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A study to Increase the Productivity of Tow hook

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Abstract*: *This study address the study to increase the productivity of tow hook. This study begins with the understanding of manufacturing procedure of tow hook. Various operations carried out on tow hook are analysed and studied deeply. The time study of all the operations is carried out and the data gathered is analysed. The problems and delays in production are identified and understood. Time study helps to find the idle time and non productive activities. Based on the data obtained the most time consuming operation is found and analysed. Appropriate solutions are suggested to minimize the time consumption. Implementing these solutions the time and energy can be utilised efficiently and effectively. This in turn leads to increase in productivity.

Keywords: Productivity, Tow Hook, Pre-priming, Time study, Production.

I. INTRODUCTION

This paper addresses the current scenario of production of Tow Hook at a small scale industry. The operations and processes carried on Tow Hook are analysed and studied deeply to understand the manufacturing processes [1]. The observation is done with the help of time study techniques [3]. The time required by each operation is noted and analysed. This is done to spot the problems in production and to increase the productivity of Tow hook. A high level of productivity can play a great role in the raising the standard of living of people. Hence getting better result by properly implementing the productivity improvement techniques is the most important task and challenge to all managers at various levels in industry. On the basis the data gathered, the operation for which comparatively more time is required is focused. It was found that Pre-priming requires the most time. Hence the whole process is studied and problems for delay and non productive activities are found [5]. The time required for this operation is optimised by suggesting appropriate solutions. This leads to increase in productivity which is the ultimate objective.

II. LITERATURE REVIEW

In manufacturing industries, assembly line is a major area to be taken into consideration for increasing productivity. Throughout this study, the aim is to propose a new system to the related company to increase their productivity [3]. This paper addresses the analysis to increase the productivity of the Fuel Injection Pump Shaft. This study starts with understanding the standard operation procedures and analyzing the process flow to get the whole idea on the production of Fuel Injection Pump Shaft [4]. Productivity increase by means of a work study in a manufacturing industry is the area of interest in this project. The project was conducted live, where in numerous types of tools and techniques were employed to improve the efficiency and productivity of industry [5]. The process of Line balancing attempts to equalize the work load on each workstation of the production line. Mixed model assembly lines are increasing in many industries to achieve the higher production rate [7].

III.DATA COLLECTION

All Data collection was done on the basis of time study approaches. The accuracy of data is extremely important as inaccurate data will lead to inappropriate results. Following table represents the time taken for the operations done for manufacturing of tow hook. It is observed that time taken by pre-priming was the highest. As per the data in table 1, graph is constructed and relative time required by operations is studied as shown in fig 1.

TABLE 1. Time Taken For Operations

Sr no.	Operation	Average time (seconds)
1	Cutting	354
2	Punching	63.5
3	Drilling	81
4	Grinding	81
5	Painting	182
6	Welding	1086
7	Pre-priming	4314
8	Heat treatment	1800

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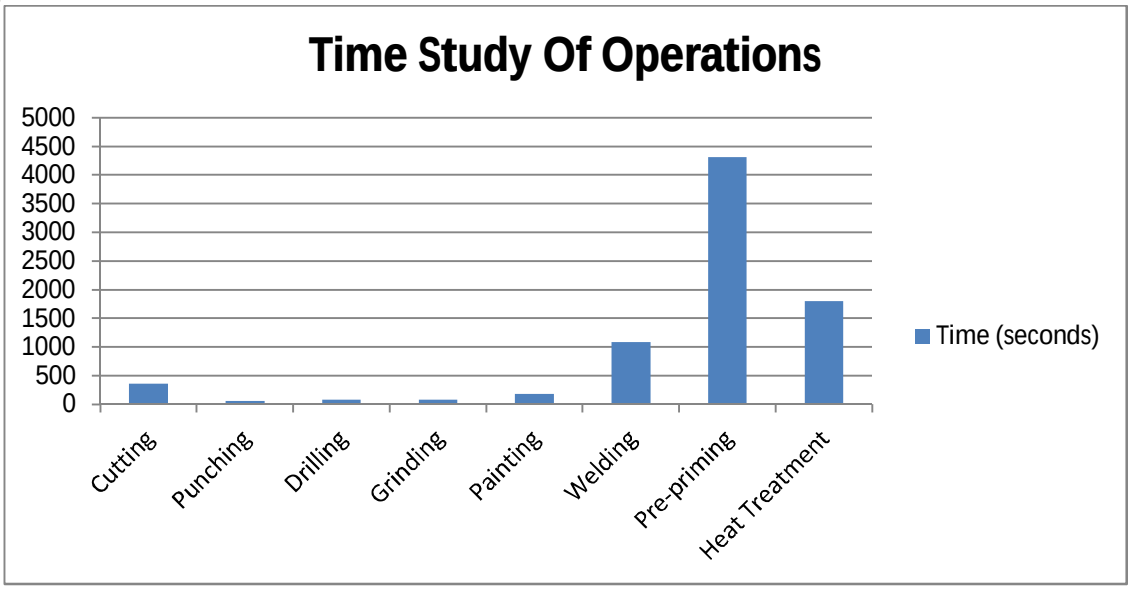

Fig 1. Time Study of Operations

IV. PROBLEM IDENTIFICATION

After analysing the time study, it was found that the time required by pre-priming operation is comparatively more as seen in fig 1. The reason for this while pre-priming the assemblies of tow hook are loaded in container and then pulled up by a chain and pulley manually and then deposited in tank. The container is dipped in three different tanks containing different solutions. Every time the container has to be pulled up and down manually. This increases the time required by operation.

