

# COMPUTERS IN MANUFACTURING ENTERPRISES

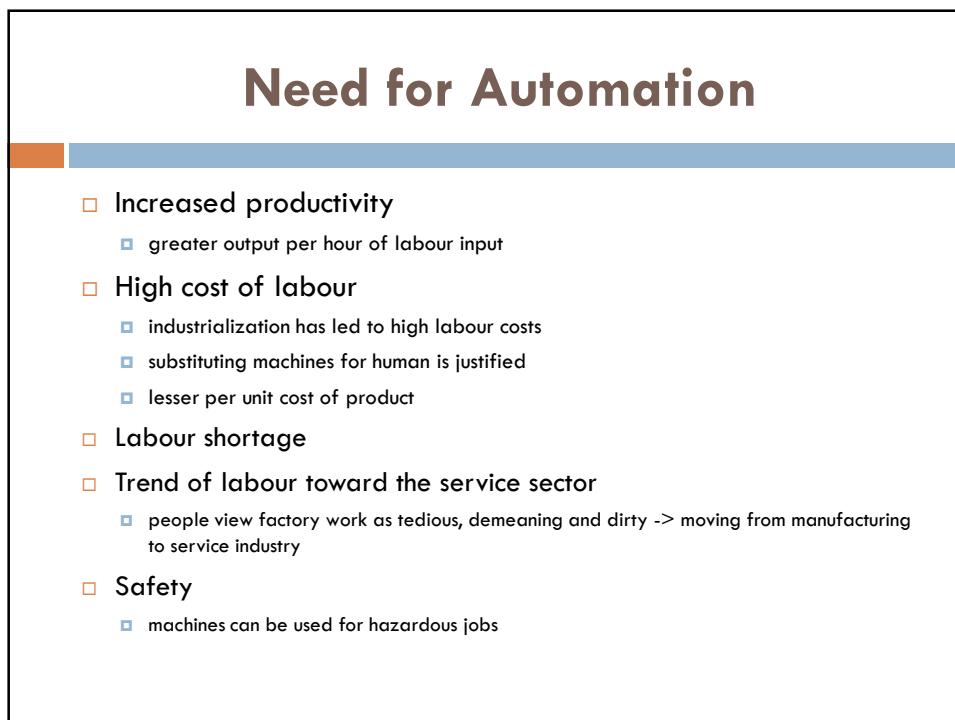
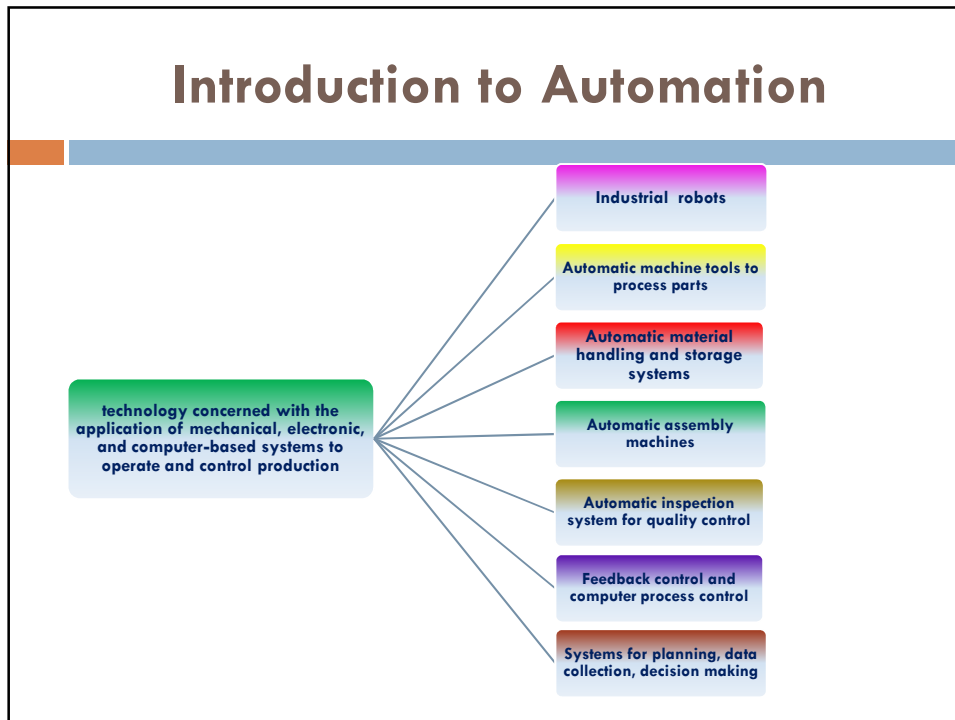
AUTOMATION: AUGUST 10, 2015

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## About the topic....

- reference book, *Automation, production systems, and computer integrated manufacturing* By Groover, Mikell P., Publisher : Prentice-Hall

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## Need for Automation

- High cost of raw materials
  - ▣ aims for greater efficiency in using these materials
  - ▣ Reduction of scrap
- Improved product quality
  - ▣ produce with speed, consistency and conformity in quality specifications
- Reduced manufacturing lead time
  - ▣ reduction in time taken between customer order & product delivery
  - ▣ good customer service
- Reduction of in-process inventory
  - ▣ work-in-process inventories has a significant cost to the company
- High cost of not automating
  - ▣ gives competitive advantage

## Automation

- Advantages
  - ▣ increased throughput or productivity
  - ▣ improved quality or increased predictability of quality
  - ▣ improved robustness (consistency), of processes or product
  - ▣ increased consistency of output
  - ▣ reduced direct human labour costs and expenses
- Disadvantages
  - ▣ causing unemployment and poverty by replacing human labour
  - ▣ may have a limited level of intelligence, and is therefore more prone to errors
  - ▣ research and development cost of automating a process may exceed the cost saved by the automation itself
  - ▣ requires a very large initial investment in comparison with the unit cost of the product, although the cost of automation may be spread among many products and over time

<http://en.wikipedia.org/wiki/Automation>

## Types of Automation: Fixed

### Fixed or hard Automation

- sequence of processing operations are fixed
- operations in the sequence are simple
- integration and coordination of operations into one equipment makes the system complex
- commands are contained in the form of cams, gears, wiring, and other hardware that is not easily changed over from one product style to another



The fixed automation system, which uses mechanical hardwired logic to perform a series of tasks, is typically used in the production of high-volume, low-variety products.

