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Development of Framework to Increase Flexibility in Shop floor and Maximize Production Rate using Substitute Machine

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ABSTRACT

The research attempt to increase flexibility in shop floor and improve rate of production through maintenance engineering policies. The research is grounded on analysis of data collected from manufacturing based MSMEs and review of literature and data of spare parts published in referred journals. The study derives a further framework model comprising three strategies (Supply chain management, inventory management, and maintenance engineering) to improve rate of production. The aforesaid process is used to identify problems that occur during machine breakdown. The paper provides a research substitute machine to manage problems during breakdown of machines so that production is not hindered.

Keywords: Supply Chain Management, Inventory Management, Maintenance Engineering, Substitute Machine, Shop Floor Flexibility.

INTRODUCTION

This research uses three processes to maximize production rate, viz. inventory management, maintenance engineering (predictive & preventive), and layout process. Inventory management is the process to maintain the material from raw to finished good material, there are many processes out of which I have chosen P Q Analysis In this, I could directly reach my best research, in PQ analysis, complete information about the product and its quantity can be extracted directly. [6, 12, 15]

The company is classified into runner repeaters and strangers by time. This information helps to plan production on the assembly line and off-line production. Sometimes small batches of high-value products that can be complete in the processing workshop. The research took place in an automobile company. The company faced two types of problems: out of stock and frequent machine breakdown. Use of product quantity analysis to correct their problems in this study, and consider changes in effective processes from raw materials to finished good products inventory management and supply chain management. [8,12] Runner Repeater and Stranger are the components of P Q Analysis which in time the Inventory Manager or Production In charge gets the estimate from the data sheet, from which can make his own, and change the production policies or get the availability of the material by contacting the vendor in a timely manner [17]. This has been done well by Researcher in the year 2014, in which he has shown graphically that the production rate can be reduced by Product and Quantity Analysis. (Paper reference) Can the bulk be run smoothly and how much material should have in stock in the industry and when it is necessary to contact the vendor of raw material and how to maintain the relation has also focused a lot on it. The production house of a manufacturing industry is called the back bone, on which all the load is done. If production stops, the whole industry shuts down. That is why it is very important to have proper channel and timely availability of material supply. [15]

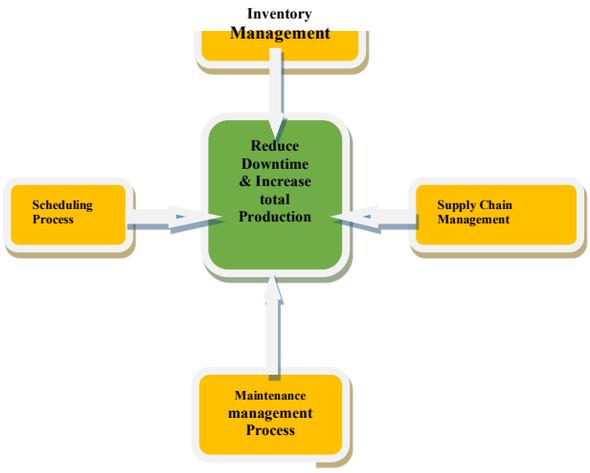

FIGURE 1. Study and analysis of inventory management practices in small scale industry

PQ ANALYSIS OVERVIEW

In supply chain management, the entire focus of the industry depends on the receipt of its material and delivery of the material on time. The company's concern is right on the bat, that my content is reaching the right place at the right time and in the hands of the right person, whether everyone's

pitch is linked to the company's repo or not, that company doesn't want to lose at all costs. [1,3] Why it is not so easy, it should be done in few days and months, it takes years, to make trust of owner . That's why the company always puts its trustworthy or best officer on such duty, who understands the company or its relationship, and then it was seen in multinational companies that the employees do not leave their employer too soon, (as statement by the employer or manager) the one whom they built on their trust. These people do this kind of work with full responsibilities. [3] But the problem is not there, that problem comes in the work being done by person, whose employees work with his full devotion, but the machinery is not in his hands, which they cannot control, it will never happen on the road. The employee who has sub logistic possibilities, whatever a factor in his mind, the productivity loss due to doing it is much more than that which cannot be ignored in the way he is doing it. In this also problems are created in some way like government policies, policies of private transport honors association organization and their rules. Taxes imposed by the government and rising fuel prices every day Paying strike tax anytime anywhere by private honors or charging extra fare by going on the wrong route, all these are very big factors because of logistics. [3,6] Maintenance engineering is a process of any industry in which when any fault occurs in any machine by the engineer, it is done in the same time or separately After setting whatever the problem is in the machine, rectification and turn it back on so that the production does not have much effect and the disturbances should not be too much, the operation time By doing this, Industry is able to make the material on time but most of the time it is not possible, which makes every small scale industry. The production rate is minimized efforts have been made to make it better and more production. In this research, it has been told that how to maintain the production rate through a sub contract (substitute) machine so that there is no negative effect on the target. [2,4,8] It has been said in many researchers in the research that whenever the machine goes into braked maintenance in the manufacturing industry, then it is located at some other place or near the manufacturing unit gets the remaining work done, but in all these the industry which has got the order has to suffer to some extent, because other industries focus on time and charge huge amount for little work. But because of this, the company which has taken the order from the mother company gets its work done on time. [3] Authors said that there is a need to improve a lot in the country in accordance with the Industry 4.0 revolution, in which all companies are allowed to organize their own workshops. There should be a maintenance department so that the routine process checks of every machine can be done there. So that the chances of failure of the machine are reduced and it does not have to go to any other company for production. [5,7,14]

