

# “A Review on Productivity Improvement For Machining Process By Using Time & Motion Study”

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**Abstract :** The Purpose of productivity improvement on Material handling, as various operations are performed on Radial Drilling machine. Most of the time, machine is in idle condition due to worker’s fatigue, during scrap handling, product management and breakdown. So production out from machine is decreases. The paper presents the review of productivity improvement methods using motion study & time study. Using motion study ineffective motion of worker is eliminating and replace it with effective motions. Time study helps to analyze time require completing each operation and finding out bottleneck operation. After analyzing bottleneck operation, time required for that operation is minimizes by using another alternate working method.

**IndexTerms - Radial Drilling machine, productivity improvement, idle time, time study, motion study, bottleneck operation.**

## I.INTRODUCTION

This paper all about productivity improvement of Radial Drilling machine of Drilling capacity 60mm & Overall Power capacity 9 kw, to improve productivity in the Radial Drilling machine follows various methods and improve the quality of product produced and also the worker performance. Productivity is the quantitative relation between what we produce and what we use as resources to produce them i.e., an arithmetic ratio between the amount produced (output) and the amount of resources used in course of production (input). The productivity is mainly coming from the following parameter, viz.

- Technology Based
- Employee Based
- Material Based
- Process Based
- Product Based
- Task Based

Among this parameter the technology based includes the computer aided design (CAD), computer aided manufacturing (CAM), which is very much useful to design and control the manufacturing. It helps to achieve the effectiveness in production system by line balancing. Material based includes the Material planning and control, Purchasing, logistics, Material storage and retrieval, source selection and procurement of quality material, Waste elimination. And Processes based is the Methods engineering and work simplification, Job design evaluation, job safety, Human factors engineering and Product Based is value analysis and value engineering Product diversification, Standardization and simplification, Reliability engineering, Product and promotion and task Based includes Management Communication in the organization, Work culture, Motivation, Promotion group activity.

For improving the productivity, the parameter machine and man is fixed and we have to improve the productivity of industry for that we study about Radial Drilling machine, this is the metalworking machines used primarily to cut, drill, boring, reaming, counter boring or form metal using tooling attached to the slide (ram) and bed. The main components for power transmission on a machine are the clutch, flywheel, and crankshaft.

This power press has a capacity of 300MT. different press cutting operations are as follows,

**1. Drilling :** Drilling is a cutting process that uses a drill bit to cut a hole of circular cross-section in solid materials

**2. Boring:** In machining, boring is the process of enlarging a hole that has already been drilled .

**3. Reaming:** Reaming has been defined as a machining process that uses a multi-edged fluted cutting tool to smooth, enlarge or accurately size an existing hole

**4. Counter Boring:** A counter bore is a cylindrical flat-bottomed hole that enlarges another coaxial hole, or the tool used to create that feature.

To improve the productivity of industry we use to prefer the work study method. Work-study forms the basis for work system design. The purpose of work design is to identify the most effective means of achieving necessary functions. This work-study aims at improving the existing and proposed ways of doing work and establishing standard times for work performance. Work-study is encompassed by two techniques, i.e., method study and work measurement. “Method study 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.” Work study includes the time study and the motion study. Time study is the A work measurement technique for recording the times and rates of working for the elements of a specified job carried out under specified conditions and for analyzing the data so as to determine the time necessary for carrying out the job at the defined level of performance. In other words, measuring the time through stop watch is called time study.



Figure :1.1

## II.OBJECTIVE

When we visit the industry in a given interval we observed that the radial drilling and horizontal milling machine performing drilling, boring, reaming and counter boring operations to the casting. There is only one product is produced from the radial drilling machine, for products we used to take readings of operations by the time study. We find out the problem area and process type that they follow for production. According that our main objectives behind the productivity improvement in industry is to improve the overall productivity of the press machine by the means of time and motion study for achieving this we have some objectives that are,

- **To minimize the time required for ineffective motions:** - This refers to the extra time which required to the employee apart from the production of product. This ineffective motion made much more impact in the productivity because it consumes more time for production.
- **To minimize the idle time of machine:** - The idle time is the time in which the machinery (i.e. power press) is ON but there is no production done. If this time is much more than the idle time then it consumes the more electricity and ultimately affect the economy, if we able to reduce that much of time it will defiantly make good impact.
- **To reduce the time required for product and scrap handling:** - when we make visit to the industry we observed that the product and scarp handling take much more time hence, this is a one of the objectives of our project.
- **To create better working environment for reducing the fatigue of employees:** - This refers to the surrounding space where the employee is working, this means the aesthetics of the working area which directly or indirectly the reasons for fatigue of employee. If we improve it will improve the performance of employee.

