Cellular Manufacturing
and Plant Layout

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Outline

- Fundamentals of layout
  - Process
  - Product
  - Fixed
  - Hybrid
- Cellular Manufacturing
  - Characteristics
  - Implementing Cells
    - Part Families
    - Production Flow Analysis

What is the Facility Layout Problem?

- Concerned with arrangement of machines, cells, or departments.
- Often computationally difficult.
- A decision is both quantitative & qualitative.

Why is the Layout Problem Difficult?

- It has geometric and combinational aspects.
- Jig-saw puzzle.
  - Difficult picture
  - No picture
  - No shapes
- Goal: Minimize material handling costs.

Effective Facility Layout

- Minimize material handling costs
- Utilize space efficiently & effectively
- Utilize labor efficiently & effectively
- Eliminate bottlenecks
- Eliminate wasted or redundant movement
- Incorporate safety & security measures

Basic Layouts

- There are three basic types of layouts:
  - Process
  - Product
  - Fixed-position
- There are two hybrid types of layouts
  - Flexible and Mixed-Model manufacturing systems
  - Cellular

Process Layout

- Process layouts (functional layouts)
  - Definition – A layout that groups similar activities together in departments of work centers according to process or functions that they perform.

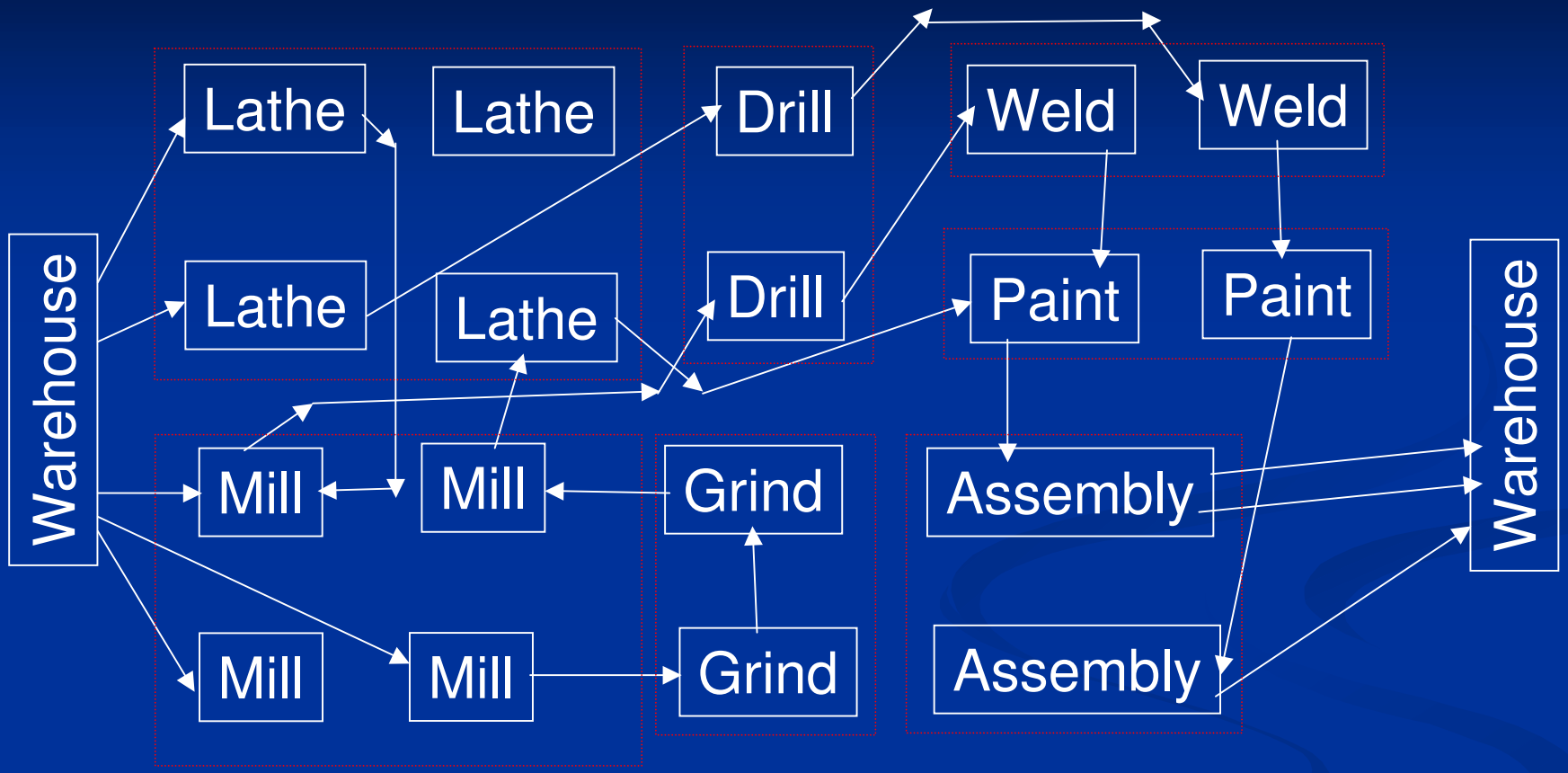
Characteristics of Process layout

- Goal – To minimize material handling cost
- Product – Varied made to order
- Demand – Fluctuates
- Production volume – low (custom products)
- Inventory – High in process
  - Low in finished goods
- Storage Space – relatively large
- Aisles – tend to be wide
- Material handling – variable path (forklift)

Characteristics

- Layout decision – machine location based
- Workers tend to be skilled at operating the equipment in their departments
- Intermittent, job shop, batch production, mainly fabrication

Process Layout



Process-Oriented Layout

- Department areas having similar processes located in close proximity
- Design places departments with large flows of material or people together