Optimum Allocation of Machine for Least Manufacturing Cost

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Abstract— Optimum allocation of machine plays a crucial role and it is a skeleton for each and every company based on which purchase of raw materials, production, distribution of goods takes place. The ultimate goal of allocation of machine in MAINI is to increase productivity by reducing lead time through coordination of material, machine, men and information, which flow across the company network and the entire customer including internal and external customers. Our project title "**Optimum Allocation of Machine For least Manufacturing Cost"** that in optimization of machine allocation is implemented in MAINI through Just in Time, Work study, time study, Method study, Ergonomics. In the present scenario, industries are facing large fluctuation in the market demands/trends. A new kind of machine allocation is required in manufacturing industry which is to be adapted to cope up with these kinds of stochastic events. Roughing machine and Sliding head machine Systems is considered as modern manufacturing paradigm which offers customized functionality and capacity as per the need. The key enablers of this customization in functionality and capacity are the Roughing machine and Sliding head machine Systems, Due to the multi functionality and capacity aspect, several machine configurations can be selected along stages to perform the desired operations. Assigning machine alternatives across stations for any product flow line has direct implications on the performance of the system. In this paper, optimal configurations are selected on the basis of cost, operation capability and reliability of the machines. The objective is to minimize the cost, maximize the operation and reliability of the selected machine configuration.

Index Terms— Work Study, Method Study, Ergronomics,

1 INTRODUCTION

We are a diversified manufacturer and supplier of high precision components and assemblies, catering to a global clientele in the automotive & industrial and aerospace sectors. We believe we are a one-stop solution provider to our clients, with a capability to manufacture a diverse range of products across sectors. Key products manufactured by us for the automotive & industrial sectors include precision components, machined castings & forgings, fuel filters and sub-assemblies used in engines, transmissions, fuel injection, turbo chargers, steering & chassis, for passenger commercial vehicles and precision components, machined castings and forgings for other industries; and for the aerospace sector include precision components and sub-assemblies used in aero structures, aero engines and aircraft systems.

Work Study:

"**Work study** is a generic term for those techniques, method study and work measurement which are used in the examination of human work in all its contexts. And which lead systematically to the investigation of all the factors which affect the efficiency and economy of the situation being reviewed, in order to effect improvement."

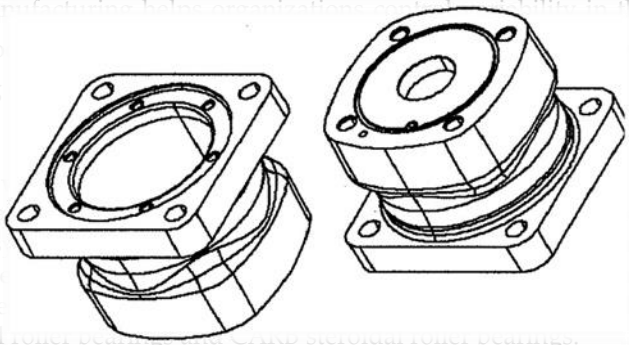
Method study:

Method study enables the industrial engineer to subject each operation to systematic analysis. The main purpose of method study is to eliminate the unnecessary operations and to achieve the best method of performing the operation.

Method study is also called **methods engineering or work design.**

Just In Time :

Just in time (JIT) manufacturing is a workflow methodology aimed at reducing flow times within production systems, as well as response times from suppliers and to customers. JIT



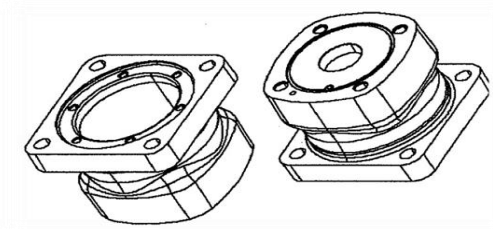


Fig 5.1 Bearing Housing (010F18220109 R1)

In the above Fig 5.1 shows the bearing house product of the MAINI PRECISION, we have been taken a two different kinds of part or two case studies in that the first case study is bearing housing its part number is 010F18220109 R1.

What Is Bypass Shaft

A bypass shaft is a rotating machine element, usually circular in cross section, which is used to transmit power from one part to another, or from a machine which produces power to a machine which absorbs power

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2 Experiment

Time study

In bearing housing and Bypass shaft part manufacturing a time study was conducted and readings were tabulated

TYPES OF M/C'S	MACHINING PROCESS	AVG TIME TAKEN
SLIDEING HEAD M/C(SPM)	Cutting, OD, Grooveing,drilling&tapping(foam tool), parting	2min 31sec
CNC 1	Rough sloting,	2min 17sec
CNC 2 (Broching tool)	Fine sloting & Notching	9min 33 sec
CNC GRINDER	Grinding	48sec
CNC 3	Maintain total length	70 sec
PRESSING M/C	Presses the CAM in to BYPASS shaft	3 to 5 sec
	TOTAL TIME TAKEN	**16min 40sec**

