

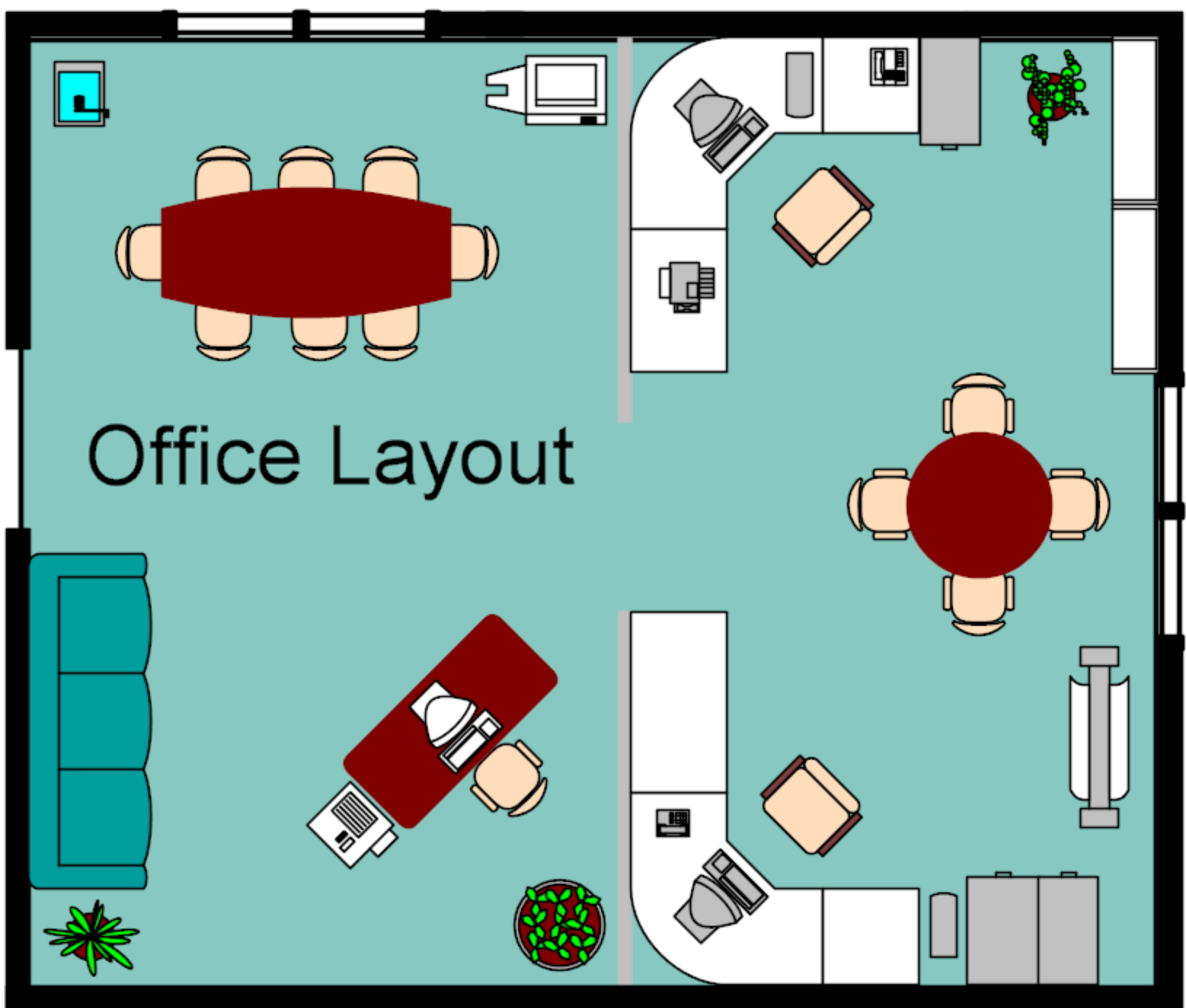
Tech 45: Unit 4

Manufacturing Facilities Design and Analysis: Employee Office Layout and Auxiliary Services

