



**The Ten Principles
of Material Handling**



**The Key to Greater Productivity, Customer Service
and Profitability**

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PLANNING PRINCIPLE

All material handling should be the result of a deliberate plan where the needs, performance objectives and functional specification of the proposed methods are completely defined at the outset.


PLANNING PRINCIPLE


Definition: A plan is a prescribed course of action that is defined in advance of implementation. In its simplest form a material handling plan defines the material (what) and the moves (when and where); together they define the method (how and who).

PLANNING PRINCIPLE
Key Points


-  *The plan should be developed in consultation between the planner(s) and all who will use and benefit from the equipment to be employed.*
-  *Success in planning large scale material handling projects generally requires a team approach involving suppliers, consultants when appropriate, and end user specialists from management, engineering, computer and information systems, finance and operations.*

PLANNING PRINCIPLE KEY POINTS

 *The material handling plan should reflect the strategic objectives of the organization as well as the more immediate needs.*

 *The plan should document existing methods and problems, physical and economic constraints, and future requirements and goals.*

PLANNING PRINCIPLE KEY POINTS

 *The plan should promote concurrent engineering of product, process design, process layout, and material handling methods, as opposed to independent and sequential design practices.*

STANDARDIZATION PRINCIPLE

Material handling methods, equipment, controls and software should be standardized within the limits of achieving overall performance objectives and without sacrificing needed flexibility, modularity and throughput.

STANDARDIZATION PRINCIPLE

Definition: Standardization means less variety and customization in the methods and equipment employed.

STANDARDIZATION PRINCIPLE

Key Points



The planner should select methods and equipment that can perform a variety of tasks under a variety of operating conditions and in anticipation of changing future requirements.



Standardization applies to sizes of containers and other load forming components as well as operating procedures and equipment.

STANDARDIZATION PRINCIPLE

Key Points



Standardization, flexibility and modularity must not be incompatible

WORK PRINCIPLE

Material handling work should be minimized without sacrificing productivity or the level of service required of the operation.

WORK PRINCIPLE

Definition: The measure of work is material handling flow (volume, weight or count per unit of time) multiplied by the distance moved.

WORK PRINCIPLE Key Points



Simplifying processes by reducing, combining, shortening or eliminating unnecessary moves will reduce work.



Consider each pickup and set-down, or placing material in and out of storage, as distinct moves and components of the distance moved.

WORK PRINCIPLE Key Points



Process methods, operation sequences and process/equipment layouts should be prepared that support the work minimization objective.



Where possible, gravity should be used to move materials or to assist in their movement while respecting consideration of safety and the potential for product damage.

WORK PRINCIPLE Key Points



The shortest distance between two points is a straight line.

ERGONOMIC PRINCIPLE




Human capabilities and limitations must be recognized and respected in the design of material handling tasks and equipment to ensure safe and effective operations.

ERGONOMIC PRINCIPLE

Definition: Ergonomics is the science that seeks to adapt work or working conditions to suit the abilities of the worker.

ERGONOMIC PRINCIPLE

Key Points

-  *Equipment should be selected that eliminates repetitive and strenuous manual labor and which effectively interacts with human operators and users.*
-  *The ergonomic principle embraces both physical and mental tasks.*
-  *The material handling workplace and the equipment employed to assist in that work must be designed so they are safe for people.*

UNIT LOAD PRINCIPLE




Unit loads shall be appropriately sized and configured in a way which achieves the material flow and inventory objectives at each stage in the supply chain.

UNIT LOAD PRINCIPLE

Definition: A unit load is one that can be stored or moved as a single entity at one time, such as a pallet, container or tote, regardless of the number of individual items that make up the load.



UNIT LOAD PRINCIPLE

Key Points

-  *Less effort and work is required to collect and move many individual items as a single load than to move many items one at a time.*
-  *Load size and composition may change as material and product moves through stages of manufacturing and the resulting distribution channels.*
-  *Large unit loads are common both pre and post manufacturing in the form of raw materials and finished goods.*


UNIT LOAD PRINCIPLE

Key Points

-  *During manufacturing, smaller unit loads, including as few as one item, yield less in-process inventory and shorter item throughput times.*
-  *Smaller unit loads are consistent with manufacturing strategies that embrace operating objectives such as flexibility, continuous flow and just-in-time delivery.*

UNIT LOAD PRINCIPLE

Key Points

-  *Unit loads composed of a mix of different items are consistent with just-in-time and/or customized supply strategies so long as item selectivity is not compromised.*

SPACE UTILIZATION

Effective and efficient use must be made of all available space.

