

Department of Mining Engineering
-3rd -Class
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Transportation and Handling of Raw Materials

Chapter Two

Principles of Materials Handling

20 Principles of Materials Handling

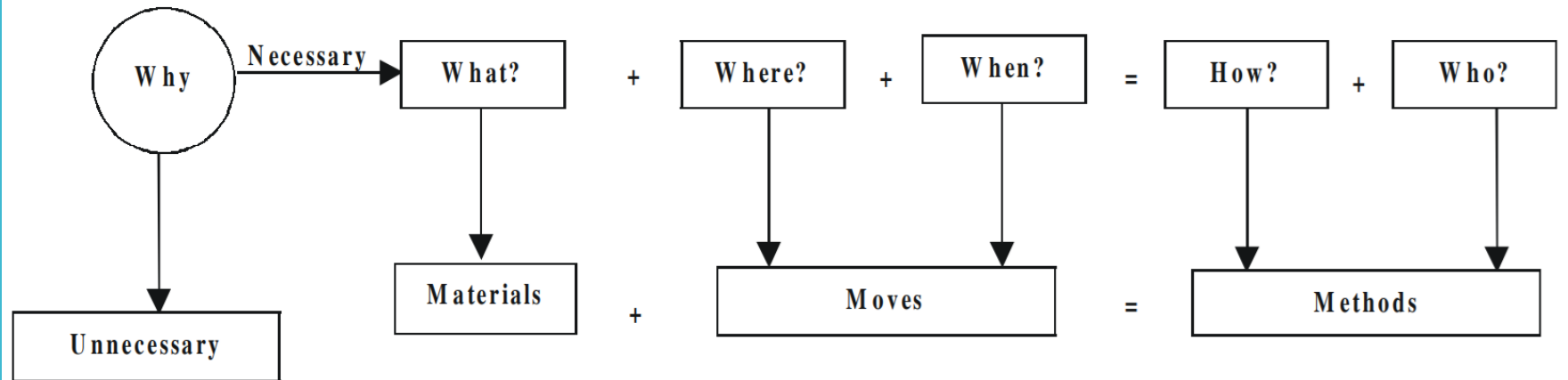


Outlines

- If you work in a material handling occupation, it is important that you know the principles of material handling. Material handling comes with a set rule of principles to ensure all material handling is adapted efficiently.
- From reducing unnecessary manual work to maximizing available space and tracking products in real-time, automated solutions are designed to help you achieve these principles to streamline your warehouse operations.
- It makes sense to control costs and cut time in material handling equipment in today's competitive environment. Below are fundamental principles of material handling equipment to serve as a guide for an efficient handling process.

