

# **PLANT LAYOUT & MATERIAL HANDLING**

**1<sup>st</sup> week**

# **Material handling:**

Part of business and economic systems that affected the physical relationship between materials, products and packaging with production process, facilities, geography or customers without increasing of the function values or changing of product properties

# Plant layout:

The arrangement of physical facilities (equipment, land, buildings, utilities), to optimize the relationships among operating personnel, material flow, information flow, and the methods required in achieving enterprise objectives (efficiently, economically, and safely)

# THE SCOPE OF PLO:

1. Transportation
2. Receiving
3. Storage
4. Production
5. Assembly
6. Packaging and Packing

# **Continued:**

7. Material handling

8. Personnel services

9. Auxiliary production activities

10. Warehousing

11. Shipping

12. Offices

13. External facilities

# **Continued:**

14. Buildings

15. Grounds

16. Location

17. Safety

18. Scrap

# MH & PLO will be affected on:

- Productivity

Good design of PLO will minimize the distance of the flow material, therefore the cycle time of production will be reduced, so the production rate will be increased

- Profitability

If the production rate high, so the production cost will minimize, and then the profit will increase

# Objectives of MH & PLO

1. Facilitate the manufacturing process
2. Minimize material handling
3. Maintain flexibility of arrangement and of operation
4. Maintain high turnover of work-in-process
5. Hold down investment of equipment
6. Make economical use of building cube
7. Promote effective utilization of manpower
8. Provide for employee convenience, safety, and comfort in doing the work



# The enterprise design process

1. Market research
2. Sales forecasting
3. Product design
4. Process design
5. Operation design
6. Facilities design
7. Equipment design
8. Building design

# Continued:

9. Financing the facility
10. Procurement
11. Installation of facilities
12. The actual manufacturing or productive process
13. Warehousing of finished goods
14. Distribution of goods
15. Marketing and sales
16. Customer

# **PLO design process:**

1. Procure basic data
2. Analyze basic data
3. Design productive process
4. Plan materials flow pattern
5. Consider general material handling plan
6. Calculate equipment requirements
7. Plan individual work stations
8. Select specific material handling equipment
9. Coordinate groups of related operations
10. Design activity interrelationships

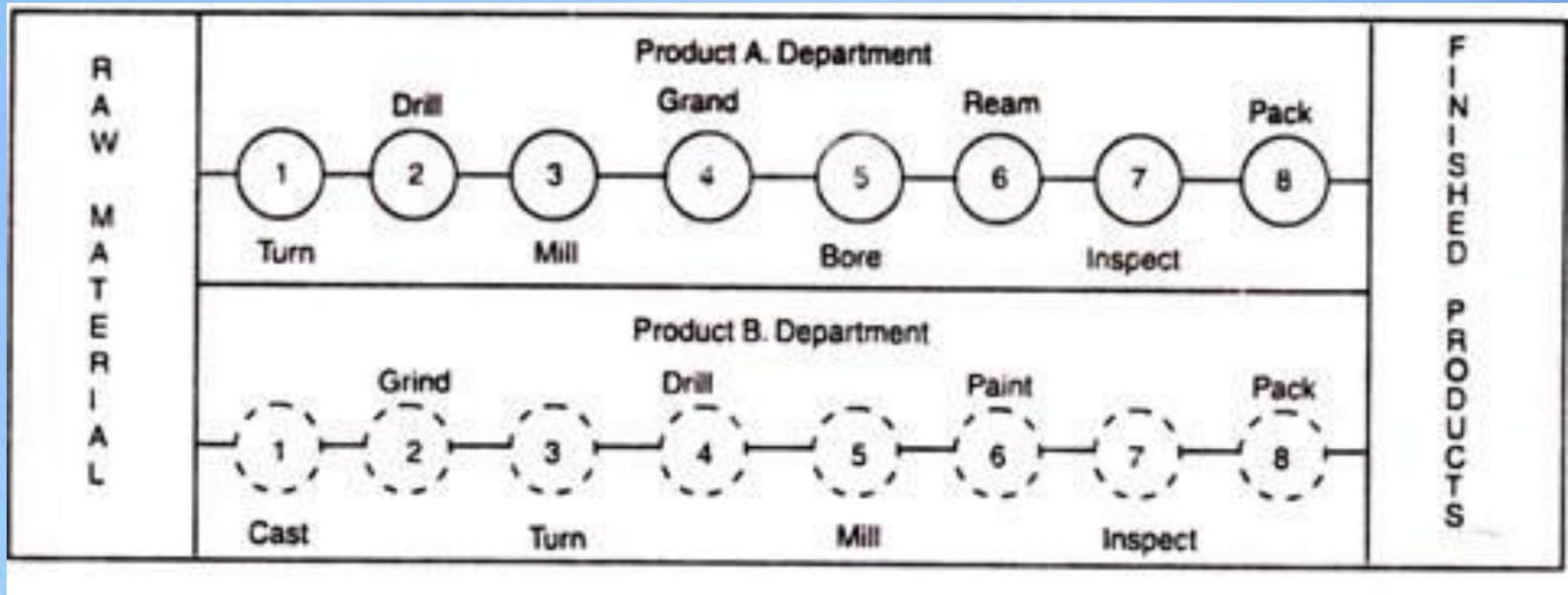
# Continued:

