ME6703 Computer integrated Mfg System (2013 Regulation)

Unit-1
Introduction

Introduction to CAD:-

↳ Computer Aided Design means the use of a Computer to assist in the design of an individual part (or) system.

↳ The process usually involves computer graphics to display the designed object on a screen.

↳ The CAD system supports the design process at all levels conceptual, Preliminary and final design

The Design process

1. Recongnition of need
2. Problem definition.
3. Synthesis
4. Analysis and optimization.
5. Evaluation
6. Presentation. by Sir Shigley.

CAD System benefits:

- Increased design Productivity
- Increased available geometric forms in the design,
- Improved Quality of the design.
- Improved design documentation.
- Creation of a manufacturing data base
- Design standardization.

Cam:- Computer Aided Manufacturing, use of computer to assist in the manufacture of a part. Cam technology is concerned with three main area NC, process planning, Robotics.

Manufacturing planning: Manufacturing planning are those in which the computer is used indirectly to support the production function. There is no direct connection b/w the computer and the process

Important applications

1. Computer aided process planning. (CAPP)
2. Computer assisted Nc Part programming.
3. Computerized Machinability data system
4. Computerized work standards.
5. Cost estimating.
6. Production and inventory planning.
7. Computer aided line balancing.

Manufacturing control: Second application of cam appr developing computer systems to implement the mfg control function.

1. processor monitoring and control
2. Quality control
3. Shop floor control
4. Inventory control
5. Just in time production systems.

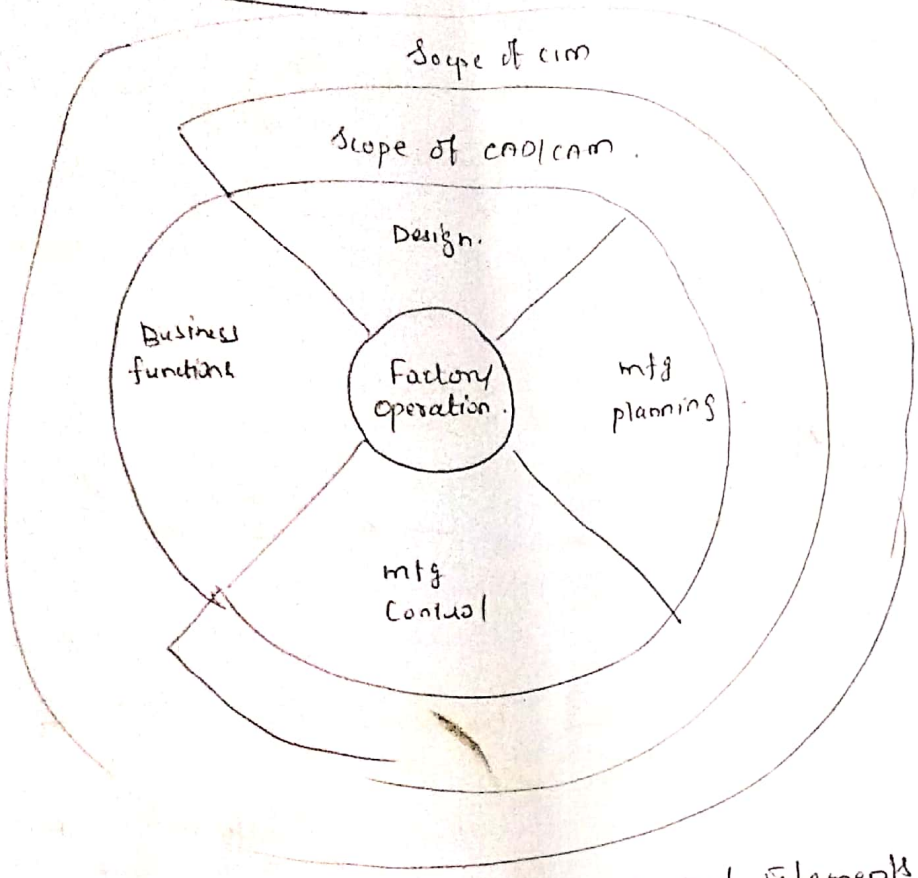
Introduction to CAD/CAM:-

→ CAD/CAM concerned with the engineering function in both design and mfg, Product design, engineering analysis and documentation of the design.

→ Nc Part programming, other activities, CAD/CAM denotes an integration of design and mfg activities by means of computer systems.

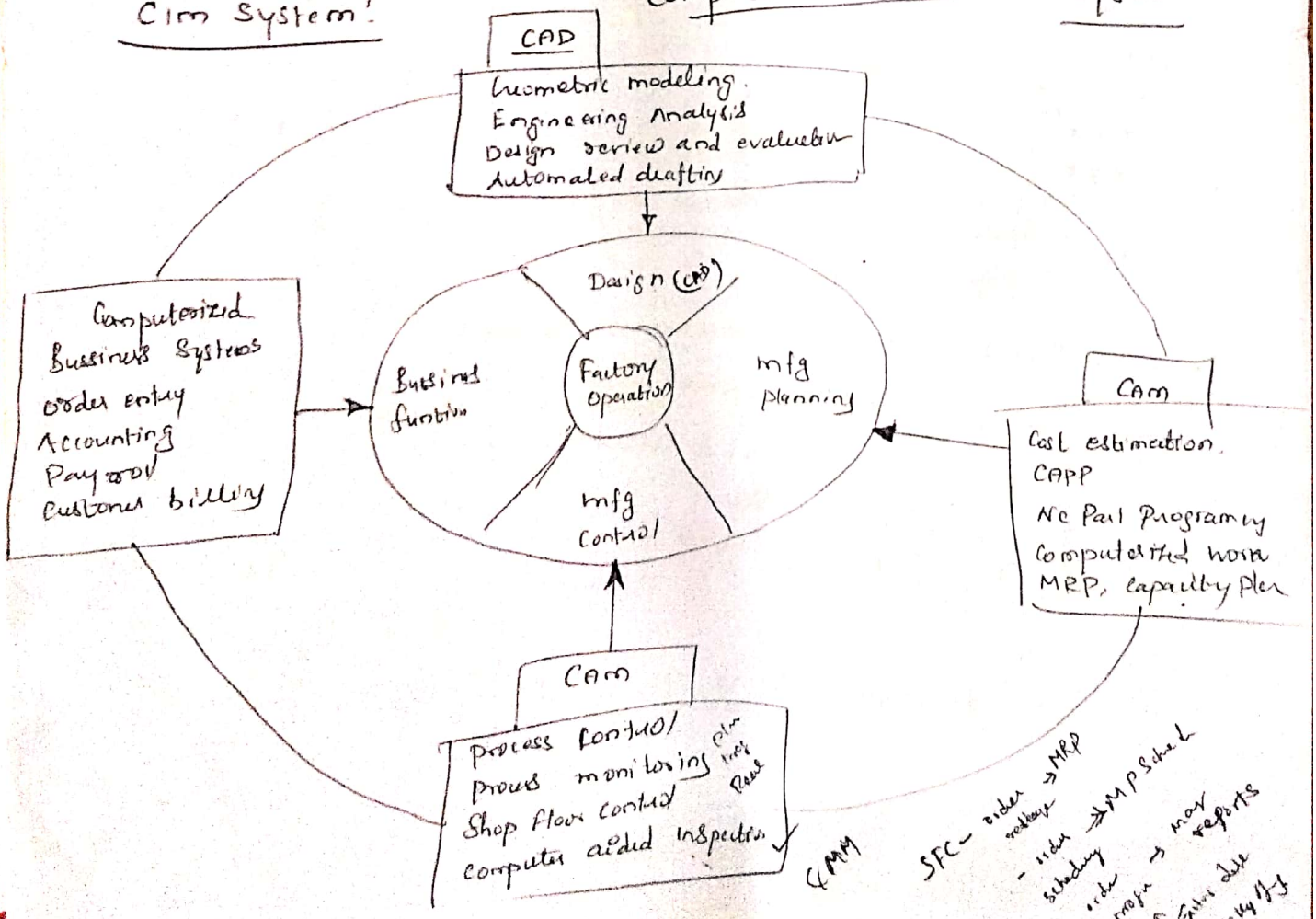
→ The Method of mfg product is a direct function Industrial engineering drawing

