Material handling

Introduction

"Material handling embraces the basic operations in connection with the movement of bulk, packaged and individual products in a semi-solid or solid state by means of gravity manually or power-actuated equipment and within the limits of individual producing, fabricating, processing or service establishment"

–Haynes

Objectives of material handling

- Minimise cost of material handling.
- Minimise delays and interruptions by making available the materials at the point of use at right quantity and at right time.
- Increase the productive capacity of the production facilities by effective utilisation of capacity and enhancing productivity.
- Safety in material handling through improvement in working condition.
- Maximum utilisation of material handling equipment.
- Prevention of damages to materials.
- Lower investment in process inventory.

Principles of material handling

Planning principle

Systems principle

Space utilisation principle

Unit load principle

Gravity principle

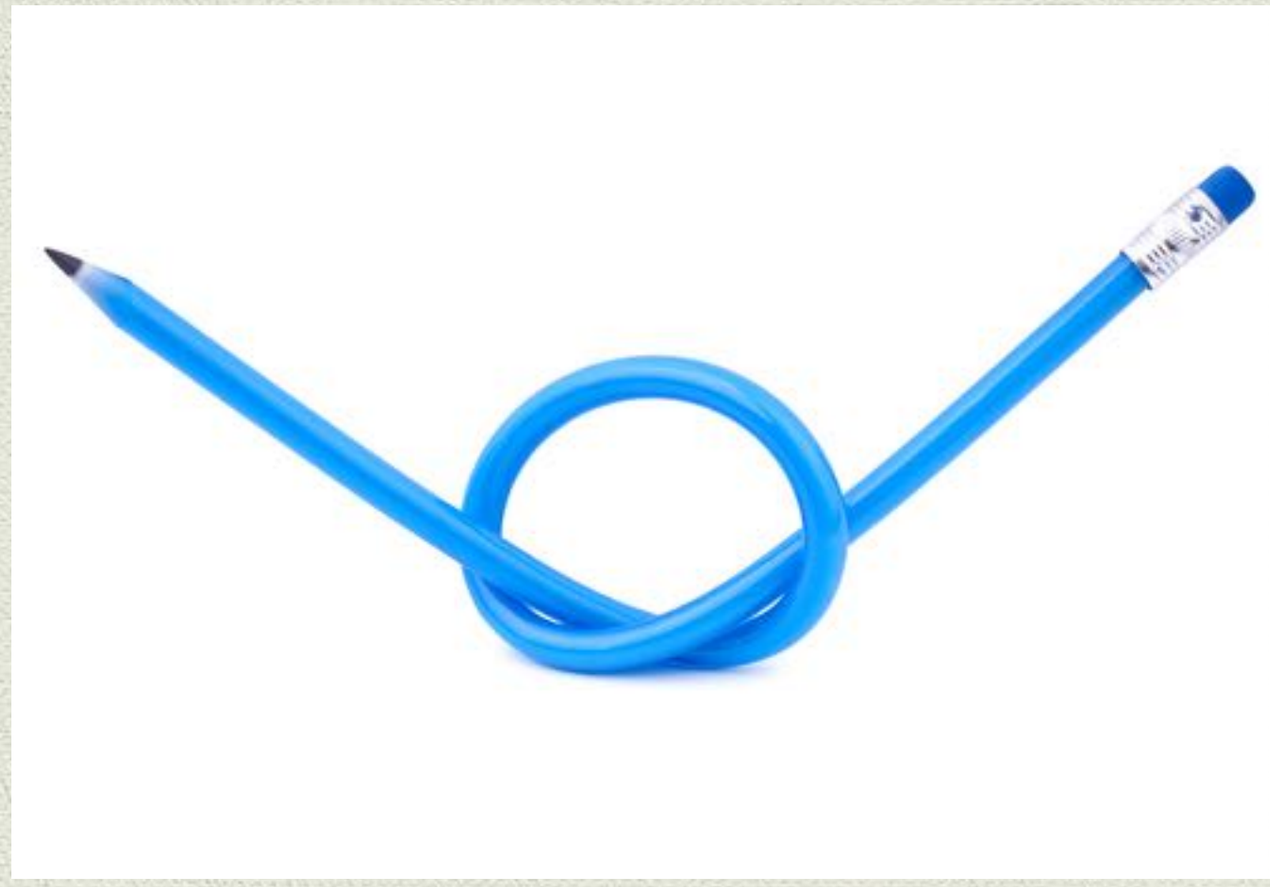
Simplification principle

Mechanisation principle

Material flow principle

Standardization principle

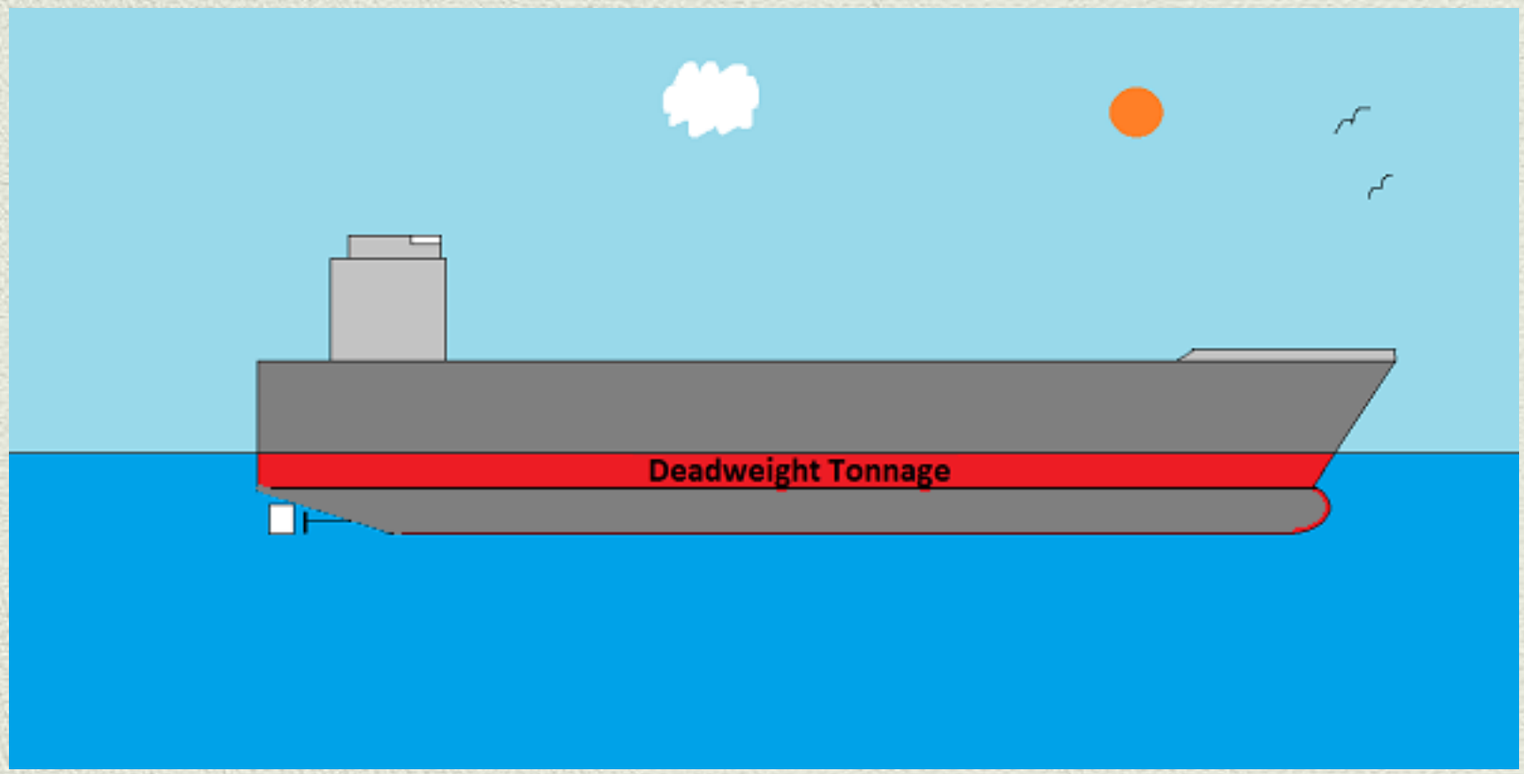
Flexibility principle



Equipment selection principle

Safety principle

Dead weight principle

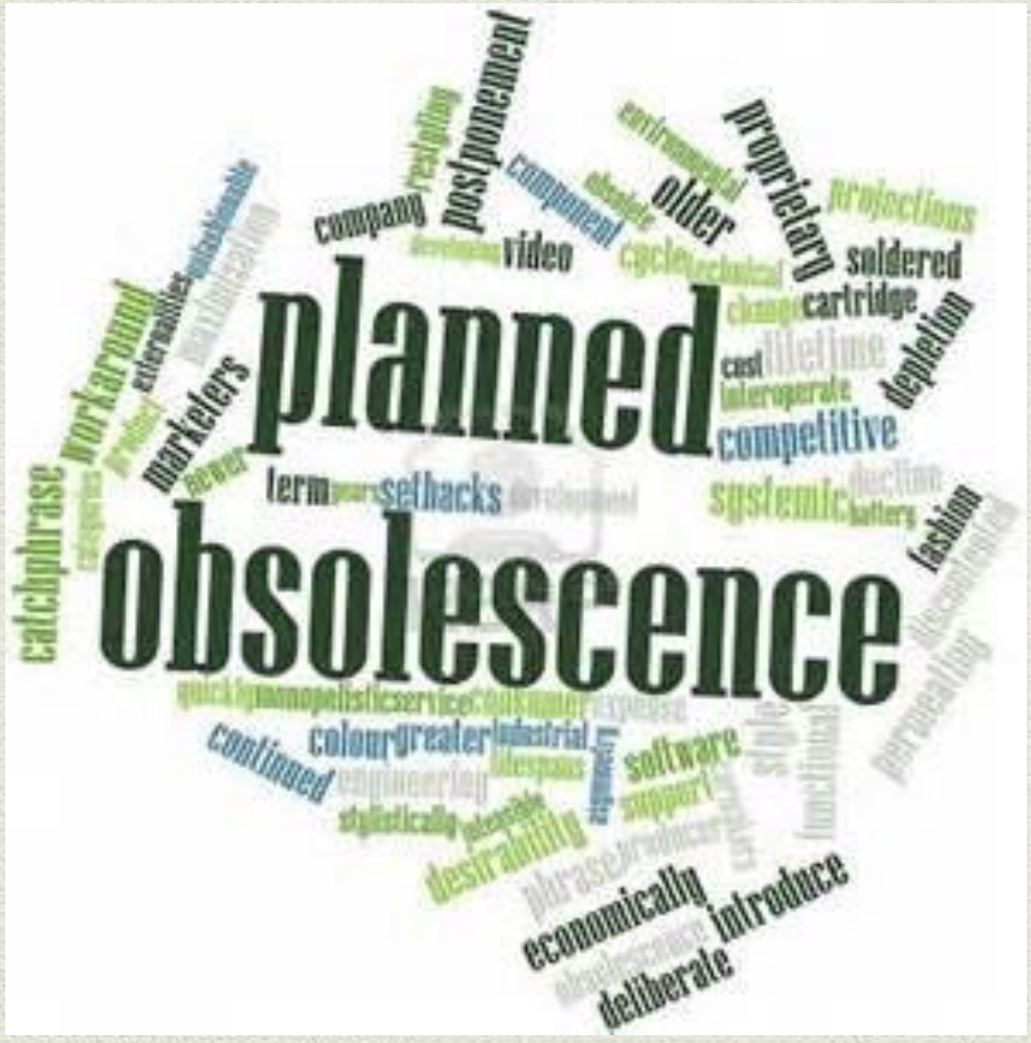


Motion principle

Idle time principle

Maintenance principle

Obsolescence principle

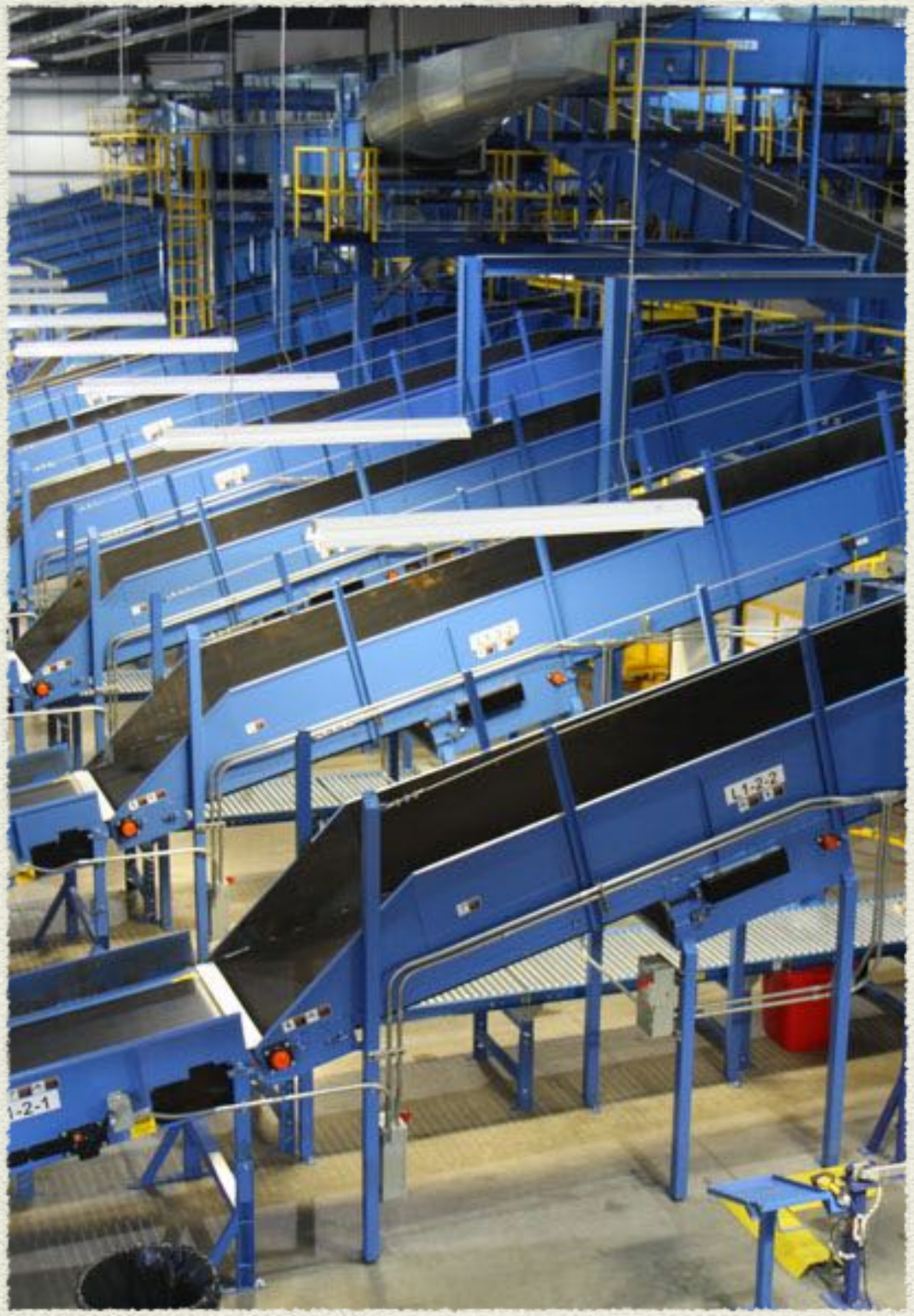


Capacity principle

