



Certified in Planning and Inventory Management

Determining Process
Type and Layout



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Determining Process Type and Layout

1. Process Type Overview

Process type defines how products move through production — from **project-based** to **continuous flow**. Each type supports specific product volume, variety, and customization levels. Selecting the right process type ensures operational efficiency and alignment with strategic goals. CPIM candidates must recognize process characteristics and their impact on capacity, cost, and responsiveness.

2. Volume–Variety Relationship

The relationship between product **volume** and **variety** determines process selection. Low-volume/high-variety products require flexible processes; high-volume/low-variety products favor standardized processes.

Understanding this trade-off helps CPIM professionals align process type with product strategy, minimizing cost and maximizing service level.

3. Project Process

Used for **unique, one-of-a-kind** products (e.g., construction, aerospace), project processes require intensive planning and coordination. Work is stationary while resources move to the product. CPIM learners must understand project scheduling tools (like PERT/CPM), resource allocation, and cost control in managing these customized, complex processes.

4. Job Shop Process

Job shops handle **low-volume, high-variety** production using general-purpose machines and skilled labor. They offer flexibility for custom work but have long lead times and higher costs. CPIM emphasizes process scheduling, routing, and capacity utilization in job shops to maintain customer responsiveness.

5. Batch Process

Batch production produces moderate volumes in groups or lots. It suits industries like food or pharmaceuticals. Balancing setup times, changeovers, and batch sizes is key. CPIM learners must understand how batch processes bridge flexibility and efficiency between job shops and assembly lines.

6. Repetitive (Assembly Line) Process

In repetitive processes, standardized products move through sequential stations. This setup enables high-volume, low-variety production with predictable flow. CPIM professionals must analyze **line balancing**, **cycle time**, and **bottleneck management** to optimize throughput and efficiency in this process type.

7. Continuous Process

Continuous processes operate nonstop to produce very high volumes of standardized goods—such as chemicals or oil. They feature high automation, minimal flexibility, and significant capital investment. CPIM focuses on process control, reliability, and preventive maintenance to sustain consistent quality and uptime.

8. Hybrid Process

Many firms blend process types to achieve balance. For example, batch production may feed a continuous assembly line. CPIM learners must understand how hybrid systems leverage flexibility and efficiency across stages of production or product families.

9. Process Layout Overview

Process layout organizes equipment by **function** (e.g., drilling, grinding). It supports varied product flows typical of job shops. CPIM professionals should recognize that process layouts enhance flexibility but increase material handling and scheduling complexity.

10. Product Layout Overview

Product layouts arrange equipment sequentially to support a specific product's flow—ideal for assembly lines and continuous processes. They minimize material movement and increase throughput. CPIM focuses on layout balancing, standardized work, and space optimization for efficient flow.

11. Cellular Layout

Cellular layouts group machines by product family, creating **mini-flow lines** that combine flexibility with efficiency. This layout reduces setup time and WIP inventory. CPIM emphasizes its role in lean manufacturing and Just-in-Time (JIT) environments to streamline production and improve quality.

12. Fixed-Position Layout

In this layout, the product remains stationary, and workers, tools, and materials come to it—suitable for large items like ships or buildings. CPIM professionals must manage resource scheduling, coordination, and space utilization effectively to minimize idle time and movement.

13. Combination Layouts

Many modern facilities use hybrid layouts—such as product layouts in assembly lines combined with process layouts for subassemblies. CPIM learners must recognize how combination layouts support complex product structures and multi-model production.

14. Flow Analysis and Mapping

Before determining layout, **flow analysis** examines how materials, people, and information move through processes. Tools like **process flowcharts** and **value stream maps** help identify bottlenecks, redundancies, and improvement opportunities. CPIM emphasizes optimizing flow for speed and efficiency.

15. Relationship Chart (REL Chart)

A relationship chart (REL chart) visualizes the closeness or adjacency requirements between departments or machines. It supports effective space planning in process and product layouts. CPIM candidates must know how REL charts improve communication flow and material movement efficiency.

16. Line Balancing

In assembly and product layouts, line balancing ensures work is evenly distributed across stations to minimize idle time and bottlenecks. CPIM professionals should understand cycle time calculations, workstation assignments, and efficiency metrics to maintain smooth production flow.

17. Material Handling Considerations

Material handling efficiency affects layout design, cost, and productivity. Layouts should minimize movement, handling, and transport distance. CPIM emphasizes selecting appropriate material handling systems—like conveyors, AGVs, or forklifts—based on process type and volume.

18. Flexibility vs. Efficiency Trade-Off

Flexible layouts handle variety but are less efficient for volume; efficient layouts excel in volume but lack adaptability. CPIM learners must evaluate this trade-off to select a layout and process type that aligns with product mix and market demand volatility.

19. Technology Integration in Layouts

Modern layouts integrate **automation, robotics, and digital twins** to optimize flow and reduce downtime. Flexible manufacturing systems (FMS) and computer-integrated manufacturing (CIM) allow quick reconfiguration. CPIM emphasizes technology as a driver of efficiency and adaptability in process design.

20. Continuous Improvement in Process Design

Process and layout selection isn't static—it must evolve with product life cycles, demand changes, and technology advances. CPIM professionals must apply lean, Six Sigma, and Kaizen methods to continuously optimize layout performance and operational flow.

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