The Scope of CAD/CAM:



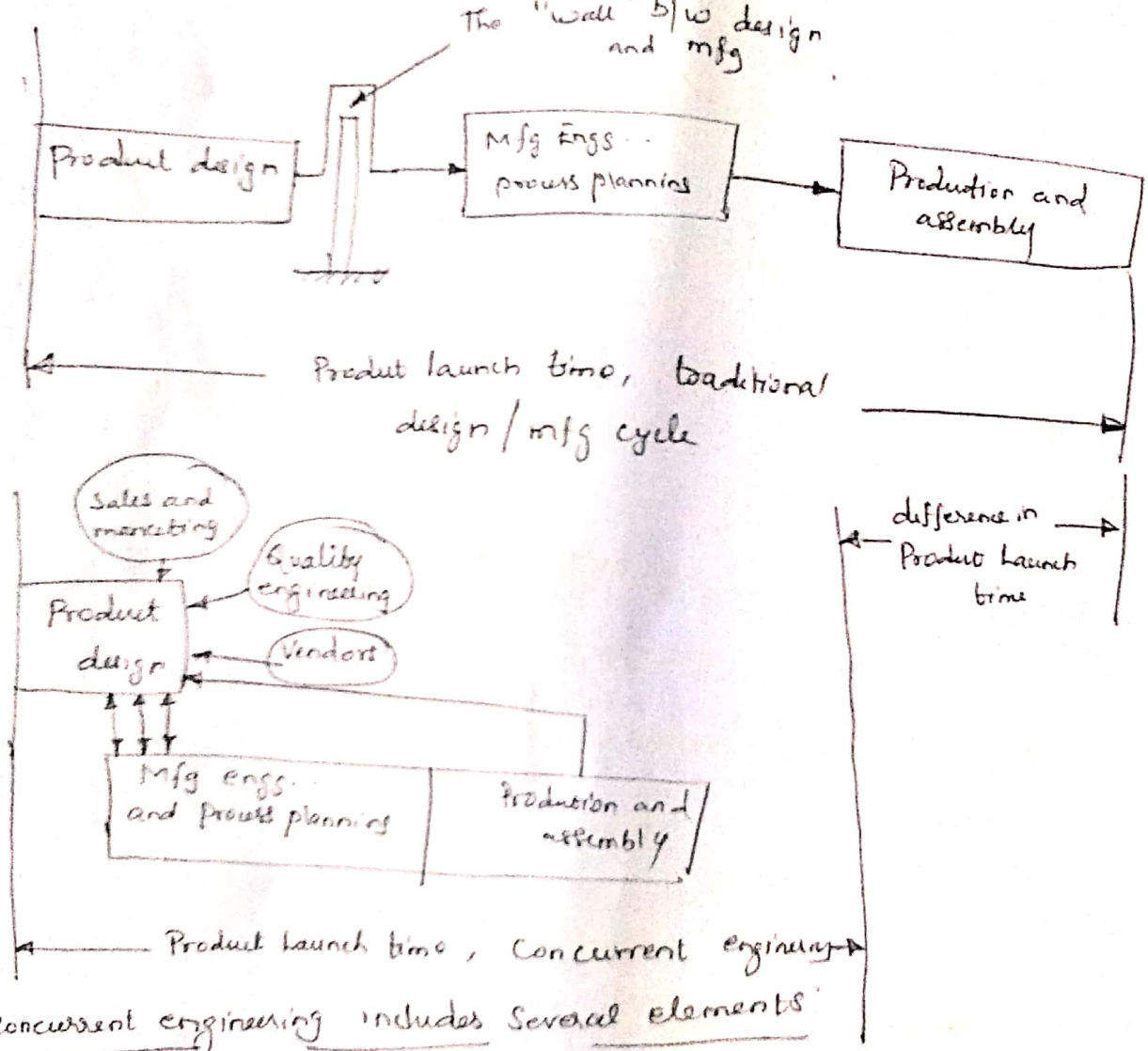
CIM System:

Computerized Elements of CIM System



Concurrent Engineering:

→ Concurrent engineering is an approach used in product development in which the function of design engineering, Mfg. engineering, and other functions are integrated to reduce the elapsed time required to bring a new product to market.