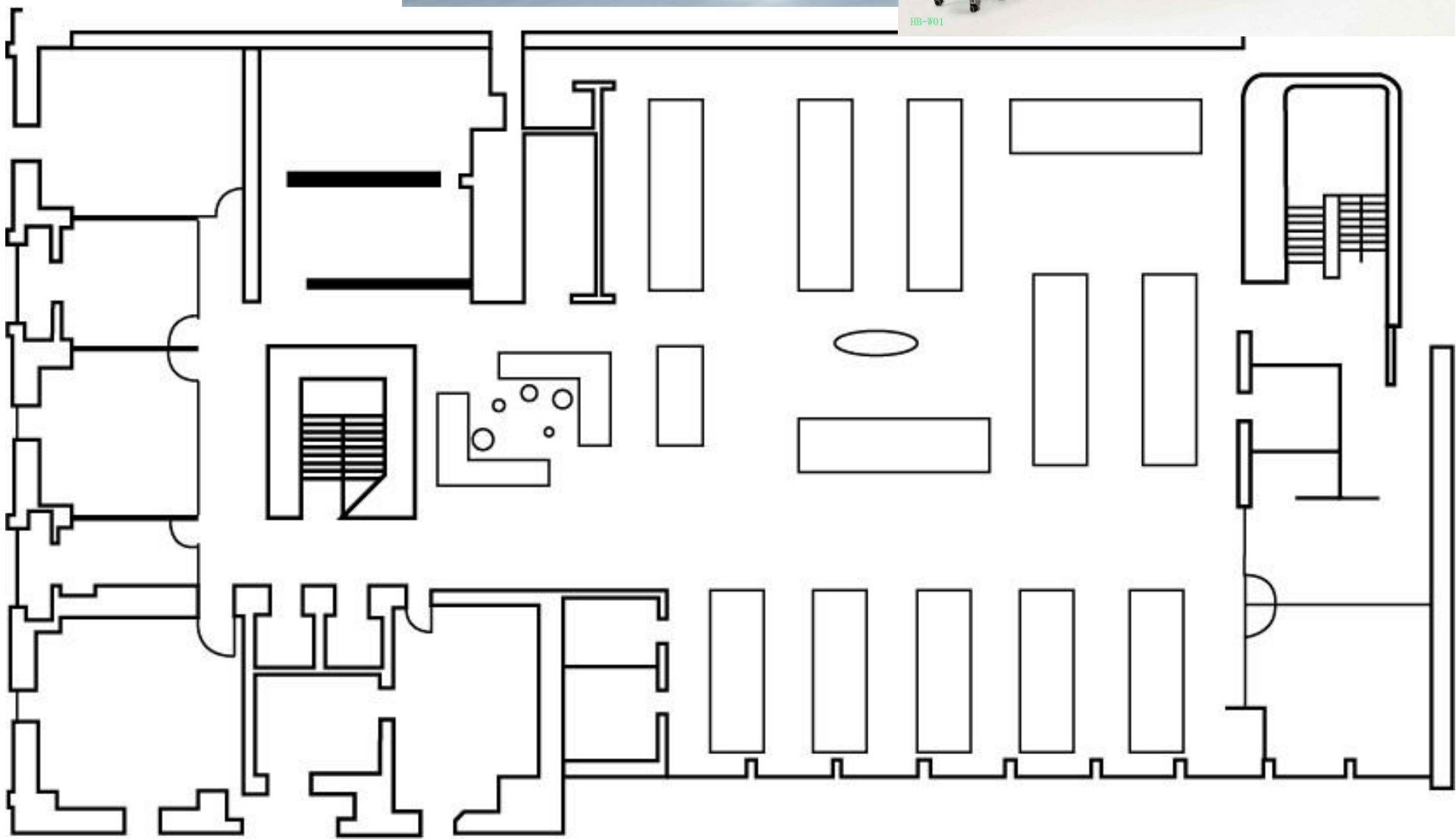
Chapter 12: Office Layout Techniques and Space Requirements

- The type, task, and organization of workers are important when creating an office layout
- An organizational chart is an informative tool used to communicate the relationships among the departments and their people

Office Layout







Some Goals of Office Layout Design

- Minimize project cost
- Increase employee productivity
- Employee convenience and safety
- Minimum material flow
- Flexible to change

Types of Office Space

- Supervisors' offices
- Open office space (bull pen)
- Conventional offices (fixed walled offices)
- The modern office



Some Special Requirements and Considerations

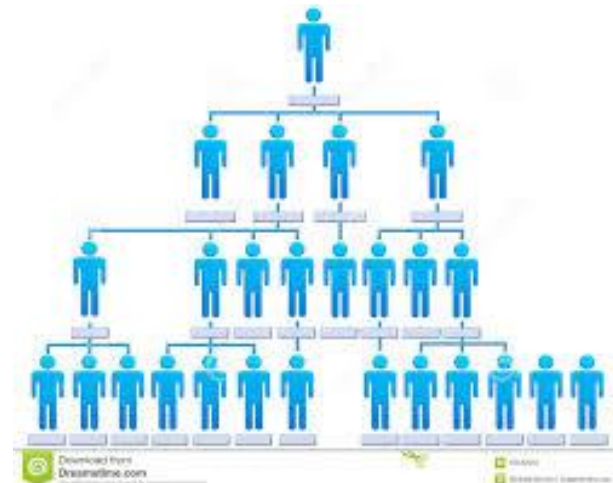
- Privacy may be required by some office employees
- Some offices require point of use storage types
- Use of second floor maximizes cubic space
- Centralized or decentralized offices (place offices where they are needed)
- Office flexibility should be considered for future expansion

