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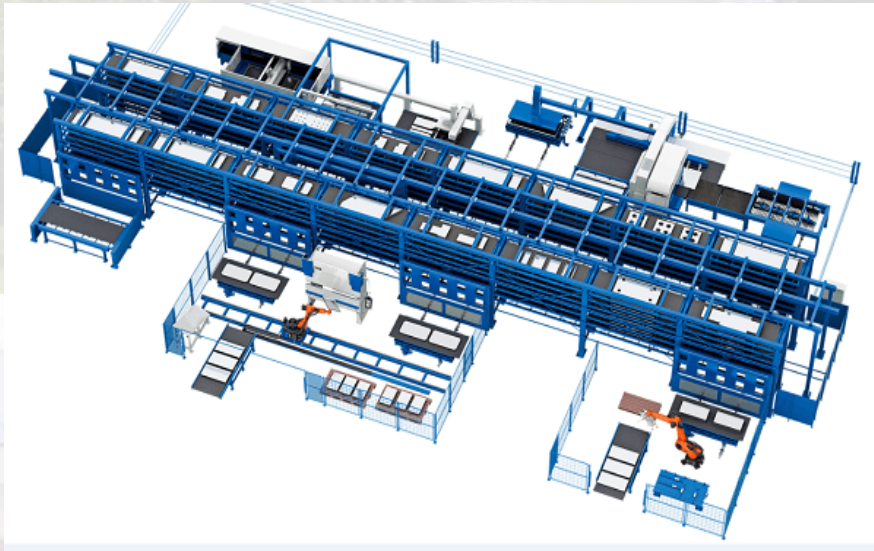
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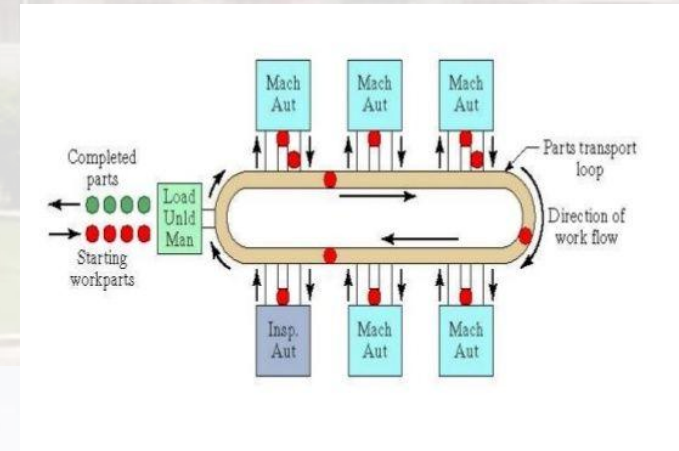
Department of Mechanical Engineering

19MEB301/CADA

FMS COMPONENTS



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FMS Components

As indicated in our definition there are several basic components of an FMS:

- (1) workstations,
- (2) material handling and storage system, and
- (3) computer control system. In addition, even though an FMS is highly automated,
- (4) people are required to manage and operate the system. We discuss these four FMS components in this section.

