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MATERIAL HANDLING & STORE LAYOUT



WHAT IS MATERIAL HANDLING (MH)

अमृतम् तु विद्या ।

- ✘ Materials handling is the science and art both involving the moving, packing and storing of substance in any form, and includes the preparation, placing and positioning the material to facilitate their movement or storage.





MEANING OF MATERIAL HANDLING

- Materials handling occurs whenever a material is moved may be in a manufacturing, dis-tribution (warehouse), or office environment. Materials handling also occur during prepara-tion for shipment, transportation may be by sea, air or land, and moving material in and out of carriers.



DEFINITION OF MATERIAL HANDLING

- International Material Management Society has defined the Materials Handling as “Materials handling is an art and science involving the movements, packaging and storing of substances in any form”.





OBJECTIVES OF MATERIAL HANDLING

- The main objective of materials handling engineer is to reduce product cost.
- Materials handling equipment is not production machinery, but is auxiliary equipment that improves the flow of material which in turn reduces stoppages in production machines and thus increases their production.



OBJECTIVES OF MATERIAL HANDLING

- ✘ Objectives of a proper materials handling system are:
 - ✘ 1. Reduced costs,
 - ✘ 2. Increased capacity,
 - ✘ 3. Improved working conditions
 - ✘ 4. Improved customer service, and
 - ✘ 5. Improved productivity.



OBJECTIVES OF MH-REDUCTION IN COST

- ✘ **1. Reduction in Cost:**
- ✘ Reduction in total cost of production can be achieved by either reducing materials handling or by improved handling procedure or both.
- ✘ (a) Reducing material handling labour.
- ✘ (b) Material handling work should not be assigned to skilled or semi-skilled labour.
- ✘ (c) Reducing indirect labour expenses on activities connected with storage, inspection, quality control, repair, tool room, shipping etc.



OBJECTIVES OF MH - REDUC-TION IN COST

- ✘ (d) Reducing damage of materials during handling.
- ✘ (e) Better utilization of space.
- ✘ (f) Reducing in process storage.
- ✘ (g) Increasing productivity.
- ✘ (h) Reducing expenditure on packaging and other protective devices.
- ✘ (i) Decreasing inventory.



OBJECTIVES OF MH- INCREASE IN CAPACITY

- ✘ **2. Increase in Capacity:**
- ✘ Improved materials handling system results in increase of ca-pacity by better utilization of space.
- ✘ Improved handling system can increase the capacity in the following ways:
 - ✘ (a) By better utilization of space:
 - ✘ Racks or containers that stacks item upon each other making full use of air space should be preferred. From this point of view use of over-head cranes, conveyors, lift trucks etc., are very suitable.



INCREASE IN CAPACITY

- ✘ **(b) By reducing travel space or excessive wastage of space:**
- ✘ For this purpose a study of flow of materials between operations should be done considering the flow paths, volume of material, timing etc. This study may help in reducing travel time and space requirements.
- ✘ **(c) By improving equipment utilization:**
- ✘ This can be achieved by ensuring regular supply and distribution of material. This will reduce the idling of machine.
- ✘ **(d) By faster loading or unloading:**
- ✘ This can be achieved by employing conveyor system, cranes, loaders, rail road cars, tipping trucks etc.



OBJECTIVES OF MH-IMPROVEMENT IN WORKING CONDITIONS

- ✘ **3. Improvement in Working Conditions:**
- ✘ **(a) Safety aspects:**
- ✘ Safety of men, material and associated equipment not only prevents loss of money but also enhances the moral of workers.
- ✘ **(b) Easy working:**
- ✘ By using proper handling equipment heavy jobs can be handled with ease, faster speed and at a constant rate throughout the period of production. This enables high morale and lower workers turnover.
- ✘ **(c) Foolproof operation:**
- ✘ Due to absence of manual handling, there are no chances of con-fusion resulting in placing of material at wrong location or disruption of production.



OBJECTIVES OF MH-IMPROVED CUSTOMER SERVICE

- ✘ **4. Improved Customer Service:**
- ✘ Customer's service will be improved by following proper and improved materials handling system which will enable regular and timely market supply by avoiding disruption in production schedule. These are the main sources of good customer service.



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PRINCIPLES OF MATERIAL HANDLING

- **A) Principles related to PLANNING**
 1. Planning Principle:
 2. Systems Principle
 3. Simplification Principle
 4. Material Flow Principle
 5. Gravity Principle
 6. 6. Unit Size Principle
 7. Space Utilization Principle
 8. Safety Principle
- B) Principles Related to EQUIPMENT:**
 9. Mechanization Principle:
 10. Flexibility Principle:



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PRINCIPLES OF MATERIAL HANDLING

- 11. Equipment Selection Principle
- 12. Standardization Principle
- 13. Light Weight Principle
- 14. Motion Principle:
- 15. Idle-time Principle
- 16. Obsolescence Principle:
- 17. Maintenance Principle
- C) Principles Related to OPERATION:
 - ✘ 18. Control Principle:
 - ✘ 19. Capacity Principle:
 - ✘ 20. Performance Principle



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PRINCIPLES OF MATERIAL HANDLING

➤ A) Principles related to PLANNING

1. Planning Principle:

All material handling activities should be planned.