1- Planning Principle

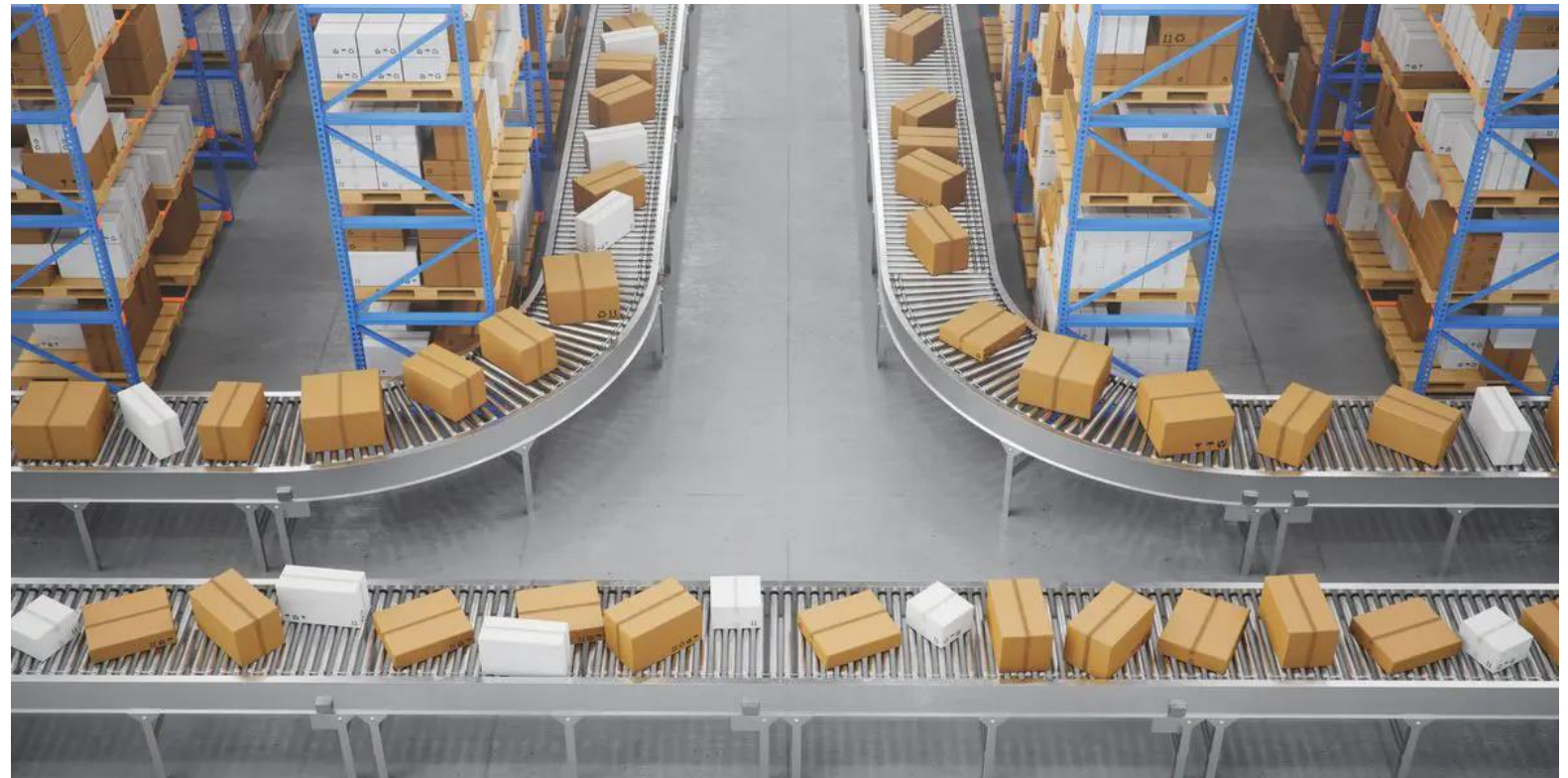
❖ All handling activities should be planned. This is the most basic principle which is in line with the Materials Handling Equation (see block below).



Suggestions for carrying out planning principles are:

- Consider the plant layout before equipment design.
- Plan the correct location for materials supply and disposal. Plan for scrap removal.
- Assure adequate storage space at the workplace.
- Avoid placing materials directly on the floor.
- Use same container throughout the movement of the material, as far as practicable.
- Observe principles of motion economy.
- Plan productive operations and inspections during material movement, if possible.
- Use an appropriate level of manual handling.

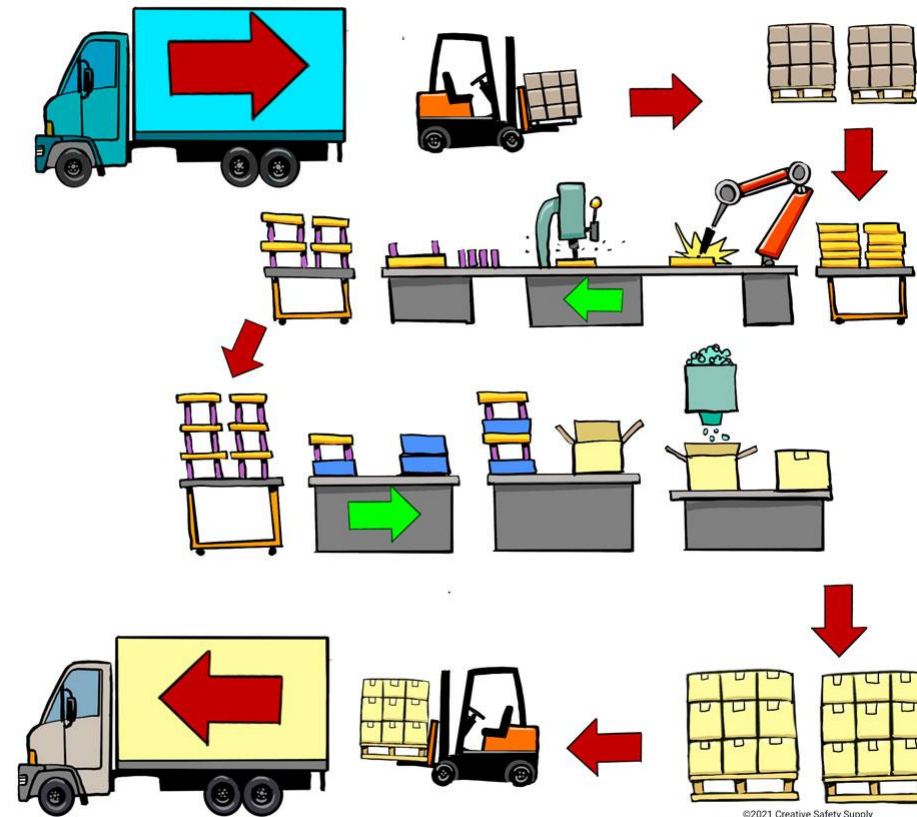
Integrate as many handling activities as possible, covering all operational processes such as receiving, storage, production, inspection, packaging, shipping and transportation.



