

PRODUCTIVITY IMPROVEMENT of GEAR CUTTING PRODUCT THROUGH METHOD STUDY

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ABSTRACT: This paper represents the study of CNC turning process and process parameters. There are many factors that influence the productivity of a manufacturing organization. The most widely tackled issue is how to improve efficiency and productivity. Method study is basically conducted to simplify the work or working methods and must go towards higher productivity. It is always desirable to perform the requisite function with desired goal minimum consumption of resources. Throughout the study, the aim is to propose a new system to the related company to increase their productivity. The purpose of this paper is to discuss related issues of motion and time study implementation and assembly line balancing and its influence toward productivity improvement. Actual time and standardized time is compared and as a result it is aimed that measuring inevitable times and take necessary precautions against them. As a result of the study, waiting time cause inefficiency in the work of molder and in the content of work/time, efficiency is increased.

Keywords: productivity improvement, manufacturing industries, assembly line balancing, motion and time study analysis.

INTRODUCTION

Productivity improvement is to do the right things better and make it a part of continuous process. Therefore it is important to adopt efficient productivity improvement technique so as to ensure individuals and organization's growth in productivity. The aim of this chapter is to introduce and understand productivity improvement, various techniques of productivity improvement, work study and its relation with productivity improvement.

In a production department of an industry there is unnecessary processes are conducted often the same work can be done using more simple and less complicated tools. This is something that costs money and in some cases time. Planning these processes will ensure a company to avoid overwork when more simple work could perform the task. Because a very wide range of material sizes and weights are used at studied company it is important to consider what type of transportation equipment to use for each material type. It is necessary to avoid using equipment that is more complicated, heavier and takes more time to use. Initially finished components are kept directly on the pallet instead they can be kept on trolley used for transport of component (engine cover) to the next department which was paint shop. Finished component from injection molding machine to the pallet was taking unnecessary operation and increasing worker's fatigue and increase the cost of the product because of there was less component deliver in a day from production to paint shop department so by removing pallet I proposed to kept component directly on the trolley instead of pallet this will save time and will reduce the worker's fatigue so that worker can produce more component in a day.

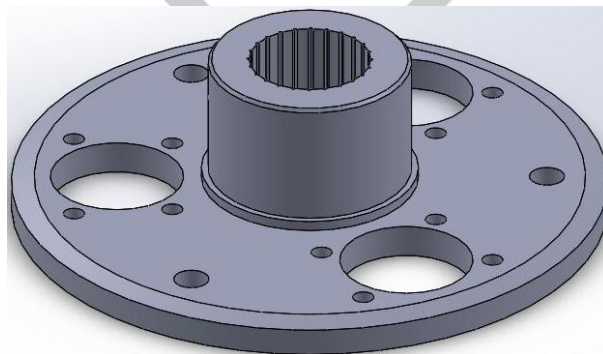


Fig. Front View

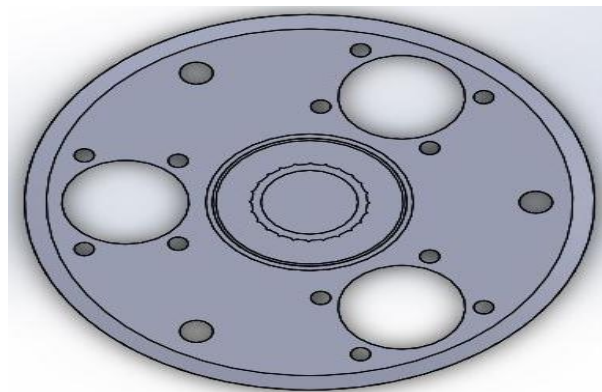


Fig: Top View

LITERATURE REVIEW

According to Mayank Dev Singh they working on “To improve productivity by using work study & design a fixture in small scale industry”. The purpose of this research is to improve production capabilities for small scale industry and this research focused on the company, which produce Stay vane of Francis turbine. This research used work study technique to improve work process in company, and the research objectives towards accomplished this study is to identify problems in the production work process and improved it in terms of production time, number of process and production rate by proposing an efficient work process to company. This research used systematic observation, flow process and stopwatch time study as research methodology. Pro-E model software used for model testing and develop new model. They concluded that the improvement of work process was executed by eliminating and combining of work process, which reduces production time, number of process and space utilization. According to Khalid S. Al-Saleh working on “Productivity improvement of a motor vehicle inspection station using motion and time study technique” This research was carried out at the Motor Vehicle Periodic Inspection (MVPI) station to improve and enhance the bottleneck inspection

METHODOLOGY

1. Study of CNC turning process and process parameters.
2. Calculate time required to produce specific operations.
3. Analyze the process and time required to complete the process.
4. Find out alternate processes or options to reduce the lengthy process.
5. Compare the actual required time with standard time of process.
6. Study on various solutions and finalize the same.
7. Implement and cross verify the final implemented solution to calculate the improvement.

