

# Plant Layouts

END4650 – Material Handling Systems

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# Types of Plant Layout

- Plant (*tesis*) layout is an important factor MHS design.
- In the case of a ***new facility***,
  - the MHS design should be considered part of the layout design.
  - In this way, there is greater opportunity to create a layout that
    - optimizes material flow in the building and
    - utilizes the most appropriate type of MHS.
- In the case of an ***existing facility***,
  - there is less flexibility in the design of the MHS.
  - Present arrangement usually limits the attainment of optimum flow patterns.

# Types of Plant Layout

- Plant layout design should provide the following data:
  - Total area of the facility
  - Areas within specific departments in the plant (dimensions)
  - Arrangement of equipment in the layout
  - Locations where material must be
    - picked up (load stations)
    - delivered (unload stations)
  - possible routes between these locations
  - distances traveled

# Types of Plant Layout

## **Fixed Position Layout**

- The product
  - large and heavy,
  - does not move from one location to another.
- The processes and equipment are brought to the product itself.
- Handling systems used for moves are large and often mobile
- Cranes, hoists, and trucks are common

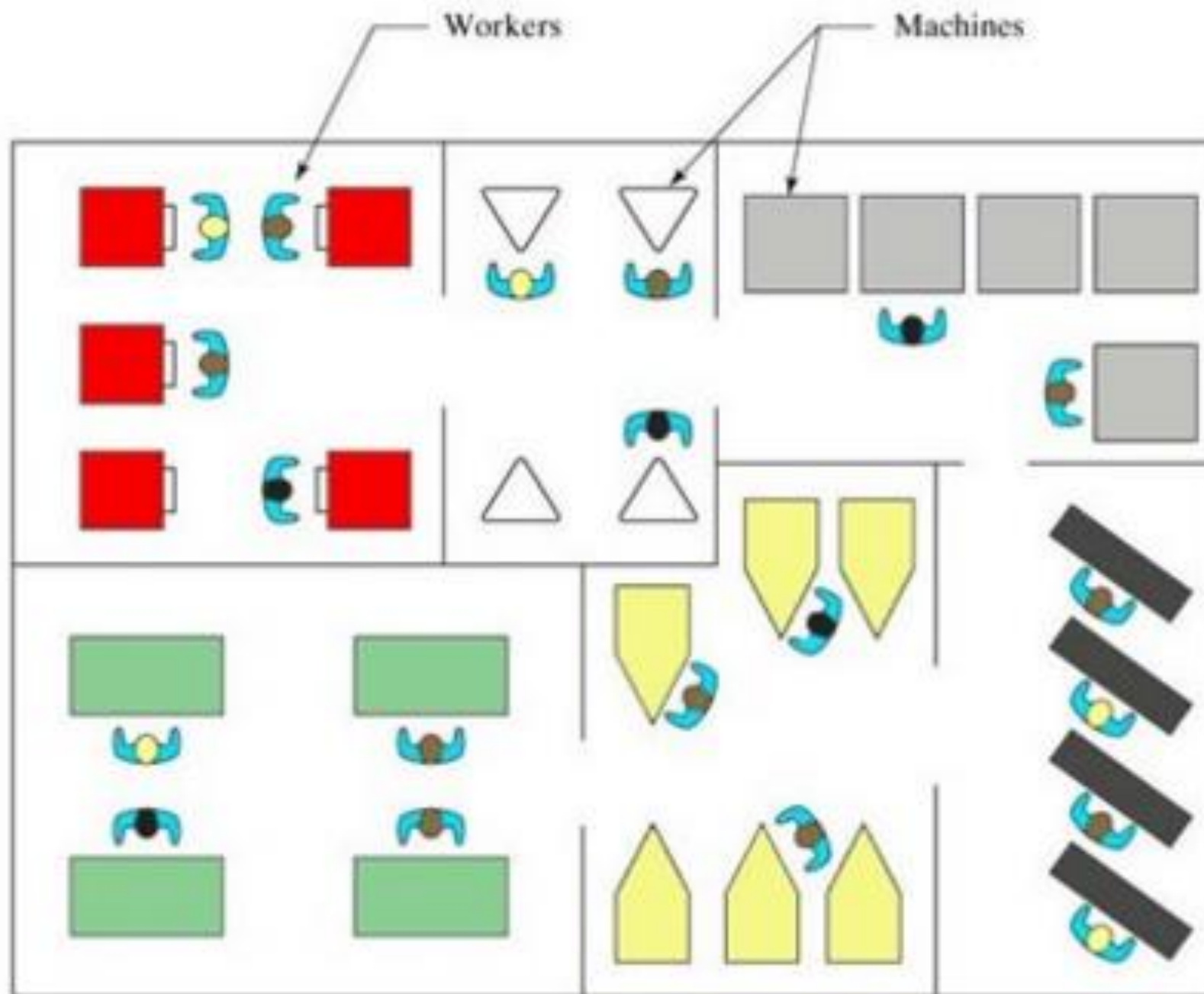
# Types of Plant Layout

- For example
  - shipbuilding
  - aircraft manufacturing
  - Dam, road and house construction



# Types of Plant Layout

- **Process (Job-Shop) Layout:**
- Machines are arranged on the basis of processes they perform.
  - All milling machines → in one department,
  - All turning machines → in one department...
- Useful for companies that
