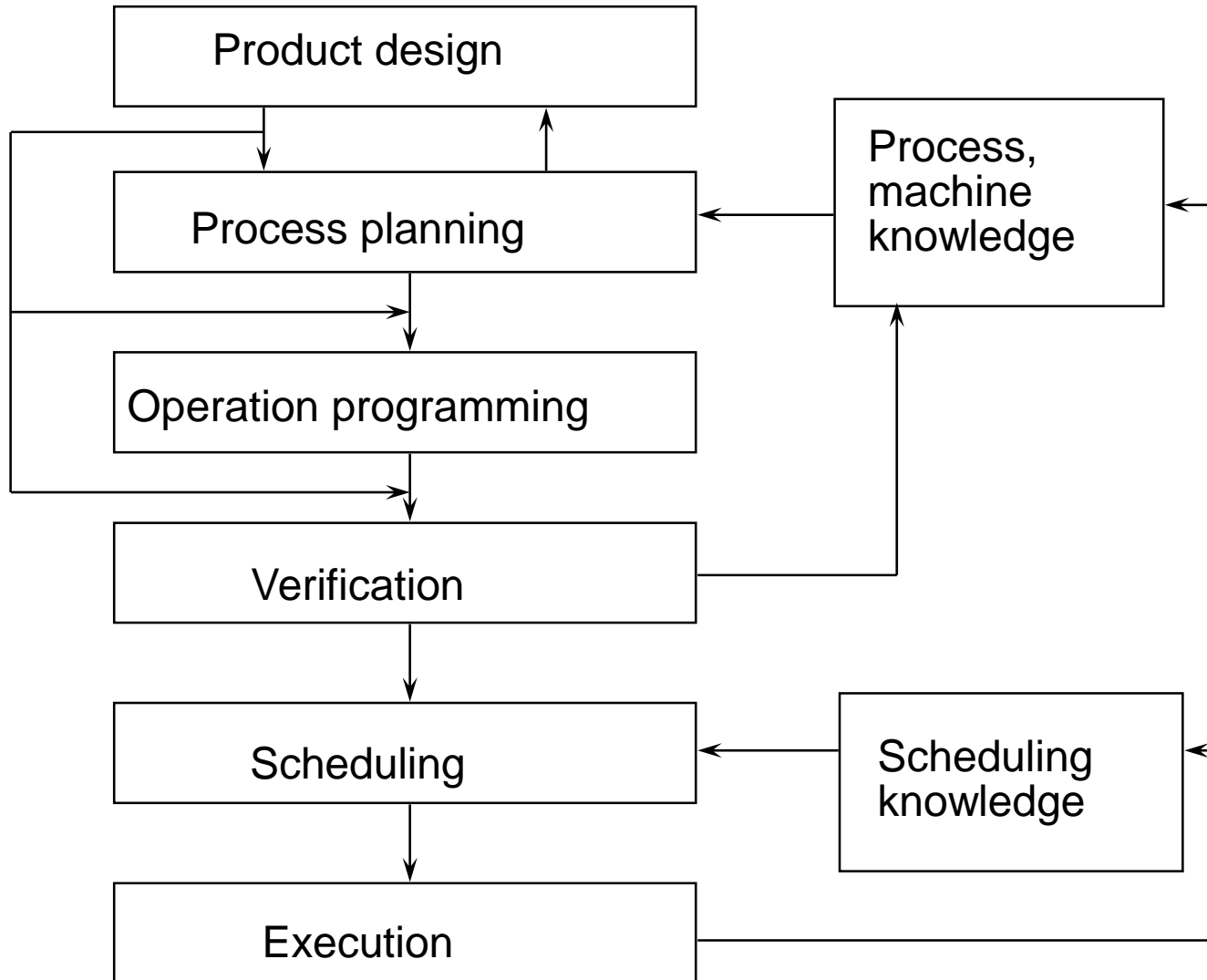


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# Introduction



# Introduction

- Process planning - Translation of design information into the process steps and instructions to efficient and effective Manufacturing.
- As new age manufacturing processes are evolving, Computer Aided Process Planning (CAPP) helps in simplifying and efficiently carrying out the conventional process planning and optimizing use of resources.
- Detailed set of instructions, engineering drawings, specifications, parts and materials lists etc

# CAPP

- Development of process plan (route sheet) using following approaches-
  - Variant Computer Aided Process Planning
  - Generative Computer Aided Process Planning
- E.g. Design changes- changes cost estimates
- Machine breakdown- alternate solution effective solution
- Interaction among various functions of an organization and dynamic changes.

# General steps involved

- Design input, Material selection, Process selection, Process sequencing, Machine and tool selection, Intermediate surface determination, Fixture selection, Machining parameter selection, Cost/time estimation, Plan preparation, Mc tape image generation these are the general steps involved in the computer aided process planning.

# Variant Computer Aided Process Planning

- Also known as data retrieval method.
- Process plan for a new part is generated by recalling, identifying and retrieving an existing plan for a similar part and making necessary modifications for new part known as 'Master Part'
- Coding and classification schemes of group technology (GT) used, number of algorithms, mathematical models are developed for family part formation and plan retrieval.
- Using existing system can save a tremendous amount of time and manpower.



