Illuminate NEBRASKA
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COMPUTER INTEGRATED MANUFACTURING

TOOLS YOU CAN CONTROL

CONCEPT Computer Integrated Manufacturing (CIM) is a system that integrates various computer-controlled processes and technologies in the production and management of manufacturing operations. There are several tools that you can control within a CIM system, including: Computer-Aided Design (CAD), Computer-Aided Manufacturing (CAM), Computer-Aided Process Planning (CAPP), Production Planning and Control, and Manufacturing Execution System (MES)

BACKGROUND

The history of tools that can be controlled in CIM can be traced back to the early days of computer technology and automation. In the 1940s and 1950s, the development of numerical control (NC) machines marked the beginning of computer-controlled manufacturing. These machines used punched tape or cards to provide instructions to the machine tools. In the 1960s, the introduction of Computer Numerical Control (CNC) machines replaced the need for physical media, enabling digital storage and modification of instructions. Around the same time, CAD and CAM software emerged, allowing engineers to design and simulate manufacturing processes on computers. As computers became more powerful and affordable in the 1980s, these tools started to become more prevalent and accessible. The development of MES and Enterprise Resource Planning (ERP) software further integrated manufacturing processes and data management. Today, advancements in robotics, machine learning, and the Internet of Things (IoT) continue to shape the landscape of CIM, enabling even greater levels of automation, efficiency, and connectivity in modern manufacturing environments.

EXAMPLE

Essential components and forms related to Computer Integrated Manufacturing include:

- **Hardware Components**
- **Software Components**
- **Data Management**
- **Integration and Communication**
- **Human-Machine Interface (HMI)**

FORMULAS / DATA

Make sure it measures up

OVERALL EQUIPMENT EFFECTIVENESS (OEE) - A measure of manufacturing productivity, OEE considers three primary factors: availability, performance, and quality. It is a key indicator of how effectively a manufacturing operation is using its equipment.

AVAILABILITY - The ratio of actual production time to planned production time.

PERFORMANCE - The ratio of actual production speed to the ideal production speed.

QUALITY - The ratio of good products produced to the total products produced.

HEURISTIC - OEE = Availability × Performance × Quality

REAL WORLD CONNECTIONS

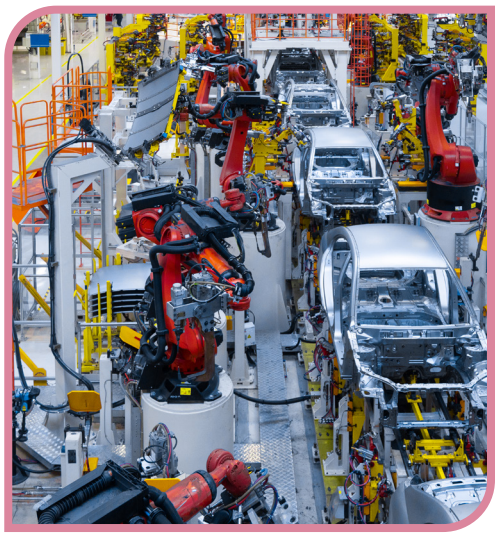
CIM can be integrated into educational curricula in Nebraska, particularly for students studying engineering, computer science, and manufacturing technology. Learning about CIM equips students with the necessary skills and knowledge to excel in the evolving manufacturing industry, preparing them for future career opportunities. Additionally, hands-on experience with CIM tools in labs and workshops can give students a practical understanding of modern manufacturing processes.

Local communities in Nebraska can benefit from CIM through increased economic growth and job opportunities. As manufacturing companies adopt CIM systems, they become more efficient and competitive, potentially attracting more business and investment to the region. This can lead to the creation of new jobs and improved economic stability for communities.

APPLICATION

A relevant application that exemplifies the topic of CIM is the implementation of a smart factory for an automotive manufacturing plant. The goal is to use CIM technologies to optimize production processes, increase efficiency, and reduce costs, while maintaining high product quality and adaptability to market demands.

PROBLEM:
The automotive manufacturing plant faces challenges related to production efficiency, quality control and the ability to adapt to changing market demands. Traditional manufacturing processes may not be sufficient to address these challenges and remain competitive in the global market.



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