

20.3: Reading- The Technology of Goods Production

The Technology of Goods Production

PowerSki founder and CEO Bob Montgomery spent sixteen years designing the Jetboard and bringing it to production. At one point, in his efforts to get the design just right, he'd constructed *thirty different prototypes*. Needless to say, this process took a very long time, but even so, Montgomery thought that he could handle the designing of the engine without the aid of a computer. Before long, however, he realized that it was impossible to keep track of all the changes.

Computer-Aided Design

That's when Montgomery turned to computer technology for help and began using a computer-aided design (CAD) software package to design not only the engine but also the board itself and many of its components. The CAD program enabled Montgomery and his team of engineers to test the product digitally and work out design problems before moving to the prototype stage.

The sophisticated CAD software allowed Montgomery and his team to put their design paper in a drawer and to start building both the board and the engine on a computer screen. By rotating the image on the screen, they could even view the design from every angle. Having used their CAD program to make more than four hundred design changes, they were ready to test the Jetboard in the water. During the tests, onboard sensors transmitted data to portable computers, allowing the team to make adjustments from the shore while the prototype was still in the water. Nowadays, PowerSki uses *collaboration software* to transmit design changes to the suppliers of the 340 components that make up the Jetboard.

Computer-Aided Manufacturing

For many companies, the next step is to link CAD to the manufacturing process. A computer-aided manufacturing (CAM) software system determines the steps needed to produce the component and instructs the machines that do the work. Because CAD and CAM programs can “talk” with each other, companies can build components that satisfy exactly the requirements set by the computer-generated model. CAD/CAM systems permit companies to design and manufacture goods faster, more efficiently, and at a lower cost, and they're also effective in helping firms monitor and improve quality. CAD/CAM technology is used in many industries, including the auto industry, electronics, and clothing.

Watch the following video as a CNC carving machine uses a computer program to create an amazing woodcarving.

https://www.youtube.com/watch?v=OX_Pw8XPYMs

Computer-Integrated Manufacturing

By automating and integrating all aspects of a company's operations, *computer-integrated manufacturing (CIM)* systems have taken the integration of computer-aided design and manufacturing to a higher level—and are in fact revolutionizing the production process. CIM systems expand the capabilities of CAD/CAM. In addition to design and production applications, they handle such functions as order entry, inventory control, warehousing, and shipping. In the manufacturing plant, the CIM system controls the functions of industrial robots—computer-controlled machines used to perform repetitive tasks that are also hard or dangerous for human workers to perform. Watch this short video of the factory where the CIM is used on the factory production line to manufacture the Kia Sportage.



Flexible Manufacturing Systems

Finally, a CIM system is a common element in flexible manufacturing systems (FMS), in which computer-controlled equipment can easily be adapted to produce a variety of goods. 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 in modifying equipment. An FMS makes it possible to change equipment setups 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.



A large number of additive processes are now available. The main differences between processes are in the way layers are deposited to create parts and in the materials that are used. Some methods melt or soften material to produce the layers, while others cure liquid materials using different sophisticated technologies. With laminated object manufacturing (LOM), thin layers are cut to shape and joined together (e.g. paper, polymer, metal). Each method has its own advantages and drawbacks, which is why some companies consequently offer a choice between the material used to build the object. Other companies sometimes use standard, off-the-shelf business paper as the build material to produce a durable prototype. The main considerations in choosing a

machine are generally speed, cost of the 3D printer, cost of the printed prototype, cost and choice of materials, and color capabilities. Printers that work directly with metals are expensive. In some cases, however, less expensive printers can be used to make a mould, which is then used to make metal parts.

KEY TAKEAWAYS

- In addition to creating high-quality products, companies must produce and deliver goods and services in an efficient, cost-effective manner.
- Sophisticated software systems, including **computer-aided design (CAD)**, **computer-aided manufacturing (CAM)**, **computer-integrated manufacturing (CIM)**, and **flexible manufacturing systems (FMS)**, are becoming increasingly important in this area.
- Computer-aided design software (CAD) is used to create models representing the design of a product.
- Many companies link CAD systems to the manufacturing process through computer-integrated manufacturing (CIM) systems that not only determine the steps needed to produce components but also instruct machines to do the necessary work.
- A CAD/CAM system can be expanded by means of computer-integrated manufacturing (CIM), which integrates various operations (from design through production) with functional activities ranging from order taking to shipping.
- A CIM system is a common element in a flexible manufacturing system (FMS), in which computer-controlled equipment can easily be adapted to produce a variety of goods.
- **3D printing** is a form of computer aided design (CAD) that builds a 3 dimensional object by adding layers of material, one upon the other until an object is created according to the CAD design

Check Your Understanding

Answer the question(s) below to see how well you understand the topics covered in this section. This short quiz does **not** count toward your grade in the class, and you can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

<https://assessments.lumenlearning.com/assessments/218>

Contributors and Attributions

CC licensed content, Original

- Revision and adaptation. **Authored by:** Linda Williams and Lumen Learning. **Provided by:** Tidewater Community College. **License:** [CC BY-NC-SA: Attribution-NonCommercial-ShareAlike](#)

CC licensed content, Shared previously

- An Introduction to Business. **Authored by:** Anonymous. **Provided by:** Anonymous. **Located at:** <http://2012books.lardbucket.org/books/an-introduction-to-business-v2.0/s15-05-the-technology-of-goods-produc.html>. **License:** [CC BY-NC-SA: Attribution-NonCommercial-ShareAlike](#)
- 3D Printing. **Provided by:** Wikimedia Foundation. **Located at:** https://en.Wikipedia.org/wiki/3D_printing. **License:** [CC BY-SA: Attribution-ShareAlike](#)
- Makerbot. **Provided by:** BBC. **Located at:** https://youtu.be/_n9vPNAzKVY. **License:** [CC BY-NC-ND: Attribution-NonCommercial-NoDerivatives](#)

All rights reserved content

- The Carbon Production Network **Located at:** <https://youtu.be/7gm4hqQXKTA>. **License:** *All Rights Reserved*. **License Terms:** Standard YouTube license
- Car Factory - Kia Sportage factory production line. **Authored by:** furiousdriving. **Located at:** <https://youtu.be/sjAZGUcjrP8>. **License:** *All Rights Reserved*. **License Terms:** Standard YouTube license

20.3: Reading- The Technology of Goods Production is shared under a [not declared](#) license and was authored, remixed, and/or curated by LibreTexts.