



## Increasing Productivity through Automation

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### ABSTRACT

There are many productivity improvement techniques like method study and work measurement, cost reduction, modernization, investment in machine and equipment, re-engineering etc. automation is about speed, accuracy, precision of the process. There are many systems where we can apply automation for better and accurate result. Automation is one of the most effective methodologies for cost cutting by elimination waste as scrap, reducing man power, reducing time, controlling quality, and improving overall performance of any machine, system or process in any industry with the complete assurance of large annual profit margins. This paper talks about concept of automation, tools and technique to be used for improving productivity, process of implementation of automation and its advantages.

**Key words:** PLC, SCADA, Response Time

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### INTRODUCTION

In today's Global Scenario manufacturing Efficiency and Agility is not an option, but it is a strategic requirement. The production cost is increasing rapidly and the labour cost, raw material cost, power cost, etc are not in our control of manufacturer. Hence to increase the productivity and reduce the production cost one can only have controls on:-

- Manpower cost – by reducing manpower.
- Utility cost – by power saving.
- Quality improvement – Through good control.
- High production – Through state of art machine.
- Keeping proper record – Through systems.

All these can be possible only by implementing automation.

### WHAT IS AUTOMATION?

Monitoring and controlling of any process with the help of latest technologies like software, ladder and logic controls, Robotics, ERP system and incorporating central computer is called Automation [1]. The use of control systems and information technologies to reduce the need for human work in the production of goods and services, save money (on production and materials costs) and making money (in profits) can also defined as automation. Workflow automation uses software to control which eliminating repetitive tasks, gaining efficiency, minimizing errors and reducing costs. No matter what the size of business, be assured that automation will add increased productivity and efficiency.

### Need of Automation

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 [2-3].

### METHODOLOGY FOR IMPLEMENTATION

- 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 which 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 [5].

### TOOLS FOR AUTOMATION

Various tools in industries now a day:-

- 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).
- NETWORKING -Network automation is the use of IT controls to supervise and carry out every-day network management functions. These functions can range from basic network mapping and device discovery to network configuration management and the provisioning of virtual network resources [2, 6].

### EFFECT ON PRODUCTIVITY

Automation affects the productivity in following aspects:-

- 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].

### ADVANTAGES

There are some advantages for use of automation in industries are shown:-

- 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 labour savings. And, 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.

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## CONCLUSIONS

From the above discussion, it can be concluded that, from study of process which is used in automation, the required results of improving productivity can be achieved in limited or very less resources in return. With a proper implementation of automation process stated above, problems can be efficiently classified in corresponding area and those techniques can be applied one by one to get long lasting results along with improved productivity as well as profit margin.

In addition to manufacturing sector, many tools and techniques of automation can be applied to various other industries and educational institutions to improve efficiency and productivity.

## REFERENCES

- [1] 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**.
- [2] *ISO 16484-5, Building Automation and Control Systems (BACS) - Part 5: Data Communication Protocols*, **2014**.
- [3] 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**.
- [4] *MODBUS, Application Protocol Specification V1.1b3*, **2012**.
- [5] G Clarke and D Reynders, *Practical Modern SCADA Protocols: DNP3, 60870.5 and related Systems*, Newnes, **2004**.
- [6] S Mackay, J Park and E Wright, *Practical Data Communications for Instrumentation and Controls*, Elsevier, **2003**.