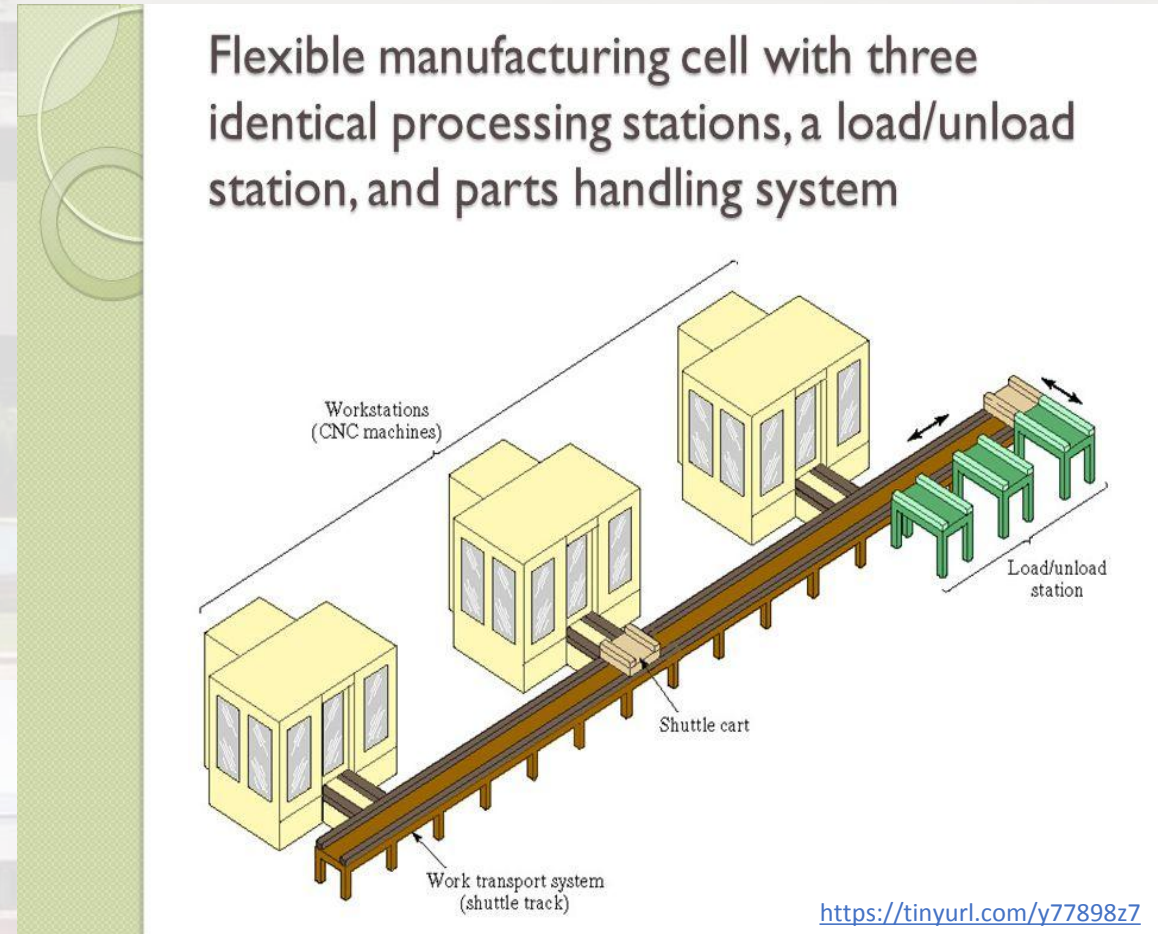


FMS Components (Cont...)

(1) workstations:

- a. Load/Unload Stations
- b. Machining Stations
- c. Other Processing Stations
- d. Assembly

Load/Unload Stations. The load/unload station is the physical interface between the FMS and the rest of the factory. Raw work parts enter the system at this point, and finished parts exit the system from here. Loading and unloading can be accomplished either manually or by automated handling systems.





FMS Components (Cont...)

Machining Stations.

- The most common applications of FMSs are machining operations. The workstations used in these systems are therefore predominantly CNC machine tools. Most common is the CNC machining center in particular.
- Machining centers are generally used for non rotational parts. For rotational parts, turning centers are used; and for parts that are mostly rotational but require multi-tooth rotational cutters (milling and drilling), mill-turn centers can be used.