## III.METHODOLOGY

To start of this project, To we arrange meeting with plant head in the first week is discus to manage the schedule of weekly meetings and the schedule of weekly visits to the industry. In that meetings we decided to divide our team into two groups and visit the industry alternately for more precious data collection. During this meetings plant head told us industry working on the lean manufacturing approach. The purpose is to inform the plant head on the progress of the project and guided by the plant head to solve difficulty. Briefing based on the introduction and next task of the project is given by supervisor. Make research of literature review with the means of the internet, books, available published articles and materials that is related to the title. For achieving the productivity improvement, we concern with them and start the detail observation of the operation study on the basis of that we decided to follow the work study method which includes the time study and motion study. After that we made the therblings for the time study approach to solve the problems and improvement in productivity. In that we visited the industry more than fifteen days and the methodology that we were going to follow as,

- 1) Collecting data from machine
- 2) Analyzing the data
- 4) Organizing the solutions

According to the methodology the working starts as our first method is to collected data from radial drilling machine, in that on the first day we used to understand what actually employs performing the tasks and from next visits we collect data in the form of time. For the data collection we follow the therblings they are select, grasp, hold, inspect, release load, avoidable delay unavoidable delay, rest for overcoming fatigue, product handling, product settlement, break down time, other work, idle time, total time required for the production made from single casting. During this visits we were got the chance to see the gear changing of machine. We also made the readings for that in that we observe that much of the time is required for the tool changing operation. This may be a bottle neck operation which is given from the literature survey. During data collection it is seen that every day there is different operator operates the radial drilling machine therefore data is collected for all the product produced. .

After the completion of the first stage of our methodologies we proceed towards the next step that is Analyzing the data in this step we are going to analyzing the data that we are already taken by means of different approaches like analyzing data by

use of software like Microsoft office Excel by plotting the different charts and graphs among the different therblings and we try other approach like TAGUCHI METHOD. And we are also going to use the Time Vs Strip Curve. After this step our next methodology is Predicting the failures which includes the identification of the causes that affects the productivity of that industry in that stage the analyzed data helps us for predicting the failures and the failures that occurring during operation were noted by our team segregation of this failures are also done in this step. After that our last methodology is to organize the solutions in the steps we are going to provide the solutions on the problem which are identified some solution are in the form of additions attachments to the roller conveys, in the form of CAD MOUDLING and working prototype of the solution.

Among our methodology first one collection of data form machine, here is one sample of this step when we visited industry.