2- Systems Principle

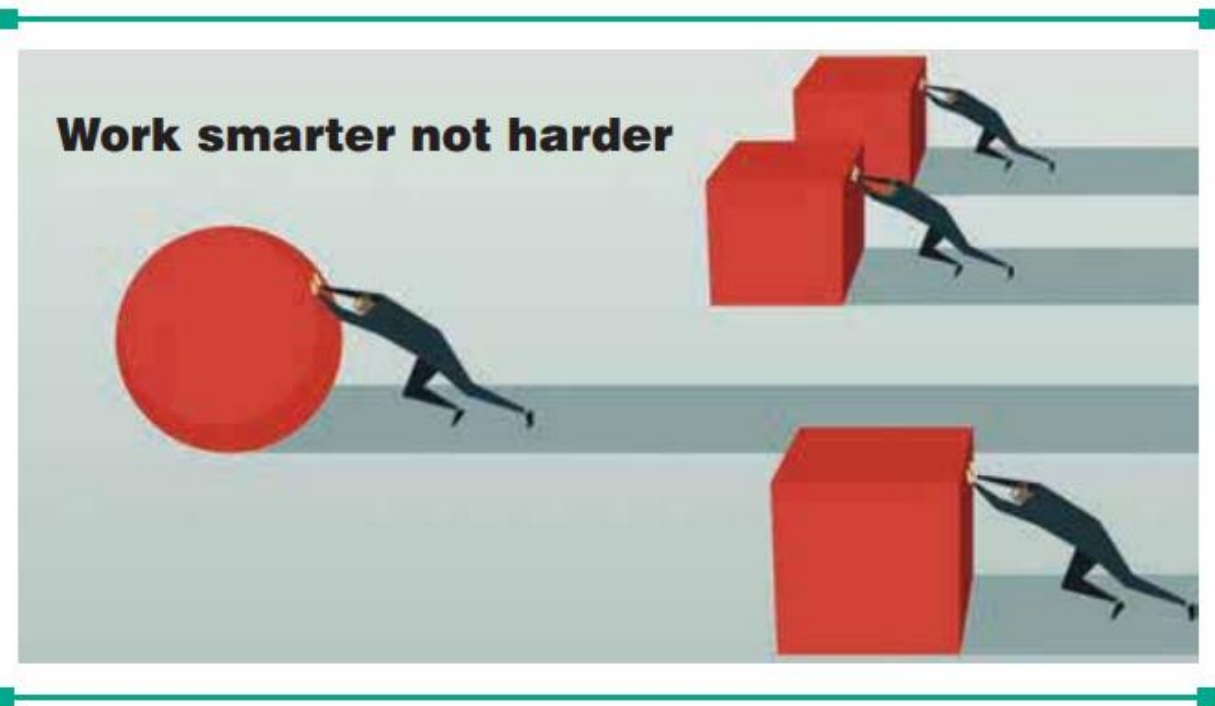
3- Material flow Principle

Plan operations sequence and equipment arrangement to optimize material flow. It should avoid backtracking, zig-zag movements, etc., and related operations must be kept together or may be combined, if possible



