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Waste Control and Automation: Efficiency and Sustainability

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ABSTRACT:

Waste management refers to the various schemes to manage and dispose of wastes. It can be by discarding, destroying, processing, recycling, reusing, or controlling wastes. The prime objective of waste management is to reduce the amount of unusable materials and to avert potential health and environmental hazards. the process of making an equipment, process, or system run automatically is known as automation. Risk management automation gives real-time visibility into the process, providing important insights into prospective or present hazards. Furthermore, it avoids errors that might lead to financial disasters. At its most basic, risk management automation automates duties that were formerly done by people but it does much more.

KEYWORDS:

Automation, Operational Management, Waste Reduction, Waste Management, Waste Control.

I. INTRODCUTION

The combing approach, which combines stock records with movement analysis, has proven to be quite efficient in discovering such goods within the entire inventory. Stock issue papers should be sifted, and things that have not been eaten nonmoving for a year should be separated. A list of such things, as well as their monetary and temporal values, must be created. Similarly, such lists must be established for goods that have not moved in two, three, five, or more years. Such lists can then be presented to upper management for disposal. It is critical to have a separate list of imported parts and insurance products. Such combing and movement evaluation has to occur on an ongoing basis[1], [2].If changes to the manufacturing programme, design, or product lines are considered, a senior executive from warehouse management must be included. This is beneficial in various ways. He may notify upper management about the quantity of materials on hand that seem to be likely to become outdated if and when the adjustments are implemented. This might even help management determine when modifications should indeed be made so that the present system can continue to function. Potatoes and fruit, as well as storage facilities for certified seeds.

Several firms have implemented formal documentation when making design or product modifications. It's known as 'Effective Point Advice.' This is often referred to as EPA. The proposed modifications are documented and communicated to interested departments, as are the specifics of new materials and products necessary, the details of materials and goods that will be invalid/obsolete when the change happens, and the estimated date when the change is anticipated to be implemented.As a result, EPA assists in reducing stockpiles of 'invalid' products, cancelling orders for such things, putting orders for purchasing and/or producing replacement items, and other associated tasks. EPA systems aid in improved coordination for the lucrative implementation of changes with the least amount of side effects, such as the buildup of outdated products.Scrap reclamation has not piqued the interest of upper management in Indian industry. Optimum scrap usage would allow for the conservation of rare natural

resources such as iron ore. This is since scrap is a key component in the production of steel and castings.

In certain circumstances, scrap may be salvaged for use inside the company. Sheets and plates are often used to make press components. Offcuts created during this process may be economically used to manufacture smaller press components such as washers. Rationalizing the supply size, as well as adjustments in process such as reversing the dies, may result in scrap reduction. A fullfledged scrap salvage department exists in large corporations. These departments sort scrap into categories such as turnings, borings, plate cuts, billet endpieces, punching, and so on. To prevent the mixing of various sorts of waste, the scrap is colour coded. It is also beneficial to endusers in each category and the supply of scrap at the right moment for manufacture. Informing the production department about the amount of scrap created at the appropriate time often allows for the avoidance of excessive scrap by timely modifications in production processes, tools, and materials.

Disposal of Scrap

When scrap is disposed of creatively, it may provide substantial returns to the company. A compact disposal organisation reporting to the materials manager, as well as a continual market analysis on the pricing of different kinds of scrap created in the facility, as well as frequent contact with companies that create comparable scrap and endusers.When scrap cannot be used inside the company, disposal action is taken. In reality, it has been shown that it is more economical to sell trash directly to end users than than through intermediaries, who often establish their own cartel, resulting in lower returns. Before to disposal, the scrap must be separated according to metal, size, and so on; when the scrap is combined, the return is even lower than the lowest element in the combination. This is because the buyer of scrap will have to pay for segregation. A casual examination of scrap pricing reveals that sheet and plate cuts will pay less per tonne than turnings and borings. However, when it comes to expensive scrap metals like copper, aluminium, and tungsten, it is essential that they be separated since the returns are significant and the price levels vary. Scrap is created in a segregated state as a result of the operation, thus sorting should be straightforward.