11. Determine storage requirements
12. Plan service and auxiliary activities
13. Determine space requirements
14. Allocate activities to total space
15. Consider building types
16. Construct master layout
17. Evaluate, adjust, and check layout with appropriate persons
18. Obtain approvals
19. Install layout
20. Follow-up on implementation of the layout

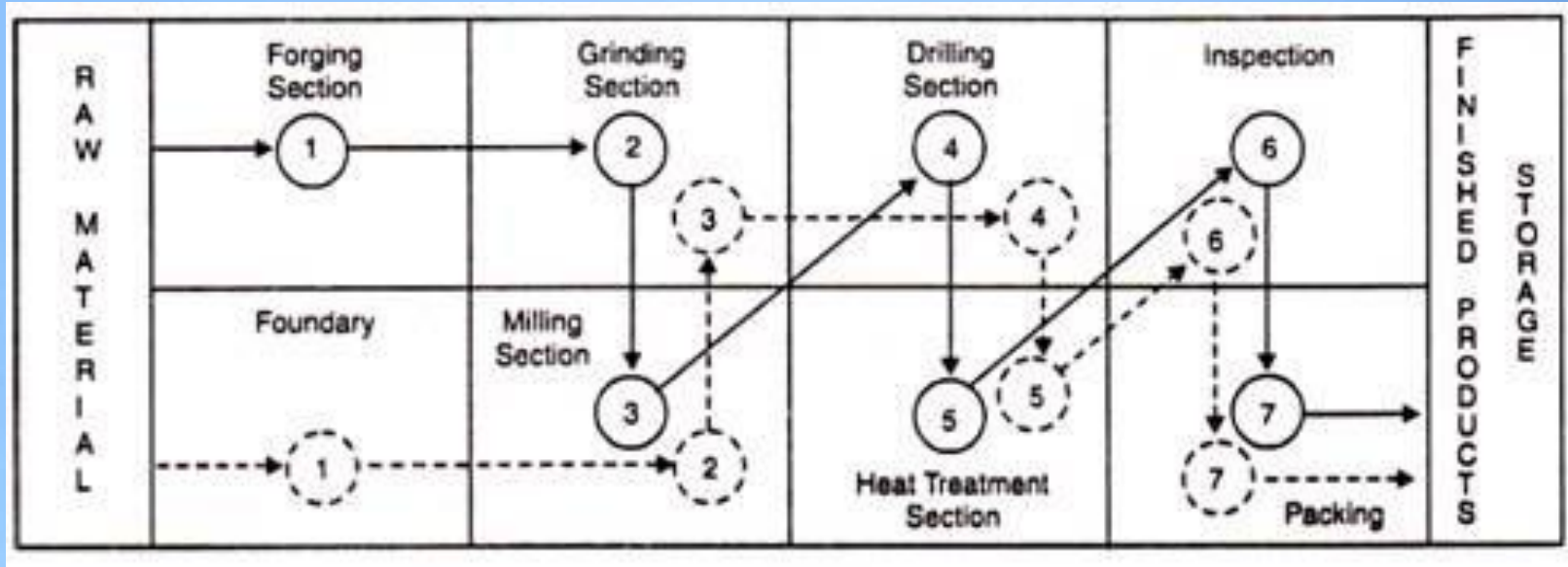
# TIPE LAYOUT:

