Module 4: Production Planning and Control (PPC)

4.1 Types and Examples of Production

1. **Job Production:**

   - Producing custom-made products (e.g., shipbuilding, tailored suits).
   - Characteristics: High variety, low volume, and specific to customer requirements.

2. **Batch Production:**

   - Producing goods in batches (e.g., bakery products, furniture manufacturing).
   - Characteristics: Medium variety, moderate volume, and standardized processes.

3. **Mass Production:**

   - Producing large quantities of standardized products (e.g., automobiles, electronic gadgets).
   - Characteristics: Low variety, high volume, and assembly line techniques.

4. **Continuous Production:**

- Producing goods without interruption (e.g., oil refining, power generation).
- Characteristics: Very high volume, low variety, and 24/7 operation.

4.2 Production Planning and Control (PPC)

i. Need and Importance:

- **Need:**

  - To ensure optimal utilization of resources.
  - To maintain a smooth workflow.
  - To meet production deadlines and customer demands.

- **Importance:**

  1. Reduces production costs by minimizing wastage.
  2. Ensures timely delivery of products.
  3. Enhances customer satisfaction.
  4. Improves productivity and efficiency.

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ii. Functions of PPC:

1. **Planning:**

   - Determining what to produce, when, and how.
   - Includes material planning, capacity planning, and workforce allocation.

2. **Routing:**

   - Defining the sequence of operations for manufacturing a product.

3. **Scheduling:**

   - Allocating resources and setting timelines for production activities.

4. **Dispatching:**

   - Issuing instructions for starting production processes.

5. **Follow-up:**

- Monitoring progress and ensuring adherence to the production plan.

6. **Inspection:**

   - Checking the quality of finished goods.

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iii. Forms Used and Their Importance:

1. **Job Cards:** Track individual jobs and their status.
2. **Material Requisition Forms:** Ensure the availability of required materials.
3. **Production Orders:** Authorize the start of production.
4. **Gantt Charts:** Visualize production schedules.

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iv. General Approach for Each Type of Production:

1. **Job Production:**

   - Customized planning for each job.
   - High flexibility in scheduling.

2.

Batch Production:

- Group similar products for production.
- Focus on setup time reduction.

3.

Mass Production:

- Standardized processes with fixed schedules.
- Emphasis on inventory control.

4.

Continuous Production:

- Automation and minimal human intervention.
- Continuous monitoring of processes.

4.3 Scheduling

Meaning:

Scheduling involves allocating resources, setting timelines, and determining the sequence of operations to maximize productivity and resource utilization.

Need for Productivity and Utilization:

1. Reduces idle time and increases efficiency.
2. Optimizes resource usage.
3. Ensures timely delivery of products.

4.4 Gantt Chart

- **Format:**
  A bar chart with time intervals on the horizontal axis and activities on the vertical axis.

- **Method to Prepare:**

  1. List all activities and their durations.
  2. Plot activities as bars on the timeline.
  3. Indicate dependencies between activities.

4.5 Critical Ratio Scheduling Method:

- **Definition:**
  A scheduling method that prioritizes jobs based on their critical ratio (CR).
- **Formula:** CR=Due Date - Current DateProcessing TimeCR = \frac{\text{Due Date - Current Date}}{\text{Processing Time}}
- **Interpretation:**
  - CR < 1: Behind schedule.
  - CR = 1: On schedule.
  - CR > 1: Ahead of schedule.

Example:
Three jobs with the following data:

Job	Due Date	Current Date	Processing Time	CR
A	10	2	4	2
B	12	3	6	1.5
C	8	4	3	1.33

Priority: A > B > C.

4.6 Scheduling Using Gantt Chart

Example: **Machining Operations for 5 Components**

Components and Data:

1. Operations: Cutting, drilling, grinding, polishing, and painting.
2. Resources: 3 machines available.
3. Quantities: 50 units per component.

Gantt Chart:

- **Horizontal Axis:** Time intervals.
- **Vertical Axis:** Activities (operations for each component).

Steps to Prepare:

1. List operations for each component.
2. Assign start and end times based on available resources.
3. Plot operations on the chart with dependencies.

4.7 Bottlenecking

Meaning:
A bottleneck is a stage in the production process where capacity is limited, slowing down the overall workflow.

Effect:

- Increases lead time.
- Reduces productivity.
- Causes delays and inefficiencies.

Ways to Reduce Bottlenecking:

1. Increase capacity at the bottleneck stage.
2. Use parallel processing.
3. Optimize resource allocation.
4. Regularly monitor and analyze workflows.

Let me know if you'd like detailed numeric examples, diagrams, or further clarifications!