# Detailed steps involved

- **Form the Part Families by Grouping Parts-** classifying parts and formation of group parts
- **Develop Standard Process Plans-** developed for each part families based on common part features.
- **Retrieve and Modify the Standard Plans for New Parts-** when new part enters the systems, it is designed and coded based on its feature, using the coding and classification scheme, and then assigned to a part family.





# Advantages of Variant Computer Aided Process Planning

- Processing and evaluation of complicated activities and managerial issues done in an efficient manner, thus reduction of time and labor requirement.
- Reduced development and hardware cost and shorter development time.

# Disadvantages of Variant Computer Aided Process Planning

- Difficult to maintain consistency during editing.
- Proper accommodation of various combinations of attributes such as material, geometry, size, precision, quality, alternate processing sequence and machine loading among many other factors are difficult.
- The quality of the final process plan largely depends on the knowledge and experience of process planner

# Generative Computer Aided Process Planning

- In generative process planning, process plans are generated by means of decision logic, formulas, technology algorithms, etc.
- Main aim is to convert a part from raw material to finished state.
- Input to the system includes the description of the part in the form of part code number.

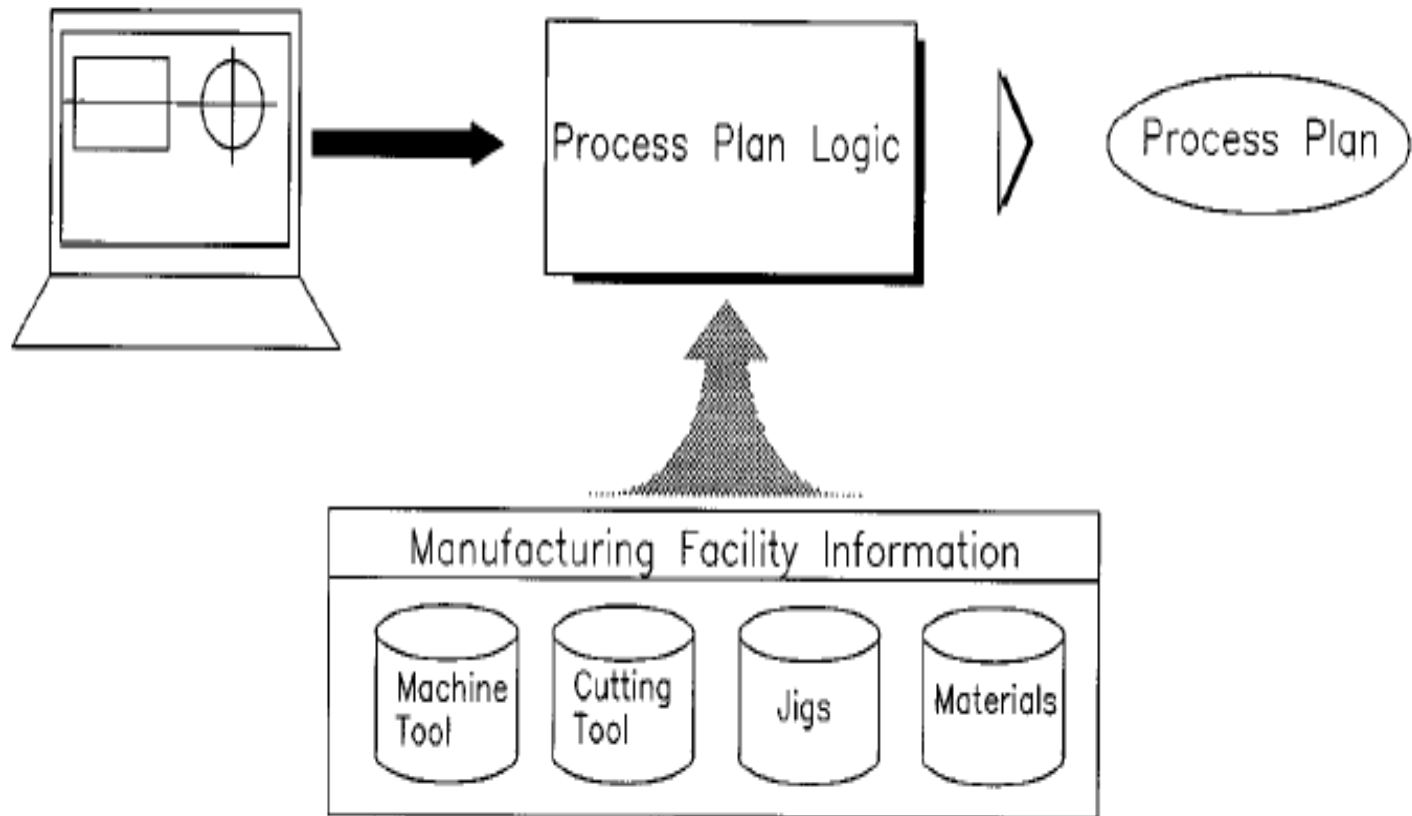
# Generative Computer Aided Process Planning

