

PROJECT ON TIME STUDY TO INCREASE THE OVERALL PRODUCTIVITY

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Abstract:- This report outlines the results of our observation in small scale industry. It is a small scale industry and machining of forged and casting components is carried out there. We went through various departments, technical and non-technical, and have collected detailed information on their respective functions and their impact on the outcomes of the company. We have made an attempt to describe some of the things we came across during the course of time. As it is a small scale industry so we saw a shortage of labours as well improper working conditions due to which their productivity rate was abating. There were a lot of factors responsible for that which our team comes to know after a detail study of all the processes and time restricted to complete those processes.

Keywords- Time study, Daily check sheet, OEE (Over Equipment Efficiency), Overall productivity

1. Introduction:

1.1 About Organization:

Organization was established in 2002, i.e. 16 years ago. It is located in Mahalunge MIDC area. It is a small scale industry and machining of a forged and casting components is carried out there. The organization involves 30 members including 2 supervisors, 2 quality person and a plant head. As it is small scale industry it serves many big industries by providing finished parts. The company works in two different shift i.e. Day shift and Night Shift. The industry has 5 CNC machines and 3 VMC machines for machining of a components. There are total 21 types of a parts are machined currently in industry.

Some machined components are shown below



Before Machining

After machining



Before Machining

After machining

1.2 About Project:

In Time study, our main purpose was to reduce the cycle time and hence increase the productivity. So, initially we have noted down all the minor and major activities of the worker and the time taken by him to complete that work. For this we have prepared a sheet as well. We have match the standard cycle time with the current cycle time. We find a time gap and we work on improvements to improve it.

1.3 Project Details

Project title: Time study.

Project Outline:

- Analysis of the work into small, easily measurable components or elements.
- Measurement of those components
- Synthesis from measured component to arrive at the time for the complete job.
- To reduce the time, cycle to increase the productivity.
- To reduces the breakdowns, minor stoppages due to lack of basic conditions.

Project Definitions:

In order to increase the overall productivity, the losses need to minimize. Detailed study of the process by using the time study measurement helps to analyse and identify the different types of losses. The major losses can be easily find out by using this method, and improvements in such major losses leads to better and continuous working condition which will help to enhance the overall productivity.

During this time study we have divided the main task into different subtasks and noted down the time required to perform each task currently. We recorded the data for 2 weeks continuously from which we identified the major losses and provided the improvements as mentioned below. This improvement resulted into decrease of time cycle.

1.4 Purpose:

To decrease the cycle time of the machining of the product and which will result into the overall increase the productivity.

1.5 Significance of study:

Machining is completely machine orientated task. Equipment or any product are designed to be reliable but they face the breakdowns due to lack of basic conditions which will decrease the overall productivity. To restore the basic condition operator has to do daily cleaning, inspection, lubrication and refastening of the machining.

In order to reduce the time required to restore basic condition need to be minimized to increase the overall efficiency of the equipment.

2. Implementation Details:

We have done a time study on a CNC operator who has an experienced of 10 years of working on CNC. The main activities of the worker is to cleaning the interior, loading the job, machining a job, unloading the job and checking the final dimensions of the job.

We initially visited the industry, and observed a loss over there. According to that, we have prepared a losses sheet and an activity sheet. In which we have noted down the time required to complete the machining of the job and the losses. The format of the sheet is as shown below.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
ERA ENGG. PVT. LTD						Daily Loss Report												
						1	2	3	4	5	6	7	8	9	10	11	12	13
						power loss	M/C breakdown loss	Setup adjustment loss	Tool change loss	Start up loss	Minor stoppage loss	Management loss	No material	No air, coolant loss	No insert loss	Rework loss	Tooling loss	Total
Job No. 103				Cycle time : 3.5min		Machine Name: CNC NO. 5						Operator Name : Arif Shaikh						
Date	Target	Atual	ok	Rejection	efficiency													
01-12-2018	200																	
02-12-2018	200																	
03-12-2018	200																	
04-12-2018	200																	
05-12-2018	200																	
06-12-2018	200																	
07-12-2018	200																	

