An optimization of process parameter in crankshaft using with time study method

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***Abstract* - The purpose of this project is to reduce the machining time of a crankshaft machined in a small scale industry were most of the work is done manually. The systematic stop watch time study is applied on various processes of operation performing in the machining unit & total time is Calculated thoroughly. Better utilization of man power, decreasing lead time, reduction in cost of component by implementation this observed solution in the running processes. In that we considered each part involved in machining process life Job setting time, tool setting time, job unloading time etc.Primary aim of project is improve the productivity & reduction in time our project basically study based project.**

INTRODUCTION

Crank shaft is use now a days in most of the automobile vehicles. It converts the reciprocating motion into rotary motion in automobile vehicles while it converts the rotary motion into reciprocating motion in compressor. It is typically connected to a flywheel to reduce the pulsation characteristic of four stroke cycle, and sometimes a torsional vibrational damper at the opposite end, to reduce the torsional vibrations often caused along the length of the crankshaft by the cylinders farthest from the output end acting on the torsional elasticity of the metal.

The importance of lead and flow time reduction is highlighted by the fact that it is one of the few strategies that sales and production departments can agree on. from the perspective of sales, shorter lead times;

1. Offer the ability to quote faster delivery to customers.
2. Lessen the impact of cancelled orders.
3. Reduce the need to make forecasts about future demand.

Different objectives of reduce the time is as bellow ;

1. Reduce Cycle Time
2. Reduce Cost
3. Quality Improvement
4. Reduce Customer end rejection
5. Focus on continuous improvement
6. Reduce man power .
7. Enhance efficient and effective use of resources

TIME STUDY PROCEDURE

Time study conducted for measuring work in process. Before making this time study each operation was broken into definite number of elements, which are not large or too short in time, then selected average cooperative operator(s). The stopwatch time study is used to analyze a specific process by qualified workers in an effort to find the most efficient ways in terms of time. Moreover, this method measures the time necessary for a work process to be completed using the best ways. The time was measured using snapback stopwatch equipment because it is easier and faster in data recording. Moreover, this type of stopwatch is suitable for this research because it can develop accurate data. This allows the element times to be entered directly on the time study sheet without the need for subtractions. Observe operators performing a task: record time taken for each element, over several cycles. Our objective is to record the time taken to perform an activity and to give the ratings of that activity. Assign appropriate allowances (e.g. Allow time for necessary but non-productive activities, such as rest, cleaning eyeglasses, etc.) Determine appropriate work standards, with the objective to eliminate idle activities and to set a new standard time to calculate the standard time of each operation Generally, the following procedure is followed in conducting stop watch time study:

1. Selection of task to be timed: Select the task or job that needs to be timed for study purpose. There are various priorities on the basis of which task or job to be studied is selected such as bottleneck or repetitive jobs, jobs with longer cycle time, to check correctness of existing time, comparison of two methods etc
2. Standardize the Method of Working: To achieve performance standard accuracy it is necessary to record the correct method of working.
3. Select the operator for study: Select the consistent worker whose performance should be average or close to average so that observed times are close to normal times.
4. Record the details: The following information is recorded on observation sheet: Name of labor, task/job performed,

department, section of work activity, general information about activity performed etc.
5. Break the task into element: Each operation is divided into a number of elements. This is done for easy observation and accurate measurement.

6. Measure the time of each element using stop watch: The time taken for each element is measured using a stop watch. There are two methods of measuring. viz., Fly back method and Cumulative method. The time measured from the stop watch is known as observed time.
7. Determine standard rating: Rating is the measure of efficiency of a worker. The operator's rating is found out by comparing
his speed of work with standard performance. The rating of an operator is decided by the work study man in consultation with the supervisor. Various rating methods used are speed rating, synthetic rating and objective rating.
8. Calculate the Normal time: The observed time cannot be the actual time required to perform the work for a worker. Therefore, Normal time needs to be calculated. Normal time is the time that a worker takes when working at normal pace.
It is calculated as below:

