

## RECONFIGURABLE MANUFACTURING SYSTEM (RMS): AN INTRODUCTION

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**Abstract:** Invention of the Reconfigurable Machine Tool (RMT) is briefly discussed in this work. The RMS and its aims and significance. It was in 1999 at the ERC when researchers began looking into. In reaction to rapid market shifts or internal system changes, a reconfigurable manufacturing system may swiftly adapt its production capacity and functionality within a component family. When compared to another manufacturing system, RMS's goal is to give adequate flexibility in a shorter amount of time via the use of modularity, integrability, and scalability, while the other system provides more generic flexibility that is tailored to anticipate variance. In this article, we have discussed the many aspects, features, pros, and cons of Reconfigurable Manufacturing Systems. The article describes Reconfigurable Manufacturing System's vital role in the future manufacturing system and its innovative approaches and qualities. This article also includes a comparison analysis of this production method with others already on the market.

**Key Words:** *Reconfigurable Manufacturing System*, Reconfigurable Manufacturing Systems (ERC/RMS) at the University Of Michigan College Of Engineering.

2. **Objectives of RMS:** The goal of RMS is to make available the necessary resources for production at the precise moment they are needed. As a result, RMS combines the best features of both dedicated and flexible production methods. RMS intends to swiftly and economically respond to:
  - Market shifts, including but not limited to shifts in product demand
3. The launch of new items and revisions to existing ones
4. Production continues despite equipment failure due to:
  - System faults
5. Modular Machining Equipment, User-Defined Adaptability,
6. Capacity for Production

**7. Introduction:** As the name indicates Reconfigurable Manufacturing System is a manufacturing system in which the configuration can be changed. Configuration refers to arrangement of things in a particular way. The change of configuration in RMS is required to change the production capacity and functionality of the system as per market demand. Production capacity means parts produced per unit time and functionality refers to part variety. Configuration change includes both hardware and software components. Reconfiguration allows adding, removing or modifying specific RMS goes beyond the economic objective of FMS by permitting

- Reduction of lead time for launching new system and reconfiguring existing system
- Rapid manufacturing modification and quick integration of new technology

### 3. Components of RMS

- CNC machines
  - Reconfigurable Machine Tools
  - Reconfigurable Inspection Machines
  - Reconfigurable Assembly Machines
  - Material transport systems

### 4. Characteristics Of RMS Ideal Reconfigurable

Manufacturing Systems include six fundamental features: process capability, controls, software, and machine structure for varying output. Modularity and the RMS reaction to changing market needs: Modularity refers to the adaptability of various technologies. Both the Reconfigurable Manufacturing System (RMS) and one of its parts may be disassembled and reassembled in different configurations. The division of labor and materials into distinct functional units that manufacturing modes, and the capabilities added to the process may be changed between production modes. methods to create the best layout for accommodating auxiliary devices, additional axis movements, and bigger tools requirements that are a given. Many parts, such as magazines and the pricey controller, in a reconfigurable manufacturing system are often modular.

### **Functionality**

machines, axes of motion, controls, and tooling Dedicated transfer lines are typically having high

**Integrability:** - It is the ability to integrate modules capacity but limited functionality and are cost rapidly and precisely by a set of mechanical, effective because as they produce a single few parts informational, and control interfaces that enable demand exceed. But saturated markets and integration and communication. At the machine level, axes of motions and spindles can be integrated to increasing pressure of global competition there are times when DTL doesn't work at their full form machines. capacity. FMS built with all the flexibility and

**Customized flexibility:** - RMS is flexible but the flexibility is customized to a particular part family. Part family refers to a group of parts having similar functionality available, sometimes it is available with those that may not be needed at the installation time

.In these case the capital lies idle on the shop floor

characteristics (manufacturing as well as design characteristics). This characteristic drastically and a major portion of the capital investment is wasted.

distinguishes RMS from flexible manufacturing Waste

systems (FMS), and allows a reduction in investment cost. IN RMS two types of wastes are eliminated

- By adding extra capacity when needed

**Scalability:** - It is the ability of a system to be By adding extra functionality

enlarged to accommodate a growing amount of work. RMS is scalable to achieve the production capacity as per the market demand. Scalability is the counterpart

### **6. Merits of RMS**

- Increased product quality.  
characteristic of convertibility.

**Convertibility:** - It is the ability to easily transform the functionality of existing systems, machines, and controls to suit new production requirements. System convertibility may have several levels. Reduce time required for product changeover.

- Enhance the development of prototype with ease.
- For launching new manufacturing system reduce the lead time.

**Diagnosability:** - It is the ability to automatically Rapid upgrading and quick integration of read the current state of a system for detecting and diagnosing the root-cause of output product defects and subsequently correct operational defects quickly.

### 5. Comparison of Manufacturing Systems

Comparison of the manufacturing system According to the

- COST
- FUNCTIONALITY
- WASTE

new process technology.

### 7. Demerits of RMS

- Difficult integration of machine
- Expensive controller.
- Difficult selection of machine modules
- Difficult in measurement of changeability, configurability and their relationship.
- Difficult to prepare model to adequate the level of changeability

**8. Future trends:** Cost Reconfigurable manufacturing systems are competitive with FMS and DTL in terms of advancements in production. not take place without the right tools. Fundamental shifts in the nature of machine tools and the dissection of some of their underlying structure

9. Unlike competing products, RMS is designed to be easily deployed, with a modular structure and plug-and-play components (controllers,

10. Future upgrades may be made to the precise hardware/software, spindles, needed to provide the required functionality. As a result, fresh ideas in theory, layout, and construction will emerge.

11. These call for the creation of methods for

12. purposes. These modifications are essential for the journal of machine intelligence (ISSN:0975-).

13. the future of reconfigurable manufacturing, issue 2927, page 38–46

14. In order to evaluate changes and important challenges in manufacturing in the next five to ten years.

15. Baldwin

16. Clark, K. C.; Harvard Business School;

17. systems, a comprehensive evaluation is being conducted at review(1997),2(1),pp-84-93.

18. Michigan State University. This research had a national/international perspective.

19. Experts from across the world in the manufacturing industry are International Journal of Production Research, Hitomi K.

20. professionals in the manufacturing industry were given the chance to share their predictions, debate the predictions

of others, and make adjustments to their own system design,(1994),pp 1-7 using a series of survey instruments.

- 21.Manufacturing conference proceedings: Fujii S.,Morita H.,Kakino Y.,Takata Y.,Murakami D.,TAsuta Y.
- 22.have these debates in mind. The purpose of this survey
- 23.intends to achieve two primary objectives. One is the Adaptable and Versatile H.A. ElMaraghy
24. Analyze the outcomes brought on by reconfigurable manufacturing thus far.
25. Current manufacturing systems, including flexible machining methods, are examined for their successes, weaknesses, and limitations in the context of the manufacturing industry. The second is to investigate how paradigms may be used, why, and what kind of technology may make this possible. 17(4), 261-276 (2006) Int. J. Flex. Manufacturing Syst.
26. Facilities for producing reconfigurable machining systems.to come

**Conclusion:** The scientific and corporate worlds have given the concept of reconfiguration a great deal of thought. In this paper, we attempt to explain the concept of reconfigurable manufacturing systems (RMSs), including what they are, how they function, what they are capable of, and what components make them up.components of Configurable Manufacturing Systems. In an effort to take a more all-encompassing view of reconfigurability in the industrial sector, this study proposes a solution based on reconfigurable manufacturing systems.

## **.References**

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