

15.6: New Technologies

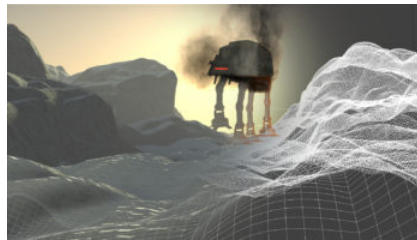
What you'll learn to do: identify existing and emerging technologies that are changing the way goods are produced and delivered

Technology has revolutionized the way products are manufactured and delivered. In this section, you'll get a glimpse of some of the latest technological innovations and how they're changing business operations.

Learning Objectives

- Describe CAM
- Describe flexible manufacturing

New Technologies



With certain manufacturing processes—especially ones demanding high precision and mass production—it can be difficult or too costly to find the skilled labor needed to perform the tasks. This pressure has increased reliance on computers and highly specialized software systems. Some of these new, sophisticated technologies are described below.

Computer-Aided Design

Computer-aided design (CAD) is the use of computer systems (or workstations) to aid in creating, modifying, analyzing, or optimizing a design. CAD software is used to increase the designer's productivity, improve the design quality, improve communications through documentation, and create a database for manufacturing. CAD is an important industrial art extensively used in many applications, including automotive, shipbuilding, and aerospace industries, industrial and architectural design, prosthetics, and many more. CAD is also widely used to produce computer animation for special effects in movies, advertising, and technical manuals. The ubiquity and power of computers today mean that even perfume bottles and shampoo dispensers are designed using techniques unheard of by the engineers of the last century.

Computer-Aided Manufacturing

Computer-aided manufacturing (CAM) is the use of software to control machine tools in the manufacturing of workpieces. Its primary purpose is to speed the production process and produce components and tooling with more precise dimensions and material consistency. In some cases, this enables production using only the required amount of raw materials—thus minimizing waste and reducing energy consumption.

In the following video, a CNC carving machine uses a computer program (CAD/CAM) to create an amazing woodcarving:



Computer-Integrated Manufacturing

Computer-integrated manufacturing (CIM) is a manufacturing approach that uses computers to control the entire production process. This integration allows individual processes to exchange information with one another and initiate actions. Although CIM can be faster and less error prone than conventional manufacturing, the main advantage is the ability to create automated manufacturing processes.

Watch this short video of a factory in which CIM is used in the factory production line to build the Kia Sportage:



Flexible Manufacturing Systems

A **flexible manufacturing system (FMS)** offers flexibility in how the production system reacts to planned or unplanned changes. This flexibility is typically built into one of the following:

- **Machine flexibility:** the system can be changed to produce new product types or alter the order of operations executed on a part.
- **Routing flexibility:** the system has multiple machines that can perform the same operation on a part, or the system can absorb large-scale changes in volume, capacity, or capability.

An FMS has immense advantages over traditional production lines in which machines are set up to produce only one type of good. When the firm needs to switch a production line to manufacture a new product, substantial time and money are often spent modifying the equipment. An FMS makes it possible to change equipment set-ups merely by reprogramming computer-controlled machines. Such flexibility is particularly valuable to companies that produce customized products.

3D Printing

3D printing (or additive manufacturing, AM) is any of various processes used to make a three-dimensional object. In 3D printing, additive processes are used, in which successive layers of material are laid down under computer control. These objects can be of almost any shape or geometry and are produced from a 3D model or other electronic data source. A 3D printer is a type of industrial robot. Several different 3D printing processes have been invented since the late 1970s. The printers were originally large, expensive, and highly limited in what they could produce; today, they are much cheaper and more versatile.

The following short videos show 3D printing in action:



The main differences between 3D printing processes are in the way layers get deposited to create parts and in the materials used to produce those layers. Some methods melt or soften material to produce the layers, whereas others cure liquid materials using

sophisticated technologies. The primary considerations in choosing a 3D printer are speed, cost of the machine, cost of the printed prototype, cost and choice of materials, and color capabilities.

Regardless of the technology used in the production process, consumers benefit greatly from these advances. Mass customization of everything from Yankee candles to T-shirts to beverage Koozies is possible because of these exciting advances in computer technology.

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