Normal Time = Observed time * Rating

9. Determine the allowance: A worker cannot work all the day continuously. He will require time for rest going for toilet, drinking water etc. Unavoidable delays may occur because of tool breakage etc. So some extra time is added to the normal time. The extra time is known as allowance. It is generally allotted as per the company policy.
10. Determine the standard time: The standard time is the sum of Normal time and allowances. Thus it is calculated as below:

Standard Time = Normal Time + Allowances

Table -1 Time Observed in Machining Operation before Modifications

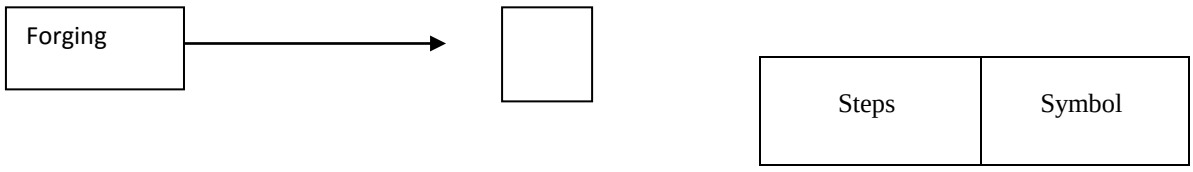
Sr.No.	Process/operation	Mounting Time	Machining Time	Un mounting Time
1.	Pin Turning	00:44.62	02:06.86	00:19.18
2.	Pin Grinding	00:09.24	03:29.78	00:08.38
3.	Turning Taper side	00:16.71	02:33.16	00:06.20
4.	Taper dia. Grinding	00:08.43	06:42.51	00:07.44

Total Time of Machining before modifications = 15.32 minutes

MODIFICATIONS IMPLEMENTED

If depth of cut is increased in turning than lesser amount of material is required to remove in grinding so that the time required in grinding is reduced. This is preferable as the purpose of grinding is surface finishing, roundness. If the depth of cut during the pin turning operation is increased by 0.25 mm in an extra pass, the time of machining is increased but the grinding time is reduced. This results in the net reduction in time of the complete process of rough and finish machining. As the mounting and un mounting time will remain same in both the cases so, only machining time is considered with the results.
Our project is related to time study so we need to decrease the cycle time of any machining operation. First we saw the layout of industry. In industry we found that the drilling and rimming is done in one department and the grinding, turning and threading is done in another department. So there is increasing in time for material handling from one department to another department. So if we can change the layout of the industry the absolutely the time will decrease and we can increase the production of the industry. IN this project we need to decrease the time without compromising the cost and quality of the product
In industry the drilling and rimming operation is done in a single machine. It takes the more time for change the tool for both the operation. so if the industry will use the special purpose machine for both the operation then the time will definitely decrease and also the manpower will decrease.
In industry we also found that in tapping m/c the coolant is applied manually so the man power is increases. Now if we use the automatic coolant apply machine for tapping operation then ultimately the manpower will decrease. And also the time will decrease so production will increase.