Chart No. 1 Daily loss report sheet

ERA ENGG. PVT. LTD					Daily Activity Report													Date :	
1																			
2																			
3		Operator Name : Arif Shaikh			Time Readings														
4	Job : 103	Operating Machine : CNC No. 5																	
5	Sr. No.	Daily Activities			1	2	3	4	5	6	7	8	9	10	11	12	13	Total Time	
6	1	Coolent oil level checking																	
7	2	Lubrication oil level checking																	
8	3	Hydraulic Check up																	
9	4	Grease Checking																	
10	5	Rusting																	
11	6	Set up arrangement																	
12	7	Insertion of tool																	
13																		Toal Time	
14		Cyclic Activities																	
15																			
16	1	Cleaning of set up by air																	
17	2	Picking up of job																	
18	3	Cleaning of job																	
19	4	loading of job																	
20	5	Closing the door																	
21	6	Removing a burr of finished product / Job M/c time																	

Chart No. 2 Daily Activity Report

2.1 Daily Activity chart before :

ERA ENGG. PVT. LTD		Daily Activity Report													Date :	
Operator Name : Arif Shaikh		Time Readings														
Job : 103 Operating Machine : CNC No.																
Sr. No.	Daily Activities	1	2	3	4	5	6	7	8	9	10	11	12	13	Total Time	
1	Coolent oil level checking														30 sec	
2	Lubrication oil level checking														1 min	
3	Hydraulic Check up														1 min	
4	Grease Checking														2 min	
5	Rusting														1 min	
6	Set up arrangement														5 min	
7	Insertion of tool														3 min	
Total Time															13.5 Min	
Cyclic Activities																
1	Cleaning of set up by air	7 sec	6 sec	6 sec	7 sec	8 sec	7 sec	6 sec	7 sec	7 sec	10 sec	7 sec	6 sec	7 sec	7 sec	
2	Picking up of job	5 sec	6 sec	7 sec	5 sec	6 sec	5 sec	5 sec	5 sec	7 sec	5 sec	5 sec	5 sec	5 sec	5 sec	
3	Cleaning of job	5 sec	6 sec	5 sec	7 sec	6 sec	5 sec	4 sec	5 sec	6 sec	6 sec	5 sec	5 sec	5 sec	5 sec	
4	loading of job	10 sec	8 sec	9 sec	9 sec	10 sec	9 sec	10 sec	10 sec	9 sec	9 sec	10 sec	8 sec	8 sec	9 sec	
5	Closing the door	2 sec	3 sec	2 sec	3 sec	2 sec	3 sec	2 sec	2 sec	2 sec	3 sec	2 sec	2 sec	2 sec	2 sec	
6	Removing a burr of finished product / Job M/c time	180 sec	1810sec	180 sec	180 sec	180 sec	180 sec	180 sec	180 sec	180 sec	180 sec	180 sec	180 sec	180 sec	180 sec	
7	Opening the door	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	
Average Cycle timing															3.5 min	
Non-productive activities																
1	Morning Breakfast														10 min	
2	Lunch Time														30 min	
3	Time on mobile calling														10 min	
4	Tea Time														10 min	
5	Washroom Time														5 min	
Total Non- productive time															65 min	
Rework Timing																16 min

Chart No. 3 Daily Activity Chart Before

2.2 Daily Activity chart after:

Company Name		Daily Activity Report													Date :	
Operator Name : Arif Shaikh		Time Readings														
Job : 103 Operating Machine : CNC No.																
Sr. No.	Daily Activities	1	2	3	4	5	6	7	8	9	10	11	12	13	Total Time	
1	Coolent oil level checking														30 sec	
2	Lubrication oil level checking														1 min	
3	Hydraulic Check up															
4	Grease Checking															
5	Rusting															
6	Set up arrangement														3 min	
7	Insertion of tool														3 min	
Total Time															7.5 min	
Cyclic Activities																
1	Cleaning of set up by air	7 sec	6 sec	6 sec	7 sec	6 sec	7 sec	6 sec	6 sec	7 sec	6 sec	6 sec	6 sec	7 sec	6 sec	
2	Picking up of job	5 sec	3 sec	3 sec	5 sec	6 sec	5 sec	3 sec	5 sec	3 sec	5 sec	3 sec	3 sec	5 sec	3 sec	
3	Cleaning of job	5 sec	6 sec	4 sec	7 sec	4sec	5 sec	4 sec	5 sec	4 sec	4 sec	5 sec	5 sec	4 sec	4 sec	
4	loading of job	10 sec	7 sec	9 sec	9 sec	7 sec	9 sec	7 sec	7 sec	9 sec	9 sec	7 sec	8 sec	8 sec	7 sec	
5	Closing the door	2 sec	3 sec	2 sec	3 sec	2 sec	3 sec	2 sec	2 sec	2 sec	3 sec	2 sec	2 sec	2 sec	2 sec	
6	Removing a burr of finished product / Job M/c time	180 sec	1810sec	180 sec	180 sec	180 sec	180 sec	180 sec	180 sec	180 sec	180 sec	180 sec	180 sec	180 sec	180 sec	
7	Opening the door	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	
Average Cycle timing															3.4 min	
Non-productive activities																
1	Morning Breakfast														10 min	
2	Lunch Time														30 min	
3	Time on mobile calling														10 min	
4	Tea Time														10 min	
5	Washroom Time														5 min	
Total Non- productive time															65 min	
Rework Timing																16 min