A. Product name: Clutch Housing

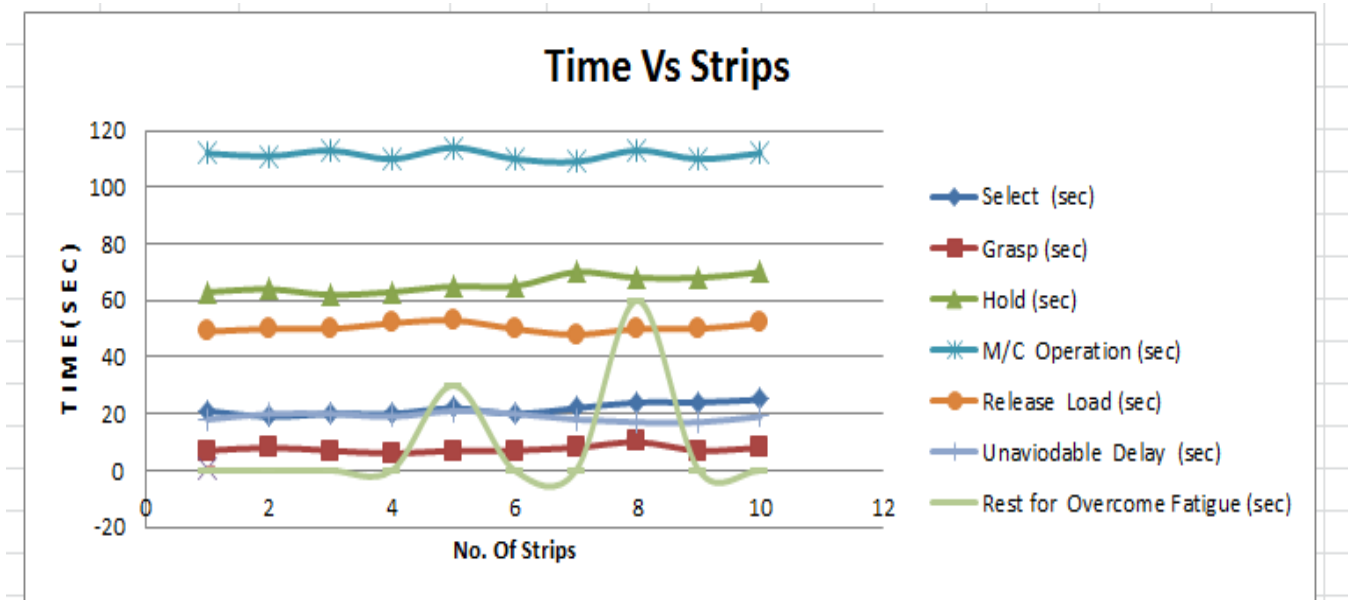
B. Dimension of raw strip: - Length=82 mm  
Width=457.2 mm

C. Number of product: - 10 per strip

	A	B	C	D	E	F	G	H	I	J
1					M/C	Release	Unavoidable	Rest for	Total	Average
2	No. of	Select	Grasp	Hold	Operation	Load	Delay	Overcome Fatigue	Time	Time
3	Strips	(sec)	(sec)	(sec)	(sec)	(sec)	(sec)	(sec)	(sec)	(sec)
4	Strip 1	21	7	63	112	49	18	0	270	
5	Strip 2	19	8	64	111	50	20	0	272	
6	strip 3	20	7	62	113	50	20	0	272	
7	Strip 4	20	6	63	110	52	19	0	270	
8	Strip 5	22	7	65	114	53	21	30	312	284.7
9	Strip 6	20	7	65	110	50	20	0	272	(sec)
10	Strip 7	22	8	70	109	48	18	0	275	
11	Strip 8	24	10	68	113	50	17	60	342	
12	Strip 9	24	7	68	110	50	17	0	276	
13	Strip 10	25	8	70	112	52	19	0	286	
14								TOTAL TIME	2847	

Table:-1.1

- GRAPH: -



Graph:1.1

#### IV. PROBLEM IDENTIFIED

When we visit the industry for data collection purpose, while this observation we observed some difficulties which employ faces during production cycle of this Radial Drilling Machine also the difficulty in material handling and other problems which directly or indirectly affect the productivity and performance of worker. Some of these problems are listed below,

- More time consumes during product handling process.
- Buffer storage of casting is more when reference point has to be done.
- Factor of safety for the worker is less.

Above problems plays an important role in productivity of industry, as we consider the first problem that is more time consumption during the product handling process, here is observed that the product settlement is full manual and there is no any mechanism or extra arrangement is provided for handling mainly the product Clutch housing because of its dimension the handling of this product is difficult in nature and requires more time we are trying to reduce the handling time of the product. Next problem found is that the buffer storage of casting is more after creating the reference point. Because radial drilling machine having two jigs and fixtures to create reference points on the casting therefore before milling machine there are more buffer storage created.

Our further observation identifies that after some period buffer storage created on the other machine after radial drilling machine. This problem occurs only in horizontal milling machine because there are two fixtures in the radial drilling machine. Next problems which comes during the tapping operation the minor tapping on the product. The Operator have visual problems doing same operations then after extra time needed to the operator.

#### V. CONCLUSION

From the above study, it was found that for improve productivity we have to work maximum time on machine and reduce time consumption in non-productive processes. We were seen that maximum time consume in product and scrap handling, which are handled by manually. So that the process product management and scrap handling becomes bottleneck processes. After analyzing bottleneck operations providing solution of product handing and scrap handling.

#### VI. REFERENCES

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