



## TIME AND MOTION STUDY OF WORKER

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### ABSTRACT

Time and Motion study refers to a broad branch of knowledge dealing with the systematic determination of preferable work methods, with the determination of the time required for the use of human or machine to perform the work by the stipulated method. This paper presents a study on utilization of time and motion study techniques applied to a production line of cotton yarn manufacturing industry. The study was done on two machine i.e. Breaker D/F and TFO in cotton mill. All the activities and number of activities done on the machine was categorized like operation, inspection, delay, storage, transport etc. On the basis of the sequence of the activity flow process chart were made, total distance travelled during the whole activity for one hour was measured and summarized. The analysis of whole activity was done through observation method.

**Keywords:** Cotton Mill, Motion and Time

### 1. INTRODUCTION

The motion study aspects consist of a wide variety of procedures for the description, systematic analysis and improvement of work methods considering the raw materials, the design of the outputs, the process or order work, the tools, workplace and equipment for each step in the process and the human activity used to perform each step. Time study when aspects of time study contains a wide diversity of procedures to determine the amount of time required, under an excellent measurement of the state, for work associated with the human, machine or combination of both. It is the huge thing in religion, philosophy and science but it is define in a situation without controversy, that could be avoid consistently because it suits all kind of field. The term time and motion study refers to a broad branch of knowledge dealing with the systematic determination of preferable work methods, with the determination of the time required for the use of human or machine to perform the work by the stipulated method (Bon and Daim, 2010).

There is a close link between time study and motion study, both are work measurement techniques which are used by industrial engineers to enhance the performance or the operational efficiency. Motion study concerned with the reduction of work content, wastes and posture difficulties that leads to worker fatigue and aims for establishing the best possible way of doing work whereas time study is concerned with investigating and reduction of any non-value added activities associated with the job and establishing standard time for an operation (Guha and Verma, 2020).

By utilizing the time and motion study, a better way to perform the operations of a process can be developed. To each operation, standard motion and time are assigned, which must be followed so that the organization finds better results in the market in which it operates (Henrique *et al.*, 2018).










Time and motion study (TMS) assist management to determine how much is produced by workers in a specific period of time, therefore making it easier to predict work schedules and output (Ghani *et al.*, 2020). TMS became a necessary tool for businesses to be successful today. Both the manufacturing and service sectors utilizes its advantages. In this research time and motion study is applied in a manufacturing setup which are highly repetitive. In repetitive tasks process time reduction and worker satisfaction and productivity are major concerns of management, as these tasks are boring, monotonous, fatiguing, de-motivating and consequently affect productivity and satisfaction ( Shikdar and Das, 2003).

An extensive study has evolved over the years which are designed to enhance productivity of organizations and individuals making up the organizations. Design of methods and elimination of unnecessary tasks are the most significant objectives of time and motion study.

### 2. METHODOLOGY

Present study was conducted in DCM, Cotton Mill, Hisar. To study the time and motion during the working on the machine. In DCM Cotton Mill there were lots of machine on which different types of operation or activities were done. So, I took only two machine for easy and effective study i.e. Breaker D/F and TFO. Complete analysis on these two machine were done. Every activity going on the machines there time taken and the motion during performing activity were observed and noted down for one hour. Every activity was categorized under the specific activity. Flow process chart were made by using the symbols of the activity and at last summarization of all activities were done. Findings were analysed, discussed and reported.

- Symbols of different Activities

ACTIVITY NAME	SYMBOLS
Operation	
Inspection	
Transport	
Delay	
Storage	
Operation and Inspection	
Change Point	
Transport and Inspection	
Operation and Transportation	

### 3. FINDINGS AND DISCUSSION

The findings from the present study was presented and discussed below:

- **BREAKER D/F MACHINE**

**Classification** of all the activities which was going on the machine under the categories of operation, inspection, transportation, delay, operation and inspection, change point and operation and transportation