Concurrent engineering includes several elements

1. Desig for mfg and assembly
2. Design for Quality
3. Design for life cycle.

Product developme using concurrent engineering:

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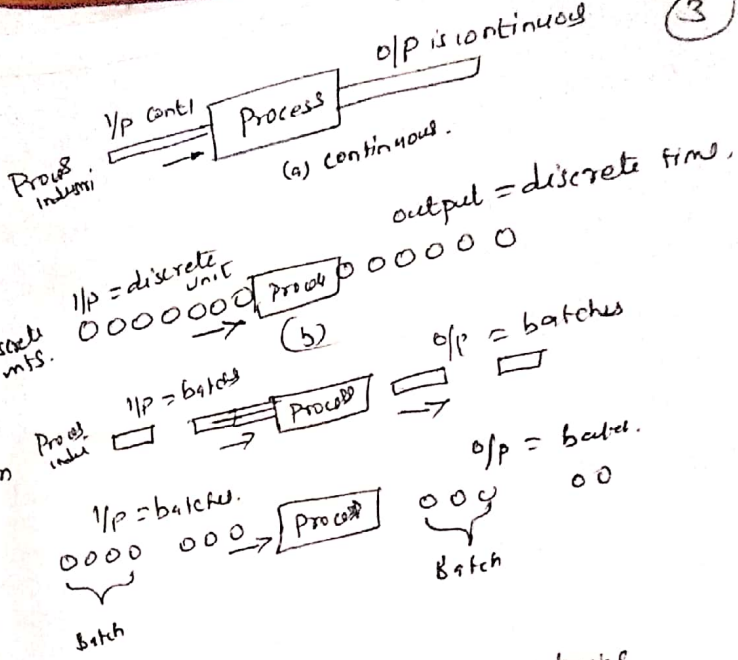
Types of Production:

a) 1. Continuous Production
b) 2. Batch Production.

Others
(1 to 100 unit/yr) → Low Production
100 - 10000 unit → Medium production
→ high Production
10,000 to million of unit per year



Manufacturing Models

→ Successful Mfg companies use a variety of metrics to help manage their operation

→ Quantitative Metrics provide a company with the means to track performance in successive periods (month of year)

→ can be devided into two basic
1. production performance measures
2. Manufacturing costs.

Mathematical Models of Production Performance:

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1. Production Rate
2. Production Capacity — $P_c = n S_w H_{sh} R_p$
3. Utilization and Availability
4. Manufacturing Lead time.
5. Work in Progress.

Automation: can be defined as the technology by which a process or procedure is accomplished without human assistance.

Automo Basic Elements of an Automated System:

→ An automated system consist of three basic elements.

1. power to accomplish the process and operate the system.
2. A Program of instructions to direct the process
3. A control system to actuate the instructions.

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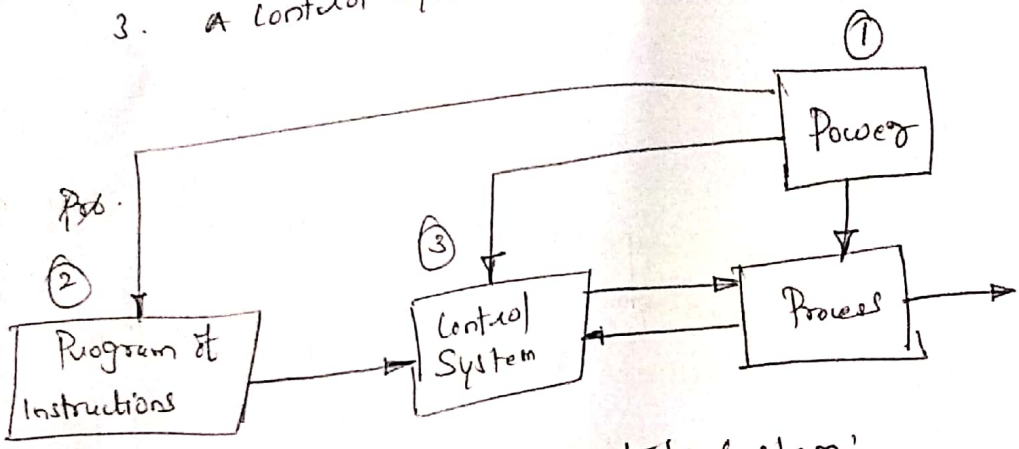

Elements of automated system.

Level of Automation:

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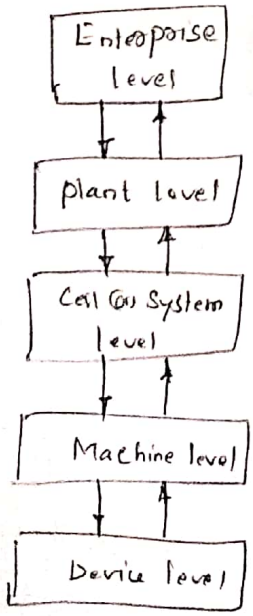
Level	Description/Examples
5	Corporate information system
4	production system
3	mfg system – Group of m/c
2	Individual m/c
1	Sensors, actuators, other hardware elements.



Five level of Automation:

End Effectors: (2.2b)

End effector usually attached to the robot's wrist. The end effector enables the robot accomplish a specific task. Wide variety of tasks performed by Industrial robots.

Types of end effector

1. Grippers
2. Tools.

Grippers: are used to grasp and manipulate objects during the work cycle.

- → Mechanical Grippers. Refer Groover, Robotic drawings
- → Vacuum Grippers.
- → Magnetized device.
- → Adhesive device.
- → Simple Mechanical devices like, hooks, Scoop.

Tools: The Robot uses tools to perform processing operations on the workpart. The robot manipulates the tool Relative to a stationary or slowly moving object.

Robotics Sensors: Sens the object

Sensors used in Industrial Robotics can be classified

1. Internal
2. External

Advanced sensor Technology

1. Tactile Sensors. { Touch Sensor, force Sensor }
2. Proximity Sensor
3. Optical Sensor
4. Machine vision.
5. Other Sensor.

Robot Programming:

A Robot must be programmed to perform its motion cycle defined as a path in space to be followed by the manipulator, combined with peripheral actions that support the work cycle.

1. Lead through Programming — Powered / Manual
2. Computer - like robot programming
3. Off-Line Programming.

Production capacity

$$P_c = n S_w H_{sh} R_p$$

P_c = weekly production capacity of the facility [output in units/wk]

n = number of work centers working in parallel

S_w = no of shift per period (shift/wk)

H_{sh} = hr/shift (hr)

R_p = hourly production rate

Example! ① The turret lathe section has six m/cs, all devoted to the production of the same part. The section operates 10 shift/wk. The no of hours per shift average 8.0. Average production rate of each m/c is 17 unit/hr. Determine the weekly production capacity of the turret Lathe section.