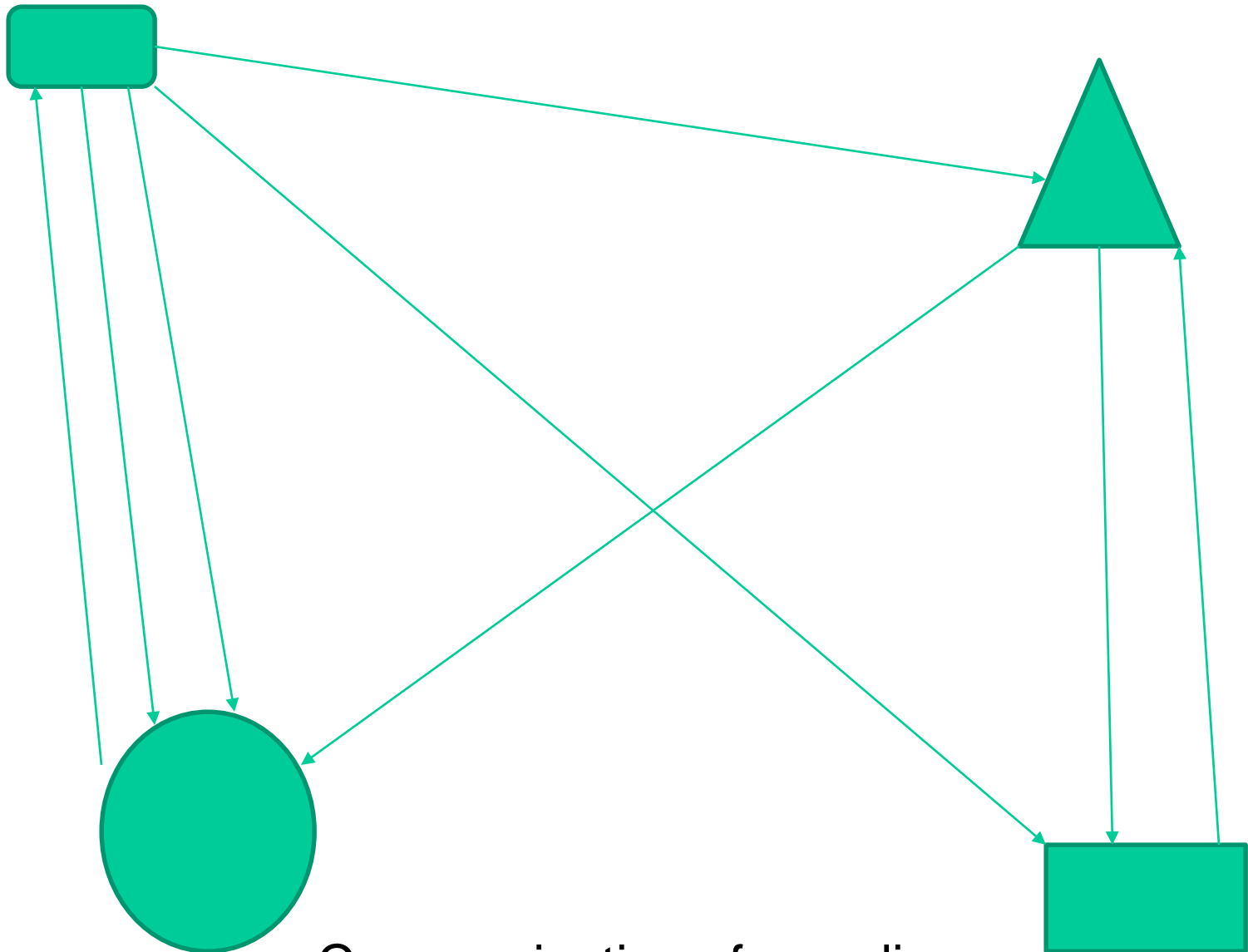
Some Special Requirements and Considerations

- Conference rooms may be useful for privacy in open offices
- Libraries may be needed for keeping reference books and magazines
- A reception area may be needed for visitors and product display
- Telephone space, copying/faxing machines space, word processing pool, file storage area and mail room may need to be established

Techniques of Office Layout

- Organizational chart technique
- Flowchart (systems and procedures analysis)
- Communications force diagram
- Activity relationship diagram
- Activity worksheet
- Dimensionless block diagram
- Office space determination
 - ✓ The 200 square feet per person technique
 - ✓ The level of the organization technique
 - ✓ The workstation technique