FLOW CHART



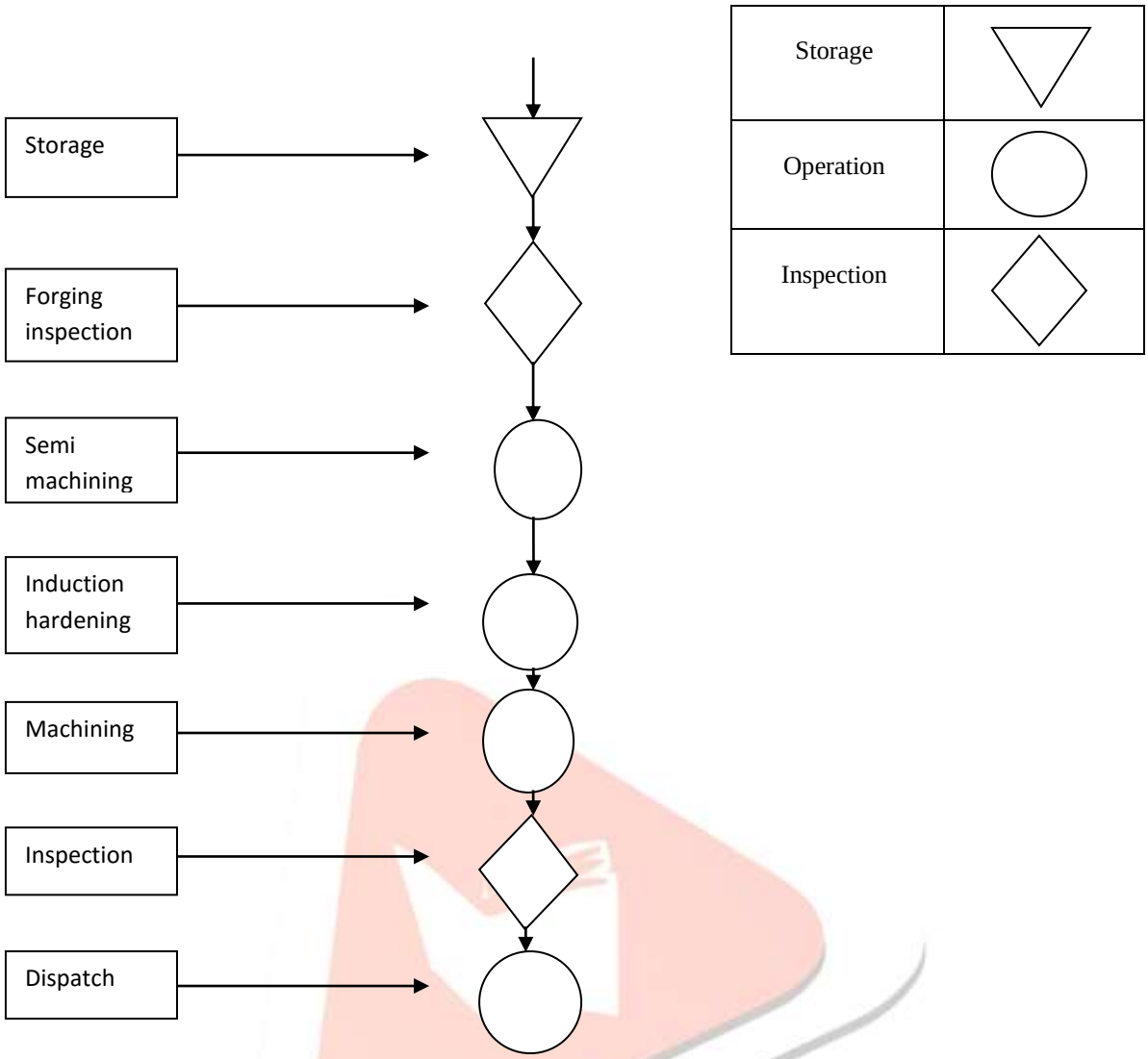


Table -2 Time Observed in Machining Operation after Modifications

Sr.No.	Process/ operation	Mounting Time	Machining Time	Unmounting Time
1.	Pin Turning	00:39.62	02:29.86	00:17.18
2.	Pin Grinding	00:08.20	01:38.64	00:07.39
3.	Turning Taper side	00:14.71	02:51.16	00:05.22
4.	Taper dia. Grinding	00:06.43	03:46.69	00:07.30

Total Time of Machining after modifications = 10.72 minutes

CONCLUSION

We know from above discussion that in an industry the general purpose machine is used and we also know the plant lay out of the industry. Now from above discussion we have concluded that if we will replace the general purpose machine by special purpose machine where drilling and rimming operation is done in single machine then we can increase the production and decrease the lead time. And if the industry will change the layout then the material handling time will decrease so the lead time will also increase.

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