Chapter 6
Manufacturing and Process Selection Design
October 15, 2006

Types of Processes

- Conversion (ex. Iron to steel)
- Fabrication (ex. Cloth to clothes)
- Assembly (ex. Parts to components)
- Testing (ex. For quality of products)

Process Flow Structures

- Job shop (ex. Copy center making a single copy of a student term paper)
- Batch shop (ex. Copy center making 10,000 copies of an ad piece for a business)
- Assembly Line (ex. Automobile manufacturer)
- Continuous Flow (ex. Petroleum manufacturer)

Product-process Matrix

Ref. The Product Process Matrix: DVD
Break-Even Analysis

- A standard approach to choosing among alternative processes or equipment
- Model seeks to determine the point in units produced (and sold) where we will start making profit on the process or equipment
- Model seeks to determine the point in units produced (and sold) where total revenue and total cost are equal

Break-Even Analysis (Continued)

Break-even Demand = \[
\frac{\text{Total fixed costs of process or equipment}}{\text{Price per unit} - \text{Cost per unit}}
\] or
\[
\frac{\text{Total fixed costs of process or equipment}}{\text{Unit price to customer} - \text{Variable costs per unit}}
\]

This formula can be used to find any of its components algebraically if the other parameters are known.

Break-Even Analysis (Continued)

Example: Suppose you want to purchase a new computer that will cost $5,000. It will be used to process written orders from customers who will pay $25 each for the service. The cost of labor, electricity and the form used to place the order is $5 per customer. How many customers will we need to serve to permit the total revenue to break-even with our costs?

Break-even Demand:
\[
= \frac{\text{Total fixed costs of process or equipment}}{\text{Unit price to customer} - \text{Variable costs}}
\]
\[
= \frac{5,000}{25 - 5}
\]
\[
= 250 \text{ customers}
\]

Manufacturing Process Flow Design

- A process flow design can be defined as a mapping of the specific processes that raw materials, parts, and subassemblies follow as they move through a plant.

- The most common tools to conduct a process flow design include assembly drawings, assembly charts, and operation and route sheets.
Example: Assembly Chart (Gozinto)

- Lock-ring
- Spacer, detent spring
- Rivets (2)
- Spring-detent

Example: Process Flow Chart

Ref. p. 216-217

Question Bowl

What is the break-even in demand for a new process that costs $25,000 to install, will generate a service product that customers are willing to pay $500 per unit for, and whose labor and material costs for each unit is $100?

a. 400 units  
b. 250 units  
c. 100 units  
d. 62.5 units  
e. None of the above

Answer: d. 62.5 units

(25,000/(500-100)=62.5)

Question Bowl

Which of the following is an example of a Continuous Flow type of process flow structure?

a. Fast food  
b. Grocery  
c. Hospitals  
d. Chemical company  
e. None of the above

Answer: d. Chemical company
Question Bowl

Which type of process is by changing of raw materials into some specific form (such as sheet metal into a car fender)?

a. Conversion
b. Fabrication
c. Assembly
d. Testing
e. None of the above

Answer: b. Fabrication