SPACE UTILIZATION

Definition: Space in material handling is three dimensional and therefore is counted as cubic space.

SPACE UTILIZATION

Key Points



In work areas, cluttered and unorganized spaces and blocked aisles should be eliminated.



In storage areas, the objective of maximizing storage density must be balanced against accessibility and selectivity.



When transporting loads within a facility the use of overhead space should be considered as an option.


SYSTEM PRINCIPLE


Material movement and storage activities should be fully integrated to form a coordinated, operational system which spans receiving, inspection, storage, production, assembly, packaging, unitizing, order selection, shipping, transportation and the handling of returns.

SYSTEM PRINCIPLE


Definition: A system is a collection of interacting and/or interdependent entities that form a unified whole.


SYSTEM PRINCIPLE
Key Points

 *Systems integration should encompass the entire supply chain including reverse logistics. It should include suppliers, manufacturers, distributors and customers.*


 *Inventory levels should be minimized at all stages of production and distribution while respecting considerations of process variability and customer service.*

SYSTEM PRINCIPLE
Key Points

 *Information flow and physical material flow should be integrated and treated as concurrent activities.*

 *Methods should be provided for easily identifying materials and products, for determining their location and status within facilities and within the supply chain and for controlling their movement.*

SYSTEM PRINCIPLE
Key Points

 *Customer requirements and expectations regarding quantity, quality, and on-time delivery should be met without exception.*

AUTOMATION PRINCIPLE



Material handling operations should be mechanized and/or automated where feasible to improve operational efficiency, increase responsiveness, improve consistency and predictability, decrease operating costs and to eliminate repetitive or potentially unsafe manual labor.

AUTOMATION PRINCIPLE

Definition: Automation is a technology concerned with the application of electro-mechanical devices, electronics and computer-based systems to operate and control production and service activities. It suggests the linking of multiple mechanical operations to create a system that can be controlled by programmed instructions.



AUTOMATION PRINCIPLE

Key Points

-  *Pre-existing processes and methods should be simplified and/or re-engineered before any efforts at installing mechanized or automated systems.*
-  *Computerized material handling systems should be considered where appropriate for effective integration of material flow and information management.*

AUTOMATION PRINCIPLE

Key Points

-  *All items expected to be handled automatically must have features that accommodate mechanized and automated handling.*
-  *Treat all interface issues as critical to successful automation, including equipment to equipment, equipment to load, equipment to operator, and control communications.*

ENVIRONMENTAL PRINCIPLE



Environmental impact and energy consumption should be considered as criteria when designing or selecting alternative equipment and material handling systems.

ENVIRONMENTAL PRINCIPLE

Definition: Environmental consciousness stems from a desire not to waste natural resources and to predict and eliminate the possible negative effects of our daily actions on the environment.


ENVIRONMENTAL PRINCIPLE

Key Points

-  *Containers, pallets and other products used to form and protect unit loads should be designed for reusability when possible and/or biodegradability as appropriate.*
-  *Systems design should accommodate the handling of spent dunnage, empty containers and other by-products of material handling.*

ENVIRONMENTAL PRINCIPLE

Key Points

-  *Materials specified as hazardous have special needs with regard to spill protection, combustibility and other risks.*

LIFE CYCLE COST PRINCIPLE


A thorough economic analysis should account for the entire life cycle of all material handling equipment and resulting systems.


LIFE CYCLE COST PRINCIPLE

Definition: *Life cycle costs include all cash flows that will occur between the time the first dollar is spent to plan or procure a new piece of equipment, or to put in place a new method, until that method and/or equipment is totally replaced.*

LIFE CYCLE PRINCIPLE


Key Points


 *Life cycle costs include capital investment, installation, setup and equipment programming, training, system testing and acceptance, operating (labor, utilities, etc.), maintenance and repair, reuse value, and ultimate disposal.*

 *A plan for preventive and predictive maintenance should be prepared for the equipment, and the estimated cost of maintenance and spare parts should be included in the economic analysis.*

LIFE CYCLE PRINCIPLE

Key Points

 *A long-range plan for replacement of the equipment when it becomes obsolete should be prepared.*

 *Although measurable cost is a primary factor, it is certainly not the only factor in selecting among alternatives. Other factors of a strategic nature to the organization and which form the basis for competition in the market place should be considered and quantified whenever possible.*