- (i) Material should be placed on pallet or any other support and not on the floor directly.
- (ii) One container should be used throughout and avoid frequent changes.
- (iii) Utilize truss capacities and ceiling heights.
- (iv) Provide sufficient storage space at the work-place.
- (v) Each operator must be instructed/trained to follow correct method.
- (vi) Plan for scrap removal means.
- (vii) Efforts are made to combine operations like inspection during productive operation.
- (viii) Minimize movement of men and material.



PRINCIPLES OF MATERIAL HANDLING

➤ 2. Systems Principle:

Handling activities be integrated and coordinated.

Handling activities are receiving, storage, in-process handling, inspection, packaging, warehousing, shipping and transportation.

(i) Consider all the handling activities while giving a detailed consideration to an activity.

(ii) Material flow between work areas is planned.

(iii) Integrated activities into the handling system.



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PRINCIPLES OF MATERIAL HANDLING

- ✘ **3. Simplification Principle:**
- ✘ Reduce, combine or eliminate unnecessary movements and/or equipment.
- ✘ (i) Motion Economy principles be applied.
- ✘ (ii) Reduce or eliminate, long and complicated movements.
- ✘ (iii) Deliver the material at correct spot in first instance.
- ✘ (iv) Eliminate re-handling.
- ✘ (v) Reduce variety of equipment.



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PRINCIPLES OF MATERIAL HANDLING

- ✘ **4. Material Flow Principle:**
- ✘ Material flow pattern must be determined by operation sequence and pattern of equipment arrangement.,
- ✘ (i) Avoid overcrowding.
- ✘ (ii) Eliminate obstacles in the flow.
- ✘ (iii) Move in a direct path and avoid back track-ing.
- ✘ (iv) Move greatest weight and/or bulk for least distance.
- ✘ (v) Minimize movements between floors,, and buildings.
- ✘ (vi) Plan proper locations of sub-assemblies.
- ✘ (vii) Plan related work areas close together.
- ✘ (viii) Avoid traffic jams and take necessary pre-cautions for cross traffic.



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- ✘ 5. Gravity Principle:
- ✘ Utilize gravity where possible.,
- ✘ (i) Use slides, chutes, hoppers etc. where possible





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- × **6. Unit Size Principle:**
- × Increase size, quantity, weight of the load handled.
Since larger the load, lesser will be the cost per unit handled.
- × (i) Handle unit loads.
- × (ii) Use containers.
- × (iii) Containers should be standardized.
- × (iv) Use standardized pallets.
- × (v) Optimize unit loads.



PRINCIPLES OF MATERIAL HANDLING

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- ✘ **7. Space Utilisation Principle:**
- ✘ Optimum utilisation of building space. As space means money.
- ✘ (i) Equipment or work area may be kept in reasonably close position.
- ✘ (ii) Inventory at temporary stores must not be kept too much.
- ✘ (iii) Utilise height of building and use rack to permit higher stocking.
- ✘ (iv) Use concept of economic order quantities and economic lot sizes.
- ✘ (v) Dispose obsolete or scrap items in time.
- ✘ (vi) Use handling equipment requiring mini-mum aisles.
- ✘ (vii) Use mobile or overhead equipment.
- ✘ (viii) Use collapsible containers to save space required by empty ones.



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- ✘ **8. Safety Principle:**
- ✘ Safe handling methods and equipment for better working conditions and to avoid unsafe conditions.,
- ✘ (i) Provide adequate guards and other safety devices.
- ✘ (ii) Handling equipment is kept in good operating conditions.
- ✘ (iii) Highlight handling hazards, moving vehicles or danger areas.
- ✘ (iv) Make arrangement for removal of undesirable fire, dust, smoke etc.
- ✘ (v) Emergency switches or controls be provided.
- ✘ (vi) Proper instructions and training for safe operation to the operators.
- ✘ (vii) Keep floor clean.
- ✘ (viii) Provide good housekeeping.
- ✘ (ix) Keep aisles clear.
- ✘ (x) Do not overload handling equipment or devices.



PRINCIPLES OF MATERIAL HANDLING

B) Principles Related to EQUIPMENT:

✘ 9. Mechanization Principle:

- ✘ For increasing efficiency use mechanized handling equipment but to the desired extent only.
- ✘ (i) Mechanization is useful for large quantities, long, frequent, high effort or hazardous moves.
- ✘ (ii) Replace excess manual handling or where large numbers of persons are engaged on handling jobs.
- ✘ (iii) Moving heavy containers.
- ✘ (iv) Design containers suitable for mechanical handling.
- ✘ (v) Use mechanized communication where required.