Solution:

$$P_c = n S_w H_{sh} R_p$$

$$P_c = 6(10)(8.0)(17)$$

$$P_c = 8160 \text{ output unit/wk}$$

Utilization and Availability

$$U = \frac{Q}{P_c}$$

U = utilization of facility

Q = actual quantity produced by facility (Pc/wk)

P_c = Production capacity for the same period (Pc/wk)

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Lean Production:

P.S.No (43)

* Lean Production (or) lean mfg define as the eliminating the wastege. Lean Production means operating the factory with the minimum possible resource and yet minimizing the amount of work accomplished with these Resource.

* Including works, equipments, time, space, material,

* Minimum possible time and achieving a very high level of Quality

* To customer is highly to satisfied.

① Value-adding activities

② Auxiliary activities

③ Wasteful activities.

x Lean production works by eliminating the wasteful activities.

Just in time Production:-

Unit - II

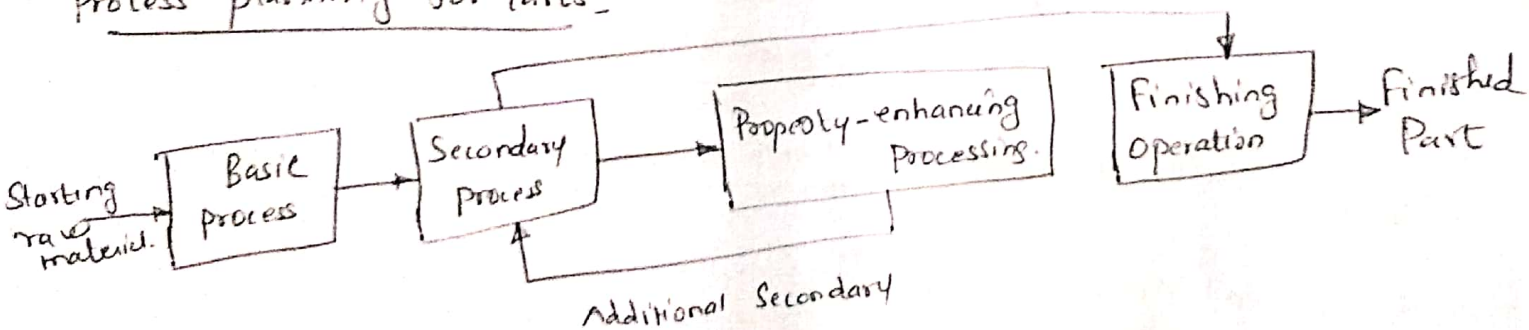
Production Planning and Control and Computerised Process Planning

PS No: 7134

Process planning: Process planning consist of determining the most appropriate mfg and assembly processes and the sequence in which they should be accomplished to produce a given part or Product.

- → Process planning for Parts
- → Process planning for Assemblies
- → Make (or) Buy Decision.

Process planning for Parts:



Typical Sequence of Processes required in Part.

Prepare Route Sheet: The processing sequence is documented on a form called "route sheet" (or) operation sheet"

Processing planning for Assemblies:

The type of Method used for a given Product depends on factors such as (1) The anticipated Production Quantities

(2) Complexity of the assembled Product

(3) Assembly processes used.

Make or buy decision!

Computer Aided Process Planning!

CAPP – Mfg firms are very interested in automating the task of process planning using CAPP systems.

CAPP is usually considered to be part of computer aided mfg

- → Process rationalization and Standardization.
- → Increased productivity of process planners
- → Reduced Lead time for process planning.
- → Improved Legibility
- → Incorporation of other Application programs

CAPP designed around Two approaches

① Retrieval CAPP system

② Generative CAPP system

① Retrieval CAPP system:

* A Retrieval CAPP system, also called Variant CAPP system. is based on the principles of Group Technology, Part classification and coding.

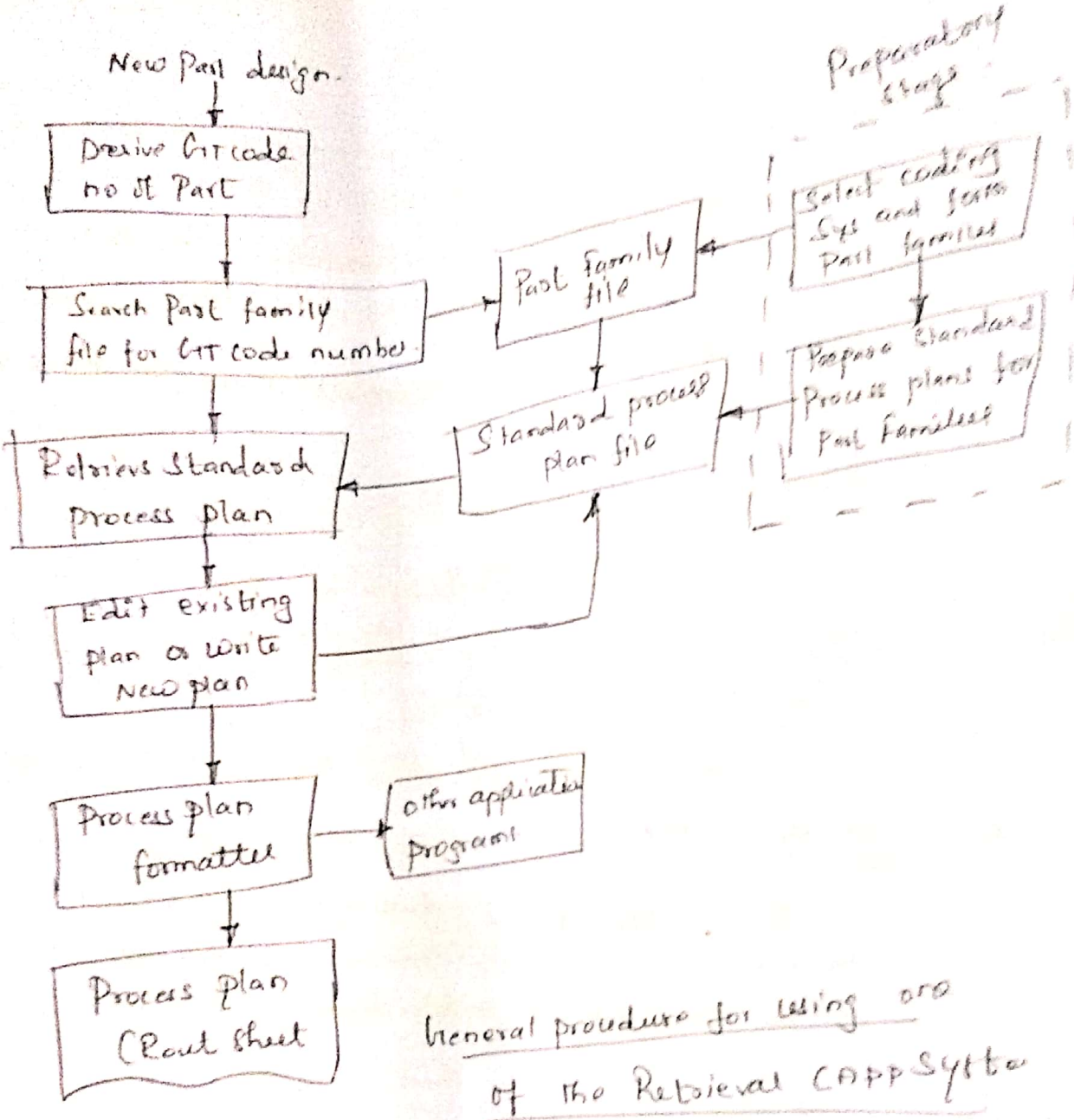
* In this type of Process planning, a standard route sheet "Preparatory phase" It consist of

