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MANUFACTURING TIME REDUCTION OF ROTOR

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Abstract: *In present world, every customer need their products to get on time with good quality. Presently every industry is striving to satisfy their customer requirement. Cycle time should be considered a viable option when an organization is trying to improve efficiency, productivity, and cast base and customer responsiveness.in today's competitive business world, companies require small lead time, low costs and high customer services levels to survive. Because of this, companies have to become more customer focused. The result is that companies have been putting in significant effort to reduce their lead time. Cycle time reduction plays an important role in improving the competitiveness and sustainability in manufacturer. However, in the past, time reduction was usually unplanned owing to the lack of a systematic and quantitative procedure. A systematic procedure is established in this study for planning cycle time reduction actions to enhance the competitiveness and sustainability of a manufacturer. First, some controllable factor that are influential to the job cycle time are identified. Subsequently, the relationship between controllable factors and the job cycle time is fitted with a back propagation network. The feasibility and effectiveness of an action have to be consider before it can be taken in practice. An example containing the real data of thousands of jobs has been used to illustrate the applicability of the proposed methodology. The financial benefits of the cycle time reduction were also analysed, which provided the evidence that the proposed methodology enabled the sustainable development of product.*

Key Words: *Cycle time, Sustainability, Rotor, Reduction.*

1. INTRODUCTION:

Time is one of the key factor considered in manufacturing industries to meet the demand and suppling good quality of product at right time. To reduce the manufacture time of any product it would start from bottle neck station. Where the product spend most of the time. Bottle neck station reduce the production rate and consume much time to complete the process. Rather than bottle neck station lack of mission and poor maintenance will affect the production rate .To meet the global demand of manufacturing product industries are run due to short of time. So that making the product with less time and low cost will be able to sustain in market. The benefit of reducing the time are able to reduce the cost and increase in productivity. The process can be more effective by reducing the scrap. It is not only necessary to reduce the wastage, but also to satisfy customer's expectations, continuous cost reductions and continuous improvements to survive in highly competitive environment. The purpose of such higher quality is to provide greater customer satisfaction and, increase income. However, providing more and/or better quality features usually requires an investment involves increases in costs. Higher quality in this sense usually "costs more." One of the strongest motivating forces is "Delighted Customer".

1.1. OBJECTIVE:

- To reduce the lead time of product
- To provide better solution for process improvement.
- To reduce rework
- To increase productivity and profitability in an organization
- To increase number of customers as getting high level of satisfaction of them including features like good design, value or price of product etc.

2. MANUFACTING PROCESS OF ROTOR:

2.1. RAW MATERIAL:

Generally rotor are made with stain less steel to avoid corrosion. Stainless steel is a family of iron-based alloys that contain a minimum of approximately 11% chromium, a composition that prevents the iron from rusting) as well as providing heat resistant properties. Different types of stainless steel include the elements (from 0.03% to greater than 1.00%), N, Al, Si, S, Ti, Ni, Cu, Se, Nb, and Mo). Specific types of stainless steel often designated by a three digit number, e.g., *304 stainless*.

2.2. MANUFACTURING OF POLES:

The rotor is a large magnet with poles constructed of steel laminate projecting out of the rotor's core. The poles are supplied by direct current or magnetized by permanent magnets. The armature with a three-phase winding is on the stator where voltage is induced.

2.3. MANUFACTURING OF ROTOR SHAFT:

As the central element of the electric motor, the shaft passes the rotational movement from the motor to the downstream elements. Depending on model, the shaft of the armature is positioned either with coils or a permanent magnet. Length, diameter, distance, run out, roundness and surface roughness are measured on the shaft of the element. Thus, there are enormous amount grades of stainless steel with varying chromium and molybdenum contents to suit the environment the alloy must endure. Resistance to corrosion and staining, low maintenance, and familiar lustre make stainless steel an ideal material for many applications where both the strength of steel and corrosion resistance are required.[1] An essential feature is the diameter of bearings. A particular challenge in the production process of the shaft after hardening if the geometry and form have warped. To ensure the proper operation of the engine, the bearings and the mounting points for e.g. the rotor must meet together within 0.01 mm. after the motor is assembled, the diameter and spacing are also checked.

2.4. ASSEMBLE:

Assemble is the process of arranging the different parts in a one location. In this process various small parts and combined together. In this method hydraulic pressing, winding, claw pressing and slip ring. The various process are discussed elaborately.

2.5. VARNISHING:

This invention relates to the impregnating of electrical apparatus with insulating varnishes. In the manufacture of electrical apparatus, and particularly rotors, it is desirable to treat the electrical windings and magnetic core with an insulating varnish, which when baked, provides a hard insulating resinous impregnant filling the interstices in the windings as solidly as possible thereby more effectively insulating them from one another. The varnish treatment is intended to protect the electrical windings from the effects of moisture, dust, corrosive gases and other external influences that might cause a premature breakdown and failure of the electrical rotor. The varnish treatment not only coats the windings with an impervious layer of resin but also fills in spaces and thereby prevents lodging or entry of dust, water, and other deleterious matter. After varnishing the rotor it has been sent to the finishing of the component and quality checking and then finally it has been packed and sent to the customer.