#### 1) Operation

- Starting of machine (1st)
- Starting of 2nd machine
- Joining of sliver's of two cans (1st machine)
- Again joining of sliver's of two cans (3rd machine)
- Joining of sliver of two cans (1st machine)
- Starting of machine
- Joining of sliver's (1st machine)
- Joining of sliver's (2nd machine)
- Restart of machines

#### 2) Inspection

- Inspection of 2<sup>nd</sup> machine by worker
- Inspection done by another person (1<sup>st</sup> machine)
- Inspection by worker (3<sup>rd</sup> machine)
- Inspection by another person (1<sup>st</sup> machine)
- Inspection by another person (3<sup>rd</sup> machine)

- Inspection by another person (2<sup>nd</sup> machine)
- Inspection by worker (2<sup>nd</sup> machine)

### 3) Transportation

- Moving of cans towards machine (1st)
- Moving of cans towards machine (2nd)
- Moving of cans towards machine (1st)
- Again moving of cans (1st)
- Moving of cans towards (3rd)
- Moving of cans towards (1st)
- Moving of cans toward (2nd)
- Shifting of cans (1st)
- Again moving of cans (2nd)
- Shifting of cans (3rd)

### 4) Delay

- Delay in starting of Machine due to stucking of sliver (1<sup>st</sup>)
- Delaying due to breakage of sliver (1<sup>st</sup>)
- Delaying due to breakage of sliver(3<sup>rd</sup>)
- Delaying due to breakage of sliver (2<sup>nd</sup>)
- Delaying due to breakage of sliver(2<sup>nd</sup>)
- Delaying due to breakage of sliver(1<sup>st</sup>)

### 5) Operation & Inspection

- Checking and starting of machine (1<sup>st</sup>)
- Checking and putting sliver onto the equipment (1<sup>st</sup>)
- Checking and starting of machine (2<sup>nd</sup>)
- Setting of machine and restart (1<sup>st</sup>)
- Checking, setting up & restart machine (2<sup>nd</sup>)

### 6) Change Point





































- Four times changing of two cans under the 1<sup>st</sup> machine

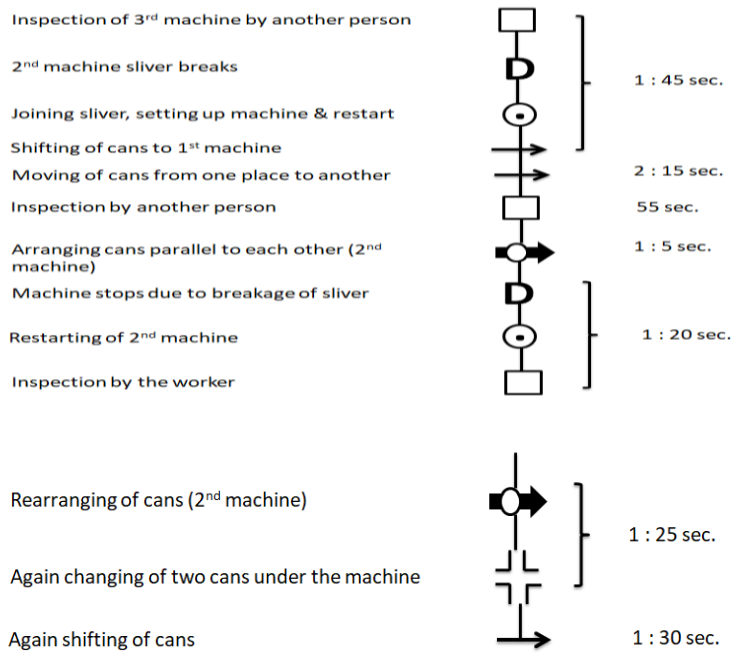
### 7) Operation & Transportation

- Parallel arrangement of cans (1<sup>st</sup>)
- Parallel arrangement of cans (3<sup>rd</sup>)
- Moving of cans and adjusting into machine (2<sup>nd</sup>)
- Rearranging of cans parallel (2<sup>nd</sup>)
- Re arranging of cans parallel (1<sup>st</sup>)

