CAM

Ankush Gaurav
Assistant Professor

Mechanical Engineering Discipline

Uma Nath Singh Institute of Engineering & Technology
Veer Bahadur Singh Purvanchal University,Jaunpur,India

ankushgaurav.vbspu@gmail.com

COMPUTER AIDED MANUFACTURING

Types of production

1. Continuous flow process

Continuous dedicated production of large amounts of bulk product.

Examples include continuous chemical plants and oil refineries.

2. Mass production of discrete products

Dedicated production of large quantities of one product (with perhaps limited model variations)

Examples include automobiles, appliances and engine blocks

3. Batch production

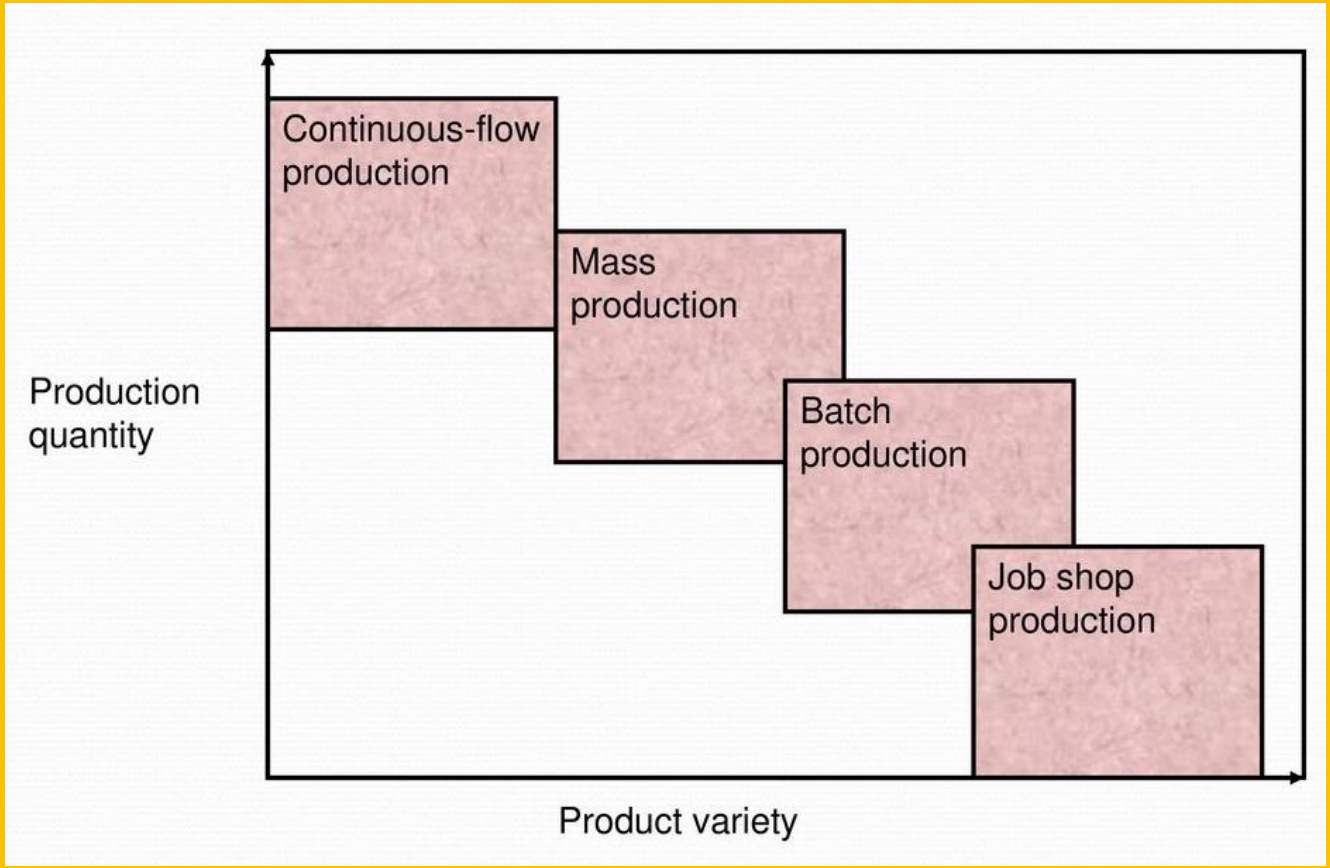
Production of medium lot sizes of the same product or component. The lots may be produced once or repeated periodically.

