Chapter 15 Lesson Plan

High-Performance Manufacturing

Chapter Resources		
Textbook Activity	**Teacher CD**	**Online Learning Center**
Clean Up Your Workspace Using 5S Use the 5S method to make a space in your home a more efficient work area.	Lesson Plan Flash® Presentation *ExamView*® Chapter Test	Chapter Activities Chapter Quizzes

FOCUS

This chapter introduces the practice of high technology as used in the manufacturing environment.

Objectives

- Explain what "high performance" means to manufacturing.
- Give examples of smart planning, smart production, and smart control methods.
- Identify advanced systems.
- Compare and contrast automatic factories to traditional ones.

Tying to Previous Knowledge

Ask the class if anyone has actually seen a robotic process in action (face-to-face or perhaps in the media). Discuss how such automation might be incorporated in advanced manufacturing.

TEACH

1. **Extension.** If you have access to LEGO®, TC Logo®, fischertechnik®, or similar building systems, use them with Chapter 15 to enable students to construct their own computer-controlled machines and production arrangements. Computer interfaces are available for Macintosh® and Windows® computers. These systems provide an excellent introduction to robotics and computer-controlled systems. Plans for conveyor belts, robotic arms, optical sorters, and more are available for both Lego and Fischer systems. These materials allow students to construct their own working models of the latest manufacturing technologies. Capsela® systems can also provide a simplified introduction to robotics.
2. **High-tech manufacturing.** Acquire and show a video about high-tech manufacturing. (Consider the Internet as a source.) Compare the procedures, machines, and operations to standard, or traditional, manufacturing.
3. **Technology assessment.** Demonstrate a computer program that does more than simply record data or display rote responses. Can a computer (program) think? Can a computer plan and execute instructions? Can a computer guide us toward solving a problem as

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High-Performance Manufacturing (continued)

opposed to simple number crunching? Can "intelligent" computers run a manufacturing program with limited or no human intervention?

4. **Analysis.** Why is a CIM program potentially better than older, but still largely automated, manufacturing systems? To help analyze the question, have a student follow written instructions to perform a simple task. Then orally communicate the same task to another student, and ask him or her to write it down and give it to a third student to read and execute. Did both "manufacturing workers" do the task correctly as indicated? It is likely that the first instance resulted in a more precise fulfillment of what was wanted because any time instructions go through a "translation," they may be distorted or modified to some degree. CIM is potentially more efficient because there is no translation. The instructions go directly from the computer to the machine.

ASSESS

Have students complete Chapter Test 15. Chapter tests are found in the *ExamView*® Assessment Suite on this Teacher Resource CD-ROM.

Reteach

1. The terms for Chapter 15 include many acronyms. Create a display, using pictures of computer-integrated manufacturing for the border. Make copies of the acronyms CIM, LAN, WAN, CAD, CAM, CAE, FEA, DVA, DFx, DFM, DFA, DFD, DFR, MRP, AGVS, AS/RS, FMC, SMED, MES, ISO, CMM, UPC, GTIN, RFID, JIT, 5S, FMS, SCM, and ERP on sheets of paper. On the same size paper, write the full name of each acronym. Post the acronym on top of the full name for the display so the acronym can be lifted to see the full name underneath. Encourage students to see the full name.
2. Devise a crossword puzzle with the abbreviations from this chapter being used as clues.

Enrich

1. To ingrain the concept of one-piece flow, try this idea: Have the students form a large circle. Give every other student a small object to pass around. Establish the rule that no one person can have more than a single object in his or her hands at one time. While they are passing the objects, physically stop one person in the circle from passing it along. Ask what happens at that point. Now "start up" the line again. Does it begin smoothly? Does it take a while until a smooth passing rhythm resumes?
2. What is meant by the statement: "The factory of the future will have two employees: a man and a dog. The man will be there to feed the dog, and the dog will be there to keep the man from touching the machines."

REFLECT

Will the future of manufacturing include human workers? Will manufacturing gradually move into space? Will manufacturing involve the same problems of today, such as pollution, quality control, waste, and price competition?