Control principle

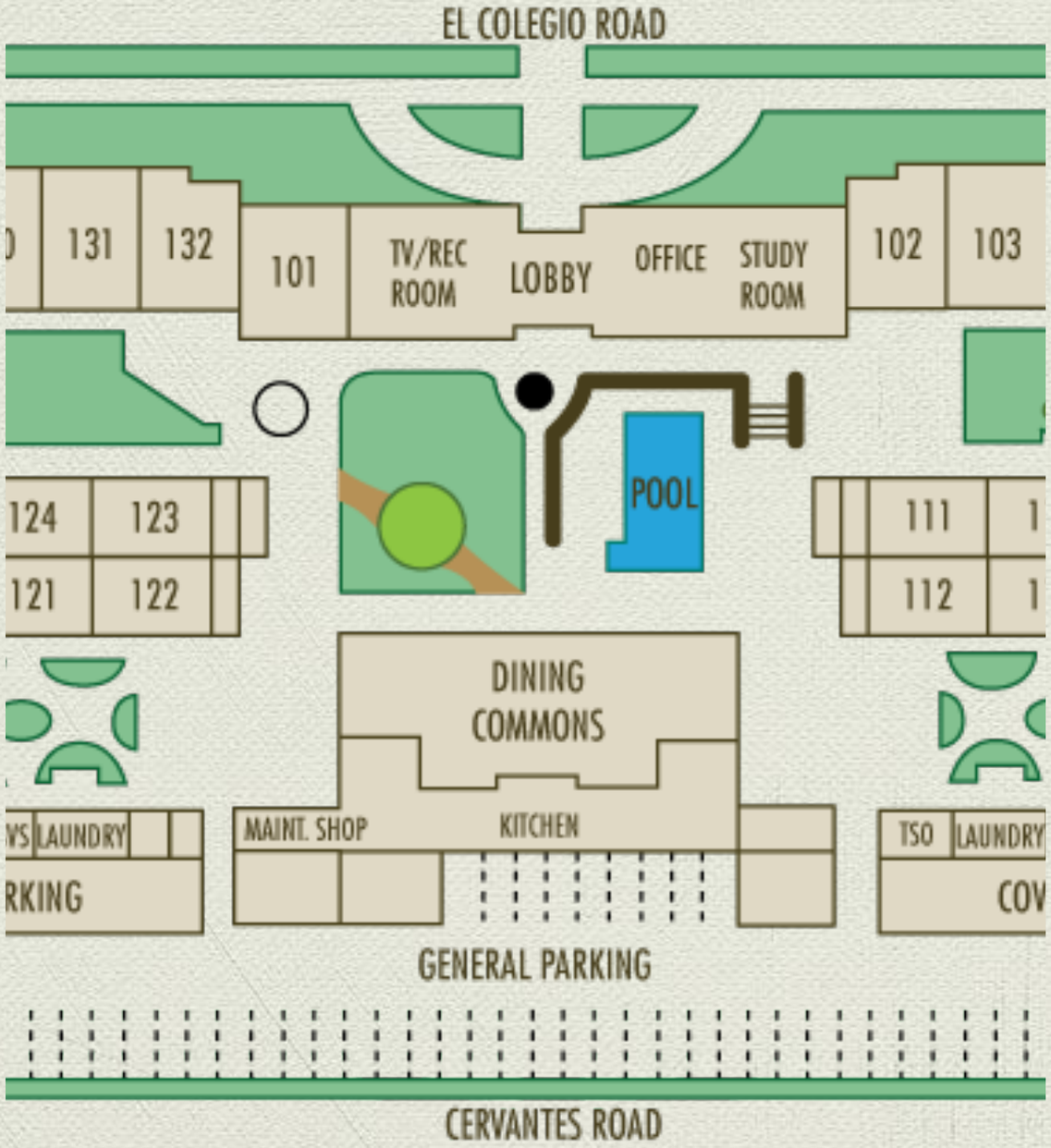
Performance principle

Selection of material handling equipments

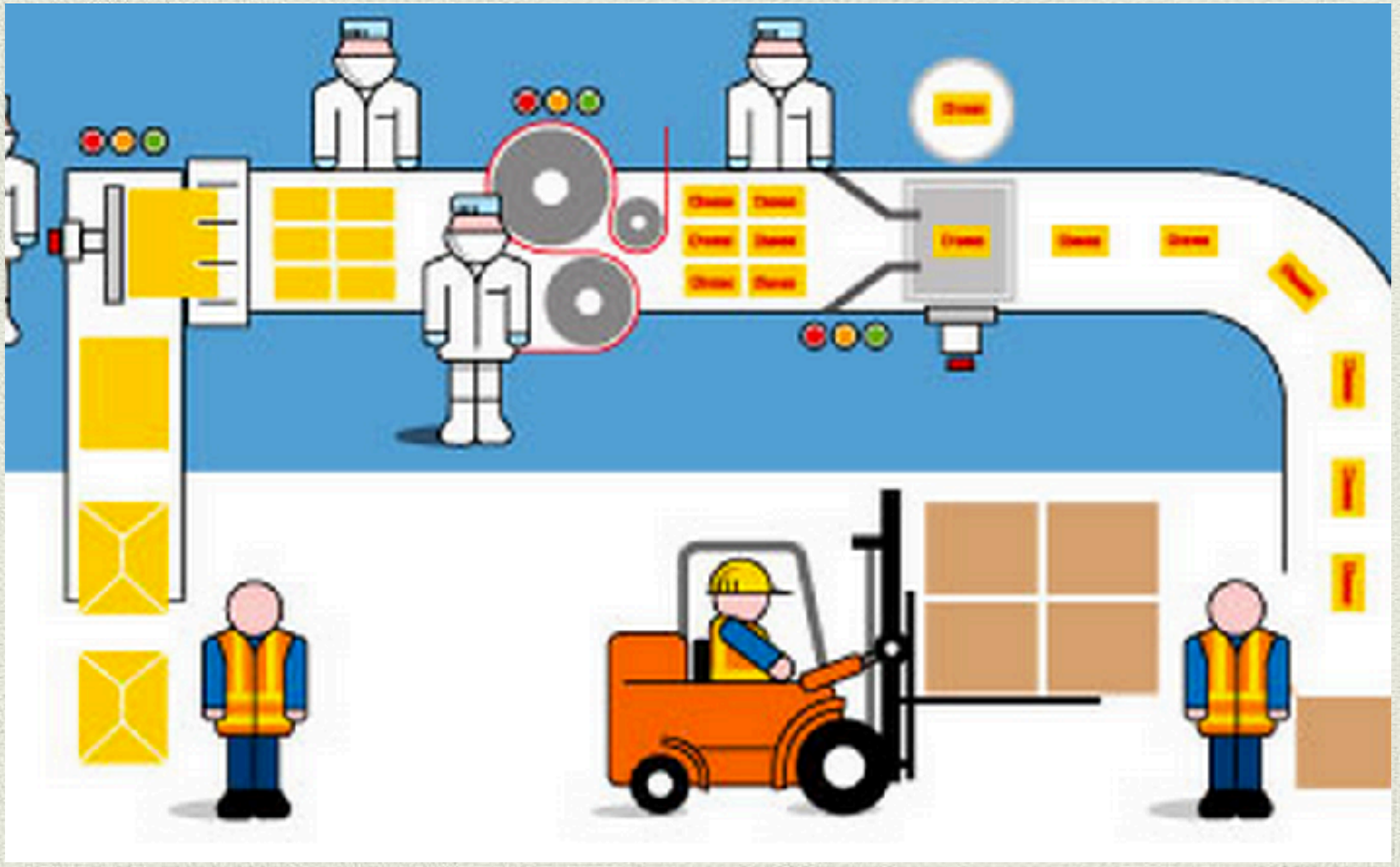


- Properties of the material

- Layout and characteristics of the building



- Production flow



- Cost considerations

- Nature of operations

- Engineering factors

- Equipment reliability

Evaluation of material handling system

Equipment utilization ratio

$$\text{MHL} = \frac{\text{Personnel assigned to materials handling}}{\text{Total operating work force}}$$

$$\text{DLHL} = \frac{\text{Materials handling time lost of labour}}{\text{Total direct labour time}}$$

Material handling equipments

Conveyors

Industrial trucks

Cranes and hoists

Containers

Robots

Material handling equipments

Guidelines for effective utilization of material handling equipments

- Eliminate handling wherever possible
- Sequence the operations in logical manner
- Use gravity
- Standartize handling equipments
- Install a regular preventive maintenance programme for material handling
- Versality and adaptability
- Weight of unit load must be maximum
- Consider work study aspects
- Non-productive operations in handling should be minimum

Guidelines for effective utilization of material handling equipments

- Close location
- Application of OR techniques
- Safety aspect
- Avoid wasteful movements
- Ensure proper coordination through judicious selection of equipments and training of workmen

Relationship between plant layout and material handling