EXISTING PROCESS

The process flow of existing process for the Gear Cutter product is mentioned as follows

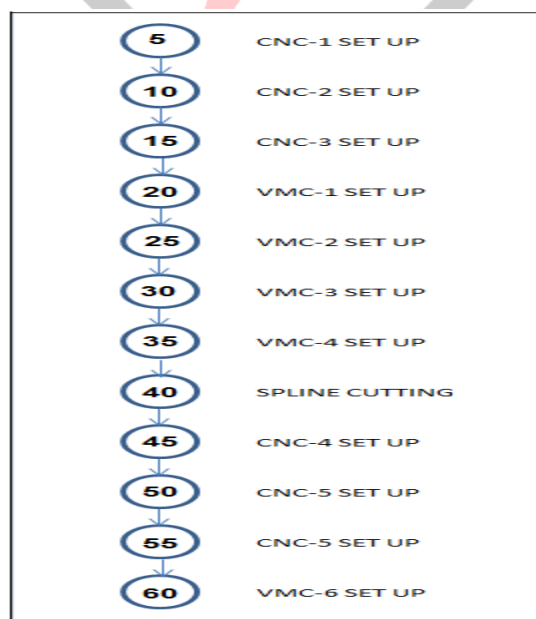


Fig 1: Process flow of Gear Cutter product (existing process)

As per the existing process flow, the product xyz need 7 processes and 120 min to produce complete component, which is in actual a time consuming process. To find out actual standard time of existing process, need to calculate it in details, following table shows the standard time calculations.

Table 1: Time calculations for existing process.

Process	Basic Time (Min)	Allowance (min)	Std Time (Min)
5	0.23	0.14	0.37
10	0.45	0.21	0.66
15	0.20	0.36	0.56
20	0.55	0.04	0.59
25	0.67	0.29	0.96
30	0.33	0.18	0.51
35	0.20	0.27	0.47
40	0.46	0.12	0.58
45	0.30	0.35	0.65
50	0.35	0.18	0.53
55	0.55	0.04	0.59
60	0.69	0.06	0.75

Total Time : 7.22

Productivity Calculation

Particular	Component produced by company		
	Per shift (8 Hrs)	Per day (24 Hrs)	Per week (6 Days)
As per Regular Process	66 Nos	198 Nos	1188 Nos

METHOD STUDY

Method Study is the first of the two main divisions of method and study and concerned with the way in which work is done. Method study is essentially used for finding better ways of doing work. It is a technique for cost reduction. The philosophy of method study is that 'there is always a better way of doing a job' and the tools of method study are designed to systematically arrive at this better way of doing a job. Method Study is a technique for improving the efficiency of every type of work, ranging from that of complete factories to the simplest manual movements used in mass production.

METHOD STUDY PROCEDURE

This procedure involves seven basic steps as follows:

SELECT: the work to be studied

RECORD: all the relevant facts about the present method

EXAMINE: the facts critically and in ordered sequences, using the techniques best suited to the purpose.

DEVELOP: the most practical, economic and effective method having due regard to all contingent circumstances.

DEFINE: the new method so that it can always be identified

INSTALL: The method as standard practice

MAINTAIN: the method by regular routine checks.

PROPOSED PROCESS

The process flow of existing process for the Gear Cutter product is mentioned as follows.

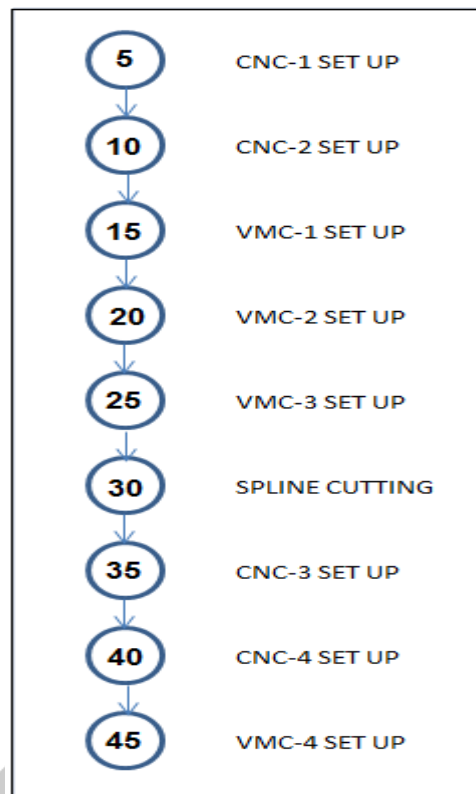


Fig 1: Process flow of Gear Cutter product (proposed process)

The process is revived and suggested several solutions, after analyzing final solution is chosen and start method study again.

Table 2: Time calculations for proposed process

Process	Basic Time (Min)	Allowance (min)	Std Time (Min)
5	0.23	0.14	0.37
10	0.39	0.21	0.60
15	0.34	0.36	0.70
20	0.50	0.04	0.54
25	0.59	0.29	0.88
30	0.33	0.18	0.51
35	0.29	0.27	0.56
40	0.47	0.12	0.59
45	0.39	0.35	0.74
Total Time :			5.49

Particular	Component produced by company		
	Per shift (8 Hrs)	Per day (24 Hrs)	Per week (6 Days)
As per proposed method	87 Nos	261 Nos	1566 Nos

RESULTS

Following results are obtained after applying method study procedure.

SN	Details	Regular Method	Proposed Method
1	Prod. per shift	66	87 Nos
2	Prod. Per day	198	261 Nos
3	Prod. Per week	1188	1566 Nos

CONCLUSION

From the above discussion it can be concluded that the process can be improved based on method study, work procedure and proper utilization of machine. It will improve the current process by reducing the process, time and the worker's fatigue. After implementing the suggested improvement ideas the firm is able to increase its productivity by 31.81%

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