  - manufacture or process a variety of products or
  - jobs in small quantities where each job is usually different from any other.
- The MHS must be flexible to deal with the variations
- Hand trucks, forklift trucks, AGVs are common



# Types of Plant Layout

## **Product Layout:**

- Aka assembly line layout or layout by product.
- production of
  - a standard or nearly identical types of product
  - in relatively high quantities.
- The machines and workstations are arranged along the product route in a sequence that corresponds to the sequence of operations the product undergoes.





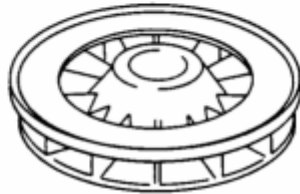
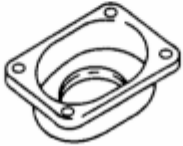
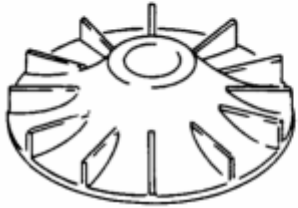
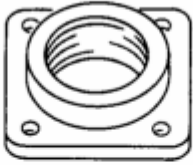
# Types of Plant Layout

- Adv:
  - Reduced material handling
  - Reduced processing time
  - Easier planning and control
- Disadv:
  - Less Flexibility
- Final assembly plants for cars, trucks, and appliances
- Conveyor systems are common
- Delivery of component parts to the various assembly workstations along the flow path is accomplished by trucks and similar unit load vehicles.

# Types of Plant Layout

## **Group Technology Based Layout**

- The parts having similarities in geometry, manufacturing process and/or functions are assembled together
- Better control over operation and planning by dividing a large system into two or more much smaller, independent subsystems.
- Planners first identify the sets of machines and their corresponding parts (i.e., parts which are entirely processed by these sets of machines.
- Each machine set and corresponding part set form a manufacturing cell and a part family
- Hand trucks and forklift trucks are commonly used in process type layouts