Generative process plan mainly consists of two major components :

- (i) Geometry based coding scheme.
- (ii) Knowledge Based

# Block Diagram for Generative CAPP

Part Descriptive System



## **Geometry-based Coding Scheme:-**

- All the geometric features for all process such as related surfaces, feature dimension, locations, on the features are defined by geometry based coding scheme.
- The level of detail is much greater in generative system than a variant system

## **Knowledge Based:-**

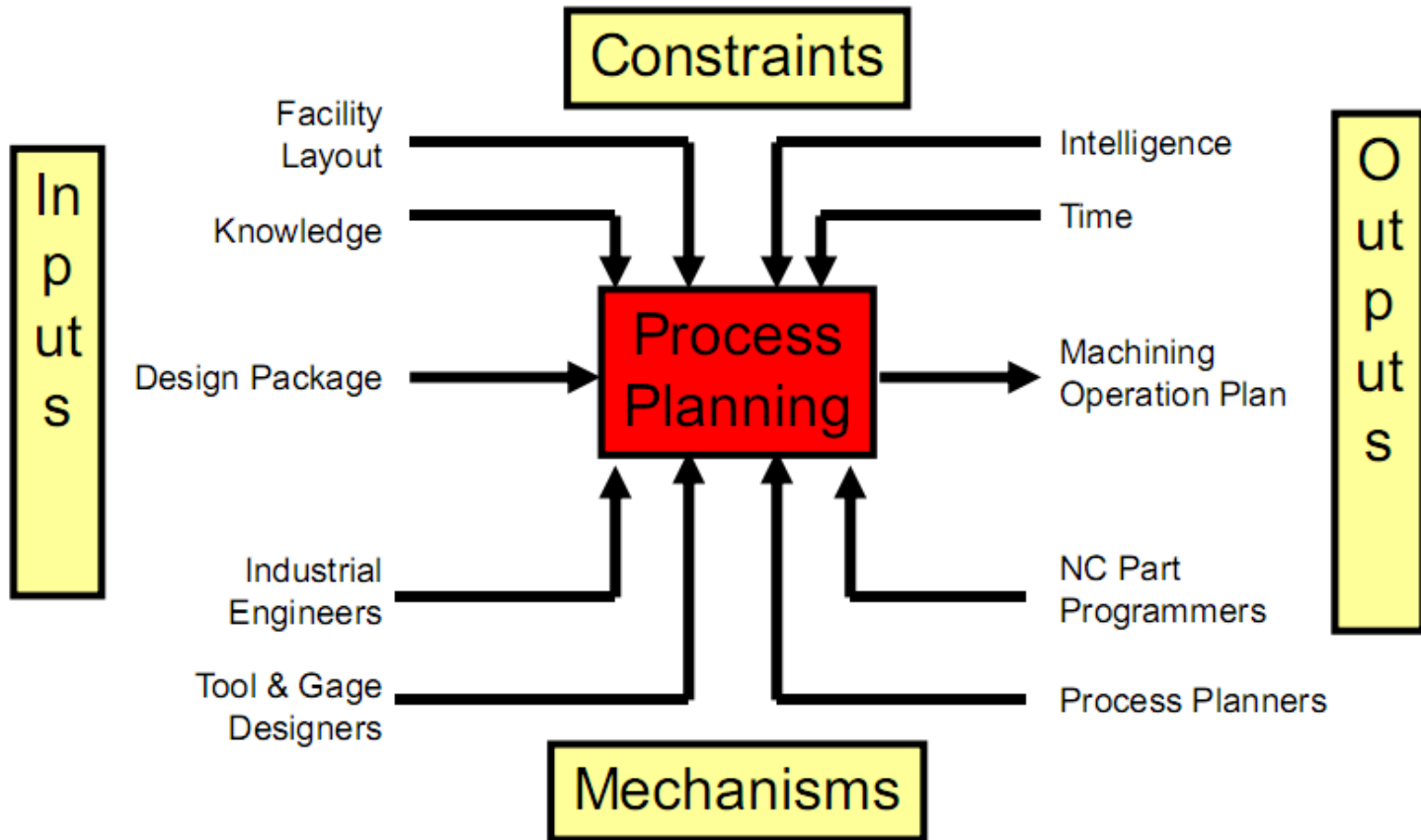
Process knowledge in the form of decision logic and data are used for matching of part geometry requirement with the manufacturing capabilities.



# Advantages of Generative Process Plan

- They rely less on group technology code numbers since the process, usually uses decision tree to categorize parts into families.
- Maintenance and updating of stored process plans are largely unnecessary.
- New Components can planned as easy as existing components

# Review of CAPP





# Advantages

- It can systematically produce accurate and consistent process plans.
- It leads to the reduction of cost and lead times of process plan.
- Skill requirement of process planer are reduced to develop feasible process plan.
- Interfacing of software for cost, manufacturing lead time estimation, and work standards can easily be done.
- Leads to the increased productivity of process planar.

# Disadvantages

- While compared with manual process planning the CAPP systems have few disadvantages:
- The inability to show special manufacturing techniques.
- The initial cost of establishing a CAPP system is high while compared with manual process planning.