<http://www.britannica.com/EBchecked/topic/44912/automation/24849/Manufacturing-applications-of-automation-and-robotics>

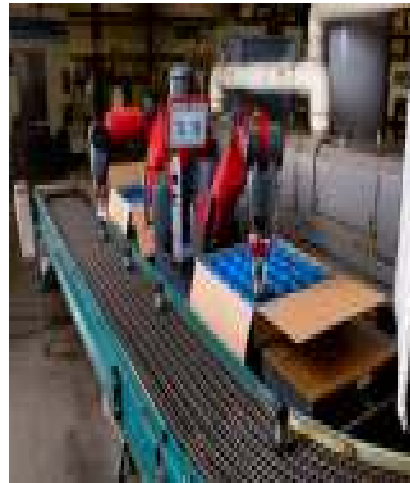
## Types of Automation: Fixed

- **Characteristics**
  - ▣ found in manufacturing of products with high demand and high volume of production
  - ▣ low unit cost
- **Disadvantages**
  - ▣ high initial investment for customized equipment
  - ▣ relatively inflexible in accommodating product changes

## Types of Automation: Programmable

### Programmable Automation

- the production equipment is designed with the capability to change the sequence of operations to accommodate different product configurations
- operation sequence is controlled by a program -> set of instructions coded for the system to be read and interpreted
- new programs can be prepared and entered into the equipment to produce new products
- used for producing products in batches, ranging from several dozen to several thousand units at a time
- example: numerical-control machine tool, program is coded in computer memory for each different product style, and the machine tool is controlled by the computer program
- Industrial robots are another example



## Types of Automation: Programmable

### Advantages

- flexible to deal with design variations
- suitable for batch production

### Disadvantages

- high investment in general purpose equipment
- waste of time
  - for every new batch., the production equipment must be reprogrammed and changed over to accommodate the new product style, there is a period of non-productive time followed by a production run for each new batch
- production rates are generally lower than in fixed automation, because the equipment is designed to facilitate product changeover rather than for product specialization

## Types of Automation: Flexible

### Flexible Automation

- extension of programmable automation
- system that is capable of producing a variety of products (or parts) with virtually no time lost for changeovers from one product to the next
- no production time is lost in reprogramming the system or changing the physical setup
- system can produce different combinations and schedule of products in one batch
- example can be a robotic arm that can be programmed to insert screws, drill holes, sand, weld, insert rivets etc



<http://www.precisionautomationinc.com/es/flexible-automation/>

## Types of Automation: Flexible

### Advantages:

- continuous production of variable mixtures of product
- flexible to deal with product design variation

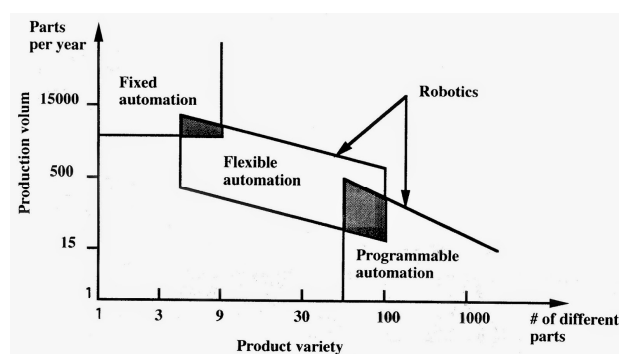
### Disadvantages

- high investment for a custom engineered system
- medium production rates

## Flexible VS Programmable Automation

- no loss in production time in flexible automation due to:
  - ▣ ability to change part programs (achieved by preparing the programs off-line on a computer system and electronically transmitting the programs to the automated production systems)
  - ▣ ability to change over the physical setup (achieved by making the changeover off-line and then moving it into place at the same time as the next part comes into position for processing)

## Comparison of Automation Types



<http://agi-automation.blogspot.in/2014/05/hard-vs-soft-assembly-automation.html>

## Guidelines for Term Paper (Team)

***What do you think are the challenges and opportunities of Government in its "Make in India" initiative and what steps should be taken by the government to make it successful?***

Step 1: Pick any one sector out of these:

1. Textile
2. Cement
3. Pharmaceutical
4. Steel
5. Automobile
6. Fertilizer
7. Electronic Goods
8. Gems and Jewellery
9. FMCG
10. Any other manufacturing sector of your choice

**deadline for giving your choice of sector is: August 31, 2015**

## Guidelines for Term Paper (Team)

□ Your analysis should be centred around following points:

1. background of the sector ( 1 page)
2. statistics and analysis for that sector
3. opportunities in that sector
4. threats / challenges (legal or social issues)
5. steps already taken or should be taken by the government
6. Conclusion

**Final deadline for paper submission 15<sup>th</sup> October, 2015**

**No late submissions will be entertained.**



## Important

- Signing on attendance sheet is compulsory
- failing to do so will result in being marked absent
- 50% attendance is mandatory for appearing in Minor 2 and Major exam.