\*1<sup>st</sup> = 1<sup>st</sup> machine , 2<sup>nd</sup> = 2<sup>nd</sup> machine, 3<sup>rd</sup> = 3<sup>rd</sup> machine

## Flow Process Chart of the Activities

❖ ACTIVITIES	SYMBOLS	TIME TAKEN
Moving of cans from one place to near machine		3 : 30 sec.
Starting of machine		66 sec.
Again moving of cans towards 2 <sup>nd</sup> machine		
Starting of 2 <sup>nd</sup> machine		2 : 34 sec.
Inspection by the worker		
Moving of cans towards 1 <sup>st</sup> machine		38 sec.
Joining of sliver's of two cans		
Arranging cans parallel		2 : 16 sec.
Checking and starting of machine		27 sec.
Checking and setting sliver onto the equipments		35 sec.
Inspection done by another person		
Arranging cans parallel to each other (3 <sup>rd</sup> machine)		2 : 31 sec.
Joining of two cans sliver together		
Checking and starting of machine		2 : 13 sec.
Again moving of cans		
Changing of two cans placed under machine		1 : 38 sec.
Setting of machine and starting		
Delay in starting machine because of stucked sliver		
Moving of cans towards 3 <sup>rd</sup> machine		45 sec.
Joining of two cans sliver		58 sec.
Starting of 3 <sup>rd</sup> machine		
Again moving of cans		45 sec.
Breaking of sliver in 1 <sup>st</sup> machine, machine stops		
Joining of sliver & start's machine again		1 : 27 sec.
Inspection of 3 <sup>rd</sup> machine by worker		
Moving of cans & adjusting into 2 <sup>nd</sup> machine		2 : 38 sec.
Inspection by another person		
Joining of two cans sliver in 2 <sup>nd</sup> machine		
Changing of two cans under the machine		1 : 38 sec.
Checking and setting up 2 <sup>nd</sup> machine & starts		
1 <sup>st</sup> machine sliver breaks		1 : 10 sec.
Joining the sliver and starting machine		
3 <sup>rd</sup> machine sliver breaks		1 : 15 sec.
Joining the sliver and starting machine		
Changing of two cans under the machine		
Shifting of cans		



This study was conducted to analyze the motion and the work of the worker during working on machine. For the study one female worker was analyzed for one hour. She was working there from last 15 years and in starting she took 2 months training for the work. The distance travelled during the whole activity was 790 meters. In this flow process chart all the activities were given in the sequence as per the work done on the machine. This also shows the time taken by the individual activities. In starting worker was moving the cans towards the machine joining the two can's sliver together and fixing it into the machine after fixing machine was started similar again worker moving the can's toward another machine same process done there. It was observed that the worker was to continue to do their work without any break/rest because the observation of the machine is necessary. It was found that mostly she has to transport the cans from one place to another and joining the sliver's into the machine. There were numbers of the activities done with machine like operation, inspection, transportation, changing point. Worker has to do two activities simultaneously like operation and inspection, operation and transportation. And delays also occurs due to the breakage of the sliver's , stucking of sliver in machine or any other.

**Table 1**

Sr. No.	Activities	Total no.
1	No. of operation	9
2	No. of Inspection	7
3	No. of Transportation	10
4	No. of Delay	6
5	No. of Operation + Inspection	5
6	No. of Change Point	4
7	No. of Operation + Transportation	5
8	Total Distance Moved	790 meters
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 790 meters. It was also observed that total numbers of operation during the activity were 9, 7 times inspection were done of the activity by both the worker and the manager, transportation of the can's from one to another were done 10 times, 6 times activity were stopped due to breakage of sliver or any other reason, changing of the can's were also done i.e. 4 times , 5 times operation + inspection were done simultaneously and operation + transportation were also done simultaneously 5 times.