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PRINCIPLES OF MATERIAL HANDLING

- ✘ **10. Flexibility Principle:**
- ✘ Equipment's ca-pable of handling variety of tasks be used.,
- ✘ (i) Buy versatile and flexible equipment.
- ✘ (ii) Buy adjustable racks.
- ✘ (iii) Utilize accessories and attachments.





PRINCIPLES OF MATERIAL HANDLING

- ✘ **11. Equipment Selection Principle:**
- ✘ Select equipment very carefully considering all aspects of materials, movements, and the method.
- ✘ (i) Select versatile equipment.
- ✘ (ii) Cost per unit to be handled should be compared.
- ✘ (iii) Consider standardization aspects.
- ✘ (iv) Equipment should be economical on long term basis.



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- ✘ **12. Standardization Principle:**
- ✘ Standardize equipment as well as methods.
- ✘ (i) Standardize the equipment, containers and pallets.
- ✘ (ii) Standardize methods.
- ✘ (iii) Train employees on standardized equip-ment and methods.





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- ✘ **13. Light Weight Principle:**
- ✘ Reduce weight of equipment.
- ✘ (i) Equipment should have less weight.
- ✘ (ii) Use light weight pallets, skids and containers.





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PRINCIPLES OF MATERIAL HANDLING

✘ 14. Motion Principle:

- ✘ The handling equipment should be kept in motion i.e., minimum period for loading, unloading or other idle-ness.
- ✘ (i) Reduce loading/unloading time.
- ✘ (ii) Use mechanical means or other means for quick loading and unloading.
- ✘ (iii) Use tractor trailers, so that tractor can be used for other work while the trailer is be-ing loaded/unloaded.
- ✘ (iv) Minimize downtime.



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PRINCIPLES OF MATERIAL HANDLING

- ✘ **15. Idle-time Principle:**
- ✘ Reduce idle and unproductive time.
- ✘ (i) To avoid idle manpower, deliver material at a desired rate.
- ✘ (ii) Do not use productive labour for handling.
- ✘ (iii) In order to utilize manpower fully, more than one machine can also be allotted to one man.
- ✘ (iv) Equipment should be fully utilized.



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PRINCIPLES OF MATERIAL HANDLING

- ✘ **16. Obsolescence Principle:**
- ✘ Obsolete methods and equipment be replaced by efficient methods and equipment.
- ✘ (i) Obsolete equipment be identified and re-placed by new equipment.
- ✘ (ii) Beware of new technological developments and remain in constant touch through books, journals, attending, conferences etc.



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- ✘ **17. Maintenance Principle:**
- ✘ Preventive maintenance practices are adopted for handling equipment.
- ✘ (i) Preventive maintenance is carried out to avoid breakdowns.
- ✘ (ii) Carry out schedule maintenance and daily inspections and take remedial measures.
- ✘ (iii) Set up regular maintenance schedule.
- ✘ (iv) Train operators for proper operation and maintenance.
- ✘ (v) Maintain adequate spare supplies.



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PRINCIPLES OF MATERIAL HANDLING

C) Principles Related to OPERATION:

✘ 18. Control Principle:

- ✘ Control production and inventory through materials handling equipment.
- ✘ (i) Provide direct mechanical paths for materials movement.
- ✘ (ii) Materials be moved in lots, batches, containers of a predetermined quantity or size.
- ✘ (iii) Materials handling system should have built in features of controlling production, inventory, and accounting.
- ✘ (iv) Material is moved as per schedule.



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PRINCIPLES OF MATERIAL HANDLING

- ✘ **19. Capacity Principle:**
- ✘ Production ca-pacity should be fully achieved.
- ✘ (i) Ensure uniform desired rate of flow.
- ✘ (ii) Equipment is operated at optimum rate.
- ✘ (iii) Plan to utilize forward as well as return runs of the equipment.
- ✘ (iv) Vehicles, conveyors, containers etc. should be loaded to full capacity.
- ✘ (v) Utilize overhead space.
- ✘ (vi) Aisles should be obstacle free and wide enough for speedy movement.
- ✘ (vii) Store items not affected by weather.



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PRINCIPLES OF MATERIAL HANDLING

- ✘ 20. Performance Principle:
- ✘ Performance of handling is measured in terms of cost per unit handled, safe working condition, and increase in production rate or reduced manpower for handling.





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- ✘ Source:
<http://www.yourarticlelibrary.com/material-management/store-keeping-meaning-types-objectives-functions-and-working-of-the-stores/26132>
- ✘ <https://www.businessmanagementideas.com/project-report/materials-management/materials-handling-functions-objectives-and-principles/6768>



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