

Time Study and Method Study Application in Machining Plant for Improvement in Production

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Abstract- Improvement in production is the main aim of any organization with less employee's effort, with justified quality and wanted quantity to be produced. To increase the quality of product 'Productivity' is the main tool. For continuous improvement in Machining industry, Productivity improvement is the very important factor to survive and for achieving the Breakthroughs in the work carried out. Taking look at the production department which include assembly line, machining shop, material handling, quality department there is some unwanted work process is done which is taking more effort, more time as well as increasing the product expense and worker experience some unwanted fatigue, so the production cycle time increases as well as productivity of the industry decreases. Quality control, Quality assurance, statistical quality control, Total quality management, etc are the Tools and Techniques which are most favourable factor for improving the quality of a product and also improvement of the productivity as well overall efficiency of the product. In the following paper introduction of quality checking technique like Autocollimator, Digital measuring instruments like Vernier, micrometre, digital roughness tester etc has been used. Compared results of process carried out before and after application of method and time study has been illustrated.

Key words- firm, breakthrough, fatigue, Productivity, method study.

1. INTRODUCTION

1.1 Time study

It is a work measurement technique for recording the times and rates of working for the elements of a job carried out with some specific conditions and analysing the data so as to obtain the time necessary for carrying out the specified job at a level which is defined for performance.

Time study procedure-

Select- selection of the job to be timed

Define- The element, Break the job into elements convenient for timing

Obtain and Record - Details regarding operator, job, method and working conditions

Extend- Observed time into normal time (basic time)

Measure- assess the rating and time duration for each element

Compute- defined job with standard time for the operation

Determine- relaxation and personal allowances

There are unnecessary processes which are conducted often the same work can be done using some simple and less complicated tools in a production department of an industry

1.2 Method study

It is the systematic recording and 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[1]

Method study involves following sequence of steps-

Select (the work to be studied)

Record (all relevant information about that work)

Examine (the recorded information)

Develop (an improved way of doing things)

Install (the new method as standard practice)

Maintain (the new standard proactive)

The work and processes studied and carried out here is done in Machining industry which is manufacturing component like frame of compound DC motor, helical shafts, hollow shafts. In order to implement method study and time study techniques are performed to increase the Productivity and meet the customer demand.

To improve Productivity in small scale industry by using work study and method study. motive behind following research behind is to improve production capabilities for small scale industries. Work study technique is used to improve work process in company, objectives of the research also identify problems in production work process and improve work process terms of the production cycle time, efficient work process to company by carrying out number of process and production rate. This study uses systematic observation, stopwatch time study and flow process methodology. Conclusion focused on improvement of work process by eliminating and combining of work process point by using multiple applications to decrease the inspection time as possible.

1.3 Wire cut EDM (electric discharge machining) – wire electrical discharge machining is a process of metal machining in which a tool discharges thousands of sparks to a metal workpiece. Wire cut EDM equipment is run by computer numerically controlled (CNC) instruments, which can control the wire on three- dimensional axis to provide greater flexibility. Simple cuts can be achieved by varying the x-y coordinates of the cutter and going for more complex cuts, adding axes of motion to the wire guides will give result

2. LITERATURE REVIEW

F. W. Taylor was the founder of Modern method and Time study. Taylor began his Time Study work in 1881. He established that each job should follow standard time, determined by time studies. In the timing process Taylor divided the work into small divisions of effort known as Elements. Time was obtained for these elements individually and their collective values were used to determine the allowed time for the task.[2]

Similarly, individuals such as Gilbreth (1909), Marshall and Cadbury heavily criticized Taylor and pervaded his work with subjectivity. 'Modern Motion Study Technique' is founded by Gilbreth. Which defined that the study of body motions used in performing an operation for the purpose of improving the operation by eliminating unnecessary motions, simplifying necessary motions and then establishing the most favourable motion sequence for maximum efficiency [2]

Allowing for the analysis of the labour process in a scientific context, Gilbreth proposed a technical language. In contrast to, and motivated by, Taylor's time study methods. Based upon the analysis of 'work motions' Gilbreths made the use of scientific insights to develop a study method. Consisting in part of filming the details of a body posture and worker's activities while recording the time. Emphasizing areas for improvement and how work had been done with visual record. Secondly, the films also helped training workers to give their best performance in working hours, these were two films served. This method allowed the Gilbreths to build on the best elements of these workflows and was able to create a standardized best practice.[2]

