operation, inspection, delay, changing point, transportation and also two activities were done simultaneously. Slub attachment activity the most efficient work process as compare to finisher D/F. Then calculate during working on machine accurate time for the processes and thereby find out the exact finishing time.

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