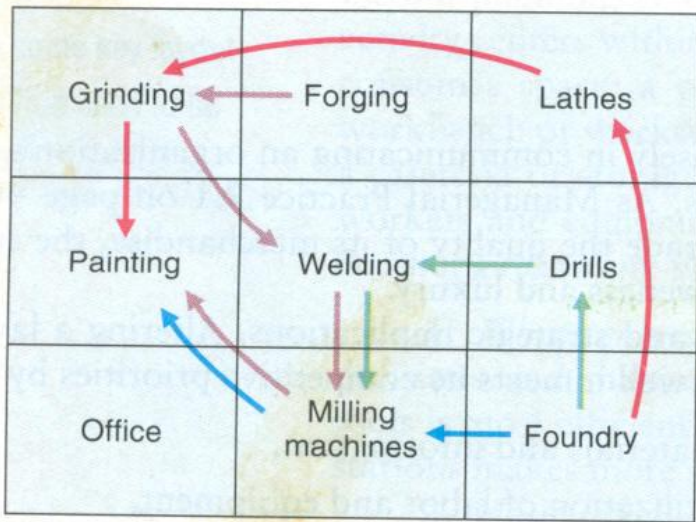
1. Process Layout
2. Product layout
3. Hybrid Layout
4. Fixed-Position Layout