Scrap is regularly disposed of through auction and tender techniques. Normally, parties in both circumstances are required to view the scrap in the scrap yard and deposit earnest money. Often, the corporation insists on a base price based on the kind of scrap. In this regard, the disposal division works closely with the finance department. In many circumstances, the disposal division may attempt to establish longterm relationships with endusers such as steel factories.Numerous businesses have been irritated by trashed components coming on the market and competing with their parts as original equipment. This is the cost that organisations incur for not disassembling and disfiguring scrap before disposing of it. Vehicle replacement components and bearings, in particular, are vulnerable to such hazards. Some groups even go so far as to ask car owners to dismantle filters and plugs before scrapping them. This is a critical consideration.

Given the scarcity of raw materials and the scarcity of credit, it is critical to maximise material use while minimising monies locked up in outmoded excess and trash products. This is only achievable if high management commits and supports it. Employees are, by definition, the greatest individuals to recommend improvements in materials, procedures, and new end users for trash. They are the ones who can reduce scrap buildup via cooperation.As a result, senior management should devise formal compensation mechanisms to encourage employee engagement in this topic. A few organisations have suggestion box strategies that pay off handsomely for the company. Workers are also rewarded and recognised throughout the process.

II. DISCUSSION

Automation

Automation is a technique that uses mechanical, electrical, and computerbased technologies to run and control manufacturing. This technology includes automatic machine tools for processing parts,

automatic assembly machines, industrial robots, automatic material handling and storage systems, automatic inspection systems for quality control, feedback control, and computer process control, and computer systems to support manufacturing activities such as planning, data collection, and decisionmaking[3]–[5].

Types of Automation

Fixed Automation

It is a system in which the equipment configuration determines the order of processing or assembly processes. The procedures in the sequence are typically straightforward. The system's complexity stems from the integration and coordination of several similar activities into a single piece of equipment. Fixed automation is distinguished by the following characteristics: a a high initial investment for customengineered equipment; b high production rates; and c relative inflexibility un adapting product modifications. Fixed automation has an economic basis in items with very high demand rates and quantities. The high initial cost of the equipment may be distributed over a large number of units, making the unit cost appealing when compared to other methods of manufacturing. Mechanized assembly and machining transfer lines are examples of fixed automation**.**

Programmable Automation

The manufacturing equipment is intended to modify the sequence of activities to meet varied product designs. A programme, which is a collection of instructions written so that the system can read and comprehend them, controls the operation sequence.New programmes may be created and loaded into the machinery to create new goods. Some of the characteristics of programmable automation include:

1. A high investment in generalpurpose equipment.
2. Low production rates in comparison to fixed automation.
3. Flexibility to cope with changes in product configuration.
4. Suitability for batch production.

Programmable automated production systems are utilised in low and medium scale manufacturing. Parts or goods are often manufactured in batches. To generate each new batch of a various products, the system must be reprogrammed with the new product's set of machine instructions. The machine's physical configuration must also be changed: tools must be loaded, fixtures must be connected to the machine table, and machine parameters must be inputted. This transition technique is timeconsuming. As a result, the normal cycle for a specific product involves a time of setup and reprogramming, followed by a period in which the batch is manufactured. Computerized machine tools and industrial robots are examples of programmed automation.

Flexible Automation

It is a development of programmable automation. A flexible automated system is one that can produce a wide range of goods or components with little or no downtime for product changeovers. There is no downtime when reprogramming the system or changing the physical configuration tooling, fixtures, and machine setting. As a result, instead of needing separate batches, the system may manufacture numerous product combinations and schedules. The following are some of the characteristics of flexible automation:

1. Expensive for a customengineered system.
2. Continuous manufacture of variable product mixes.
3. Moderate output rates.
4. Adaptability to product design modifications.

The key aspects that separate flexible automation and programmable automation are: 1 the ability to change component programmes with no downtime; and 2 the ability to replace the physical setup with no downtime (Figure.1). These capabilities enable the automated production system to continue

production without the downtime associated with programmable automation. Part programme changes are often performed by creating the programmes offline on a computer system and electronically communicating the programmes to the automated production system. As a result, the time spent programming for the future work does not interfere with production on the present job. This programming power in flexible automation is partly due to advancements in computer systems technology. Shifting the physical setup between parts is performed by doing the changeover offline and then relocating it into place when the next component arrives for processing. One method of executing this strategy is to employ pallet fixtures that hold the pieces and transport them into position at the workstation. In order for these techniques to be effective, the number of components that can be manufactured on a flexible automation system must be greater than that of a system controlled by programmable automation[6], [7].

