AUTOMATION is defined as a technology by which a process or procedure is accomplished without human assistance

SOCIO ECONOMIC IMPACTS OF AUTOMATION

- POSITIVE
  - Increased productivity
  - Cost reduction
  - Enhanced safety
  - Economic growth
  - Job creation
- NEGATIVE
  - Job displacement
  - Skills gap
  - Human-touch loss

LOW COST AUTOMATION

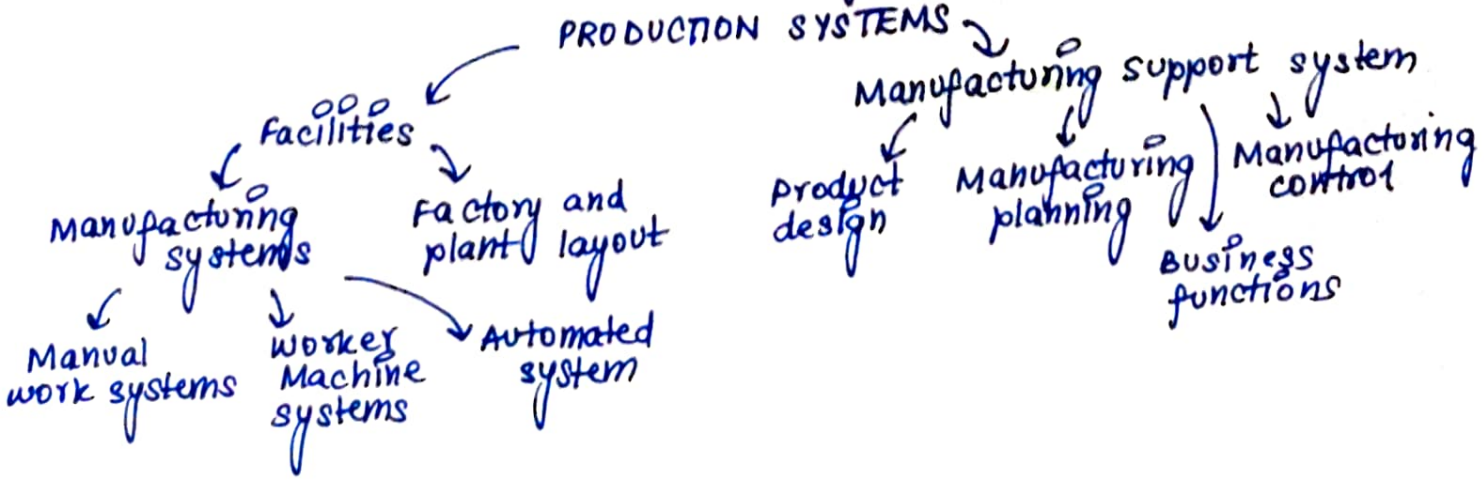
Low cost automation is a technology that creates some degree of automation around the existing equipments, tools, machines etc. by using standard components available in the market with low investments.

Activities suitable for LCA → loading, unloading, feeding, clamping, welding gazing, assembly, packaging

Equipments → Hydraulic, pneumatic, electric and electronic system

PRODUCTION SYSTEM – A production system is a collection of people, equipments and procedures organized to perform the manufacturing operations of a company. A production system consists of 2 components –

- Facilities – The physical facilities of a production system include the equipments, the way equipments are laid out, and the factory in which the equipment is located
- Manufacturing support system – procedures used by the company to manage production and to solve the technical and logistics problem encountered in ordering materials, moving work through the factory, ensuring quality standards.



- The USA principle
  USA stands for 1) Understand the process
  2) simplify the process
  3) Automate the process
  - To comprehend the current process in all of its details (input types output types, actual operation during the process etc.)
  - Once the process is understood then the search begins for ways to simplify
  - The search often includes questions like → what is the purpose of this step? Is this step necessary? can it be eliminated? Does it use more/most appropriate technology? How can it be simplified?
  - Once the process is reduced to its simplest form then automation can be considered

10 STRATEGIES OF AUTOMATION

- specialization of operations - use of special purpose equipments designed to perform 1 function with greatest efficiency
- combined operations - performing more than one operation at a given machine.
- simultaneous operations - performing multiple operations at the same time and combining them at a workstation
- Integration of operations - linking several workstations together into a single integrated mechanism
- Increased flexibility - Max. utilization of equipments by using same equipment for variety of parts
- Improved material handling and storage
- On-line inspection - Incorporating inspection permits correction to the process
- process control and optimization - time for each process can be reduced.
- Plant operation control - manage and coordinate operations in a plant
- computer integrated manufacturing

AUTOMATION MIGRATION STRATEGY

- Phase 1 - Manual production
- Phase 2 - Automated production using single station automated cell
- Phase 3 - Automated integrated production

AUTOMATION TYPES

FIXED AUTOMATION

- sequence of operations is fixed
- high initial investment
- high production rates
- inflexibility of equipment to accomodate product

FLEXIBLE AUTOMAT^{N}

- sequence of operations can be changed
  It is an extension to programmable automat^{n}
- High initial investment
- medi production rate
- flexible

PROGRAMMABLE

- sequence of oper^{n} can be changed
- oper^{n} sequence is controlled by a program
- high investment
- lower production rates

MANUFACTURING can be defined as the application of physical/chemical processes in order to alter the geometry/property/appearance of a material to make products

Manufacturing process

- Processing operations
  - Transforms a work material from one state of completion to a more advanced state that is closer to final product
    - Shaping process
    - property enhancing
    - surface processing
- Assembly operations
  - Joining two or more components to create a new entity
    - Joining processes
    - Mechanical fastening

Manufacturing industries

- Primary industry
  - exploits natural resources
- secondary industry
  - convert o/p from primary industry to products
- Tertiary industry
  - constitutes service sector of economy

Manufacturing operations

- processing and assembly operations
- material handling
- Inspection and test
- coordination and control

Production

- Job-shop production
  - Type of production facility which makes low quantity of specialized and customised products
- Batch/cellular production
  - After the batch of one product is made, the facility is changed over to produced a batch of next product
- Mass production
  - Type of production facility which makes large quantities of products