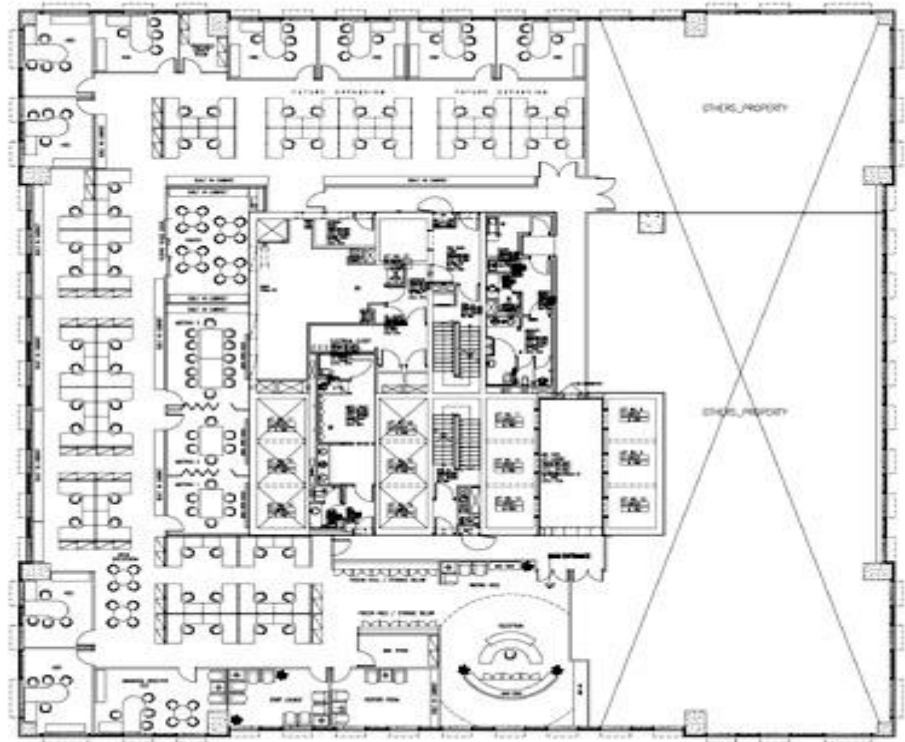


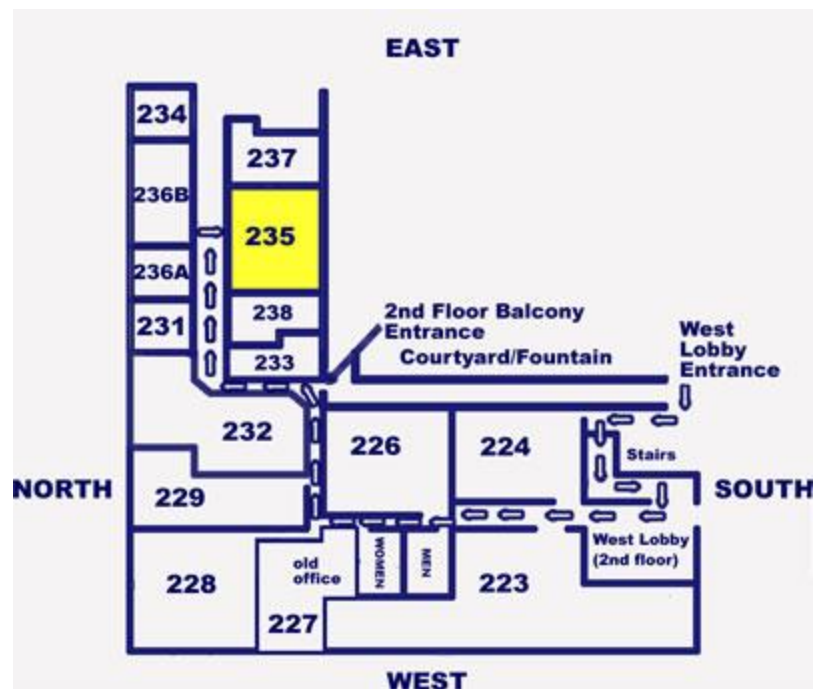
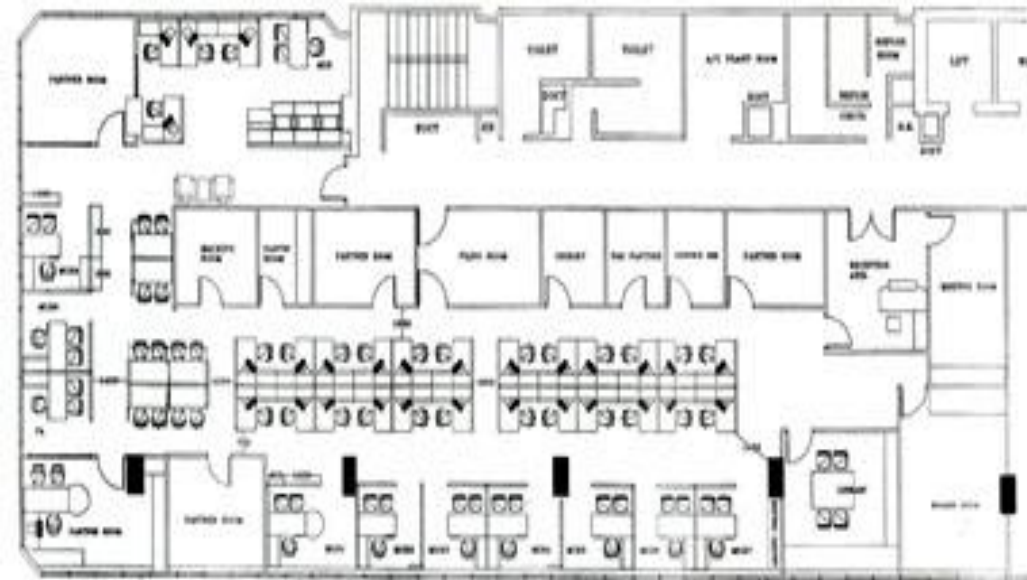