Examples include books, clothing, certain machinery

4. Job shop production

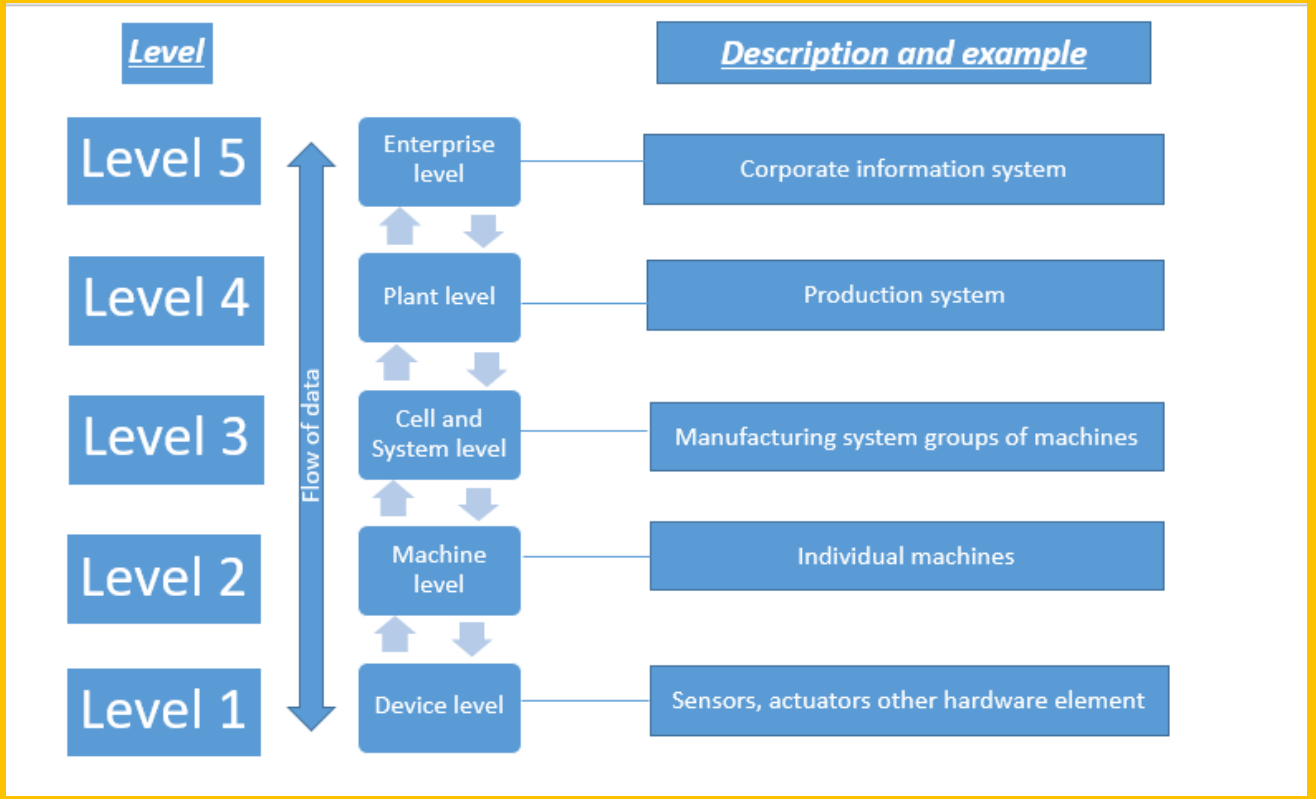
Productions of low quantities, often one of a kind of specialized products. The products are often customized and technologically complex.