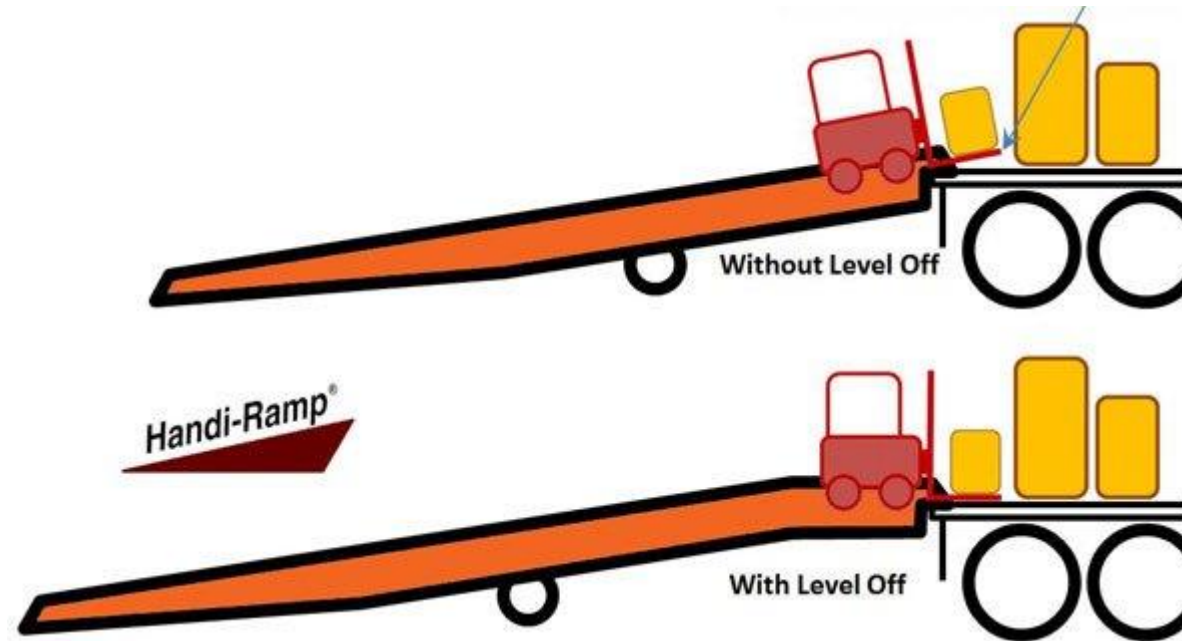
4- Simplification Principle

The material handling process should be very simple and unnecessary mechanization is not preferable. Reduce, combine or eliminate unnecessary movement and/or equipment. It increases the efficiency of material handling.