Communications force diagram
Activity relationship diagram
Activity worksheet
Dimensionless block diagram

Techniques of Office Layout

- Detailed master layout
 - ✓ Begins with the length and width of the office for the layout
 - ✓ Department layouts are next, including internal walls/boundaries
 - ✓ The final level is where chairs, desks and other equipment will be placed
 - ✓ This detailed plan will be needed before space assignment can be achieved
 - ✓ See allowances for specifications





Chapter 8: Auxiliary Services Requirement Space

Manufacturing departments need support services, and these services need space. Typical service functions include the following:

- Receiving & Shipping
- Storage
- Warehousing
- Maintenance and Tool Room
- Utilities, Heating, and Air Conditioning

Receiving & Shipping

- Are two separate departments but have similar people, equipment and space requirement
- Could be placed next to each other or across the plant from each other
- Their placement has a big effect on the flow of material in the plant
- The receiving department is the start of the material flow, while shipping is the end of material flow
- Effect of the trucking industry on receiving and shipping

Receiving & Shipping

- Functions of a receiving department (assisting receiving trailers, unloading, recording receipts, inspecting, preparing receiving reports, sending to stores or production etc.)
- Facilities required for a receiving department (dock doors, dock levelers, dock plates and boards, aisles, outside areas, offices etc)
- Functions of a shipping department (packaging finished goods, addressing cartons or containers, weighing containers, collecting orders for shipping, loading trailers, creating bills of lading etc.)





Storage (Different Kinds)

- There are different types of storage, including:
 - 1) Raw material stores
 - 2) Finished parts stores
 - 3) Office supply stores
 - 4) Maintenance supplies stores
 - 5) Janitorial supply stores
- Just-in-time inventories
- Maximizing the use of the cubic space
- Storage facilities requirements spreadsheet

Warehousing

- Warehousing is the storage of finished products
- Warehouse design criteria
- Functions of a warehouse
- Warehouse space determination



Maintenance & Tool Room

- The maintenance and tool room function is to provide and maintain production tooling
- Varies from company to company
- Sometimes these services are done by outside contractors

Utilities, Heating, and Air Conditioning

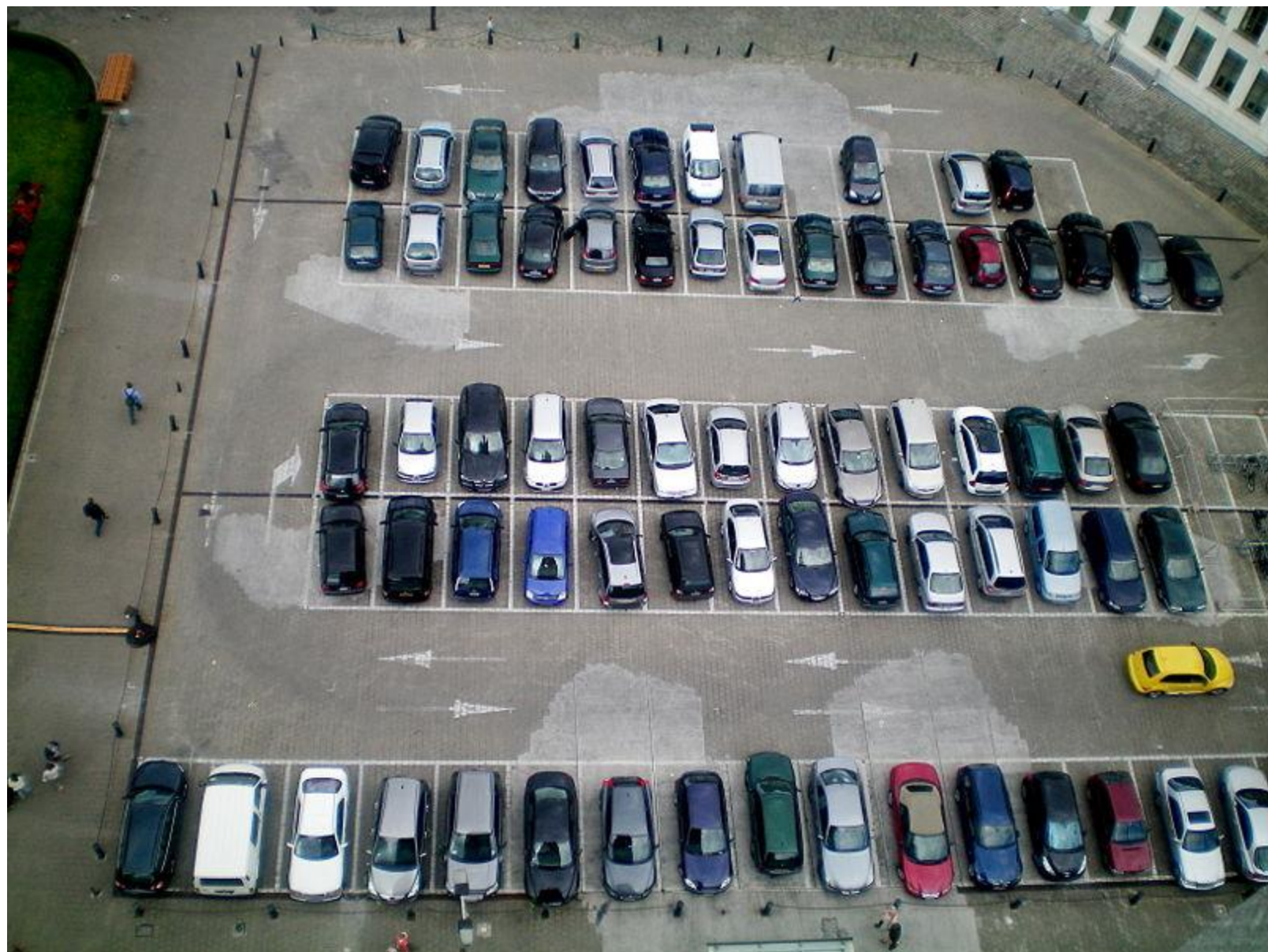
- These must be considered when determining space
- Must be kept separate from the normal traffic