Chart No. 4 Daily Activity Chart After

2.3 Improvements Details:

Initially the cycle time was 3.5 min as mentioned in the above chart. In order to reduce the cycle time, we have done some improvements as mentioned below:

1) Initially the job was used to be lie on the floor for which operator has to bend down to pick up the job for which he used to take 5 secs to do this. Now, we have arranged a table on the side from where he used to take job now within 3 sec. Here we have save a time of 2 sec.

2) He used to take the air pipe two times for cleaning of the set up first and then for the cleaning up of job. Now, we have change the sequence of action by which the operator has to take the air pipe once firstly he used to have a cleaning of the job and of the set up. Initially he used to take 12 secs to do so and now it comes to the 10 sec only.

3) Initially the operator used to take 9 secs for loading of job as the job were used randomly oriented and now it took only 7 sec as to do so.

4) Initially the operator used to check all the parameters daily as mentioned above, which used to take around 13.5 min daily, for that we have neglected some parameters to check daily as they are not necessary to check on daily basis but can be checked on weekly basis and we reduce it to the 7.5 min. In that we also reduced the set up arrangement time as well.

Sr.No	Activity	Before Time	After Time	Time saving
1	Daily parameters checking time	13.5 min	7.5 min	6 min
2	Job Picking time	5 sec	3 sec	2 sec
3	Cleaning of job and set up	12 sec	10 sec	2 sec
4	Loading time for job	9 sec	7 sec	2 sec

Table No. 1 Cycle time improved chart

3. Result and Calculations:

Sr. No	Activity	Before	After
1	Operator duty hours	12	12
2	Daily Target	200 jobs	200 jobs
3	Daily rework time	16 min	16 min
4	Daily Inspection time	13.5 min	7.5 min
5	Weekly Inspection Time	0	7.5 min
6	Non- productive time	65 min	65 min
7	Cycle time for 1 job	210 sec	204 sec
8	Total productive time	625.5 min	631.5 min
9	No. of jobs completed daily	178 jobs	192 jobs
10	Efficiency of operator	89 %	96%

Table No. 2 Result Table

3.1 Calculation:

Increase in job machined per shift = $185 - 178 = 7$

Increase in productivity percentage for one shift for one CNC m/c = $(185 - 178) / 178 = 3.9 \%$

Labour cost = 51.28 Rs / Hr

Total cost saving for 1 shift = $[7 / (3.4 \times 60)] \times 51.28 = \text{Rs. } 20.34$

Total saving per day for 1 m/c = $2 \times 20.34 = \text{Rs. } 40.682$

Total saving in plant for 1 day = $5 \times 40.682 = \text{Rs. } 203.4$

Total saving per month in plant = $26 \times 192.3 = \text{Rs. } 5288.667$

Total saving per year in plant = $12 \times 5288.667 = \text{Rs. } 63464.128$

Conclusion:

It is found that time study is very effective in repetitive job analysis. A small improvement in the cycle processing can save a small time for one small process, as it is a repetitive process the overall impact of the small time improvement is very high and it increases the overall productivity up to large extent. Time study has its several advantages regarding the development of the culture of an organisation. The culture of the continuous improvement gets developed in the organization. Selection of the proper method of doing time study is very important and one should give a complete thought process before doing the time study. The operator selected for the time study should have experienced of doing the same job and should be cooperative towards the time study person.

The time study gives the information about the time loss during various operation and the particular area which plays major roles in the losses can be targeted for the improvement. Thus this is how the total productivity of the organization can be improved by conducting the time study at various stages.

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