2.6. INSPECTION:

After completing the varnishing process resistance is checked weather the rotor is ok for run or not. And it is the final inspection done by workers.

3. TIME TAKEN TO MANUFACTURE THE ROTOR:

SI.NO	PROCESS	TIME TAKEN(minutes)
1	Time of manufacture of rotor shaft	25
2	Time of manufacture of poles	8
3	Assembly	3
4	Winding (235 turns)	1
5	Claw pressing	2
6	Slip ring mounting	3
7	Varnishing	44
8	Resistance check	1
9	Final inspection	5
10	Total time	92

4. CALCULATION:

S.NO	MACHINE PROPERTIES	SPECIFICATION
1	TIME CONSUPTION	44 min
2	CAPACITY	68
3	LOADING POINT	3
4	MANUFACTURING COST	RS.4
5	DEFECTIVE COMPONENT	4

4.1. MACHINE EFFICIENCY:

Percentage of defect = (Number of defect/Total number of component)*100
= (4 / 68) * 100
= 5.88
Efficiency = 100 – percentage of defect
= 100 – 5.88
= 94.11

4.2. NUMBER OF STATIONS:

Station = total number of component / capacity of tank
= 68 / 3
= 22

4.3. PRODUCTION RATE:

Production rate per hour = (60 / time taken to complete single station) * 3
=(60 / 2) * 3
=(30) * 3
=90
Production rate per shift = production rate * 8
=90 * 8
=720
Process cost per product = wages of worker / production rate per shift
=550/720
=.763 RS

4.4. PROCESSING TIME:

Time = Number of station * Nime for processing
= 22 * 2
= 44 min

SI.NO	MACHINE PROPERTIES	SPECIFICATION
1	MACHINE EFFICIENCY	94.11
2	NUMBER OF STATIONS	22
3	PRODUCTION RATE	90
4	PROCESS COST PER PRODUCT	.763 RS
5	PROCESSING TIME	44 min

4.5. PROBLEM IDENTIFICATION:

- Time consumption to varnishing a rotor is high
- The travel of rotor is long
- Producing uneven varnishing component

BOTTLE NECK STATION

4.6. SOLUTION OF PROBLEM

There are 2 factors have been considered to decrease the lead time

1. Loading and unloading point

By making an additional loading point with the help of Pneumatic Cylinder.

2. Soaking tank

Increasing the tank capacity it can be achieved by increasing length
Of tank from 45cm to 58 cm.

5. CALCULATION:

5.1. MACHINE EFFICIENCY:

Percentage of defect=(Number of defect/Total number of component)*100
= (3 / 68) * 100
= 4.411

Efficiency = 100 – percentage of defect
= 100 – 4.411
= 95.58

5.2. NUMBER OF STATIONS:

Station = total number of component / capacity of tank
= 68 / 4
= 17

5.3. PRODUCTION RATE

Production rate per hour = (60 / time taken to complete single station) * 4
= (60 / 2) * 4
= (30) * 4
= 120

Production rate per shift = production rate * 8
=120 * 8
=960

Process cost per product = wages of worker / production rate per shift
=550/960
= .572 RS

5.4. PROCESSING TIME:

Time = Number of station * Nime for processing
= 17 * 2
=34 min

SI.NO	MACHINE PROPERTIES	SPECIFICATION
1	MACHINE EFFICIENCY	95.58 %
2	NUMBER OF STATIONS	17
3	PRODUCTION RATE	120
4	PROCESS COST PER PRODUCT	.572 RS
5	PROCESSING TIME	34 min

6. RESULTS:

SI.NO	MACHINE PROPERTIES	SPECIFICATION	
		EXISTING	PRESENT
1	MACHINE EFFICIENCY	94.11	95.58 %
2	NUMBER OF STATIONS	22	17
3	PRODUCTION RATE	90	120
4	PROCESS COST PER PRODUCT	.763 RS	.572 RS
5	PROCESSING TIME	44 min	34min

CAMPARISON OF PRESENT VS EXISTING VALUE

From the above table it can be seen that the several problems associated with the varnishing process are studied and the feasible solutions are also derived by our knowledge. After studying all problem related to each research papers individual solutions are provided. Based on solution on that problem effect on production is changed as increase in productivity or reduction of cycle time.

7. CONCLUSION:

By reducing the manufacture time of rotor the time and cost to manufacture the rotor is reduced. And production rate are also increased. Now a days industries are searching the easy and cost effective method of time reduction. If the time is reduced automatically the production rate will increased. A key to this is the production cycle time. Shortening the production cycle time improves the responsiveness to customer demands, and leads to significant profits from yield improvement and cost reduction. In the past, cycle time reduction is usually unplanned owing to the lack of a systematic and quantitative procedure.

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