Chapter 9: Employee Services: Space Requirements

- Employees have needs, hence the need for their services. These services include the following:
 - Parking lots
 - Locker rooms
 - Cafeteria and lunchroom
 - Drinking fountains
 - Break areas & lounges
 - Miscellaneous employee services
 - Employee entrance
 - Restrooms and toilets
 - Recreational facilities
 - Aisles
 - Medical facilities

Parking Lots Include:

- Manufacturing employee parking
- Office employee parking
- Visitor parking
- Should incorporate requirements of the Americans with Disabilities Act (ADA) of 1989
- Size of parking is proportional to number of employees
- Refer to course allowances for lot specifications



Employee Entrance

- Should be close to their parking lot
- Their entrance door and aisle should lead into the plant

Locker Rooms

- For change from street clothes to work clothes
- For safe storage of personal effects while working
- Size = number of employees X 4 square feet per employee

Restrooms and Toilets

- One toilet per every 20 employees
- Should be no farther than 200 feet away from employees
- Special accommodations for employees with disabilities
- There should be a men's restroom and a women's restroom
- Number of washbasins = number of toilets
- See allowances for related specifications

Cafeteria or Lunchroom

- Should provide a comfortable, pleasing environment
- Size depends on number of employees, the type of service provided, and the facilities included
- Should be about 10 square feet per employee



Recreational Facilities

- A new and rising trend
- Includes health/sport-related facilities
- Healthy employees would increase productivity



Drinking Fountains

- Should be located within 200 feet of every employee
- Should be located on an aisle for easy access
- Should be fifteen square feet or 3 feet X 5 feet each

Aisles

- For movement of people, equipment and materials and must be sized for that
- Can be greatest consumer of facility space if not planned well
- Can be two-way or one-way type
- See allowances for specifications



Medical Facilities

- Could vary from first-aid rooms to full-fledged hospitals
- One registered nurse is required for every 500 employees
- A doctor could be justified for 3000 employees

Break Areas and Lounges

- Should be close to employees
- Should have recreational facilities for employees
- Should include restrooms, vending machines and such likes

Miscellaneous Employee Services

- May include child-care services
- Libraries
- Training and educational facilities
- Exercise and workout facilities etc.

Machines	Length	X	width	Sq Ft	X	No of Stations	Total square Ft
Turning Lathes	10	X	5	50	X	32	1600
Drilling Lathes	15	X	6	90	X	7	630
Threading Lathes	10	X	30	300	X	14	4200
Knurling Lathes	6	X	4	24	X	7	168
Assembly	40	X	20	800	X	1	800
Total for Machines							7398
Workers Offices							
Machine Operators	10	X	10	100	X	70	7000
Supervisors	20	X	10	200	X	7	1400
Manager	20	X	15	300	X	2	600
Secretary	10	X	10	100	X	2	200
Clerks	10	X	10	100	X	2	200
Janitors	10	X	10	100	X	2	200
Total for Workers							9600
Storage Space							
Stock Materials	20	X	10	200	X	2	400
Tools	20	X	10	200	X	1	200
Warehouse	20	X	20	400	X	1	400
Fork Trucks	7	X	5	35	X	5	175
Totes and Bins	4	X	4	16	X	20	320
Supplies	20	X	10	200	X	1	200
Total for Storage							1695
Auxiliary Services							
Kitchen	20	X	10	200	X	1	200
Dining Area	40	X	40	1600	X	1	1600
Toilets	5	X	3	15	X	4	60
Washing Basins	5	X	3	15	X	4	60
Drinking Fountains	3	X	5	15	X	4	60
Recreational	40	X	50	2000	X	1	2000
Library	20	X	10	200	X	1	200
Conference Room	20	X	10	200	X	1	200
Visitors' Room	20	X	10	200	X	1	200
Parking Lot	200	X	100	2000	X	1	2000
							6580
TOTAL SPACE							43148