RESEARCH METHODOLOGY

After the many research paper relevant to read and understand by us then we have an idea about to use of two three things which is better to increase rate of production in same shop floor these are first to make the process layout (framework) of the production or manufacturing house and then set the substitute machine in same industry in side of them, when I visited number of companies those who are manufacturing automobile parts as well as common to all metal parts the list of industries which I visited are Gajra gear Pvt. Ltd. Dewas It is a specially Gear manufacturing company, Katch motors pvt. Ltd. Pithampur manufactures many automobile components approximate 1000 plus parts, Anideep Tooling Solution pvt. Ltd. Indore, Barkha pipe Industry Pvt. Ltd. Indore, these all are small scale and medium scale level companies, they all are focuses only perform same time work done but they didn't think about and have any maintenance engineering process, so which one of them I have chosen a company Anideep Tooling solutions which is situated in Indore region and they are manufactures almost 700 plus parts of different segments. Here we discussed request to complete our research after the completion of the research industry get benefitted in terms of increase production rate without any drawback, the honor of the company is agreed and permit to do work and visit simultaneously in a time interval. First of all to discuss the problems with operator and to draw a existing process layout of company and then starts tricks to resolve hurdles which is faced in shop floor and suggest a new layout which is remove the contraction in between occurred. This is flexible type of layout used by us it is also one of the experimental processed.

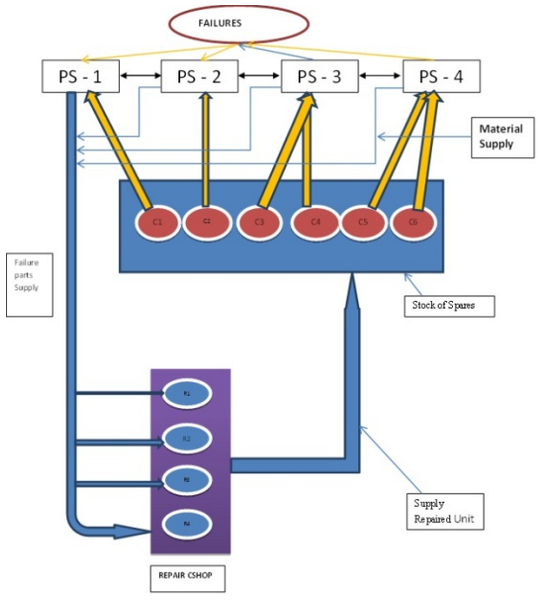

FIGURE 2. LAYOUT OF SHOPFLOOR TO REMOVE CHALLENGES

FRAMEWORK /FLOWCHART OF SPARE PARTS MATERIAL SUPPLY

Where: - Ps: - Production Station (1, 2, 3&4)
C: - Stock of Spares after repaired
R: - Repair Shop (1, 2, 3 & 4)

In this layout, we first set up the machines, put them in a lineup and then analyzed the orders that came in, and then prepared them in the development section. By which the time taken to prepare that particular product and its expenditure was examined. After that prepared the final sheet in which the first focus was on when and how and how many times the machine was spread or where the operator got the most problem. In the preparation of the product, then after the setup of the machine made Smart tags, which was available on the shop floor in the total machine industry. 4 center lathe 2 CNC lathe 1 CNC Milling and center Lathe machine 2 grinding machine and basic procedure first to last level like material testing, hot and cold working process etc. Then we started the production and lineup the machine as per the requirement of spare parts and put one machine (CNC lathe) in the last. But the company's development section always working we saved it for our time, if there is a machine file, and then use it. We could do it as a substitute machine. And as we know and in this research, I have told that this company follows brake down maintenance strategy, then there is also the spread of parts of the machine was sure what we had seen at the time of preparation and were now ready In this framework / process flow chart an attempt was made by us which was successful to some extent in this how we followed the step by step procedure Description in detail: First of all setup 4 machines which I will perform the work which were identified by the name Ps1 then Ps4 They started production on these machines and it was also seen that a route map was prepared for the fellows who were coming earlier. Like fillers were due to mechanical vibrations over temperature in our machine or to file the machine code again and again, which takes more time in production. Then a flow plan was also made for the material which is shown below and its description has also been given. When set up 4 machines then also created 6 ordinary shops of very near spare parts which will always supply spare parts to 4 machines Whenever a part of any type of the machine fails and if it is possible to change it within minutes then it should be processed from the same If there is such a part file which does not get repaired in some time, then make repairing statements for it, which will be immediately in the same shop. They should be completed by staying and then they should be supplied back through proper channel till the machine with time. In the midst of all this, from where the spare parts are being supplied, the supply of raw material is also very important, but these materials have also been stocked. In this way, the help of this framework helped a lot in completing at production time.

