Productivity Improvement Of Crankshaft

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Abstract: In this dissertation, productivity improvement of crank shaft of DUK ENGINE is carried out. This is basically depends upon company process analysis. In this we have improved the productivity by 12%.After process analysis for the current process plan of the company, identified some spaces where we were having chance for improvement. From that we reach to the conclusion, some modifications are required in the process plan, current plant layout with the help of which we can improve the productivity upto satisfactory requirement. Main part of the research is related to the study of methodologies used currently, working conditions with which staff is working as well as the material handling map for the jobs inside the premises of company which is used for the job from raw material to finished goods. While doing this We did the study for each machine operation by using the techniques of method study and time study which are related to the subject of industrial engineering. In that we considered each part involved in machining process like job setting time, tool setting time, CNC program setting time, CNC program running time, speeds, feeds, depth of cuts used for the every operation, tool life, tool changing time, job unloading time etc. Primary aim of our project is to improve the productivity and the reduction in job manufacturing cost. Our project is basically study based project. Productivity improvement is the key to improve the profit of company as well to generate better and better working conditions for the operators working at shop floor. Thus improvement in system leads to good results for company.

Index Terms: Productivity, Crankshaft, CNC, SPM, VMC, forging

1 INTRODUCTION

Productivity of the production system is analogous to the efficiency of machine just as it is described to increase the efficiency of the machine it also requires to raise the productivity of the production within available resources. Productivity is the quantitative relationship between what is produced and the resource which are consumed. Productivity may be defined as the ratio between output and input of various resources employed e.g. Land, equipments, machinery, material, labour etc. There are various types of productivity.

1. Labour Productivity - It is the ratio of number of units produced to the number of hour worked.
2. Capital Productivity - It is the ratio of output capital to the input capital investment
3. Material Productivity - It is the ratio of material output to the material input
4. Energy Productivity - In this case only energy consumed is considered

The aim of study was to improve the productivity of Crank shaft.The project of Analysis was carried out with a view to understand the applicability of the theoretical knowledge in practical knowledge.I have considered that I can take decision or make out any solution for the query by applying selective analysis; root cause analysis method for productivity improvement and there is scope that by implementation of these techniques we can achieve the aim. The focus was on decrease the cycle time for various processes; optimize utilization of resources and improvement needed in machines. This productivity improvement can make a huge difference in the profitability of a business. There are three fundamental factors those affect the productivity, in order to improve productivity of any physical item we have to make improvement on these three factors namely machinery, raw material and design

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2 OBJECTIVES

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
8. To introduce performance measure for various functions
9. Material Flow Design for Cell
10. Operator Training
11. Improve Motivation

3 WORK PERFORMED

The crankshaft, sometimes abbreviated to crank, is the part of an engine that translates reciprocating linear piston motion into rotation. To convert the reciprocating motion into rotation, the crankshaft has "crank throws" or "crankpins", additional bearing surfaces whose axis is offset from that of the crank, to which the "big ends" of the connecting rods from each cylinder attach. It typically connects to a flywheel to reduce the pulsation characteristic of the four-stroke cycle, and sometimes a torsional or 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. As specified in the scope the main objective was to analyze the Crankshaft product and identify the area of improvement which will achieve the aim to improve the productivity of Crankshaft produced. The processes involved in crankshaft are contributes to overall productivity. The below tables listed the processes where improvement is needed. Also listed the parameters of each process that affects the productivity and which is considered as focus of productivity improvement.

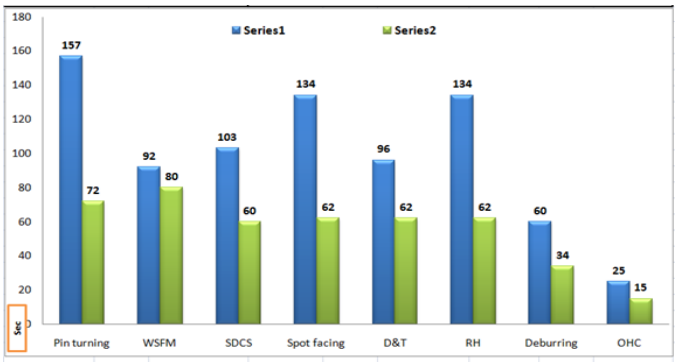
Process	Parameter
Forging	Poor Yield
Pin turning	Less productivity due to High cycle time
Web side face milling	Poor productivity
Straight Drilling Clutch side	Under utilization of VMC
Spot facing , Angular Hole drilling and Tapping	A. Poor Productivity
	B. Under utilization of VMC
Drilling and Tapping on MG side	A. Poor Productivity
	B. Under utilization of VMC
Reservoir Hole Drilling and Grooving	A. Poor Productivity
	B. Under utilization of VMC
M14 Threading	Under utilization of CNC
De-burring Of Holes	Manual dependent, hence chances of poor quality
Oil Hole continuity checking	Manual dependent, hence chances of poor quality

After analysis of the existing system, identified the following area to improve productivity.

- Reduce the material used for forged job
- Material movement across units in cell required more labour and its time consuming. Also the process/machine wait for the needed input.
- Company does not have much expertise in forging process so it can be outsourced to vendor
- Special purpose machine (SPM) should use in place of Vertical Machining Center (VMC)
- Manual operations should replace with machine to improve quality and speed

4 STATISTICAL ANALYSIS

With the implementation of proposed changes the cycle time of processes reduced



Process	Pin turning	WSFM	SDCS	Spot facing	D&T	RH	Deburring	OHC
Previous cycle time	157	92	103	134	96	134	60	25
New cycle time	72	80	60	62	62	62	34	15

5 RESULT

The cycle time is reduced with the use of special purpose machine, changing plan layout

Process	Existing	Proposed
Forging	39%	51%
Pin turning	157 Sec	72 Sec
Web side face milling	92 Sec	80 Sec
Straight Drilling Clutch side	103 Sec	60 Sec
Spot facing , Angular Hole drilling and Tapping	134 Sec	62 Sec
Drilling and Tapping on MG side	96 Sec	62 Sec
Reservoir Hole Drilling and Grooving	134 Sec	62 Sec
M14 Threading	47 Sec	Same Cycle time ,added extra machine
De-burring Of Holes	60 Sec	35 Sec
Oil Hole continuity checking	25 Sec	15 Sec

6 CONCLUSION

The overall productivity is improved with the proposed changes and these are highlights

- The forging material required quantity is reduced and resolved Poor Yield issue
- Cycle time reduced for the processes
- Use of SPM reduced cycle time and reduced manual efforts

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