Leadership in Energy and Environmental Design (LEED)

- Green Building Rating System, developed by the U.S. Green Building Council (USGBC), provides a suite of standards for the environmentally sustainable design, construction and operation of buildings and neighborhoods.
- LEED is a measurement tool for green building in the United States and it is developed and continuously modified by workers in the green building industry, especially in the ten largest metro areas in the U.S

LEED Was Created To:

- Define “green building” by establishing a common standard of measurement
- Promote integrated, whole-building design practices
- Recognize environmental leadership in the building industry
- Stimulate green competition
- Raise consumer awareness of green building benefits
- Transform the building market

LEED Has 100 Possible Base Points

- **Certified** - 40 - 49 points
- **Silver** - 50 - 59 points
- **Gold** - 60 - 79 points
- **Platinum** - 80 points and above

Points Are Distributed Across Seven Credit Categories

1. Sustainable Sites - 26 Possible Points
2. Water Efficiency - 10 Possible Points
3. Energy and Atmosphere - 35 Possible Points
4. Materials and Resources - 14 Possible Points
5. Indoor Environmental Quality - 15 Possible Points
6. Innovation in Design - 6 Possible Points
7. Regional Priority - 4 Possible Points

Obi, Chapter 11

Planning and Implementing Manufacturing
Systems

The Initial Plan in Manufacturing Systems

- Planning for What Product to Produce:
 - Product identification
 - Market studies
 - Who needs the product?
 - Quantity to be produced
 - Who will design the product?
 - Who will produce the products?
 - Who will manage production?
 - How to transport the products
 - Who will sell the products?



Planning for Other System Components

- Planning and Implementing Production Methods and Processes
 - Process Planning Procedures
 - Steps to Process Planning
 - CAD or Manual Drawings
 - Study and Separate the Drawings into Parts
 - Identify, List, and Sequence Required Operations for Each Part
 - Assign Time Data, Equipment, and Tooling to the Sequenced Processes

Seat	Legs (4 Required)	Supports (4 Required)
1. Plane stock to thickness	1. Mark lengths of legs	1. Mark lengths of support
2. Layout seat circumference	2. Cut out legs	2. Cut out supports
3. Saw rough circumference	3. Form the tapers	3. Sand smooth
4. Smoothen seat edges	4. Drill two holes	4. Stain
5. Round seat edge	5. Sand smooth	5. Apply finish
6. Sand smooth	6. Stain	6. Dry
7. Stain	7. Apply finish	7. Store
8. Apply finish	8. Dry	
9. Dry	9. Store	
10. Store		

Task	Time	Machine	Tooling
1. Plane stock to thickness	5	Planer	Goggles
2. Lay out seat circumference	7	NA	Ruler/dividers
3. Saw rough circumference	12	Band saw	Eye goggles
4. Smoothen seat edges	20	Wood lathe	Skew
5. Round seat edge	10	Wood lathe	Skew
6. Sand smooth	5	Wood lathe	Sand paper
7. Stain	5	NA	Brush
8. Finish	5	NA	Spray can
9. Dry	15	Blower	NA
10. Store	<u>60</u>		
Total time	144 minutes		

