III SPACE REQUIREMENTS

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3.1 Elements of Space Requirements
- Work Areas: equipment, worker, material storage, material handling, tool rooms & cribs, maintenance, quality control & inspection, supervision, offices
- Non-Work Areas: shipping/receiving, and food, medical & convenience facilities

3.2 Principles of Space Planning
- Optimal design:
  - Optimize use of space within feasible range
  - Criteria of optimality: efficiency & productivity, material handling, cost, and operator safety & fatigue.
- Strategic planning: for future expansions/changes (5-10 yrs)
- Ground-up approach: 1st form workstations then depts.

3.3 Space Requirements for Work Stations
Production-center method: based on detailed analysis of:
- Equipment
  - Static width, depth and height
  - Travel: vertical, left, right, forward and backward
  - Maintenance
- Material
  - Receiving, work-in-process, and shipping; input output buffers
  - Chips and scrap
  - Tools, fixtures, jigs, dies, spare parts, lubricants, inserts
- Personnel
  - Operator
  - Task
  - Ingress and egress
- Plant service: utility lines, vent hood, air conditioning,

3.4 Space Requirements for Departments
- Combine if possible spaces for plant services, operator ingress and egress, and material storage
- Provide aisle space for material handling (Table 4.3, P. 101)
  - If largest load < 6 ft²: 5-10%
  - If largest load > 18 ft²: 30-40%
- Recommended aisle width - see Table 4.4, P. 103
  - Tractors: 12 ft
  - Forklifts: 9-11 ft
  - Personnel: 3 ft
- Avoid curves, nonright angle intersections, aisle along walls
- Use columns to border aisles

3.5 AISLE ARRANGEMENT
- Recommended aisle width - see Table 4.4, P. 103
- Avoid curves, nonright angle intersections, aisle along walls
- Use columns to border aisles
### 3.6 Other Methods for Determining Space Requirements

- **Converting method:** present space requirements are converted to those required for the proposed layout, to reflect planned production quantities
- **Roughed-out layout method:** templates/scale models used for generating configuration & space requirements
- **Space standards method:** use of industry standards, or past successful applications
- **Ratio trend & projection method:** establish ratio of ft² to: direct labor hrs, units

### 3.7 Space Requirements for Non-Work Activities (Chapter 5)

- **Employee Parking:**
  - Determine # automobiles, use ratio (1.25 or 1/3)
  - Determine available space and alternative layouts
- **Storage of Personal Belongings:**
  - Locker rooms: 6 ft² per person
  - Between entrance and work area along outside wall
- **Rest Rooms:**
  - Within 200 ft of every permanent workstation
  - 15 ft² for toilet, 6 ft² for urinal, 6 ft² for sink, 15 ft² for entrance; see table (5.2 and 5.3 for # per).

### 3.7 Space Requirements for Non-Work Activities (Chapter 5)

**Food Services**

- **Dining away from facility:** longer break, lost supervision, concentration & interaction
- **Cafeteria:** vending machines, serving line, full kitchen - tray and table size, layout, outside view, etc.
- **Drinking fountains:** within 200 ft of a regular location
- **Break areas**

**Health Services**

- **Examination room, beds, waiting rooms**
- **First aid room**