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Increased the Productivity of Casting on the Shot Blasting Hanger with Time study & Method Study.

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Abstract:- *Shot Blasting machine use a various hanger during machining of various process, in this work its essential to increase production rate in current industry. For this its required to increase hanger capacity for the various castings used in the industry. To increase hanger capacity form 16 number of casting to 48 numbers of casting,soits required to re-designed the hanger such a way that its capacityup to 300Kg of short blasting machine. With the study of shot blasting machine and its hanger we should have to design hanger as requirement*

Keywords: *-Shot Blasting Machine, Shot Blasting Hanger Cost Reduction, Productivity Improvement,*

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I. INTRODUCTION

Shot Blasting Cycle

- Process is start with the feeding a shots in the blast wheel and blast wheel convert electrical energy in to kinematic energy by rotating turbine wheel of shots. This process is continues until get require surface finish. Used shots are collect by conveyer system at the bottom of the chamber and again it fed to blast wheel by Elevator. Separation system is separate the damaged shots in the elevator. Other side dust collector is working for collecting a dust which is generating during shot blasting process in a chamber. Blower is sucking a dust by air from the shot blasting chamber. Mixture of dust and air is entering in the dust collector by inlet ducting. Mixture is pass through a bag arrangement, in which air is pass through it and pure air is come out through blower and dust are collect in the bag. After completing one cycle of the process, shaker mechanism is shaking bag arrangement, due to shaking dust come out which is collected in bags and collect in the container which is provided at the bottom of the dust collector.

II. PROBLEM STATEMENT

Existing system of short blasting machine hanger carrying 16 Number of casting for the operation having 14 minutes of machining time. The problem is that, number of components per operation is less, so required to increase the production rate at the same machining time.After discussion with industry and important of above problem we have taken this problem for our project work. After doing study of current short blasting machine, hangers and its process there may be possibility to increases the production and profit of company.

Fig 1. Existing Hanger with castings use in short blasting machine.

III. AIM& OBJECTIVE

Present design of Hanger is carrying maximum 16 No of casting due to this productivity is very low of current industry, so we will redesign the current shot blasting hanger and achieve the following objectives on the new design of the hanger for the shot blasting machine.

1. To increase no. of casting more than 16 within the existing hanger capacity. (300kg).
2. To reduce the cycle time of operation.
3. Redesign of hanger.
4. Material selection for hanger.
5. Bending Stress and Diameter of hanger Rods by using Analytically Method.

IV. RE-DESIGN OF EXISTING HANGER

4.1. Selection of material for New Hanger

New hanger made of mild steel (Grade-C20) having following properties of it.

New hanger material : - Mild Steel (C20)
Ultimate tensile strength : - 540 N/mm2
Yield Strength : - 260 N/mm2

300 kg Short Blasting machine door is 1000*1000. So, we Assume all the lengths of hanger as shown in fig below, so it can move in and out easily between the door.

4.2 Calculation for Diameter of steel rod.

Weight of Casting : - 4.5 Kg/casting
Number of Casting on Hanger : - 48 Nos
Number of branches of hanger : - 48 Nos
Number of casting per branch : - 1 No

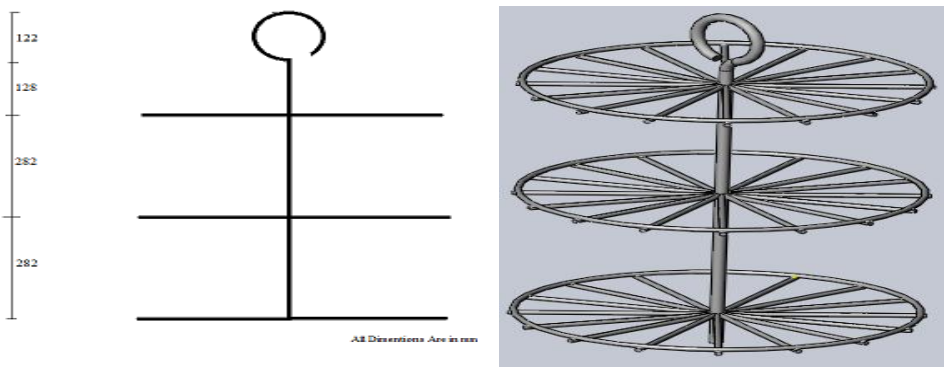

Fig 5.1: - New Hanger Dimensions with Proposed Model.

V. Results And Discussions

5.1 Test Results and Discussions

Fig 5.1: - Actual Photo of hanger during trial test(Before shot blasting).

Fig 5.2: - Actual Photo of hanger during trial test(After shotBlasting)

Table 1 Time required at different stages (Cycle time).

SSr. No.	Parameters	Existing hanger (min)	Re-Design hanger (min)	NewDesign hanger (min)
1.	Loading Time	3	7	9
2.	Shot Blasting operation time in machine	14 (Two Cycles)	14 (Two Cycles)	12 (One Cycle)
3.	Unloading Time	3	7	9
4.	Inspection Time	5	12	15
5.	Painting Time	16	36	48
6.	Total Time required per Batch	41	76	93

Table 2: - Comparison between Existing and Re-design hanger.