Bypass shaft

TYPES OF M/C'S	MACHINING PROCESS	AVG TIME TAKEN
ROUGHING M/C (SPM)	Roughing faces and external surfaces	2min 46sec
CNC 1	☐ Face Finishing Internal&External surfaces,grooving	20min 3sec
CNC 2	oFace Finishing Internal&External surfaces, Grooving	22min 21sec
VMC	Drilling, chamfering,boreing,counter boreing	18min 31sec
BEBURR M/C	Deburring & pre cleaning	47sec
LAPPING M/C	Lapping	20 min in bulk
	TOTAL TIME TAKEN	**84min 4sec**

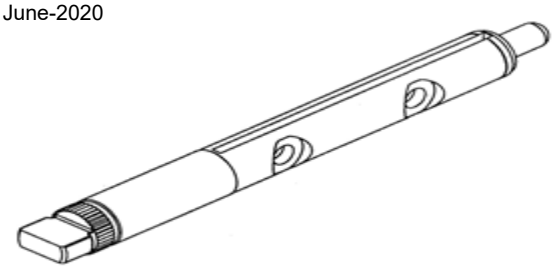


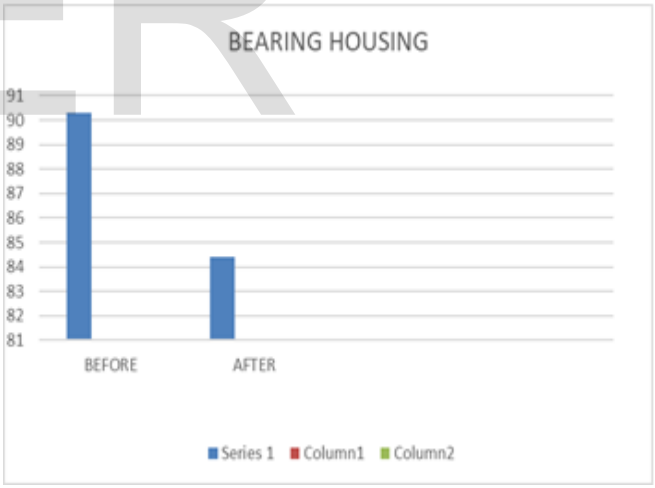
FIG 6.1 SHAFT BYPASS (010F33150661 R2)

In the above Fig 6.1 shows the Shaft Bypass product of the MAINI PRECISION, we have been taken a two different kinds of part or two case studies in that the second case study is shaft bypass its part number is 010F33150661 R2.

3 Analysis

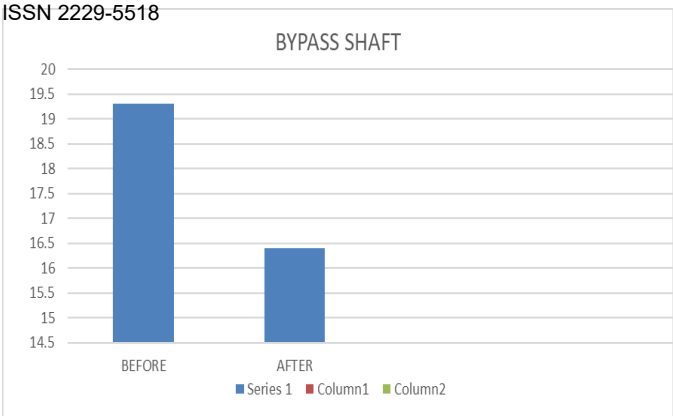
Bearing housing

No	IMPLEMENTATION MACHINE's	BEFORE	AFTER
1	ROUGHING MACHINE	90min 42sec	84min 4sec



Bypass shaft

No	IMPLEMENTATION MACHINE's	BEFORE	AFTER
1	SLIDING HEAD MACHINE	19min 3sec	16min 40sec



4 Results and discussion

RESULTS OF BEARING HOUSING and BYPASS SHAFT

Bearing housings are modular assemblies designed to make it easy to install bearings and shafts, while protecting bearings, extending their operating life and simplifying maintenance. Before roughing process done separately it has been taken more time to do other process in a same machine. To do a roughing process separately we implemented the Roughing Machine. If we do a roughing process separately we can save a more time which we can increases a production time

A bypass shaft is a rotating machine element, usually circular in cross section, which is used to transmit power from one part to another, or from a machine which produces power to a machine which absorbs power. Before implementation of Sliding Head Machine it usually taking more time it couldn't get better finishing without SHM. After implementation of Sliding Head machine it become a work better & easy it could make almost process in a SMH but notching process have to done separately. By implementation the SMP we can save more time by the way it increase the production rate.

5 Conclusion

Hence we conclude that by optimum allocation of machines and by the application of time study techniques the following reduction in time can be obtained

Time has been reduced from90min45sec to 84min4sec in(bearing housing)& from 19min3sec to 16min40sec in(shaft bypass) in machining of parts.

Production rate is improved by 17.4 %(bearing housing) and 13.6 %(bypass shaft) compared to before implementation roughing machine and slider head machine.

Cost was reduced by using the optimum allocation of machines.

Improving the quality of product by implementation of Roughing & Sliding head machine because the process has been done separately.

Reduction in overall production time.

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