3. WORK OBSERVATION AND MODIFICATION

Machining process from converting raw material to well finished hollow shaft of 600mm in length, with ID QA (internal diameter QA)

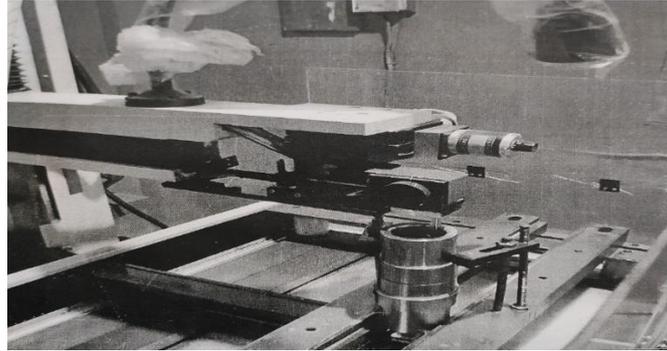


Fig-1: wire cut EDM for ID QA in Hollow shaft.

3.1 Method study and time study observation -

Table-1: Standard time required for machining

Processes involved	Timing calculated in 'Min'
Loading the workpiece in cutter machine by human efforts	20
Dimension and material checking	25
Outer Rough turning with conventional lathe machine	90
Inner turning with conventional lathe machine	120
Lathe finish/smooth turning	30
Removing of 0.2 or 0.3 mm of excess material (internal and external) with cylindrical grinding machine	120
Inspection with dial gauge	35
Giving ID QA with wire cutting machine	120
Drilling specified holes in job	90
Overall inspection by quality head	100
Job removal	25
Packaging of job (manually)	30
Cleaning the machines and Scrap disposal	60
Total	865

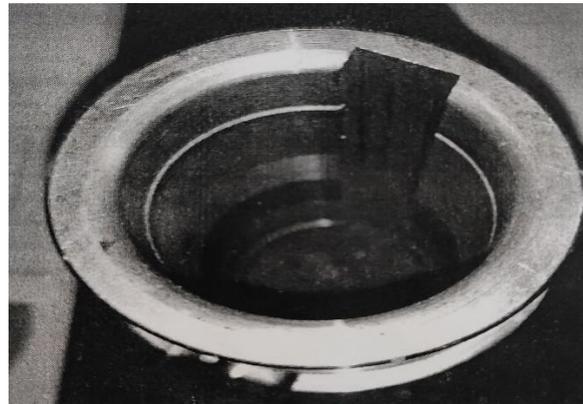


Fig-2 Ready hollow shaft

Table-2: Modified timing in Machining after implementation of Method and Time study

Processes involved	Timing calculated in 'Min'
Loading the workpiece in cutter machine by portable Gantry	10
Dimension and material checking	25
Outer Rough turning with CNC lathe	30
Inner turning with CNC lathe	50
Lathe finish/smooth turning	30
Removing of 0.2 or 0.3 mm of excess material (internal and external) with cylindrical grinding machine	120
Inspection with sine bar (flatness)	20
Giving ID QA with wire cutting machine	120
CNC Drilling specified holes in job	35
Overall inspection by the quality head with the help of modern measuring instruments (digital roughness tester, digital vernier calliper and digital vernier height gauge)	50
Job removal	25
Packaging of the job with automatic packaging machine	15
Cleaning the machines and Scrap disposal	60
Total	590

4. RESULT

Productivity: Productivity is the efficiency of production of any type of goods or services expressed by some measure.

It is the ratio of input parameter to the output parameter Reduction in production cycle time [3]

= Overall time before Modification - Overall time after modification

= 865min -590min

=275 min

Increase in productivity= $275/865 = 0.31791 \%$

% Increase in productivity = 31.79 %

4.1 Suggestions to be noted

- 5s techniques must be maintained during the inspection period.
- Use of digital measuring instrument.
- Conventional machining instead of non-conventional machining.

5. CONCLUSION

The above result concludes that proper use of method study and time study can increase the rate of productivity and desired production can be achieved by proper utilization of machines and material according to the required job. Worker's fatigue can be minimized by applying the following techniques in particular industry. As time is saved, a different task can be assigned according to the potential of the individual resulting in productivity. Also, time consumed in unwanted operations can be saved.

The above method helped in increasing productivity up to 31.79% and the reduction in time is 275 minutes.

6. REFERENCES

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