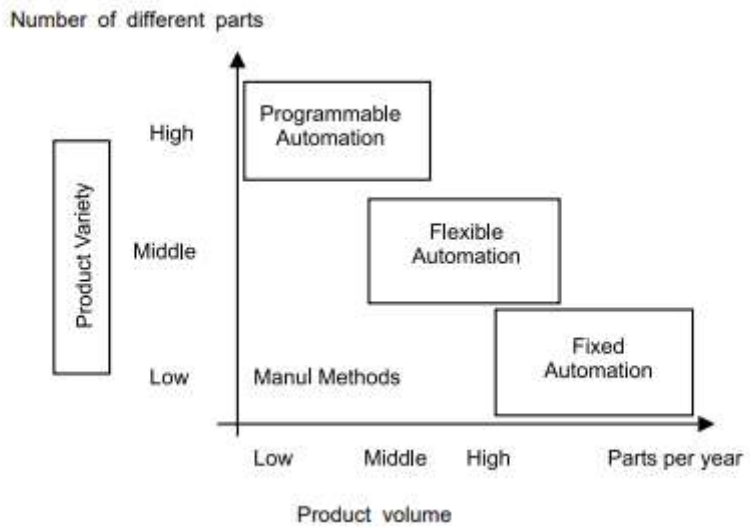

Figure 1: Represent the Types of production automation [Wordpress].

Computer Integrated Manufacturing

Computers have had a significant influence on the development of factory automation systems. Nowadays, computer systems are used to implement almost all contemporary manufacturing systems.The term computer integrated industry CIM refers to the widespread use of computers to design goods, organise production, manage operations, and execute many businessrelated duties in a manufacturing organisation. Another word that is used interchangeably with CIM is computeraided design and computeraided manufacturing CAD/CAM.Automation and CIM have a solid link with a manufacturing conceptual model. In a manufacturing company, physical production operations in the plant may be differentiated from informationprocessing activities. All manufacturing processing, assembly, material handling, and inspections conducted on the product are considered physical activities. These procedures have direct touch with the physical actions that occur throughout manufacturing. Raw materials enter one end of the plant and completed goods exit the other. Physical operations processing, handling, and so forth take place inside the plant. The informationprocessing functions create a ring around the factory, supplying the data and knowledge needed to properly manufacture the product. 1 business operations, 2 product design, 3 production planning, and 4 manufacturing control are examples of information processing functions. These four functions constitute a series of actions that must occur in tandem with physical manufacturing operations.

Reasons for Automation

Some of the causes for automation are as follows:

1.Improved Labour Productivity: Automation of industrial activities has the potential to increase labour productivity. This translates to more production per hour of labour input. Automation achieves higher production rates output per hour than the analogous human tasks.

2. High Labour Expenses: The tendency in the world's industrialised countries has been towards everincreasing labour costs. As a consequence, increased investment in automated technology to replace manual tasks has become economically acceptable. Because of the high cost of labour, corporate leaders are being forced to replace robots for human labour. Automation leads in a reduced cost per unit of goods since machines can create at faster rates of production.

3. Labor Shortages: There has been a general labour deficit in many industrialised countries. Labor shortages encourage the development of automation as a labour alternative.

4. Laborforce Shift Towardsthe Service Sector: This shift has been notably noticeable in India. There are also societal and institutional variables to blame for the tendency. People have a negative perception of industrial employment as repetitive, degrading, and filthy. This viewpoint has led people to seek jobs in the economy's service sector, such as government, insurance, personal services, legal, and sales. As a result, the share of the labour force involved in manufacturing is decreasing.

5. Safety: Work is made safer by automating the process and moving the operator from active involvement to a supervisory function.

6. High Cost of Raw Materials: The high cost of raw resources in production necessitates higher efficiency in their use. One of the advantages of automation is the minimization of scrap.

7. Increased Product Quality: Automated processes not only create components quicker, but also with higher consistency and adherence to quality criteria.

8. Decreased Manufacturing Lead Time: By reducing manufacturing lead time, manufacturers get a competitive edge in promoting superior customer service.

9. Reduce Inprocess Inventory: Keeping huge inventories of workinprocess costs the firm a lot of money since it locks up capital. Inprocess inventory is worthless. It serves no use other than raw material stock or completed product inventory. Automation helps to achieve this aim by minimising the amount of time a workpart spends in the production.