# Product or Line Layout

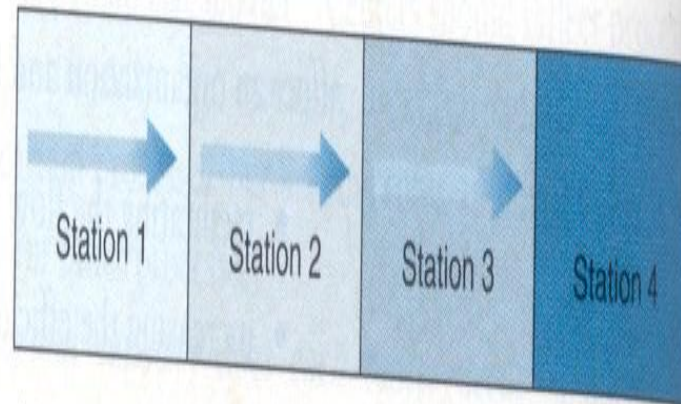


# Process or Functional Layout





(a) Layout of a job shop

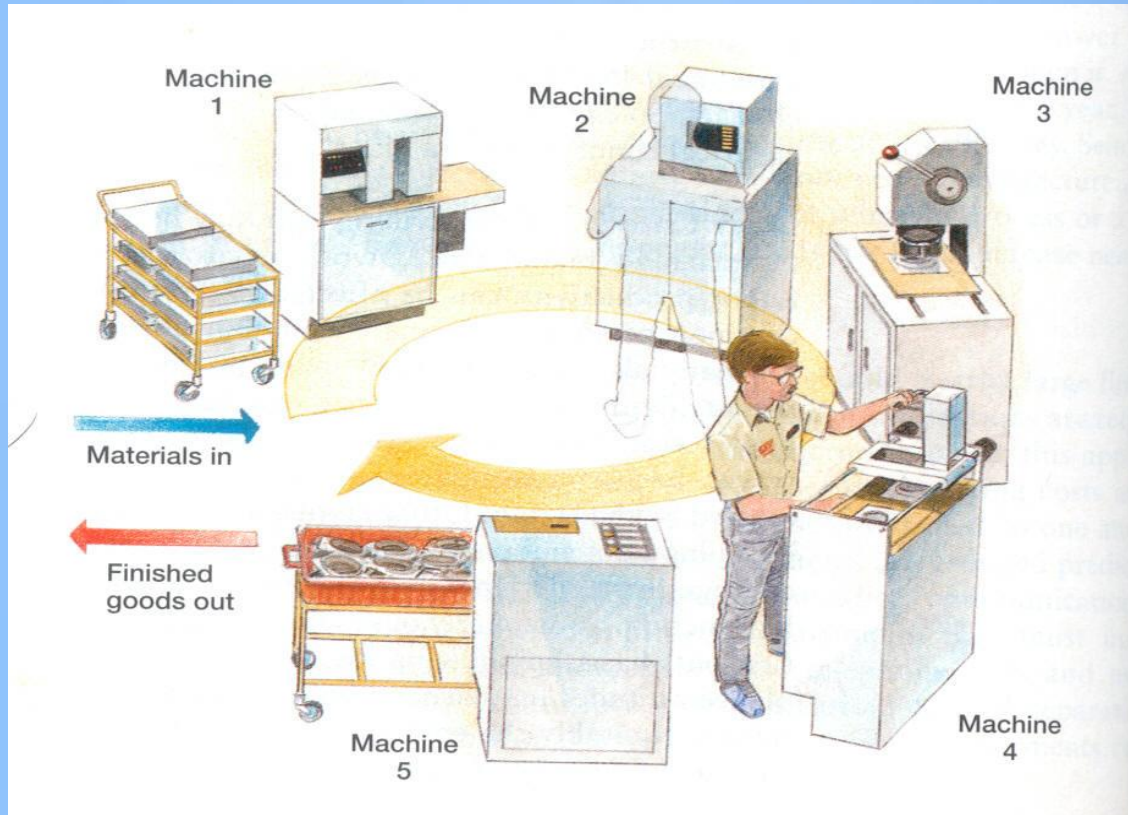


(b) Layout of a production line

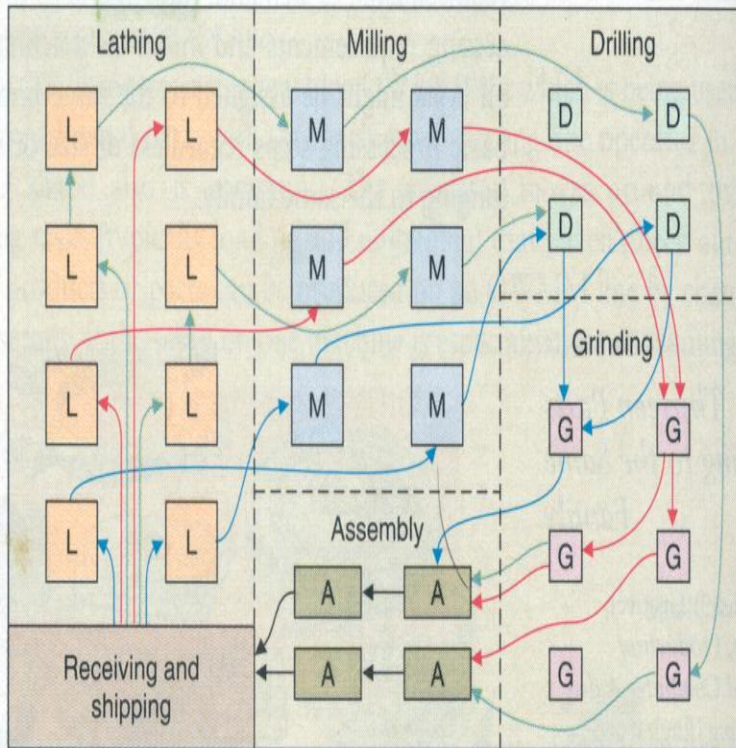


# CREATING HYBRID LAYOUTS

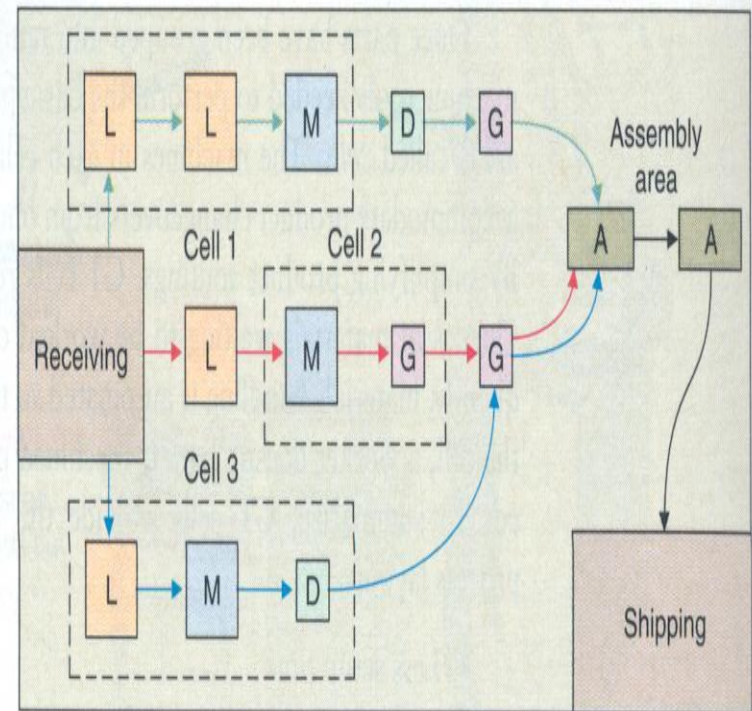
1. One worker, Multiple Machines (OWMM): one person operate some different machine together for one production line (material to the end product)
2. Group Technology: The same family product was executed in the group of machine