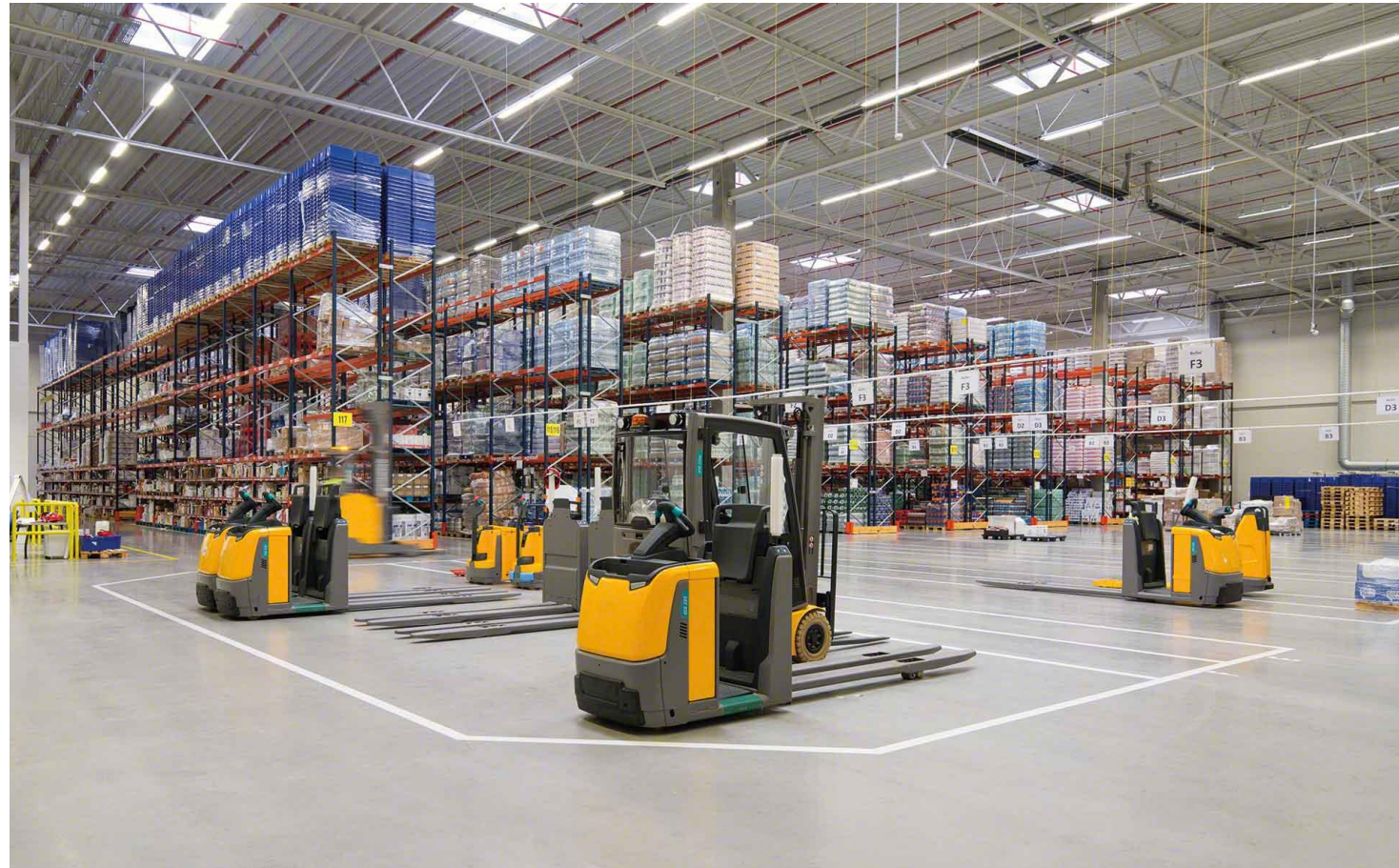
5- Gravity Principle

Gravitational movement is almost free of cost since it uses gravity wherever convenient to transport material. Roller conveyors, slides, slips between equipment and intermediate ramps can be used on separate floors. Sloping floors are popular in unloading a truck.