Sr. No.	*Parameters*	*Existing Hanger*	*Re-Design Hanger*
1	*No. of Branches*	*8*	*12*
2	*No. of castings per branch*	*2*	*3*
3	*Total No. of Castings on hanger*	*16*	*36*
4	*No. of operation cycles*	*2*	*2*
5	*Weight of hanger*	*8.29 kg*	*12.7 kg*
6	*Total Time required per Batch*	*14 min.*	*14 min.*

5.2 Discussion: -

After performing trial test on re-design hanger, it seems that surface finish of casting is same that of existing one and operation cycles required is same (i.e. Two cycles).

Production rate increased but surface finish issue still not solved in one operation cycle. Still another operation cycle is required as that of existing one. Our problem still remains unsolved so, we have to design such hanger which will solve above problems and also increase production rate.

Table 3: - Comparison between Existing and New design hanger.

SSr. No.	Parameters	Existing Hanger	New Design Hanger
1	No. of Branches	8	48
2	No. of castings per branch	2	1
3	Total No. of Castings on hanger	16	48
4	No. of operation cycles	2	1
5	Weight of hanger	8.29 kg	33.77 kg
6	Total Cycle time	14 min.	12 min.

5.3 Discussion: - After performing trial test on New design hanger, it seems that surface finish of casting is improved and operation cycles required is only one. Production rate increased with proper surface finish. Hence our problem is solved by newly designed Hanger with minimum cycle time required for shot blasting of castings.Following table represent the work conclusion.

Table 4:- Objective achieved

Parameters	Existing Hanger	New Hanger
Number of Casting produce	16	48
No of Operation Cycle	2	1
Time required for producing 1 casting.	2.56 min	1.94 min

5.4 Discussion: -

After implementation of new designed hanger, we increased casting range 16 Nos to 48 Nos hence we increased production rate thrice and operation cycles reduced from two to one and saved cycle time per component is 1.02 minutes.

VI. Cost Analysis

6.1 Cost of Hanger

Cost of material MS(C20)- Rs 55 / Kg.

Table 5:- Cost analysis

Sr No	Component	Weight	Cost
1	Hanger	33.7 kg	Rs 1853.5 /-
2	Fabrication Cost	-	Rs 1500 /-
	Total		Rs 3353.5 /-

6.2 Total Benefit after New ideas implementation: -

After implementation of new designed hanger, we increased casting range 16 Nos to 48 Nos hence we increased production rate thrice.

6.2.1 Hence total saving cost of component: -

= No of components loaded on hanger after implementation - No of components loaded on hanger before implementation

32 Nos = 49 -16

Shot Blasting Cost for one component is Rs.15/-,

Hence total benefit Amount per Batch = 15 * 3 = Rs.480/-

6.2.2 Total batches produced per day = 20

(Shot blasting frequency once in Two days)

Total cost benefits per day = 20 * 480 = Rs 9,600/-

Total cost benefit per month = 13 * 9600 = Rs 1,24,800/-

Total cost benefit annually = 12 * 124800 = Rs 14,97,600/-

6.3 Worker Cost: -

One man for per shift for working loading and unloading the job.

For two shift two manpower required.

Total worker cost per day = 2 * 300 = Rs 600 per day (wages for per worker Apprx.Rs.300/-)

Total worker cost per month = 13 * 600 = Rs 7,800 per month.

Total worker cost annually = 12 * 7800 = Rs 93,600 per year.

6.4 Material Cost:

Shots Required per day = 56 kg

Cost of Steel shots per Kg = Rs 45

Total material cost per day = 56 * 45 = Rs 2,520 per day

Total material cost per month = 13 * 2520 = Rs 32,760 per month

Total material cost annually = 12 * 32760 = Rs 3,93,120 per year.

6.4.1 Hanger cost per annually = Rs 40,242 per year

6.4.2 Safety equipment's cost (shoes, hand gloves, googles, helmets, etc.) = Rs 5,000/- per year.

6.5 MSEB Cost per annually = Rs 1,20,000 /-

6.6 Maintenance cost annually = Rs 45,000 /-

6.7 Total Benefits

Table 6. Cost Benefits to Industry

Sr. No	Description	Measurement
Total Cost Saving per year		
1	Total cost benefit annually	Rs.14,97,600 /-
2	Total worker cost annually	Rs. 93,600 /-
3	Total material cost annually	Rs. 3,93,120 /-
4	Hanger cost per annually	Rs. 40,242 /-
5	Safety equipment's cost	Rs. 5,000 /-
6	MSEB Cost per annually	Rs. 1,20,000 /-
7	Maintenance cost annually	Rs. 45,000 /-
	Total Benefit annually	**Rs. 8,00,638 /-**

VII. CONCLUSION

Table 7:-. Comparison between Existing and Re-design hanger.

Sr. No.	Parameters	Existing Hanger	Re-Design Hanger
1	No. of Branches	8	12
2	No. of castings per branch	2	3
3	Total No. of Castings on hanger	16	36
4	No. of operation cycles	2	2
5	Weight of hanger	8.29 kg	12.7 kg
6	Total Time required per Batch	14 min.	14 min.

After performing trial test on re-design hanger, it seems that surface finish of casting is same that of existing one and operation cycles required is same (i.e. Two cycles).Production rate increased but surface finish issue still not solved in one operation cycle. Still another operation cycle is required as that of existing one. Our problem still A remains unsolved so,we have to design such hanger which will solve above problems and also increase production rate.

In this project work, castings carrying capacity of hanger is increase hence production rateincreases by using newly design hanger as compare to existing hanger using in shot blasting machine. After implementation of new designed hanger, we increased casting range 16 Nos to 48 Nos hence we increased production rate thrice.Total Benefit annually for industry Rs 8, 00,638 /-

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