- **TFO (TWO FOR ONE)**

**Classification** of all the activities which was going on the machine under the categories of operation, inspection, transportation, delay, operation and transportation

**1) Operation**

- Putting JISH into the pot in lower side & binding upper-lower row Jish yarn together (1st).
- Joining the yarn of upper & lower Jish together (2nd).
- Joining of yarn and restart winding of yarn after delay (1st).
- Joining the yarn of upper & lower Jish together (3rd).
- Joining of yarn and restart winding of yarn after delay (2nd).
- Joining of yarn and restart winding of yarn after delay (3rd).
- Joining of yarn and restart winding of yarn after delay (2nd).
- Collection of Jish.
- Putting Jish into pot.
- Again collection of Jish.
- Putting cone upper side of machine for winding up the yarn onto them.
- Joining yarn from pot to the cone for winding.
- 4 times again rejoining & restart of rolls for winding after breakage of yarn.

**2) Inspection**

- Two times inspection by the worker.

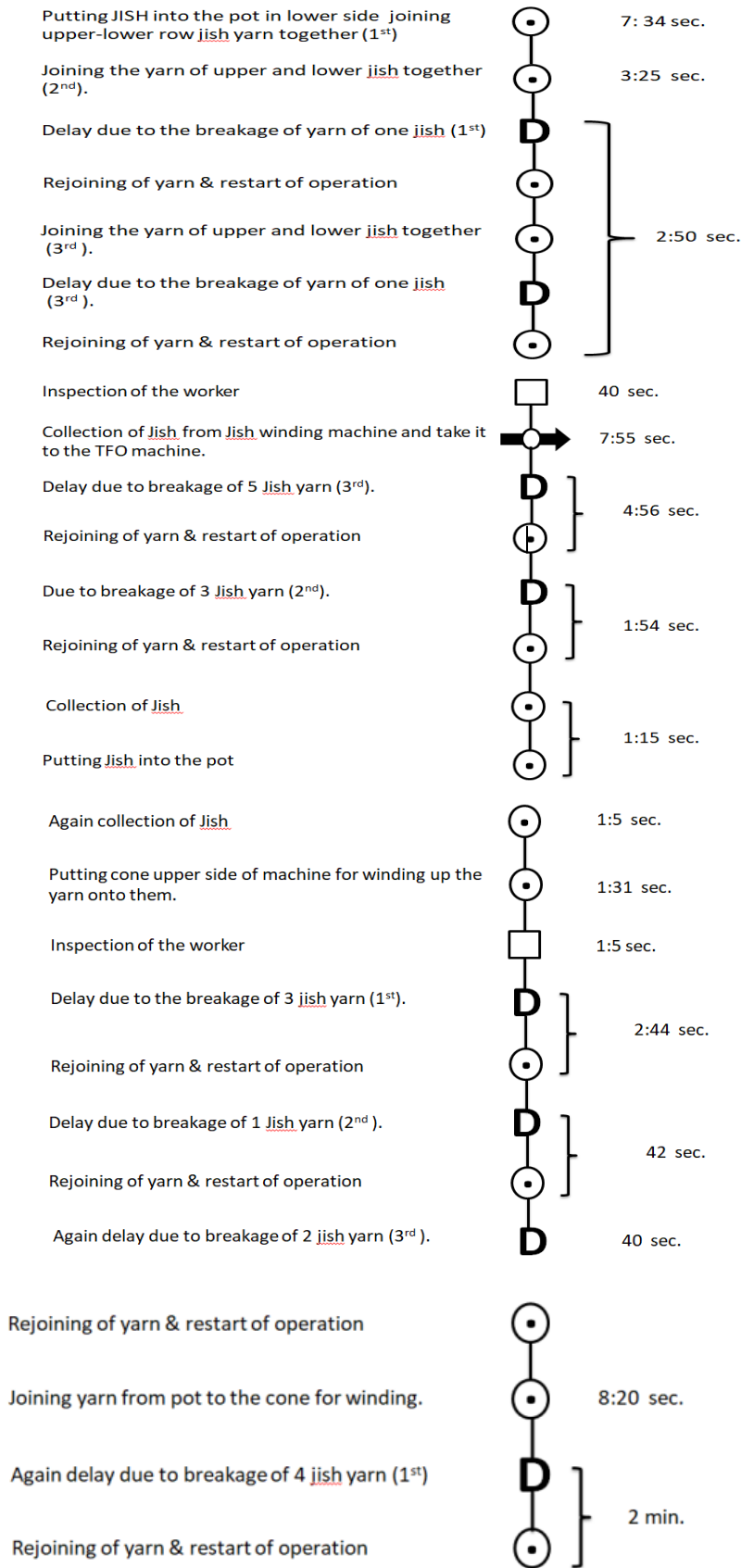
**3) Delay**

- Due to breakage of yarn of one Jish (1<sup>st</sup>).
- Due to breakage of yarn of one Jish (3<sup>rd</sup>).
- Due to breakage of 5 Jish yarn (3<sup>rd</sup>).
- Due to breakage of 3 Jish yarn (2<sup>nd</sup>).
- Delay due to the breakage of 3 jish yarn (1<sup>st</sup>).
- breakage of 1 Jish yarn (2<sup>nd</sup>).
- Again delay due to breakage of 2 jish yarn (3<sup>rd</sup>).
- Again delay due to breakage of 4 jish yarn (1<sup>st</sup>).

**4) Operation & Transportation**

- Collection of Jish from Jish winding machine and take it to the TFO machine.

**Flow Process Chart of the Activities:**



In this activity one female worker was studied who was working on TFO machine. She was working there from last 4.5 years and in starting she took training of two months. Activity was studied for 1 hour. This flow process chart shows all the activities in the sequence as per the work was done on the machine. In this activity it was found that worker has to work continue because the the observation of machine necessary if there was any kind of problem occurred that can be solved immediately. In this worker has to put the jish into the pot , insert a tube in between and in tube wire is inserted after that the yarn from the jish was joined to the yarn of jish which was placed on upper side then roll was started . Continue inspection of all these rolls were done. If there was breakage of yarn then rejoining of yarn were done and restarting of operation. In between inspection was also done by the worker that machine was working properly or not. In whole activity total distance travelled by the worker was 280 meters. All the operation, delays, inspection and other activities were studied and time was noted.

**Table 2**

Sr. No.	Activities	Total no.
1	No. of operation	16
2	No. of Inspection	2
3	No. of Delay	8
4	No. of Operation + Transportation	1
5	Total Distance Moved	280 meters
6	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 280 meters. It was also observed that total numbers of operation during the activity were 16, 2 times inspection were done of the activity by the worker only , 6 times delay of the activity were occur due to the breakage of yarns, one time operation + transportation were done simultaneously.

#### 4. CONCLUSION

From this study it was concluded that during working on one machine there was several activities which has to done. Worker have to do continue work without taking rest in between because continue observation of the activity has to done to avoid any kind of delay. It shows that there were number of operation, inspection, changing point, transportation and also two activities were done simultaneously. All the motion and time during the working of worker were analysed and reported.

#### REFERENCES

- [1] Shikdar, A. and Das, B.(2003). The relationship between worker satisfaction and productivity in a repetitive industrial task. *Applied Ergonomics*, 34(6): 603-610.
- [2] Ghani, U., Hayat, M., Khalid, Q.S. and Azam, K. (2020). Productivity Improvement Through Time and Motion Method. *International Journal of Engineering and Technology*, 12(2):108-123.
- [3] Bon, A.T. and Daim, D. (2010). Time Motion Study in Determination of Time Standard in Manpower Process. 3rd Engineering Conference on Advancement in Mechanical and Manufacturing for Sustainable Environment, pp. 14-16.
- [4] Guha, S. and Verma, D.S. (2020). Time and Motion Study in an Manufacturing Industry. *Journal of Emerging Technologies and Innovative Research*, 7(8): 2066-2072.
- [5] Henrique, P., Cury, A. and Saraiva, J. (2018). Time and Motion study applied to a production line og organic lenses in Manaus Industrial Hub. *Gest. Prod., Sao Carlos*, 25(4): 901-915.