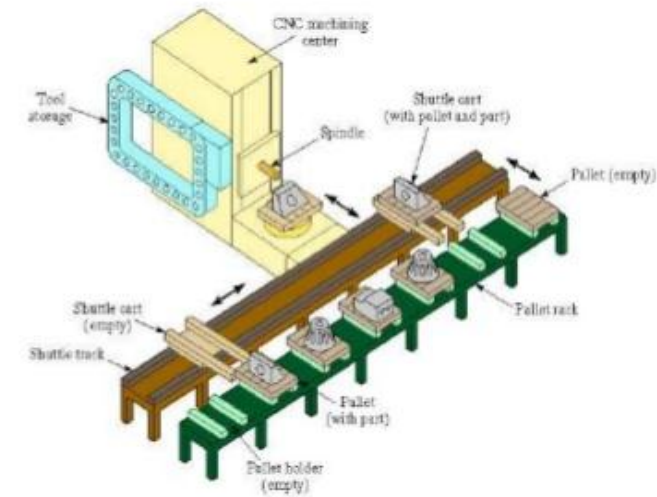


Fig. Single Machine Cell

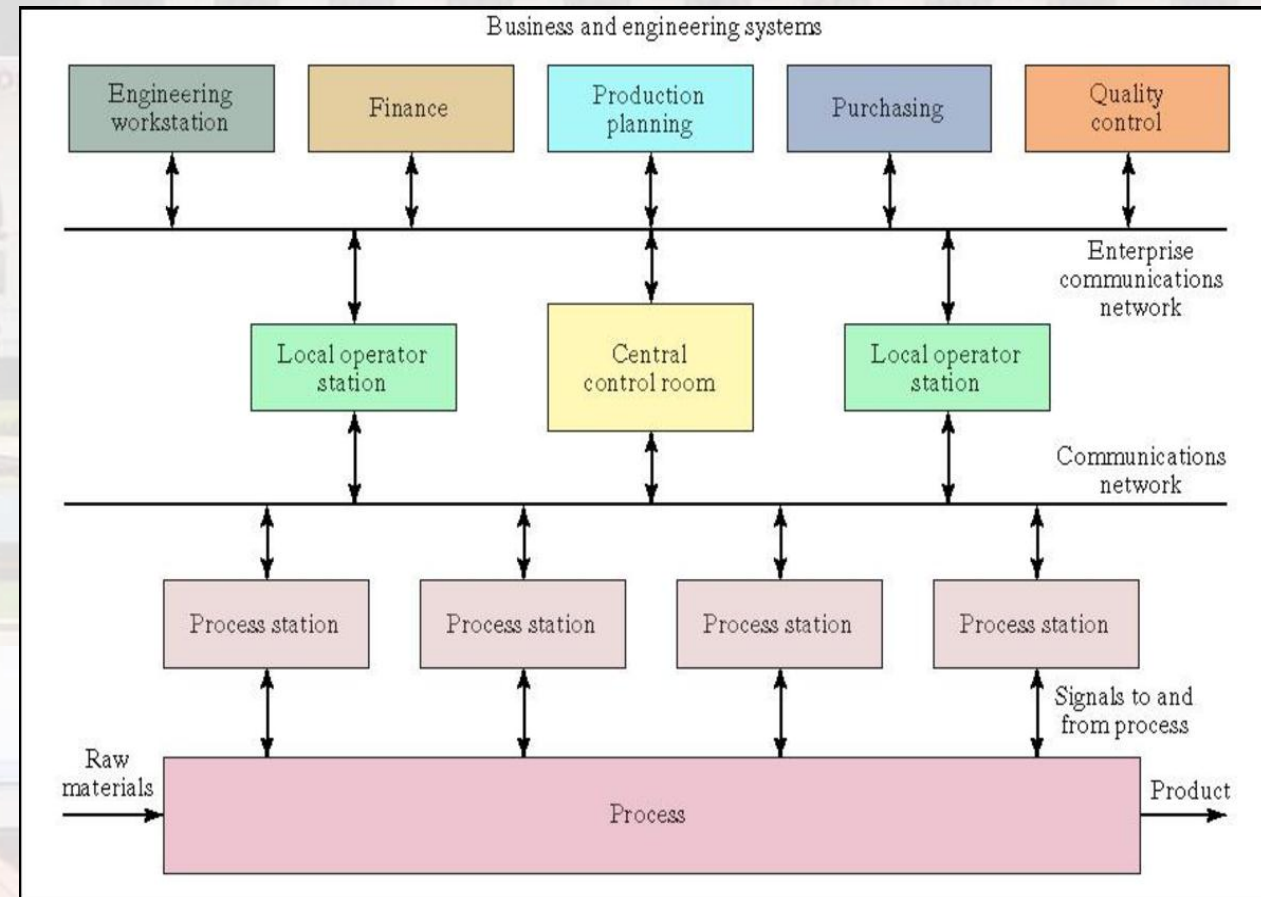
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FMS Components (Cont...)

Other Processing Stations.

- The FMS concept has been applied to other processing operations in addition to machining.
- One such application is sheet metal fabrication processes, reported in the processing workstations consist of press working operations, such as punching, shearing, and certain bending and forming processes.



