National Conference on
"Role of Engineers in Nation Building" organized by VIVA Institute of Technology, Mumbai
(6th and 7th March 2020)
International Journal of Engineering Research & Science (IJOER)
ISBN:[978-93-5391-287-1] ISSN: [2395-6992] [Vol-6, Issue-3, March- 2020]

Automation is the Technique to Improve Production Rate

Ketan M. Shinde[1]
[1](Mechanical Engineering Department, VIVA Institute of Technology, Mumbai University
Email: ketanmarutishinde@gmail.com

Abstract: *Paper represents the increasing the efficiency of production by automation at different levels in industries. Production efficiency is the ratio between the input and the output parameters of the automated production process. Productivity is an effort is made to study the entire layout design of production line right from raw materials stage until finished product output with automation techniques. Production rate improvement is a plan of action towards manufacturing excellence and it is necessary to achieve good financial and operational performance. Productivity becomes the dominant issues in the market place where customers make their buying decisions based on product quality, sometimes they can pay more for what they consider as high quality product. Previously most organisations were using some techniques for increase production rate such as work measurement, method study and, cost reduction, modernization, investment in machine and equipment, re-engineering etc. automation is about speed, accuracy, and precision of the process. There are many levels where we can apply automation for better and accurate output. Automation is one of the most effective technique for reduction in cost, waste, scrap, labour, time, and controlling quality, and improving overall performance of any machine, system or process. This paper talks about concept of automation tools and technique to be used for improving production efficiency and its advantages.*

Keywords *– **Automation, cost reduction, method study, Productivity, work measurement.***

I. INTRODUCTION

The technical development based on new technologies, electronic management, artificial intelligence and computer-integrated production activities essentially determines the development of automation. The pursuit of a complex improvement of the technological, auxiliary and information activities and the minimization of the human involvement in the production activity will increasingly become a major factor in the development of automation.[1]. Productivity improvement is to do the right things better by continuous process. Therefore, it is important to adopt efficient productivity improvement technique to ensure individuals and organization's growth in productivity. [2] Recently much competitive business environment, the industry is challenged by the demand for productivity, quality, safety and environmental protection. Tight profit margins and networked manufacturing emphasize the need for integration and global optimization of production facilities. [3]. There are many machines or systems automation is needed for better and accurate result. Automation is one of the most effective technique for cost cutting by elimination some wastes like scrap, reducing labor, , controlling quality, reducing time and improving overall performance of any machine, system or process in any industry with the complete assurance of large annual profit margins [4]. To Monitor and control any process with the help of latest technologies such as software, PLC control system, Robotics, ERP system and incorporating central computer is known as Automation [5].

II. AUTOMATION

Monitoring and controlling of any process with the assistance of advance technologies like smart control devices, PLC, Robotics, ERP system and incorporating central computer is named Automation [6]. the utilization of control systems and knowledge technologies to scale back the necessity for human add the assembly of products and services, economize (on production and materials costs) and making money (in profits) also can defined as automation. Workflow automation uses software to regulate which eliminating repetitive tasks, gaining efficiency, minimizing errors and reducing costs. Regardless of what the dimensions of business, be assured that automation will add increased productivity and efficiency.

2.1 Need of automation

International Journal of Engineering Research & Science (IJOER)
ISBN:[978-93-5391-287-1] ISSN: [2395-6992] [Vol-6, Issue-3, March- 2020]

Some of the reasons for need of automation are such as to Achieve more with less, Elimination of human error, Cleaner Technology, Consistency of product, Minimize Energy consumption, Easy diagnosis of fault, Reduction in Resources, Reduction of Peak Loads, Reduction in Effluent, Environment Protection, Improve Safety and Health, Reduce Maintenance (Chemicals, water, energy etc.), Reduce manpower, Data collection and consolidation, Effective application for Complex tasks, Trending and Report generation Reduce Errors, Increase Speed, Increase Productivity -More automation equals more job capacity, shorter delivery times and optimized business operations, Reduced turnaround and fulfilment times add to overall productivity, Remove the Human Element against market- standard job, Reduce Waste, Expand Capabilities -Automating all parts of the workflow will increase capacity, Improve throughput and Optimize equipment use Workflow automation results in expanded capabilities and increased revenue.[7]

III. PROBLEM STATEMENT

Company realise that they should develop their output and productivity to achieve their yearly target by eliminating some causes and production time that affect profit for company. In mass production the product moves from one workstation to to another next workstation for different processes on material in time restriction. Once it's get disturbed due to delay in between two successive workstation it increases the total cycle time in that workstations. Faster station is limited by slowest station. Thus it decreases the rate of productivity. As the demands are not met by the company, automation techniques are used to eliminate waiting time and to reduce cycle time in the present process in production line to achieve the goal of the company.