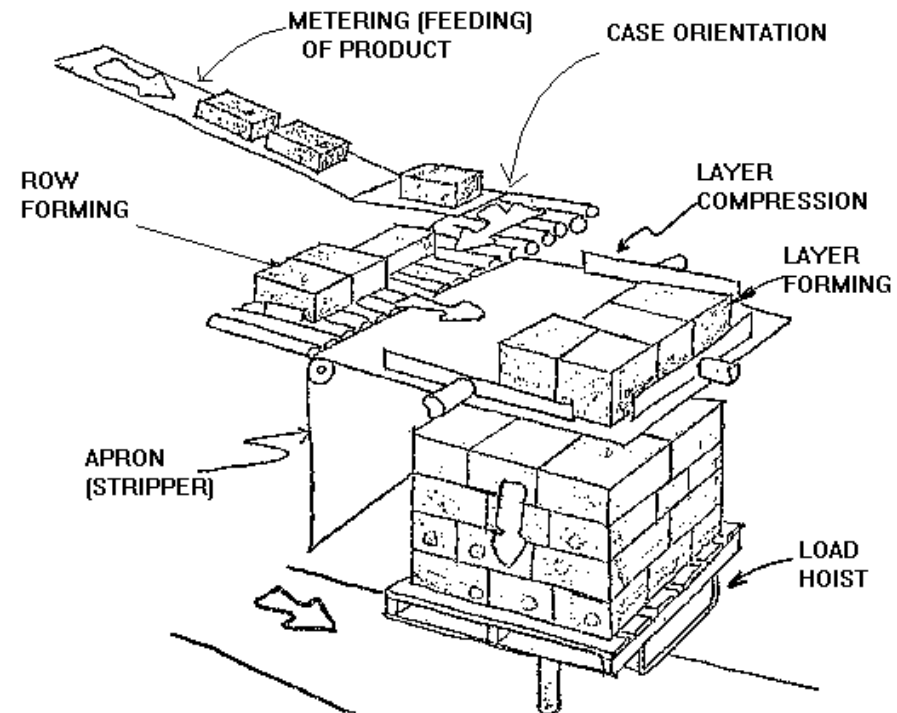
6- Space Utilization Principle

The ideal use of building volume should be adapted. Equipment should be kept close together and a narrow aisle should be kept. Temporary storage should be minimized, and racks should be used for higher stacking.



The unit load (quantity, size, weight) should be maximized by examining the possibility of unitization of loads by using containers. The materials purchased should be of sufficient size to optimize the transporting performance.

7- Unit Size Principle



8- Safety Principle

Conveying and material handling equipment should have adequate safety conditions. Attention should be paid to adequate lighting, ventilation, maintenance of good equipment, cleaning facilities and so on.



CONFINED SPACE



WORKING AT HEIGHT



WORK AUTHORIZATION



ENERGY ISOLATION



LINE OF FIRE



BYPASSING SAFETY CONTROLS



DRIVING



HOT WORK



SAFE MECHANICAL LIFTING



FIT FOR DUTY

9- Mechanization /Automation Principle

Mechanization/automation is preferable in cases of huge numbers or amounts of goods, repetitive transport, lengthy motions, dangerous transport/products, unnecessary care, hard materials and disposal of waste.



10- Equipment Principle

The equipment should be matched with the material handling and process adopted. As far as possible, universal and standardized equipment should be used with reasonable performance to match future capabilities.



11- Standardization Principle

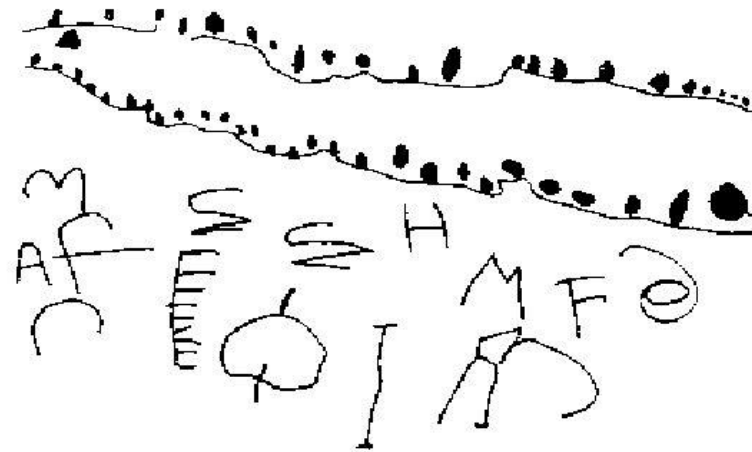
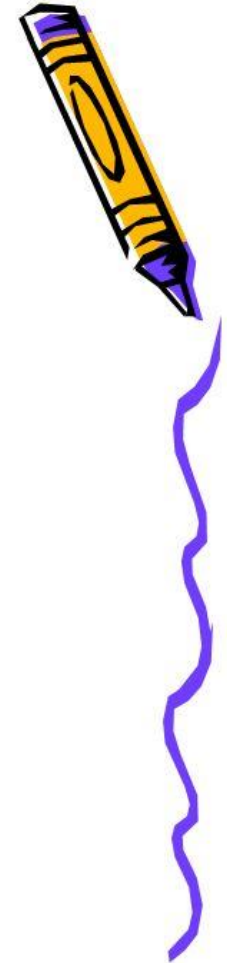
The material handling methods, equipment and containers should be standardized as far as possible for ease of handling and suitable for new machines in case of replacement.



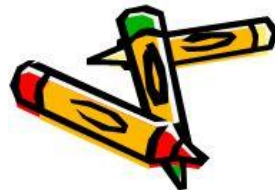
The equipment used should have flexibility. Use methods and equipment, which can perform different tasks and applications.