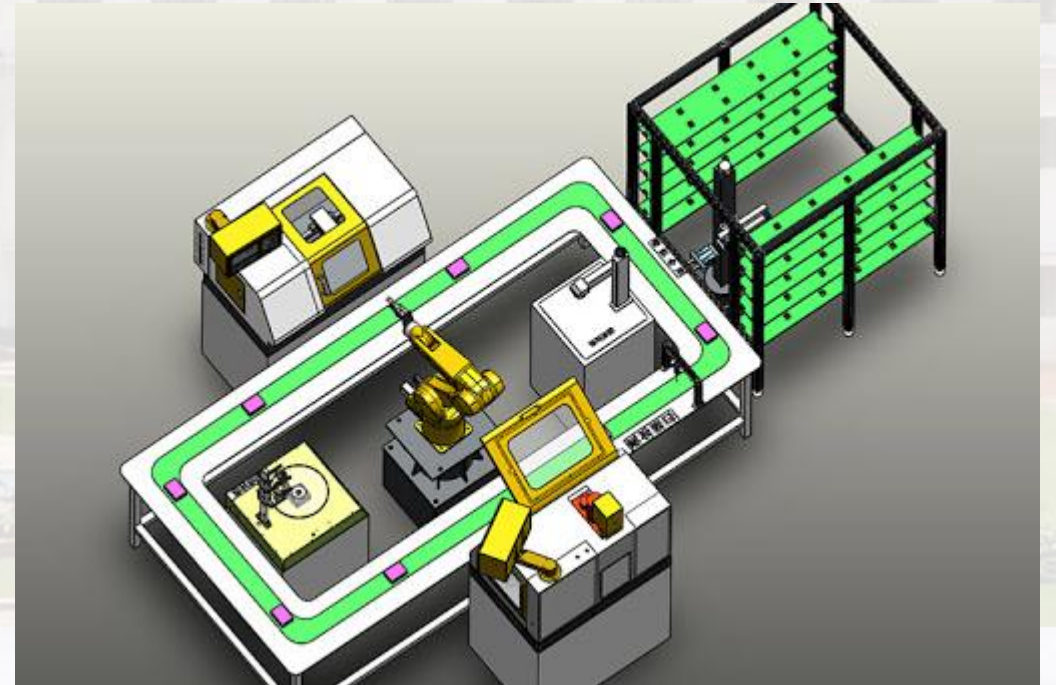
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FMS Components (Cont...)

Assembly.

- Some FMSs are designed to perform assembly operations. Flexible automated assembly systems are being developed to replace manual labor in the assembly of products typically made in batches.
- Industrial robots are often used as the automated workstations in these flexible assembly systems.



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FMS Components (Cont...)

2. Material Handling and Storage System

- The second major component of an FMS is its material handling and storage system. In this subsection, we discuss the functions of the handling system, material handling equipment typically used in an FMS, and types of FMS layout.
- Functions of the Handling System. The material handling and storage system in an FMS performs the following functions:
 1. Random, independent movement of work parts between stations
 2. Handle a variety of work part configurations
 3. Temporary storage
 4. Convenient access for loading and unloading work part
 5. Compatible with computer control



FMS Components (Cont...)

3.Computer Control System

The FMS includes a distributed computer system that is interfaced to the work stations, material handling system, and other hardware components.

A typical FMS computer system consists of a central computer and microcomputers controlling the individual machines and other components.

Functions performed by the FMS computer control system can be grouped into the following categories:

- Workstation control
- Distribution of control instructions to workstations
- Production control
- Traffic control
- Shuttle control
- Work piece monitoring
- Tool control
- Performance monitoring and reporting
- 9Diagnostics



FMS Components (Cont...)

4. Human Resources

One additional component in the FMS is human labor. Humans are needed to manage the operations of the FMS. Functions typically performed by humans include:

- (1) loading raw Work parts into the system,
- (2) Unloading finished parts (or assemblies) from the system.
- (3) changing and setting tools.
- (4) equipment maintenance and repair,
- (5) NC part programming in a machining system,
- (6) programming and operating the computer system, and
- (7) overall management of the system



FMS Components (Cont...)

Physical subsystem includes the following elements:

- 1. Workstations.** It consists of NC machines, machine-tools, inspection equipment's, loading and unloading operation, and machining area.
- 2. Storage-retrieval systems.** It acts as a buffer during WIP (work-in-processes) and holds devices such as carousels used to store parts temporarily between work stations or operations.
- 3. Material handling systems.** It consists of power vehicles, conveyers, automated guided vehicles (AGVs), and other systems to carry parts between workstations.

Control subsystem comprises of following elements:

- 1. Control hardware.** It consists of mini and micro computers, programmable logic controllers, communication networks, switching devices and others peripheral devices such as printers and mass storage memory equipment's to enhance the working capability of the FMS systems.
- 2. Control software.** It is a set of files and programs that are used to control the physical subsystems. The efficiency of FMS totally depends upon the compatibility of control hardware and control software.



Assessment

- 1) The following is not a component of Automation system
 - a) power
 - b) program of instructions
 - c) control system
 - d) manpower

- 2) A flexible manufacturing system may be _____
 - a) an automated assembly line
 - b) very difficult to change when new products are introduced
 - c) expensive to alter

- 3) List out different types of storage systems



THANK YOU