3.1 Problem and its effect

The current major problem faced by industry is conventional process time. Industry requires output in minimum time maintaining product accuracy and good quality. For that, company must use advanced technologies such as automation. Due to this cycle time lots of major problem arise. They are as follows:

1. Long cycle times cause high inventories,

2. More cycle time causes higher cost, and poor customer service.

3. Fail to complete order in time.

4. The machining cost is high due to process.

5. As process hour's increases labour cost and product cost increases.

6. Job cannot be delivery on time as cycle time is more.

IV. METHODOLOGY FOR IMPLEMENTATION AUTOMATION

- It is very important to identify the needed and the feasibility of the system to be automated.
- The production cost, the complicity of the machines, the utility requirement of the machines, quality parameters of the products are most important factors to consider while planning for Automation.
- Select the system that has Flexibility, Ease of Programming, Adaptability to change, Expandability, Enhance ability of function, Ruggedness in system, Service back up.
- Performance factor for automation are Response Time, Reliability, Maintainability, Availability and Capability etc.

International Journal of Engineering Research & Science (IJOER)
ISBN:[978-93-5391-287-1] ISSN: [2395-6992] [Vol-6, Issue-3, March- 2020]

4.1 Tools for automation

- PLC - A programmable logic controller, PLC, or programmable controller is a digital computer used for automation of typically industrial electromechanical processes, such as control of machinery on factory assembly lines, amusement rides, or light fixtures.
- SENSORS - A sensor is a transducer that converts a physical stimulus from one form into a more useful form to measure the stimulus.
- ACTUATORS - Hardware devices that convert a controller command signal into a change in a physical parameter.
- DRIVES - Whenever something must be moved, a motor is usually at the source of most automated equipment. There are many types of AC and DC motors.
- SCADA - SCADA (supervisory control and data acquisition) is a system that operates with coded signals over communication channels so as to provide control of remote equipment (using typically one communication channel per remote station.

4.2 Effect on productivity and quality

- Increasing production by avoiding manual delays.
- Improving productivity by achieving the optimum efficiency of the machine.
- Avoiding reprocessing and improving the productivity.
- Automation improves the power saving possibilities and hence the cost of product goes down.
- By avoiding manual error it improves the quality of product and hence productivity.
- Automation can give useful data of the machines, which increases the possibility of analyzing the cause of low or poor productivity.

4.3 Advantages

- Automation is a need for today's competitive market where quality, cost and availability is playing major role.
- Through Automation only we can achieve these parameters and compete in the market.
- Automation increase Productivity and Growth.
- Workflow Automation adds increased capability to any print business, making it possible for you to focus on what you do best.
- Able to produce more jobs. Workflow automation results in more job capacity for shorter delivery times and optimized business operations.
- Workflow automation will help you reduce costs with labor savings. In addition, you will save supplies and toner by avoiding re-do's and makeovers. Good for your bottom line, good for the planet.
- Automating parts of your workflow will increase capacity, improve throughput and optimize equipment use. All this adds up to expanded capabilities and increased revenue.

V. CASE STUDY

5.1 Objectives of the study

- To study the automation.
- To study need of automation.
- To study increasing Productivity & Quality Of products by implementation of automation in manufacturing sectors

5.2 Area of study.

International Journal of Engineering Research & Science (IJOER)
ISBN:[978-93-5391-287-1] ISSN: [2395-6992] [Vol-6, Issue-3, March- 2020]

Indian Industrial development with the help of make in India project. If Indian industries make excellent quality products properly, Indian industrial development made strong, it helps to Government and we can achieve target. Researcher selects 48 industries from Dhule City of Maharashtra State. I have selected for this research domain industrial personnel belong specially belong to production and quality departments of some reputed organizations of Dule district.

5.3 Research Methodology.

The study is based on critical evaluation and analysis of basically Primary Data. The primary sources include industrial personnel. With the help of the questionnaire, detailed discussions were made with the certain sources of primary data to understand their views, thinking and attitude which would help to give the researchers useful recommendations, if any. The questionnaire is processed with the help of statistical tools like tabulations, grouping, percentages, growth rate, averages, etc. Questionnaire is used mainly to analyze the opinion of the industrial personnel

5.4 Industrial employee survey .

Industrial Development is very important in Indian economy and increasing employment .Make in India initiative for development of Indian industrialization at world level so for that it is very important to consider opinion of industrial personnel.

5.5 Research Area

Researchers' selected small scale and Large scale Industries from Dhul city. Researchers selected 40 small scale industries and 08 large scale industries in Jalgaon city. Researcher collects data through Primary and Secondary sources. Researcher distributes questionnaires among the Industrial personnel Plant manager, Production manager, Quality manager & Maintenance manager in each industry.

5.6 Data Analysis

Researcher prepared the questionnaire for Industrial personnel and distributes it among the Industrial personnel Plant manager, Production manager, Purchase manager & Maintenance manager in each industry total 48 industry in which 40are small-scale industries and 08 large-scale industries. After receiving the questionnaire researcher analysis the questionnaire and make four groups of Plant manager, Production manager, Quality manager & Maintenance manager.

TABLE 1
INFORMATION OF QUESTIONNAIRE

Sr. No.	Type of Industries	Plant manager	Production manager	Purchase manager	Maintenance manager	Total
1	Small scale	40	40	40	40	160
2	Large scale	8	8	8	8	32
	Total	48	48	48	48	192

From above There are 192 questionnaire received from group two type of industries small scale and large scale industries , after analysis, researcher select 100 % respondents i.e. 192 for study.