① Selecting an appropriate classification and coding scheme for company.

② Forming Part families for the Parts produced by the company

③ Preparing std process plans for the Part families.

Step 2, 3 ongoing new parts are designed.



General procedure for using one of the Retrieval CAPP Syste

Generative CAPP System:

* Generative CAPP system represent an alternative approach to automated process planning. Instead of retrieving and editing an existing plan contained in a computer's data base,
* Designing a Generative CAPP System is usally expert system (or) a branch of artificial intelligence, solving complex problem.

1) Geometric model
2) GT code number.

Aggregate Production planning:

* This is involves planning the production output Levels for major product lines produced by the company. these plans must be coordinated among various function in the firm, including product design, production, marketing and Sales.

* highe Level corporate planning activity.

	Week.									
Product line	1	2	3	4	5	6	7	8	9	10
M model lin	200	200	200	150	150	120	120	100	100	100
N model lin	80	60	50	40	30	20	10			
P model lin							70	130	25	100.

(a) Aggregate production plan.

Master production Schedule:-

* The aggregate production plan must be converted into a master production Schedule (MPS) whic is specific plan of MQ Quantities to be produced of individual model within each product line.

* MPS divide into three categories
  - → Firm customer orders
  - → Forecasted demand
  - → Spare Parts.

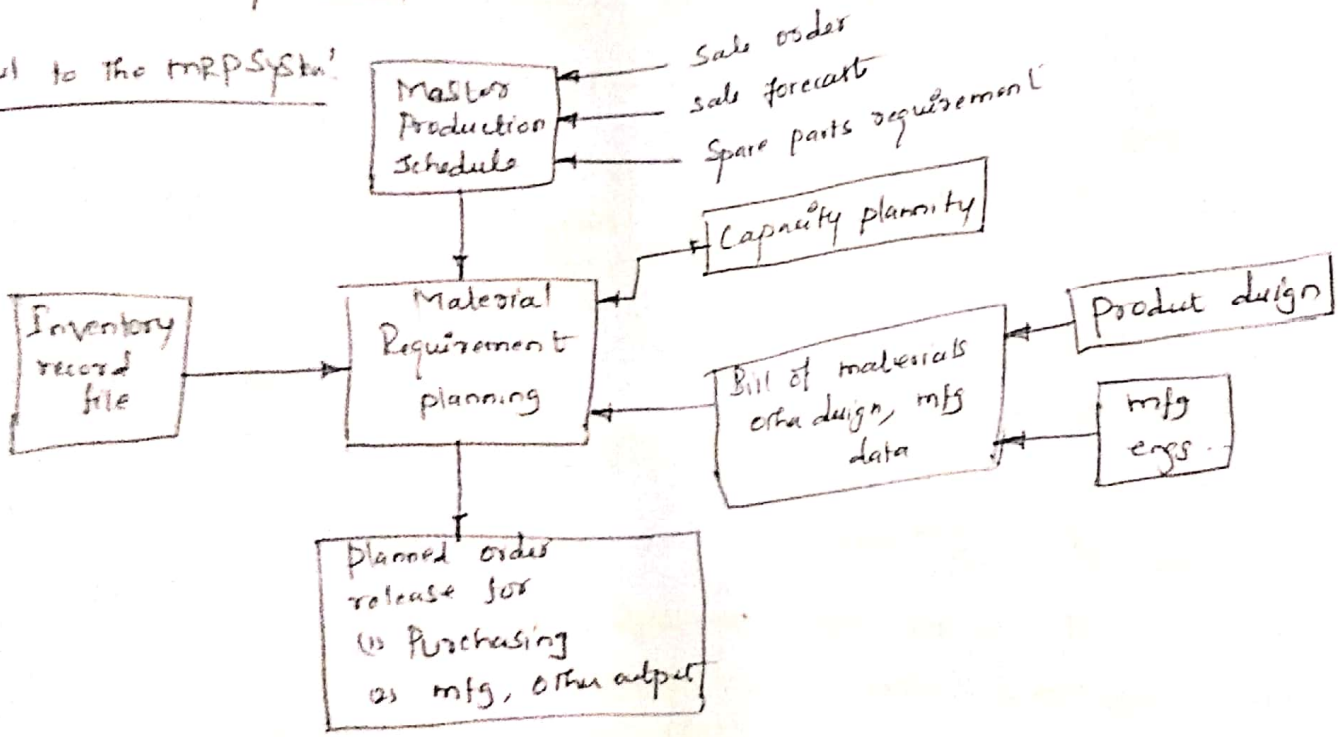
	Week.									
Product line/mode	1	2	3	4	5	6	7	8	9	10
M3	120	120	100	110	100	100	80	60	70	20
M4	80	80	80	50	50	40	40	30	30	30
N8	80	60	60	50	40	30	20	10		
P1								50		100
P2							70	00	25	

Master Production Schedule

Material Requirement planning:

* MRP is a planning technique, usally implemented by computer that translate the mps of end products into a detailed schedule for the raw materials and Parts used in those end products

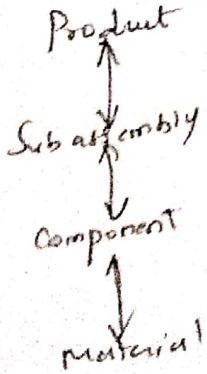
Input to the MRP System:



Structure of an MRP system

How MRP works:

The MRP processor operates on data contained in the MPS, the Bom file and the Inventory record file. The master schedule specifies the period by period list of final products required.