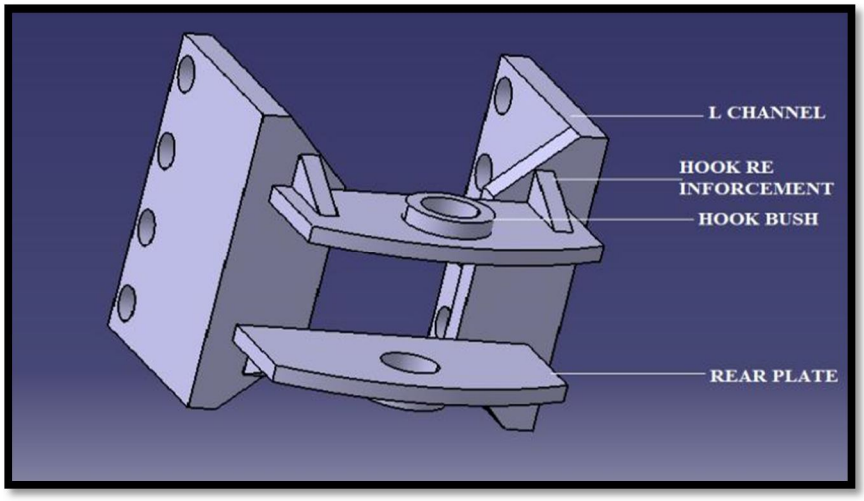

Fig 2. Isometric view of Tow Hook

V. PROPOSED SOLUTION

Instead of transporting the container manually while pre-priming, an automatic crane should be used. Now a day, automatic cranes are cheap and readily available in markets. It will eliminate all the unnecessary time required for pulling up and down the container and also decrease the loading time, thus decreasing over all time. It also reduces the work force and efforts required for the process. A lone person will be able to operate the crane all by himself. Such cranes can also be made in work shop.

They are onetime investments and there maintenance can also be easily done. Hence they are implementable. Common purpose cranes are generally single phase electric hoist with transporting speed 6 meter/min. They have low maintenance and can also be modified and automated further by users. Using a crane will greatly shorten the Transporting time while pre-priming. Table 2 shows the estimated results after implementing the solution. It is found that overall average time required per batch is reduced greatly and the man power is also effectively used.

TABLE 2
Time study of pre-priming operation after implementing solution.

Sr no.	Process	Average Time (seconds)	Total average time (seconds)
1	Transporting the assemblies	310	3986
2	Loading the assemblies in container	12	
3	Lifting the container	54	
4	Soaking in all 3 tanks	3600	
5	Storage	10	

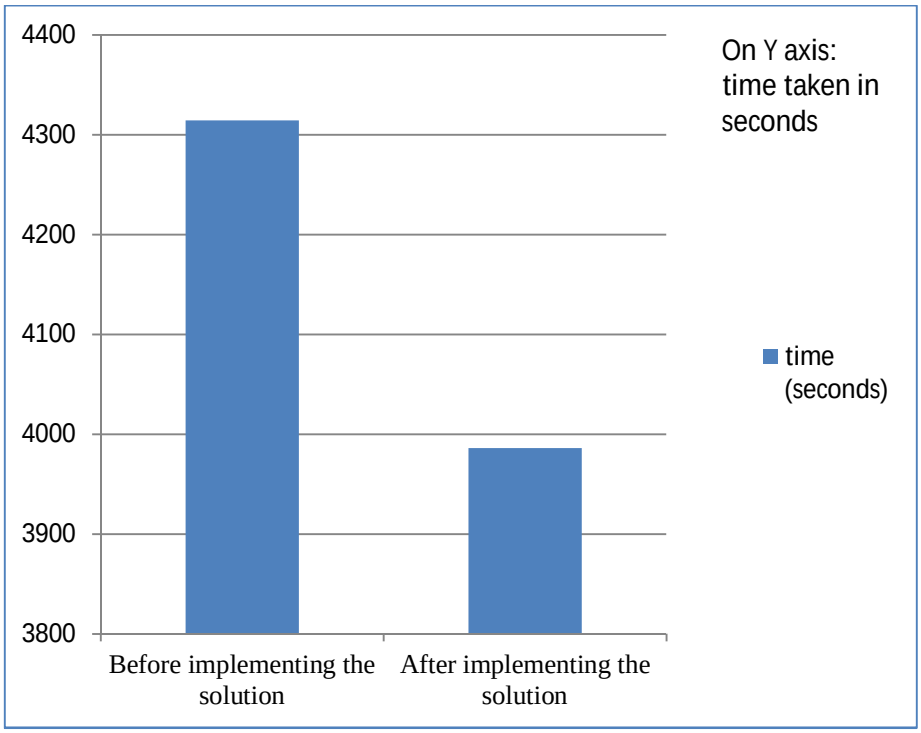

Fig 3. Comparison between assemblies manufactured before and after implementing solution.

