

## Inventory Management

### Key Concepts:

Inventory are those stocks or items used to support production (raw materials and work-in-process items), supporting activities (maintenance, repair, and operating supplies), and customer service (finished goods and spare parts). Inventory functions are anticipation, hedge, cycle (lot size), functions (safety stock, buffer, or reserve), transportation (pipeline) and service parts.

Why do you keep inventory?

What is the true cost of inventory holding?

How much money can you add to the bottom line with good inventory management?

How do you reduce you exposure to obsolete and excess inventory?

How much are back orders causing you in lost sales and customer perception?

### What are Service levels:

A desired measure (usually expressed as a percentage) of satisfying demand through inventory or by the current production schedule in time to satisfy the customers requested delivery dates and quantities.

### What Types of Inventory are there?

There are many ways to look at inventories. Inventories include raw materials: purchased items or extracted materials that are converted via the manufacturing process into components and products.

Work-in-process: a product or products in various stages of completion throughout the plant.

Subassemblies: An assembly that is used at a higher level to build another assembly

finished goods: Items ready for sale to a customer

MRO: maintenance, repair and operation supplies.

### Function of inventory:

Safety stocks: In general, a quantity of stock planned to be in inventory to protect against fluctuations in demand or supply.

Cycle stocks: that which depletes gradually as customer orders are received and is replenished cyclically when supplier orders are received. The other is a cushion of protection against uncertainty in the demand or in the replenishment lead time.

Pipeline stock: inventory to fill the transportation network and the distribution system including the flow through intermediate stocking point.

Promotional products: a product that is subject to wide fluctuations in sales because it is usually sold at a reduced price or with some other sales incentive.

# Inventory Management:

## Elements of inventory:

Over time, demand and the ability to service demand (replenish inventory) can vary. Forecasts may not be precise due to uncertainties, so, a reserve of stock (safety stock) may be necessary to reduce inventory shortages (stock-outs). Inventory levels above the safety stock and normal demand are considered excess inventory.

## Inventory Holding:

Reasons for holding inventory:

purchased parts:  
variations in supplier lead time  
quantity discounts  
price changes  
scarcities of materials  
manufactured parts:  
cover period between production runs  
allow flexibility in production scheduling  
variations in product demand (safety stock)  
economies of scale.

## Inventory Costs:

Cost of inventory production and holding:

order/setup costs:  
cost of replenishing inventory through changes in the production run for a different item  
includes labor and other associated costs  
carrying costs:  
cost of capital  
insurance costs  
costs of space, staff  
inventory handling, deterioration, damage, obsolescence, insurance

## Opportunity costs:

restriction of other investments that could have been made with the same money in other parts of your business  
stock-out costs:  
lost sale  
halted production.

## Objectives of Inventory Management:

minimize costs:  
minimise working capital investment  
minimise inventory carrying costs  
minimise scrap and rework  
provide the highest level of customer service possible for the investment.

# Inventory Management:

## Inventory management tasks:

make decisions about:  
safety stock  
replenishment production runs  
excess stock.

Inventory must be managed differently for:  
Independent demand: influenced by market conditions  
Dependent demand: derived from the production of parent items.

### ABC Inventory management methodologies:

ABC-Analysis (Parato)  
ABC analysis of inventory:  
select a criterion (sales / usage) based on importance  
rank the inventory items on criterion  
calculate the cumulative sales and/or usage for all items  
assign items into A, B, C groups  
assign inventory levels and warehouse locations for each item.

ABC classification, where items are not of equal importance:

A-items: few items (ex. 20 %) which have a high rate of usage and/or high unit cost and account for 80 % of the total value of usage in the inventory

B-items: number of items (ex. 30 %) which in total account for 15 % of the total value of usage

C-items: great many items (ex. 50 %) with low individual usage and/or low unit value which in total account for only 5 % of the total value of usage

ABC and inventory control efforts:

A-items: very careful management and careful estimates of future usage.

B-items: routine management and routine effort in forecasting demand.

C-items: little effort in forecasting demand, however be careful for strategic items (safety stock).

### Inventory Management Systems:

Inventory management systems include:

two-bin replenishment system:

used for low value , non-critical items (i.e.. class C items)

relies on visual inspection of declining inventory

one bin contains enough material to meet needs between the time one order is received and another is placed

second bin (also called the "reserve bin") contains enough material to meet needs between placing an order and receiving the materials

if production taps into the reserve bin, additional materials must be ordered immediately

reorder point system: amount ordered when inventory declines to a predetermined level (ROP)

considers:

when to order (reorder point)

how much to order (order quantity)

periodic review systems:

after predetermined fixed passages of time, orders are placed for variable amounts

consider:

how much to order (order quantity)

how long between orders (reorder time interval)

# Inventory Management:

## Materials Requirements Planning (MRP):

assumes variable demand throughout production  
calculates component requirements based on the Master Production Schedule (MPS), Bill of Material and inventory data  
materials are purchased only when the MPS has them scheduled for use  
materials are pushed through a plant

MRP II systems share information with other functional departments, outside the operations area (i.e., purchasing, sales, cost accounting). These systems plan the use of company resources, including scheduling raw materials, vendors, production, equipment and processes

## JIT: A different approach to reordering:

activities that add no value are waste, material only is supplied when it is requested from the next step in the production process (pull system)  
these requests are called kanban.

## How Much to Order:

Economic Order Quantity (EOQ):  
the lot size that minimizes total annual inventory holding and ordering costs  
assumptions:  
annual demand is constant.  
forecast is perfect (no random error)  
all costs are constant and linear  
lead time is known and constant.  
Economic Order Quantity (EOQ): variations  
quantity discounts: product cost is function of the order quantity  
variations in demand: safety stock  
variations in lead time: safety stock.

## When to Order:

Reorder point (R.O.P.)

## Safety Stock:

Level of safety stock with a set service level:  
track historical sales to find:  
average  
standard deviation  
establish % service level  
find Z-score from distribution table  
 $SS = (Z\text{-score}) * \text{Standard Deviation}$

## Excess Inventory:

Reasons for excess inventory include:  
engineering changes  
spoilage  
defects  
technical obsolescence  
lack of market demand.

## Inventory Counting Methods:

Cycle counting:  
a few experienced people count continuously throughout the year  
timely detection of errors  
fewer mistakes in item identification  
minimal loss of production time  
systematic improvement of record accuracy.

# Inventory Management:

## End of year:

many inexperienced people count inventory in a short hectic period once per year  
no correction or cause of errors  
many mistakes in item identification  
plant and warehouse shutdown for inventory  
no improvement of inventory accuracy.

## Suggestions - A step action plan:

Find out why you have inventories  
Analyse the present situation  
Do an ABC-analysis  
Define the inventory levels  
Define the inventory system  
Define key performance indicators  
Introduce key performance follow-up reports

## Rationalise Products:

Print and analyse lists of slow-moving and Class C items  
Monthly evaluation  
Action plans  
Follow-up

## Reduce Excess:

try to move the order decoupling point to an early stage in the supply chain to reduce inventory holding (carrying) cost:

ABC - item management  
shorten replenishment cycles.

## Key Performance indicators:

Inventory turnover:  
Stock coverage:  
 $\text{stockholding} \times 52 \text{ weeks} / \text{annual usage}$   
Customer satisfaction:  
comparison of % of demand actually satisfied with the defined service level  
number of backorders

## Contact Us Today

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**Call 1300 – 4 TODAY** (1300 – 486 – 329) or email [info@supplytoday.com.au](mailto:info@supplytoday.com.au) to discuss your inventory management needs.

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