Material Handling - Principles, Operations and Equipment

Introduction

Raw materials form a critical part of manufacturing as well as service organization. In any organization, a considerable amount of material handling is done in one form or the other. This movement is either done manually or through an automated process. Throughout material handling processes significant safety and health; challenges are presented to workers as well as management. Therefore, manual material handling is of prime concern for health and safety professional, and they must determine practical ways of reducing health risk to the workers.

Material Handling

Manual material handling ranges from movement of raw material, work in progress, finished goods, rejected, scraps, packing material, etc. These materials are of different shape and sizes as well as weight. Material handling is a systematic and scientific method of moving, packing and storing of material in appropriate and suitable location. The main objectives of material handling are as follows:

- It should be able to determine appropriate distance to be covered.
- Facilitate the reduction in material damage as to improve quality.
- Reducing overall manufacturing time by designing efficient material movement
- Improve material flow control
- Creation and encouragement of safe and hazard-free work condition
- Improve productivity and efficiency
- Better utilization of time and equipment

It is critical for manufacturing organization to identify importance of material handling principle as the critical step in promoting the job improvement process. Manual material handling significantly increases health hazard for the workers in from lower back injuries.

In the current competitive and globalized environment, it is important to control cost and reduce time in material handling. An efficient material handling process promotes:

- Design of proper facility layout
- Promotes development of method which improves and simplifies the work process
- It improves overall production activity.
- Efficient material handling reduces total cost of production.

Principles of Material Handling

Material handling principles are as follows:

- **Orientation Principle:** It encourages study of all available system relationships before moving towards preliminary planning. The study includes looking at existing methods, problems, etc.
- **Planning Principle:** It establishes a plan which includes basic requirements, desirable alternates and planning for contingency.
Material handling operations are designed based upon principles as discussed above. Material handling equipment consists of cranes, conveyors and industrial trucks.

**Systems Principle:** It integrates handling and storage activities, which is cost effective into integrated system design.

**Unit Load Principle:** Handle product in a unit load as large as possible

**Space Utilization Principle:** Encourage effective utilization of all the space available

**Standardization Principle:** It encourages standardization of handling methods and equipment.

**Ergonomic Principle:** It recognizes human capabilities and limitation by design effective handling equipment.

**Energy Principle:** It considers consumption of energy during material handling.

**Ecology Principle:** It encourages minimum impact upon the environment during material handling.

**Mechanization Principle:** It encourages mechanization of handling process wherever possible as to encourage efficiency.

**Flexibility Principle:** Encourages of methods and equipment which are possible to utilize in all types of condition.

**Simplification Principle:** Encourages simplification of methods and process by removing unnecessary movements

**Gravity Principle:** Encourage usage of gravity principle in movement of goods.

**Safety Principle:** Encourages provision for safe handling equipment according to safety rules and regulation

**Computerization Principle:** Encourages of computerization of material handling and storage systems

**System Flow Principle:** Encourages integration of data flow with physical material flow

**Layout Principle:** Encourages preparation of operational sequence of all systems available

**Cost Principle:** Encourages cost benefit analysis of all solutions available

**Maintenance Principle:** Encourages preparation of plan for preventive maintenance and scheduled repairs

**Obsolescence Principle:** Encourage preparation of equipment policy as to enjoy appropriate economic advantage.
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Maintenance Policy and Repair

Introduction

Plant and machinery in the initial days always perform to their fullest capacity. But with regular wear and tear, this becomes increasingly difficult. If proper and regular maintenance is undertaken than production capacity can be maintained at a more or less same level. Maintenance also requires replacement decisions. Replacement is a substitution of existing fixed asset with a new asset, which may enhance features capable of performing similar function. The need for replacement may arise because of normal use, obsolescence, early service failure, destruction, etc.

Maintenance
Maintenance is defined as a process in which working condition of plant or machinery is maintained at the optimum level as to give maximum output. **Maintenance is done through repair, partial replacement and total replacement. Following is the significance of the maintenance policy:**

- Maintenance policy ensures that equipments are always in ready and reliable condition. This ensures company is able respond to any sudden change in demand.
- Maintenance policy ensures that equipments are always calibrated to provide good-quality products and competitive advantage. This ensures that there are no sudden and frequent breakdowns and reduce production of defective products.
- Maintenance policy ensures that there are no major breakdowns. This ensures there is no lose of inventory or market share for companies following JIT philosophy.
- Maintenance policy ensures that costs are always controlled.
- Maintenance policy is particularly important in capital-intensive industries.

If organizations are not able to implement an effective maintenance policy than it can result in the following results:

- Full capacity utilization may not be achieved.
- Increase in production cost as fixed labor cost cannot be reduced.
- Increase in maintenance cost as more spare parts are required.
- Reduction in product quality and increase in wastage.
- Safety of workers and operators in jeopardy.

**Maintenance Management**

**Maintenance management is process where available resources are regulated in a manner that plant and machinery can perform at specific levels.** Maintenance management involves planning, scheduling and execution of maintenance-related activities. The main objectives of the maintenance management are as follows:

- Minimum level of production loss and minimum incidence of breakdown.
- Minimum level of wastage.
- Optimum usage of maintenance equipment and personnel.
- Quality of product is improved.

**Planning and Scheduling**

The maintenance department is responsible with planning and scheduling of maintenance activities in line with the requirement and expectation of the organization. Planning and scheduling need to ensure that business as usual is not disturbed.

The following are key points to plan maintenance:

- Identify the equipment for maintenance and technique for maintenance.
- Categorize maintenance into routine, priority and emergency.
- Plan maintenance considering cost, time, space etc.
- Material planning for maintenance requirements.
- Budget time and money requirements.

The need to schedule maintenance can be best described as follows:

- To optimize usage of plant, machinery and tools.
- To optimize usage of manpower in maintenance.
- To ensure smooth production flow.

From above it can safely be concluded that it is very critical for company to have a robust and effective maintenance and repair policy.
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