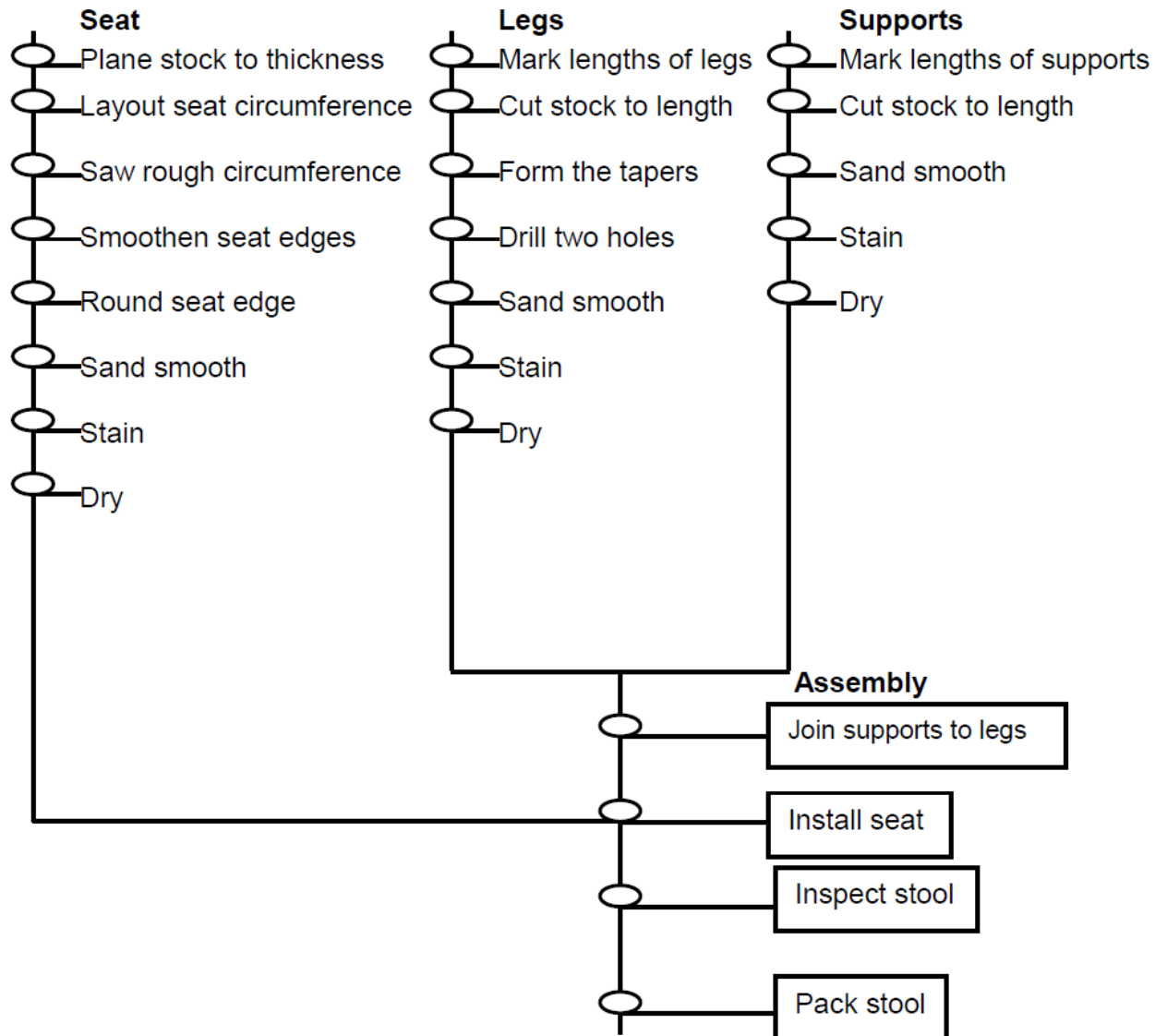
PRODUCT NAME: Seat	FLOW BEGINS	FLOW ENDS	DATE
	Planing the stock	Storage of part	9/16/2012
PREPARED BY: John Doe	APPROVED BY: James Doe		

PROCESS SYMBOLS AND NO. USED	O OPERATIONS 12 I INSPECTIONS 2 D DELAYS 0 T TRANSPORTATIONS 0 S STORAGE 1
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TASK NO.	PROCESS SYMBOLS	DESCRIPTION OF TASK	TIME INVOLVED	MACHINE REQUIRED	TOOLING REQUIRED
1	O	Plane stock to thickness	5	Planer	Ruler, goggles
2	O	Layout seat circumference	10	NA	Calipers, ruler
3	O	Saw rough circumference	15	Table saw	Goggles
4	O	Setup wood lathe	5	Wood lathe	Faceplate
5	O	Turn to actual size	10	Wood lathe	Skew, goggles
6	O	Form seat radius	15	Wood lathe	Skew, goggles
7	I	Inspect seat	2	Visual	Ruler, gage
8	O	Sand entire seat surface	10	Wood lathe	Sand paper
9	O	Clean entire seat surface	2	NA	Clean rag
10	O	Stain seat	5	NA	Wood stain/brush
11	O	Finish seat	10	Paint booth	Spray can/lacquer
12	O	Dry seat	30	Paint booth	Blower
13	I	Inspect part	2	NA	Visual and touch
14	S	Store part	60	Storage	NA
15	O	Cleanup work area	5	NA	NA

Total time = 186 Minutes

The Operation Process Chart



Planning and Implementing Equipment and Facilities

- Facility Layout
- Determining Takt Time
- Prioritizing and Ranking the Equipment

Planning and Implementing Materials and Material Handling Systems

- Planning for the Types of Materials the Company will be Using
- Planning for Material Movement or Handling
- Planning for the Inventory of Materials and Tooling

Planning and Implementing Labor

- Determining How Many Workers will be Needed in the Plant
- Planning How to Manage the Workers When they Come on Board

Planning for the Life Cycle Aspect of the End Product

- Customer issues
- Service life issues
- Serviceability issues
- Disposal and/or afterlife issues