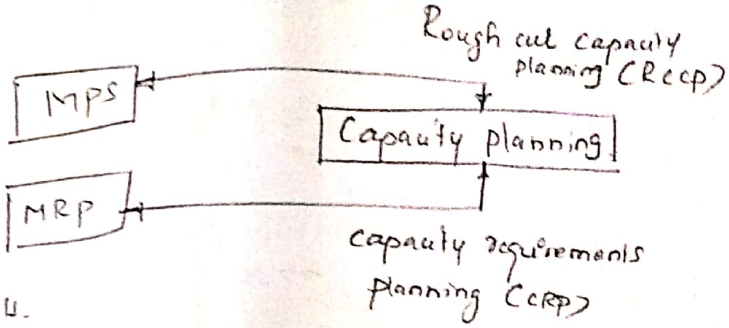


Capacity planning:

This concerned with determining the Labour and equipment resources needed to achieve the master schedule.

Two stage of capacity planning:

1. Master production Schedule.
2. Material requirements planning.



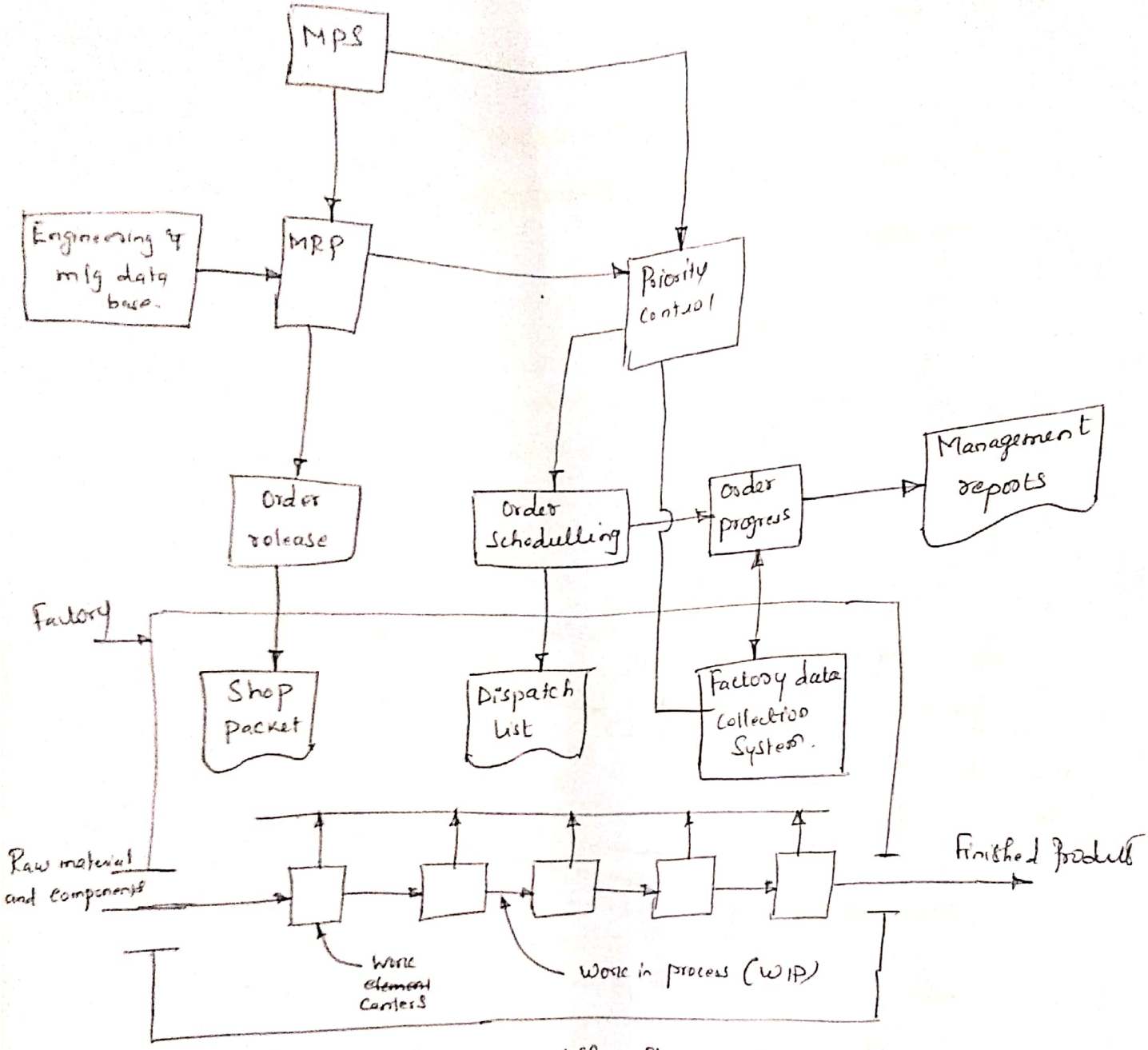
1. Employment levels.
2. No of temporary workers
3. No of work shifts
4. No of Labor hours
5. Inventory stockpiling.
6. Order backlogs
7. workload through Subcontracting.
8. Investing in new equipment
9. constructing new plants.
10. Purchasing.
11. Closing plants.

Shop Floor Control:

SFC is the set of activities in production control that is concerned with releasing production orders to the factory, monitoring, controlling the progress of the orders through the various work centers,