VI. RESULTS

After implementing the solution, the time required for process is evaluated. Productivity is calculated as ratio of output to input. In this case increase in productivity is needed to be calculated. Hence the formula given below is used to calculate productivity.

Percentage increase in productivity = $\frac{Initial\ time\ taken - Final\ time\ taken}{Initial\ time\ taken} * 100$

Thus the increase in productivity is found to be 7.6%.

VII. CONCLUSIONS

This paper has highlighted and solved the problems found during the production of Tow Hook. The data collected from time study of operations lead to certain areas that were focused. The data produced was thoroughly analysed and problems were identified. Specific solutions were found to optimise the manufacturing process. Thus the productivity was increased.

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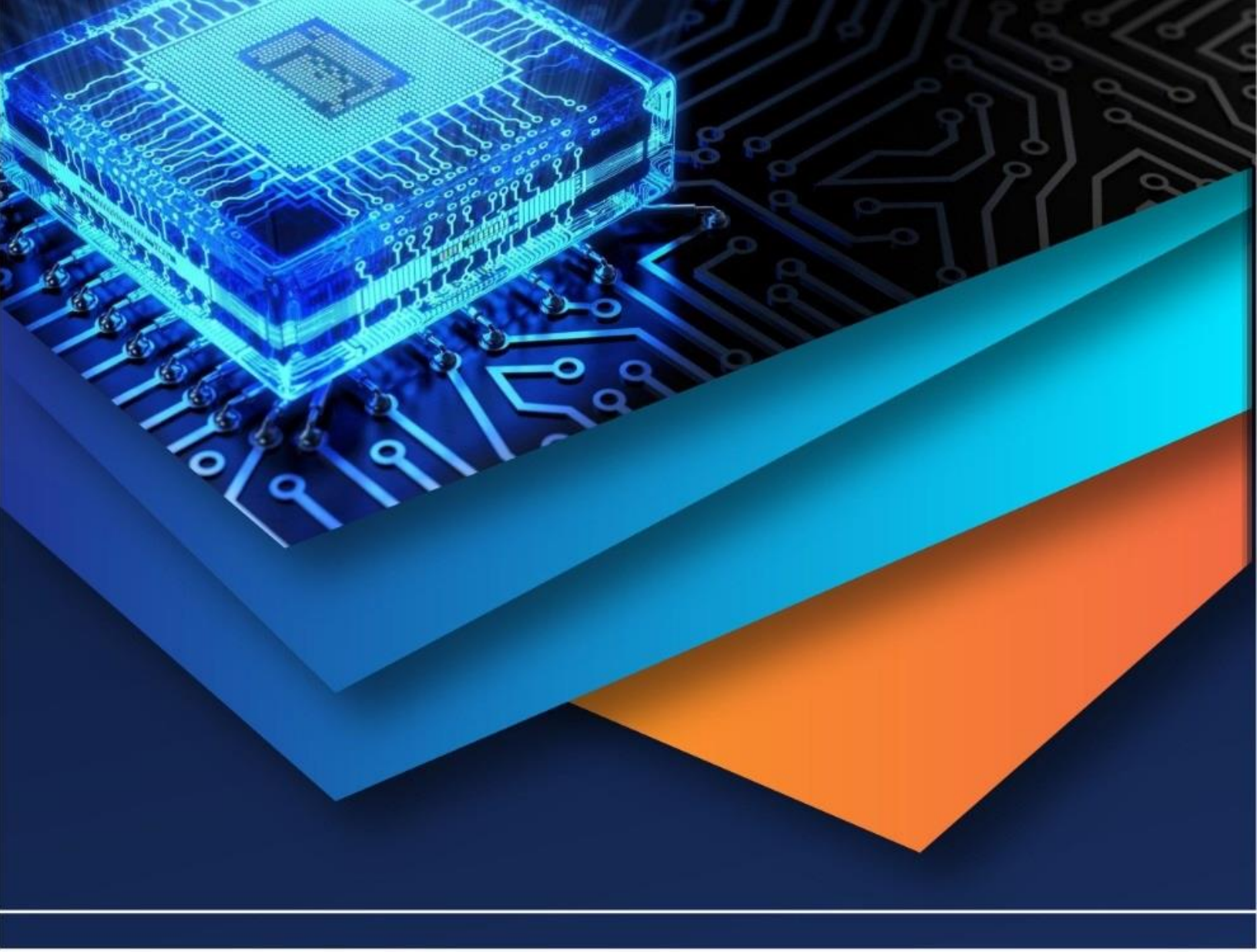

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