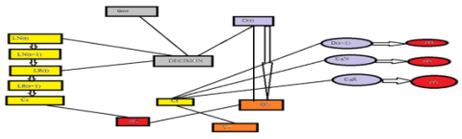

FIGURE 3. layout of shop floor spare parts management process

Where:-
LN (t) :- Recycled new parts respectively during period t.
LR (t) :- Supply time respectively during period t.
LN (t+1):- Supply time for new parts during period t.
LR (t+1):- recycled parts during period t.
D (t) :- The demand of parts during period t.
D (t+1) :- The demand of parts during the period t+1.
C_{aN} , C_{aR} :- Purchase cost during the period per unit respectively for new and recycled parts.
Ob : - The obsolescence risk during the period
Co : - Obsolescence cost during the period
Ct : -Total purchase cost of new & recycled spare parts.
Crs : - Shortage of stock risk during the period.
Cs : - Storage cost per unit per period.

The Second Diagram Framework explains by us how the strategies worked with the previous framework and how the materials or spare parts were needed. The complete description is given through the flow chart, which we are again elaborating this is a part of the flow chart from the research paper. and it is designed according to the company in which the work was being done In this frame work, a lot of focus is on spare parts which makes availability on time to the machine and to the production department. In this, we applied ten sessions making process with time, due to which all our work got time and time. Here are some notations that show their abbreviations along with the chart above those who are saying that the operational strategies have been followed at each point. LN and yellow blocks showing the demand rate of spare parts and new recycled spares with respect to time, Violet Indigo color shows what the demand rate along with decision making is, orange color shows high risk of material requirements and last red color shows purchase demand and shortage and risk demand during the operation time, By mixing all these, a table has been prepared in which it has been forecasted when what material can there be need and demand. That strategy of forecasting table is given below.

TABLE 1. Strategies of Forecasting Models

	Type of Demands	Forecasting Models
High Circulation	Constant Failure rate	Simple Moving Avaerage
		Weighted Mean Average
		Exponential smoothing to 1 parameter
Low Circulation	Intermittent	Croston Method
		Bootsrap Method
	Non-Intermittent	Moving Average
		Moving Average
		Simple Exponential Smoothing Method

CONCLUSION

After reading some research paper and then after analyzing the content of all those who were the best in them when we applied this practical in the industry then it was not possible the company was not trying to take risk in starting but When the company CEO was explained about the project by taking the production manager and supervisor in the loop That this will not harm your company, in return only and only your benefit will be there. When company owner shared all the planning and experience of other companies with researcher, also realized that many companies are the ones who suffer losses. Due to which sometimes they are not able to do new planning and keep working on repetitive planning or even operations. Finally Anideep Tooling Solutions Pvt. Ltd. permits us to work in production shop we sincerely thank the organization who gave us permission to work in production house and we also share all the information with them at all times so that wherever they do not think that they will have any loss from anywhere, our only motive was that if every company follows this procedure to get will definitely benefit, this was a hypothesis in our mind which proved to be true after research and we saw a lot of changes in production rate. The biggest change which was directly related to the new planning of production, now the company is looking for a different or smaller facility for new development. Or will not depend on the vendor, they develop a new product by keeping a well-equipped machine in our own shop floor and at the same time, that machine can also be effectively done by that which helps in increasing the production. In this research, only the work of the framework has been shown, in this, further work is also going on data analysis, which will be further benefited and The production time will also decrease as well as the rate of productivity will increase.

RESULT

In this research, we get the information of every moment of the machine or to say that the information of every second by which we can find out when our running machine may fail, we controlled the production to some extent by all these methods but it was not a permanent solution. Due to this, after stopping the machine in the evening time, it also had to do the same maintenance which I am telling in my research data. For this, I first went to the company for 5 months to continue, only to find out how many times which machine is spreading in a day to make which part. Then I went to different production cells and started making a summary on them, which I am sharing with you with some data in the next research paper with data analysis. In which how many times the file of their machine was on every machine shop done by the company and for what reason it spread.

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DECLARATION OF COMPETING INTEREST

None

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