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University Textbooks in the Humanities (SAMT)

English **3**
for the Students of
Mechanical Engineering
Manufacturing & Production

Jamaloddin Jalalipour



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Section One: Reading Comprehension

Manufacturing Technology

- 1 As you read this introduction, take a few moments to inspect the different objects around you: your watch, chair, stapler, pencil, calculator, telephone, and light fixtures. You will soon realize that all these objects have been transformed from various raw materials and assembled into the objects that you now see before you. Some objects, such as nails, bolts, and paper clips, are made of one piece. However, most objects such as aircraft engines, ballpoint pens, toasters, bicycles, computers, and thousands more are made of several parts from a variety of materials. A typical automobile, for example, consists of about 15,000 parts; a C-5, a transport plane, consists of more than 4 million parts, and a Boeing 747-400 has 6 million parts. All are made by various processes that we call manufacturing. Manufacturing, in its broadest sense, is the process of converting raw materials into products. It compasses the design and manufacturing of goods using various production methods and techniques.
- 2 Manufacturing began about 5000 to 4000 B.C. with the production of various articles of wood, ceramic, stone, and metal. The word manufacturing is derived from the Latin *manu factus*, meaning "made by hand". The word **manufacture** first appeared in 1567, and the word manufacturing in 1683. Modern manufacturing involves making products from raw materials by various processes, machinery, and operations, following a well-organized plan for each step.
- 3 Manufacturing comprises approximately 20 to 30 percent of the value of all goods and services produced in industrialized nations. Generally, the higher the level of manufacturing in a country, the higher the standard of living of its people. Manufactured products are also used to make other products. Examples are large presses to form sheet metal for car bodies, metalworking machinery used to make parts for other products, and sewing machines for making clothing.
- 4 Because a manufactured item has undergone a number of changes in which raw material has become a useful product, it has "added value", defined as monetary worth in terms of price. For example, clay has a certain value

when mined. When the clay is used to make a ceramic dinner plate, cutting tool, or electrical insulator, value is added to the clay. Similarly, a wire coat hanger or a nail has added value over and above the cost of a piece of wire.

5 Manufacturing may produce "discrete products", meaning "individual parts or part pieces", or "continuous products". Nails, gears, steel balls, beverage cans, and engine blocks are examples of discrete products. Wire, metal or plastic sheet, hose, and pipe are continuous products that may be cut into individual pieces and thus become discrete products.

6 Manufacturing is generally a complex activity involving people who have a broad range of disciplines and skills together with a wide variety of machinery, equipment, and tools with various levels of automation, including computers, robots, and material-handling equipment. Manufacturing activities must be responsive to several demands and trends:

- A product must fully meet "design requirements" and "specifications".
- A product must be manufactured by the most "economical" methods in order to minimize costs.

- "Quality" must be built into the product at each stage, from design to assembly, rather than relying on quality testing after the product is made.

- In a highly competitive environment, production methods must be sufficiently "flexible" to respond to changing market demands, types of products, production rates, production quantities, and on-time delivery to the customer.

- New developments in "materials, production methods, and computer integration" of both technological and managerial activities in a manufacturing organization must constantly be evaluated with a view to their timely and economic implementation.

- Manufacturing activities must be viewed as a large "system", each part of which is interrelated. Such systems can be modeled in order to study the effects of various factors, such as changes in market demands, product design, materials, costs, and production methods, on product quality and cost.

- The manufacturer must work with the customer to get timely feedback for continuous "product improvement".

- The manufacturing organization must constantly strive for higher "productivity", defined as the optimum use of all its resources: materials, energy, capital, labor, and technology. Output per employee per hour in all phases must be maximized.

7. All these factors collaborate to yield efficient manufacturing activities.

Part I. Comprehension Exercises

A. Put "T" for true and "F" for false statements. Justify your answers.

- 1. The process of converting raw materials into products is called manufacturing.
- 2. Ballpoint pens and paper clips are both made of just one piece.
- 3. According to the author, the lower the level of manufacturing in a country the lower the standard of living of its people.
- 4. Sewing machines are good examples of manufactured products that are used to make other products.
- 5. The author defines "added value" as monetary worth of an item in terms of hard work.
- 6. Ceramic dinner plates, cutting tools, and electrical insulators are instances of "continuous products".
- 7. According to the text, quality cannot be inspected after a product is made.
- 8. Manufacturing activities must not be considered a large system, because its parts are not interrelated.

B. Choose a, b, c, or d which best completes each item.

1. Engine blocks and steel balls are examples of
 - a. added value
 - b. certain value
 - c. cutting tools
 - d. discrete products
2. For higher productivity,
 - a. the optimum use of all resources must not be applied
 - b. materials, machines, energy, etc. must be considered output
 - c. output per employee per hour in all phases must be maximized
 - d. the manufacturing organization must constantly be defined
3. Each part of manufacturing activities is somehow related to another one. So
 - a. we can study various factors while manufacturing
 - b. we can consider the production methods thoroughly
 - c. manufacturing activities must be viewed as product designs
 - d. manufacturing activities must be considered a system
4. Timely feedback for product improvement is taken from
 - a. the manufacturer
 - b. market demands
 - c. the consumer
 - d. production methods
5. Value is added to the clay when it
 - a. is used as a new material
 - b. is used to make other products

- c. becomes a useful material d. becomes a certain product
6. Using machinery and following a well-organized plan are two important characteristics of
- a. modern manufacturing b. transformed process
c. production methods d. raw materials
7. The tools with various levels of automation that are used in modern manufacturing are
- a. engines and machines b. sewing machines and presses
c. computers and robots d. computers and aircraft engines

C. Answer the following questions orally.

1. How do you define modern manufacturing?
2. Where is the word manufacturing derived from?
3. What is the difference between a paper clip and a toaster in manufacturing?
4. Which one is more complex in manufacturing, a typical automobile or a transport plane? Why?
5. What is the definition of "added value"?
6. Why do we call nails and gears "discrete products"?
7. What must manufacturing activities be responsive to?
8. Why should we not rely on quality testing after the product is made?

Part II. Language Practice

A. Choose a, b, c, or d which best completes each item.

- ✓ 1. Since not all manufacturing operations produce finished parts or products, additional may be necessary.

a. organizations b. considerations
c. processes d. dimensions
- 2. Product diversification and high production invariably call for diversity in the materials used.

a. functions b. inputs
c. materials d. outputs
3. Modern manufacturing is an industrial activity which requires such as human power, materials, machines, and capital.

a. resources b. activities
c. concepts d. companies
- ✓ 4. The main purpose of manufacturing is to produce useful products from materials.