SFC consists of three phases

1. Order release
2. Order Scheduling
3. Order progress



Three phases in a shop floor control system

Inventory control

Inventory control attempts to compromise b/w two opposing objectives

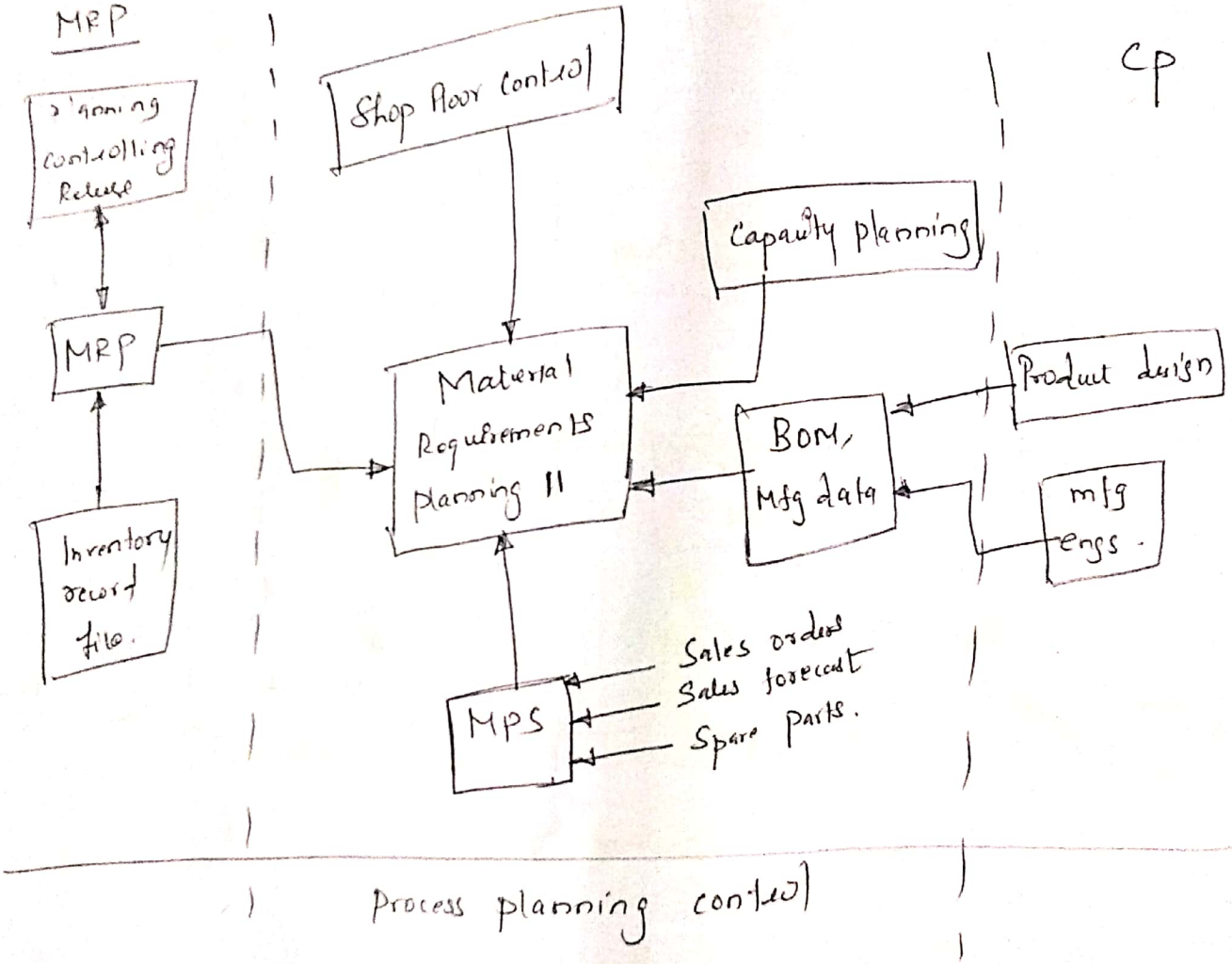
1) Minimize the cost of holding inventory
2) Maximize the customer service.

Inventory control includes a variety of techniques for managing the inventory of a firm. Important formula of economic Quantity

Manufacturing Resource planning (MRP II)

MRP can be defined as a computer based system for planning, scheduling, controlling the materials, resources, supporting activities

SFC.

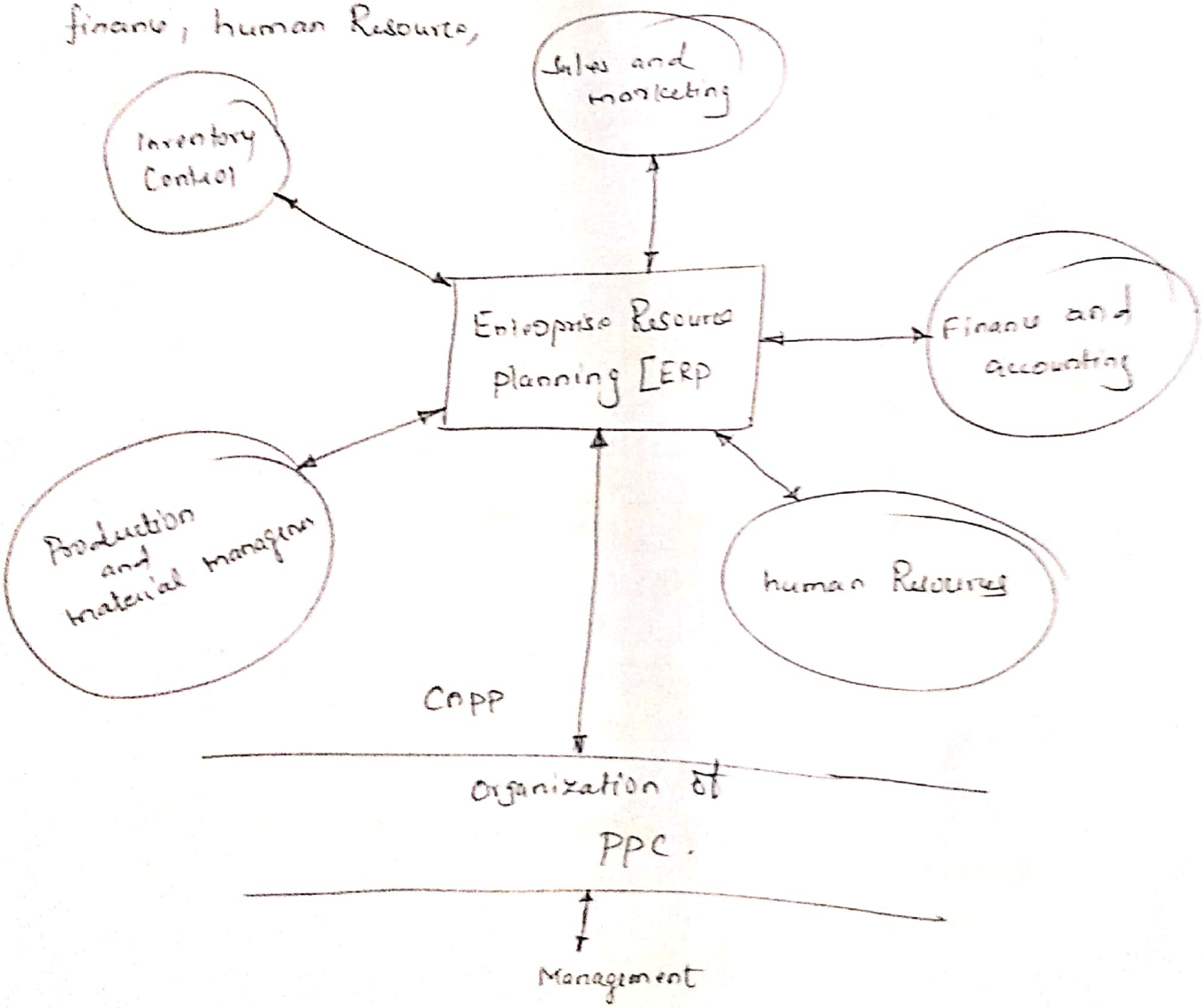


*Mfg resource planning represented an improvement over material requirements planning because it included production capacity of SFC - feedback.

