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Integrated Manufacturing System (IMS)

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Description

Through research and development operations, the product design stage defines the technological specifications of products that fulfil market needs and completes the final design/drawing of parts/items. In addition to functional design, industrial design factors such as aesthetics and ergonomic ease of use are taken into account in order to achieve the function, quality, reliability, and safety that should be displayed in the usage of products. Stage of process planning This determines the procedures for processing and machining parts and assembling products, as well as machine tools and jigs and fixtures for holding workpieces, the sequence of operations to be carried out by production facilities, the cutting tools and equipment required for each operation, and the machining or process conditions. The production implementation stage obtains raw materials from outside sources, machines them into parts, assembles, modifies, and inspects the goods, and distributes them to the market/customers (shipping). Stage of production management. This is where the overall production plan and detailed schedule for the above manufacturing processes are created, as well as where the production control is carried out [1].

Quick-response manufacturing is a method of production that aims to reduce the time between receiving an order and receiving the product. CALS (Computer-aided Acquisition and Logistic Support/Commerce at Light Speed) is an integrated information system with computer aids for this aim. This aids procurement and manufacturing activities by computerizing all data related to product life cycles, including development, design, production, distribution, and maintenance. The Internet is frequently used to carry out this task. The notion of Intelligent Manufacturing has evolved over time to include the most recent technical advancements into the manufacturing system. IMS can be classified into three types or paradigms based on the level of information technology and the characteristics of its integration with production systems [2].

The digital manufacturing paradigm, also known as first-generation intelligent manufacturing, is the basis of IMS, upon which future paradigms are built. During the 1980s, production plans and output designs started to be made on computers instead of paper charts and graphs. Factory layout, product design, machinery use, and labor are all digitally simulated in order to create the optimum value chain that minimizes costs, improves product quality, and makes the best use of resources. Because everything is done digitally, it cuts down on the time it takes to create products that are tailored to individual customer needs. The internet is integrated into the computerized manufacturing system in the second generation of intelligent manufacturing. The internet network allows collaborative manufacturing by connecting ideas, processes, and data across diverse production units. Connecting firms in the same industry (horizontal integration), connecting enterprises operating on different stages of the manufacturing process within the same industry (vertical integration), and connecting users to enterprises are all possible using networking technologies [3].

The first step toward making the production process more user-centric is to have users interact with it. IMS has experienced key achievements because of the integration of Artificial Intelligence (AI) with digital and networking technologies. The use of AI in manufacturing processes has the potential to radically transform production methods and eliminate the requirement for human intellect. Artificial intelligence empowers next-generation intelligent manufacturing to conduct research and development and develop new processes, designs, products, and business models without the need for human participation. Because robots are faster than people, AI will lower not only the time it takes to produce goods, but also the time it takes to create and come up with new ideas [4,5].

The total is larger than the sum of its parts in an integrated management system. Successful management system integration can provide a number of real benefits to the firm, including:

- Keeping the effort from being duplicated
- Getting more bang for your buck with senior management time
- Using resources more efficiently to implement and maintain systems
- Obtaining a more cost-effective certification
- Getting rid of audit fatigue

Conflict of Interest

None.

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