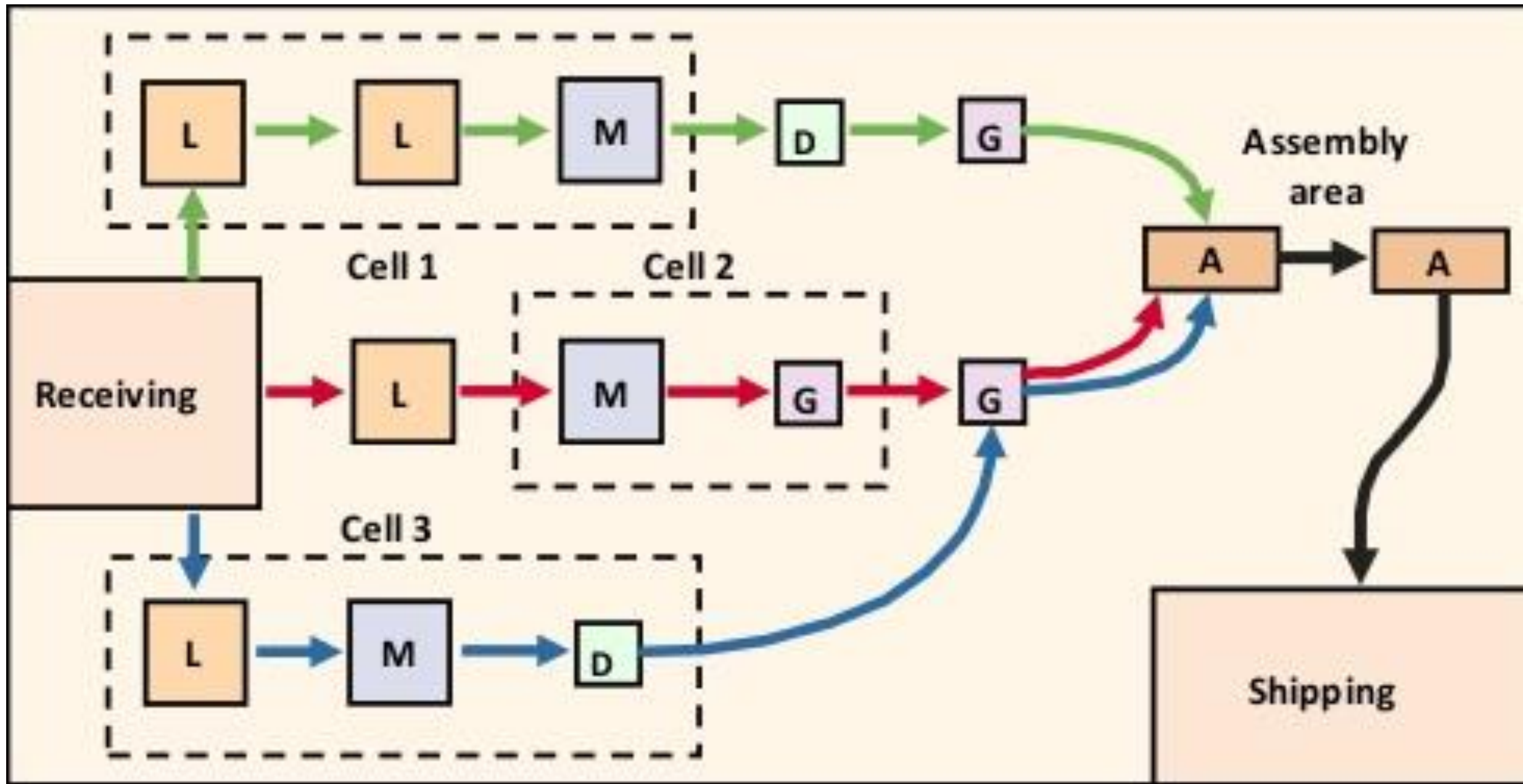


Part number

Machine number

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
A		1									1								
B	1									1						1			
C			1	1			1	1	1					1					
D	1	1	1	1		1	1	1	1	1	1	1		1	1			1	1
E						1						1							
F	1	1								1	1								
G					1							1	1				1		1
H		1								1	1							1	
I			1	1		1						1		1					
J					1								1						
K					1								1						





# Types of Plant Layout

## **Hybrid Layout:**

- Used where
  - some production items may require a product layout,
  - others may call a fixed layout
- As a company expands by increasing its product lines and volume, it may find that none of the layout techniques meet its need.
- Some companies use hybrid layouts, a combination of the layouts discussed.