ONE WORKER MULTIPLE MACHINES (OWMM)



(a) Jumbled flows in a job shop without GT cells



(b) Line flows in a job shop with three GT cells

# PERFORMANCE CRITERIA:

1. Level of capital investment
2. Requirements for materials handling
3. Ease of stock picking
4. Work environment and “atmosphere”
5. Ease of equipment maintenance
6. Employee attitudes
7. Amount of flexibility need
8. Customer convenience and level of sales

# BAD LAY OUT

1. Long material flow lines & backtracking
2. Poor utilisation of space
3. Congestion for movement of materials and men
4. Large amount of WIP
5. Long production cycles
6. Excessive handling of materials
7. More frequent accidents
8. Difficult to supervise and control
9. Spoilage of products during handling
10. Production line bottlenecks.

# Video 1



- A college wishes to build a new campus with 6 different buildings.
- The college wants to layout the facility to reduce the amount of student/staff travel distance between the buildings.

## Buildings

A - Lecture Building

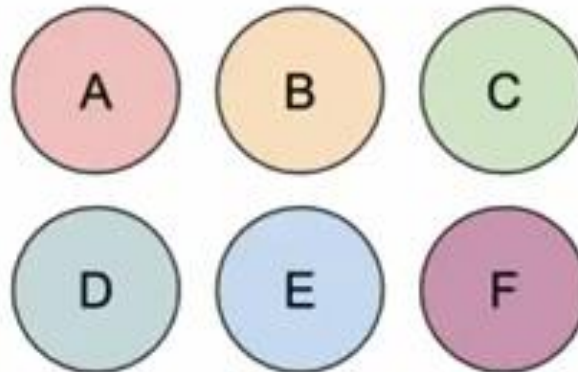
B - Library

C - Study Hall

D - Concert Hall

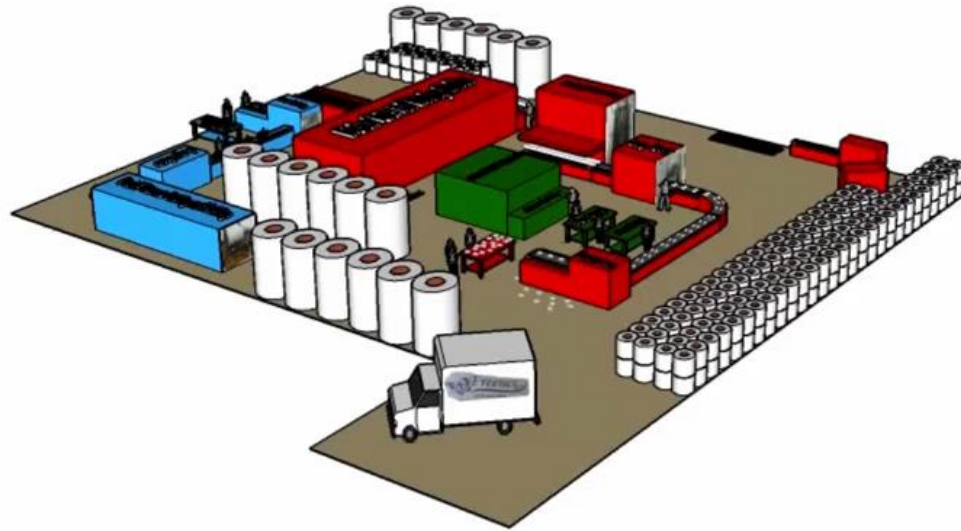
E - Aula Maxima

F - Student Services



- The college already has experience with a campus with the same types of facilities.

# Video 2



# Video 3





**Thank you**

