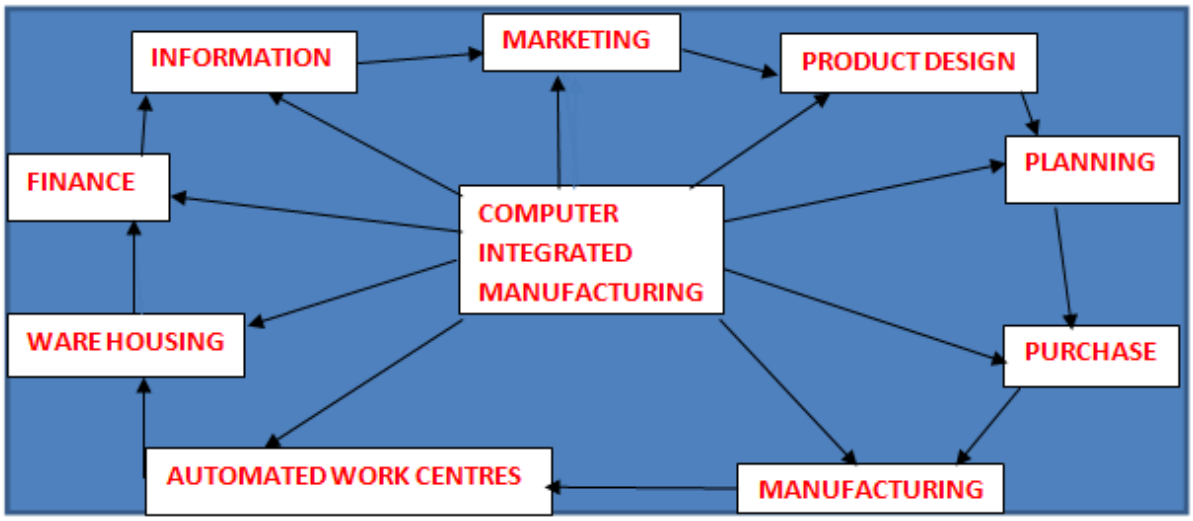
CONTROL SYSTEMS

Control systems, shop floor control, and inventory control are critical aspects of manufacturing and production management. Here's a brief overview of each:

1. Control Systems

Control systems are used to manage, regulate, and automate various processes in manufacturing, robotics, and industrial applications. They can be:

- **Open-loop control systems** (no feedback, e.g., washing machines)
- **Closed-loop control systems** (feedback-based, e.g., CNC machines, robots)
- **PID controllers**, **PLC-based control systems**, and **computer-integrated control** for real-time monitoring.



2. Shop Floor Control (SFC)

Shop Floor Control (SFC) is a system used to monitor, manage, and control production activities on the manufacturing shop floor. It ensures that manufacturing operations are carried out efficiently, meeting quality, cost, and delivery targets.

SFC is a system that manages and monitors production activities on the shop floor in real time. It involves:

- **Scheduling and Dispatching** – Allocating tasks to machines and operators.
- **Monitoring Work-in-Progress (WIP)** – Tracking materials as they move through different processes.
- **Data Collection and Analysis** – Capturing production data for performance evaluation.
- **Integration with Manufacturing Execution Systems (MES)** – For seamless operations.

Functions of Shop Floor Control

1. **Work Order Management** – Tracks and schedules production orders.
2. **Resource Allocation** – Assigns machines, tools, and labor to tasks.
3. **Real-Time Monitoring** – Provides live tracking of work progress.
4. **Production Scheduling** – Helps in sequencing jobs to optimize efficiency.
5. **Quality Control** – Ensures that products meet specifications.
6. **Inventory Management** – Monitors material usage and availability.
7. **Performance Analysis** – Analyzes key metrics like machine uptime and worker productivity.

Components of Shop Floor Control System

1. **Data Collection Systems** – Includes barcode scanners, RFID, sensors, etc.
2. **Manufacturing Execution System (MES)** – A digital system that integrates with SFC for real-time control.
3. **Supervisory Control** – Ensures workflow adherence.
4. **Reporting & Analytics Tools** – Helps in decision-making through dashboards.

Types of Shop Floor Control

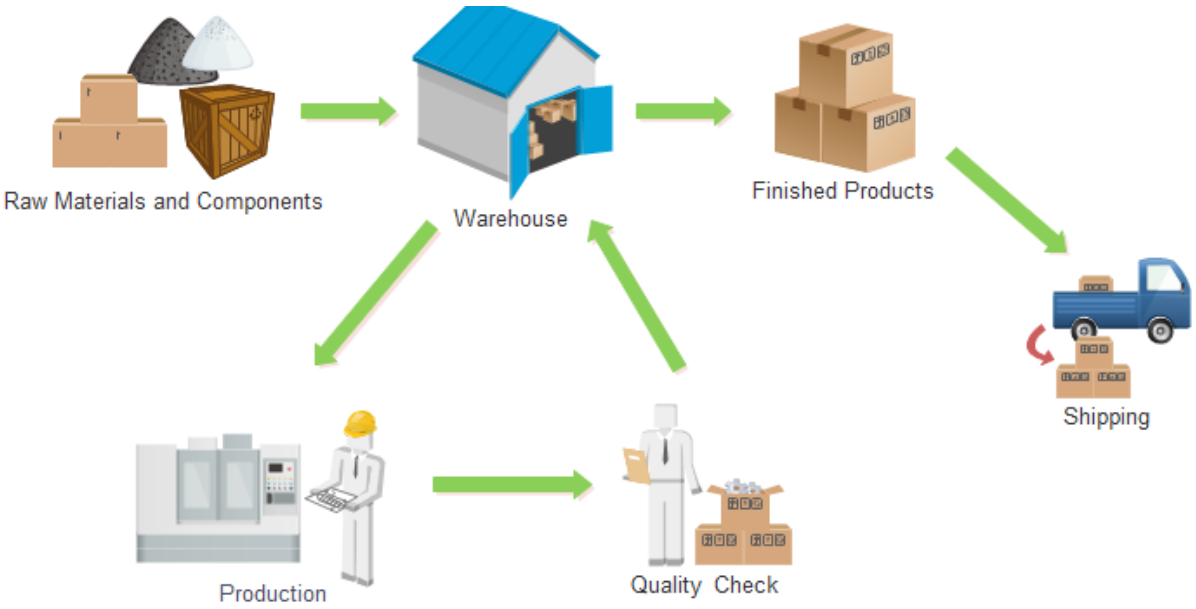
1. **Open Loop Control** – No real-time feedback; decisions made based on prior data.
2. **Closed Loop Control** – Uses real-time feedback for dynamic decision-making.

Benefits of Shop Floor Control

✓ Improved production efficiency
✓ Reduced downtime
✓ Enhanced quality control
✓ Better resource utilization
✓ Real-time visibility into production

3. Inventory Control

Inventory control ensures the right quantity of materials and products is available while minimizing costs.



It includes:

- **Techniques like Just-in-Time (JIT), Economic Order Quantity (EOQ), and ABC Analysis.**
- **Stock Monitoring Systems** – RFID, barcodes, and ERP software for tracking.
- **Types of Inventory** – Raw materials, WIP, and finished goods.
- **Demand Forecasting** – Prevents overstocking or stockouts.