5.7 Testing of Hypothesis:

To study increasing Productivity & Quality Of products by implementation of automation in manufacturing sectors.

H_0 (Null Hypothesis) There is no increasing Productivity & Quality Of products by implementation of automation in manufacturing sectors..

H_1 (Alternative Hypothesis) There is increasing Productivity & Quality Of products by implementation of automation in manufacturing sectors.

Chi-square formula for testing hypothesis is as follow:

$$X_2 = \Sigma_i \Sigma_j (O_{ij} – E_{ij})_2 / E_{ij}$$

International Journal of Engineering Research & Science (IJOER)
ISBN:[978-93-5391-287-1] ISSN: [2395-6992] [Vol-6, Issue-3, March- 2020]

While applying the Formula. Following two tables were prepared.

TABLE 2

TESTING OF HYPOTHESIS

Sr.No.	Name of Respondent	YES	NO	TOTAL
1	Plant Manager	37	11	48
2	Production Manager	33	15	48
3	Quality Manager	31	17	48
4	Maintenance Manager	27	21	48
	TOTAL	128	64	192

TABLE 3

TESTING OF HYPOTHESIS

Oij	Eij	Oij-Eij	(Oij – Eij)2	(Oij – Eij)2 / Eij
37	32	5	25	0.78
33	32	1	1	0.03
31	32	-1	1	0.03
27	32	-5	25	0.78
11	16	-5	25	1.56
15	16	-1	1	0.06
17	16	1	1	0.06
21	16	5	25	1.56
			Total	4.86

International Journal of Engineering Research & Science (IJOER)
ISBN:[978-93-5391-287-1] ISSN: [2395-6992] [Vol-6, Issue-3, March- 2020]

VI. CONCLUSION

From the above example, it are often concluded that, from study of process, which is employed in automation, the specified results of improving productivity are often achieved in limited or very less resources reciprocally . With a correct implementation of automation process stated above, problems are often efficiently classified in corresponding area and people techniques are often applied one by one to urge long lasting results along side improved productivity also as margin of profit . additionally to manufacturing sector, many tools and techniques of automation are often applied to varied other industries and academic institutions to enhance efficiency and productivity.

REFRENCES

[1] Pancho Tomov," Increasing the Efficiency of Automation of Production Processes by Reporting the Parameters of the Parts' Flow", TEM Journal. Volume 6, Issue 3, Pages 484-487, ISSN 2217-8309, DOI: 10.18421/TEM63-08, August 2017.

[2] https://shodhganga.inflibnet.ac.in/bitstream/10603/13108/8/08_chapter%203.pdf.

[3] Teemu Tommila, Juhani Hirvonen, Lauri Jaakkola & Jyrki Peltoniemi," Next generation of industrial Automation, Concepts and architecture of a component-based control system", Jukka Peltola, Seppo Sierla & Kari Koskinen Helsinki University of Technology.

[4] Dheeraj Nimawat and Ashish Shrivastava," Increasing Productivity through Automation", European Journal of Advances in Engineering and Technology, 2016, 3(2): 45-47.

[5] http://old.aia-india.org/downloads/Harish%20Chatterjee%20-%20Increasing%20productivity%20through%20automation.pdf.

[6] M Brambley, D Hansen, P Haves, D Holmberg, S McDonald, K Roth et al, Advanced Sensors And Controls For Building Applications: Market Assessment and Potential R&D Pathways, PNNL-15149, Technical Report, Prepared For The Us, Department of Energy by Pacific Northwest National Laboratory, 2005.

[7] Chaudhari .C. Niraj et al; International Journal of Advance Research, Ideas and Innovations in Technology.© 2017, IJARIIT.

[8] G Clarke and D Reynders, Practical Modern SCADA Protocols: DNP3, 60870.5 and related Systems, Newness, 2004.

[9] M Brambley, D Hansen, P Haves, D Holmberg, S McDonald, K Roth et al, Advanced Sensors And Controls For Building Applications: Market Assessment and Potential R&D Pathways, PNNL-15149, Technical Report, Prepared For The Us, Department of Energy by Pacific Northwest National Laboratory, 2005.

[10] ISO 16484-5, Building Automation and Control Systems (BACS) - Part 5: Data Communication Protocols, 2014.

[11]KA Stouffer, JA Falco and KA Scarfone, SP 800-82 Guide to Industrial Control Systems (ICS) Security: Supervisory Control and Data Acquisition (SCADA) systems, Distributed Control Systems (DCS), and Other Control System Configurations such as Programmable Logic Controllers (PLC), Technical report, National Institute of Standards & Technology, 2011.

[12]G Clarke and D Reynders, Practical Modern SCADA Protocols: DNP3, 60870.5 and related Systems, Newnes,2004.

[13] Niraj C. Chaudhari, Pavitra D Patil "Increasing Productivity & Quality of products by Implementations of Automation in manufacturing sectors" International Journal of Advance Research, Ideas and Innovations in Technology (Volume3, Issue2),2017