12- Flexibility Principle

Flexibility Principle



*Carlene
Age 4
Flexibility principle*



13- Deadweight Principle

The deadweight used in handling should be minimized by using lightweight materials like aluminum, magnesium, etc. Selecting lightweight equipment is also a good choice.



Deadweight Loss

[ˈded-ˈwāt ˈlɒs]

A cost to society created by market inefficiency, which occurs when supply and demand are out of equilibrium.

Loading and unloading of material should be adapted without stopping the movement of handling equipment or the pause duration should be minimized.

14- Motion Principle



The material should remain in motion and unproductive/idle time should be minimized. The material should be delivered on time at all the places using handling equipment.

15- Idle Time Principle



Idle Time

[ɪ-ˈdɪl ˈtɪm]

Paid time during which an employee, or machine, is not doing anything productive.

16- Maintenance Principle

Do schedule maintenance and repair work of all materials handling equipment to minimize outages.

MAINTENANCE CHARGES



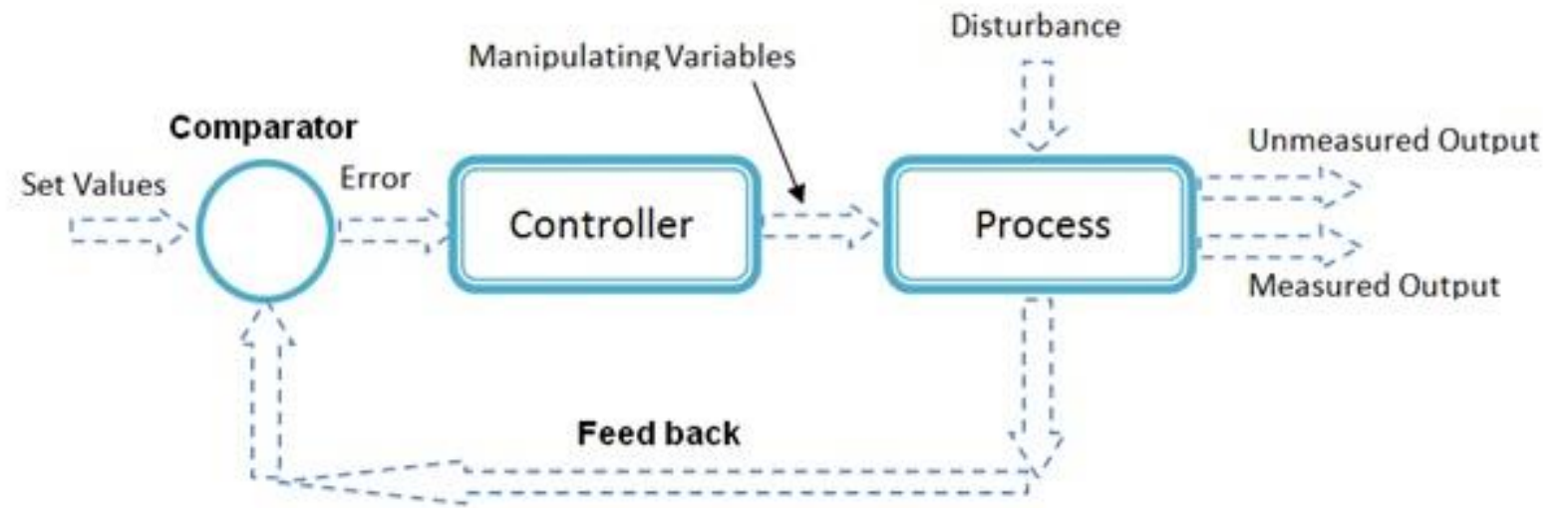
17- Obsolescence Principle

Old equipment/procedures should be replaced with new and more efficient handling methods or equipment methods.



18- Control Principle

Use materials handling equipment to improve production and inventory control and order handling.



19- Capacity Principle

The material handling equipment should be properly used to reach the full production capacity. Mechanical handling systems should be used for the uniform flow of materials.



20- Performance Principle

High-performance material handling devices should be selected by comparing other methods of material transfer on the basis of initial cost, operating cost, and efficiency to observe the effect of the enhancement in production.





- Thank You