Examples include prototypes, aircraft, machine tools, and other equipment


Continuous-flow production
Mass production
Batch production
Job shop production
Production quantity
Product variety

Category	Automation achievements
Continuous-flow process	•Flow process from beginning to end •Sensors technology available to measure important process variables •Use of sophisticated control and optimization strategies •Fully computer automated lines
Mass production of discrete products	•Automated transfer machines •Dial indexing machines •Partially and fully automated assembly lines •Industrial robots for spot welding, part handling, machine loading, spray painting, etc. •Automated material handling systems •Computer production monitoring
Batch production	•Numerical control (NC), direct numerical control (DNC), computer numerical control (CNC). •Adaptive control machining •Robots for arc welding, parts handling, etc. •CIM systems.
Job shop production	•Numerical control, computer numerical control

Levels of automation



Automation Strategies

1. *Specialization of operations.*
2. *Combined operations.*
3. *Simultaneous operations.*
4. *Integration of operations.*
5. *Increased flexibility.*
6. *Improved material handling and storage.*
7. *Online inspection.*
8. *Process control and optimization.*
9. *Plant operations control.*
10. *Computer integrated manufacturing.*

Specialization of operations

The first strategy involves the use of special purpose equipment designed to perform one operation with the greatest possible efficiency. This is analogous to the concept of labor specialization.

Combined operations

Production occurs as a sequence of operations. Complex parts may require dozens of processing steps. T he strategy of combined operations involves reducing the number of distinct production machines or wor kstations through which the parts must be routed. This is accompanied by performing more than one op eration at a given machine, thereby reducing the number of separate machines needed. Since each mac hine involves a setup, setup time can usually be saved as a consequence of this strategy. Material handli ng effort and no operation time are also reduced.

Simultaneous operations

A logical extension of the combined operations strategy is to perform at the same time the operations th at are combined at one workstation. In effect, two or more processing operations are being simultaneou sly on the same work part, thus reducing total processing time.

Integration of operations

Another strategy is to link several workstations into a single integrated mechanism using automated wor k handling devices to transfer parts between stations. In effect this reduces the number of separate ma chines through which the product must be scheduled. With more than one work station several parts can be processed simultaneously, thereby increasing the overall output of the system.

Increased flexibility

This strategy attempts to achieve maximum utilization of equipment for job shop and medium volume sit uations by using the same equipment for a variety of products. Prime objective is to reduce setup time a nd programming time for the production machine.

Improved material handling and storage

A great opportunity for reducing non productive time exists in the use of automated material handling and storage systems. Typical benefits included reduced work in process and shorter manufacturing time s.

Online inspection

Inspection of quality of work is traditionally performed after the process. Incorporating inspection in the manufacturing process permits corrections into the processes the product is being made. This reduces s crap and brings the overall quality of the product closer to the normal specifications intended by the de signer.

Process control and optimization

This includes a wide range of control schemes intended to operate the individual processes and the ass ociated equipment more efficiently. By this the individual process time can be reduced and product qual ity improved.

Plant operations control

It attempts to manage and coordinate the aggregate operations in the plant more efficiently. This imple mentation usually involves a high level of computer networking within the factory.

Computer integrated manufacturing

We have the integration of factory operations with engineering design and many of the other business f unctions of the firm. CIM involves extensive use of computer applications computer databases and com puter networking in the company.

Advantages of automation

- Reduced lead time
- Set-up time reduction
- Safer working conditions for the workers
- Lesser working Hour
- Lower prices and better products
- It itself provide employment opportunities.
- Incresed Standard of living

Disadvantages of automation

- Changes are Difficult and slow
- High initial investment
- Reduction in the labor force with resulting unemployment
- Reduced Purchasing Power

References

- https://www.autodesk.com/products/fusion-360/blog/computer-aided-manufacturing-beginners/
- Mikell P. Groover-Automation, Production Systems, and Computer-Integrated Manufacturing-Prentice Hall
- https://slideplayer.com/slide/14478776/
- https://techdifferences.com/difference-between-cad-and-cam.html
- https://en.wikipedia.org/wiki/Automation
- https://link.springer.com/referenceworkentry/10.1007%2F1-4020-0612-8_60
- https://twitter.com/humanvsmachine
- https://www.wisdomjobs.com/e-university/production-and-operations-management-tutorial-295/types-of-automation-9679.html
- https://slideplayer.com/slide/12795797/
- http://www.brainkart.com/article/Basic-Elements-of-an-Automated-System_6383/
- Computer Aided Manufacturing by J.S.Narang
- http://fac.ksu.edu.sa/sites/default/files/10_strategies_for_automation_and_production_systems.pdf

Thank You