

Optimization of Flexible Manufacturing Systems Using IoT

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Abstract. A flexible manufacturing system (FMS) is an automated material handling and integrated workstation that is computer-controlled and used for the automatic random processing of palletized parts. To assess the effectiveness of the FMS design before deployments, computer simulation is a cost-effective method. It is crucial to test this simulation software before usage since they have such a clear influence on the FMS decision-making process. A FMS is a complicated, integrated system that includes a central computer numerical control machining center and an automated material management system. The sole drawback of FMS is its greater initial cost and replacement cost if it does not function properly. Therefore, it is important to analyze FMS before installing it. The use of Industry 4.0 technologies has expanded the flexibility of the entire manufacturing system. The development of these technologies, which include the Internet of Things (IoT), big data, artificial intelligence (AI), additive manufacturing (AM), sophisticated robotics, virtual reality, cloud computing, simulation, and others, has increased the industrial system's adaptability.

Keywords: Flexible transfer lines, flexible manufacturing cells (FMC), Internet of Things (IoT), and Flexible Manufacturing System.

INTRODUCTION

The availability of several workstations at which generic processes are carried out defines flexible manufacturing systems (FMS). This system's flexibility is realized through a network of programmable transportation that connects the workstations and an advanced control system that coordinates the operations of the workstations and transport systems while keeping track of the status of the ongoing jobs. In general, innovations fascinate people, especially if the results can benefit them. The global marketplace is impatient and price-sensitive.

Due to daily fluctuations in client demand for a wide range of goods with eight pre-specified quality at lower prices, Indian business requires flexible production facilities to compete in today's global market incorporating innovative production technologies like FMS, JIT, CAD, and CAM, which have enormous potential. The many independent manufacturing systems that were discussed throughout this article may be combined in India to create a single, large-scale system in which the production of parts is managed with the assistance of a central computer to

satisfy the daily changes in consumer expectations. Such a production system has the benefit of being very flexible in terms of the little effort and rapid turnaround time needed to make a new product; for this reason, it is referred to as a FMS.

THE FMS CONCEPT

The FMS offers batch production with the efficiency of mass manufacturing. When components are produced in lots of few to more than 50, with a total yearly demand of less than, say, 100,000 units, it is referred to as batch production. When greater yearly production rates are needed, mass manufacturing is used, and thus, the usage of specialized machinery might be justified. It may cost 100 times as much to create a single unit using general-purpose machine tools as it does to produce the identical item using the most effective mass production techniques. It should be able to lower the cost of creating components in small and medium quantities by utilizing FMS technology. Advanced FMS will contain a high-power laser station incorporated into the production line; the laser will be used