10. High Cost of Not Mechanising: Automating a manufacturing unit provides a major competitive advantage. The advantages of automation manifest themselves in intangible and unexpected ways, such as enhanced quality, increased sales, improved labour relations, and a better business image.

All of these elements combine to make industrial automation a viable and appealing alternative to human manufacturing processes.

Advantages of Automation

The following are some of the benefits of automation:

1. The solution to a shortened workweek is automation. The average number of working hours per week will continue to fall as a result of automation, providing for more leisure time and a better quality of life.
2. Automation creates safer working conditions for employees. Since the worker has less direct
3. Automation leads in reduced pricing and higher quality goods. It has been projected that the cost of machining one unit of product using traditional generalpurpose machine tools that need human operators might be 100 times that of creating the same unit utilising automated massproduction processes. The electronics sector has several instances of manufacturing technology advancements that have drastically lowered costs while enhancing product value e.g., colour TV sets, stereo equipment, calculators, and computers.
4. The rise of the automation sector will provide job possibilities. This has been notably true in the computer sector, where as firms such as IBM, Digital Equipment Corp., Honeywell, and others have prospered, new employment have been generated.

5. These new employment include not only those directly employed by these corporations, but also computer programmers, systems engineers, and others who are required to utilise and operate computers.
6. Automation is the only way to raise living standards. Only via increased productivity brought about by new automated techniques of manufacturing can the quality of life be raised. Wage rises without corresponding gains in productivity will result in inflation. More production is required to afford a better society [8]–[10].

III. CONCLUSION

In operational management, the management of waste and the function of automation are essential. Organisations may decrease waste creation, increase process efficiency, and support sustainability by putting waste management techniques into practise. By removing human activities, increasing accuracy, and giving useful data for process optimisation, automation technologies play a vital role in waste reduction. Organisations may save costs, raise product quality, increase operational effectiveness, and support environmental sustainability by integrating automation and waste management practises.

REFERENCES

[1] C. D. S. Guimarães, D. R. D. S. Maia, and E. G. Serra, Construction of biodigesters to optimize the production of biogas from anaerobic codigestion of food waste and sewage, *Energies*, 2018, doi: 10.3390/en11040870.

[2] S. R. Jino Ramson, S. Vishnu, and M. Shanmugam, Applications of Internet of Things IoTAn Overview, 2020. doi: 10.1109/ICDCS48716.2020.243556.

[3] T. Tolio *et al.*, Design, management and control of demanufacturing and remanufacturing systems, *CIRP Ann. Manuf. Technol.*, 2017, doi: 10.1016/j.cirp.2017.05.001.

[4] L. Bellia and F. Fragliasso, Evaluating performance of daylightlinked building controls during preliminary design, *Autom. Constr.*, 2018, doi: 10.1016/j.autcon.2018.05.026.

[5] R. V. Tiwari, A. Maheshwari, M. C. Srivastava, and A. Sharma, Design and Fabrication of Project on Water Bodies Cleaning Robot, *Int. J. Eng. Manag. Res.*, 2018.

[6] G. Ravi, K. M. Madhu Varshini, K. Malligarjunan, and M. Manokaran, Automotive unit to improve the yield of agriculture biogas plants, *J. Adv. Res. Dyn. Control Syst.*, 2020, doi: 10.5373/JARDCS/V12SP5/20201838.

[7] J. Bell, J. Philp, and R. I. Kitney, Addressing the post-COVID era through engineering biology, *Eng. Biol.*, 2021, doi: 10.1049/enb2.12008.

[8] A. T. Rizaluddin and H. Hardiani, Online Monitoring of Effluent Quality for Assessing the Effect of Wastewater Treatment Plant to Discharge into the Receiving Water: a review, *J. Ris. Teknol. Pencegah. Pencemaran Ind.*, 2021, doi: 10.21771/jrtppi.2021.v12.no1.p719.

[9] I. C. Reinhardt, J. C. Oliveira, and D. T. Ring, Industry 4.0 and the Future of the Pharmaceutical Industry, *Pharm. Eng.*, 2021.

[10] G. Kleineidam, L. J. Schmid, M. Krasser, and B. Koch, Critical infrastructurescyber security requirements from a utility'sperspective, *Elektrotechnik Und Informationstechnik*, 2017.