

Inventory Management Systems

Inventory Management Systems – Study Notes

1. Definition & Purpose

- **Inventory Management System (IMS):** Software or integrated set of tools that tracks, controls, and optimizes the flow of goods from suppliers to customers.
 - **Primary goals**
 - Maintain optimal stock levels (avoid stockouts & overstock)
 - Reduce carrying costs
 - Improve order fulfillment speed & accuracy
 - Provide real-time visibility for decision-making
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2. Core Components

Component	Function	Typical Features
Master Data Management	Stores product, supplier, and location data	SKU/UPC codes, descriptions, unit of measure, safety stock parameters
Transaction Processing	Records every movement of inventory	Receipts, issues, transfers, adjustments, returns
Inventory Tracking	Monitors quantity & location in real time	Bin/location mapping, lot/serial tracking, FIFO/LIFO, expiration dates
Demand Forecasting	Predicts future needs	Historical sales analysis, seasonality, trend algorithms, AI/ML extensions
Replenishment Engine	Generates purchase or production orders	Reorder point (ROP), economic order quantity (EOQ), automatic PO creation
Reporting & Analytics	Turns data into actionable insights	Stock turnover, ABC analysis, days of inventory on hand (DOH), KPI dashboards
Integration Layer	Connects IMS to other business systems	ERP, accounting, e-commerce platforms, WMS, POS, supplier portals

3. Types of Inventory Managed

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1. **Raw Materials** – inputs for manufacturing.
 2. **Work-In-Process (WIP)** – partially finished goods.
 3. **Finished Goods** – ready for sale/shipment.
 4. **MRO Supplies** – maintenance, repair, and operations items.
 5. **Perishables** – items with limited shelf life (food, pharma).
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4. Key Processes & Workflows

4.1 Receiving / Inbound

1. PO verification ? 2. Goods receipt ? 3. Quality inspection ? 4. Put-away to designated location ? 5. Update inventory balances.

4.2 Order Fulfillment / Outbound

1. Sales order entry ? 2. Allocation (reserve stock) ? 3. Picking ? 4. Packing ? 5. Shipping ? 6. Inventory decrement.

4.3 Cycle Counting & Physical Audits

- **Periodic cycle count:** rotate through inventory segments on a schedule.
- **Full physical inventory:** annual or bi-annual lock-down count.

4.4 Returns & Reverse Logistics

- Receive returned item ? Inspect ? Decide: restock, refurbish, scrap ? Adjust inventory accordingly.
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5. Inventory Control Techniques

Technique	When to Use	Main Metric
ABC Analysis	Large SKU portfolios	Classification by annual consumption value (A=high, B=medium, C=low)
Safety Stock Calculation	Demand variability & lead time uncertainty	Safety stock = $Z \times \sigma_d \times L$ (Z = service factor, σ_d = demand std dev, L = lead time)

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Technique	When to Use	Main Metric
Reorder Point (ROP)	Continuous demand, stable lead time	$ROP = (\text{average demand} \times \text{lead time}) + \text{safety stock}$
Economic Order Quantity (EOQ)	Constant demand, fixed ordering cost	$EOQ = \sqrt{(2DS)/H}$ (D=annual demand, S=order cost, H=holding cost per unit)

**Just-In-Time