Enterprise Resource planning [ERP]

* ERP is an extension of MRP II that includes all the functions of oragnization, including those unrelated to mfg.

* The function include sales, marketing, Purchasing, operations, logistics, distribution, inventory control, accounting, finance, human Resource,



Unit - III

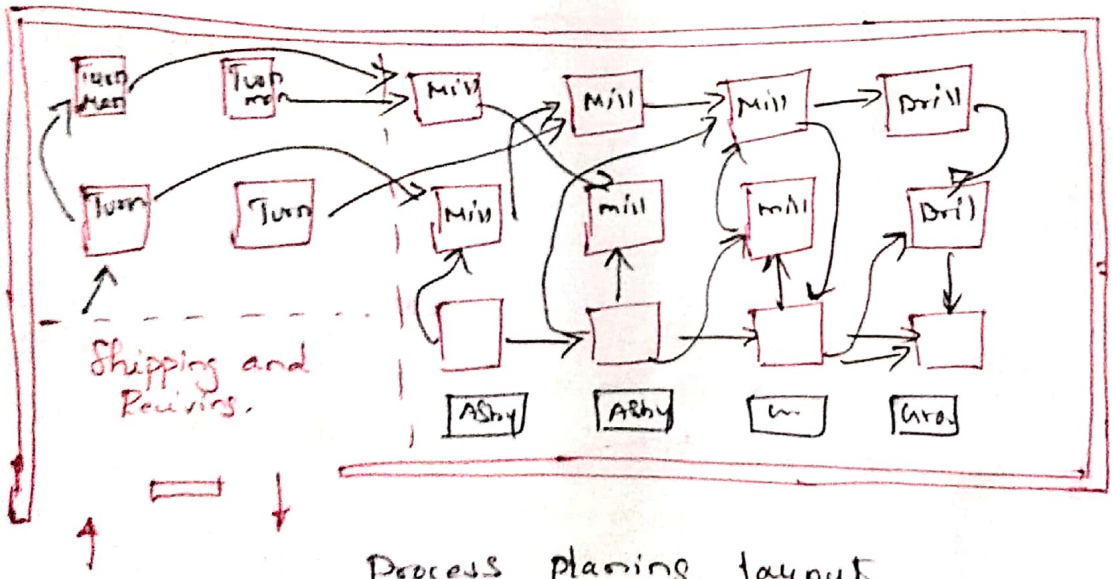
CELLULAR MANUFACTURING.

Group Technology (GT) :-

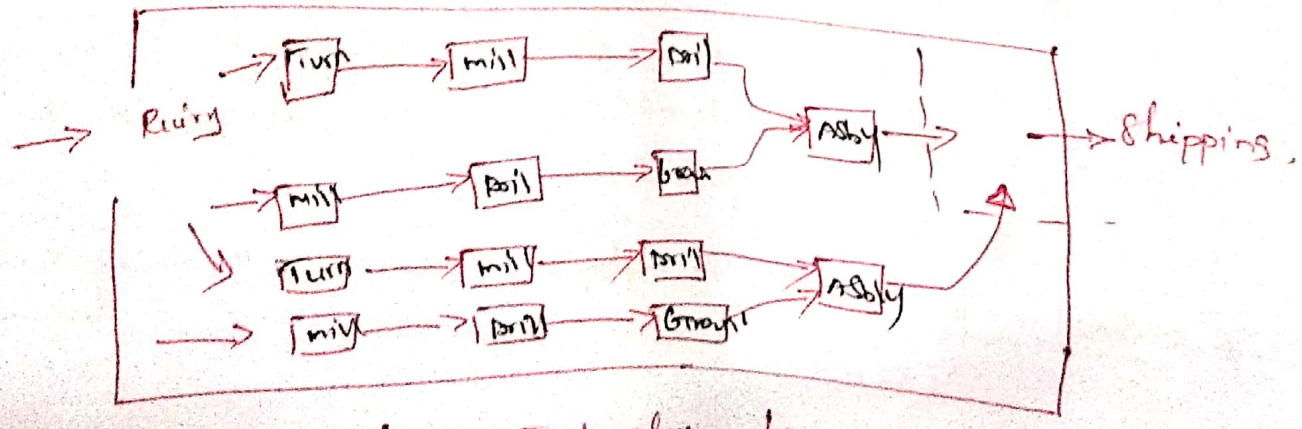
Group Technology is a Manufacturing philosophy in which Similar Part are identified and group together to take advantage of their similarities in design and Production. its called GT

Part Families :

A Part Family is a collection of Parts that are similar either in geometric shape and size (or) in the processing steps required in their Manufacturing.



Process planning layout



Group Technology layout.

Part classification and coding:

This method is the most time consuming of the three methods. In Part classification and coding, similarities among parts are identified and these similarities are related coding systems.

→ Design attributes – geometry, size, materials, bill of material

→ Manufacturing attributes – Consider the processing step Required.

→ Both design and Manufacturing attributes.

Features of Parts classification and coding systems:

1. System based on Part design attributes
2. System based on Part Manufacturing attributes.
3. System based on both Design and Mfg attributes.

Classification and coding schemes:

→ **hierarchical structure:** also known as a monocode, in which the interpretation of each successive symbol depends on the value of the preceding symbols.

→ **Chain type structure:** also known as a polycode, in which interpretation of each successive symbol in the sequence is always the same; it does not depend on the value of preceding symbol.

→ **Mixed mode structure:** a hybrid of the two previous coding schemes

Opitz part coding System.

Opitz Part coding System was developed by H. Opitz
The Opitz coding Scheme uses the following digit Set Sequence.

12345 6789 ABCD

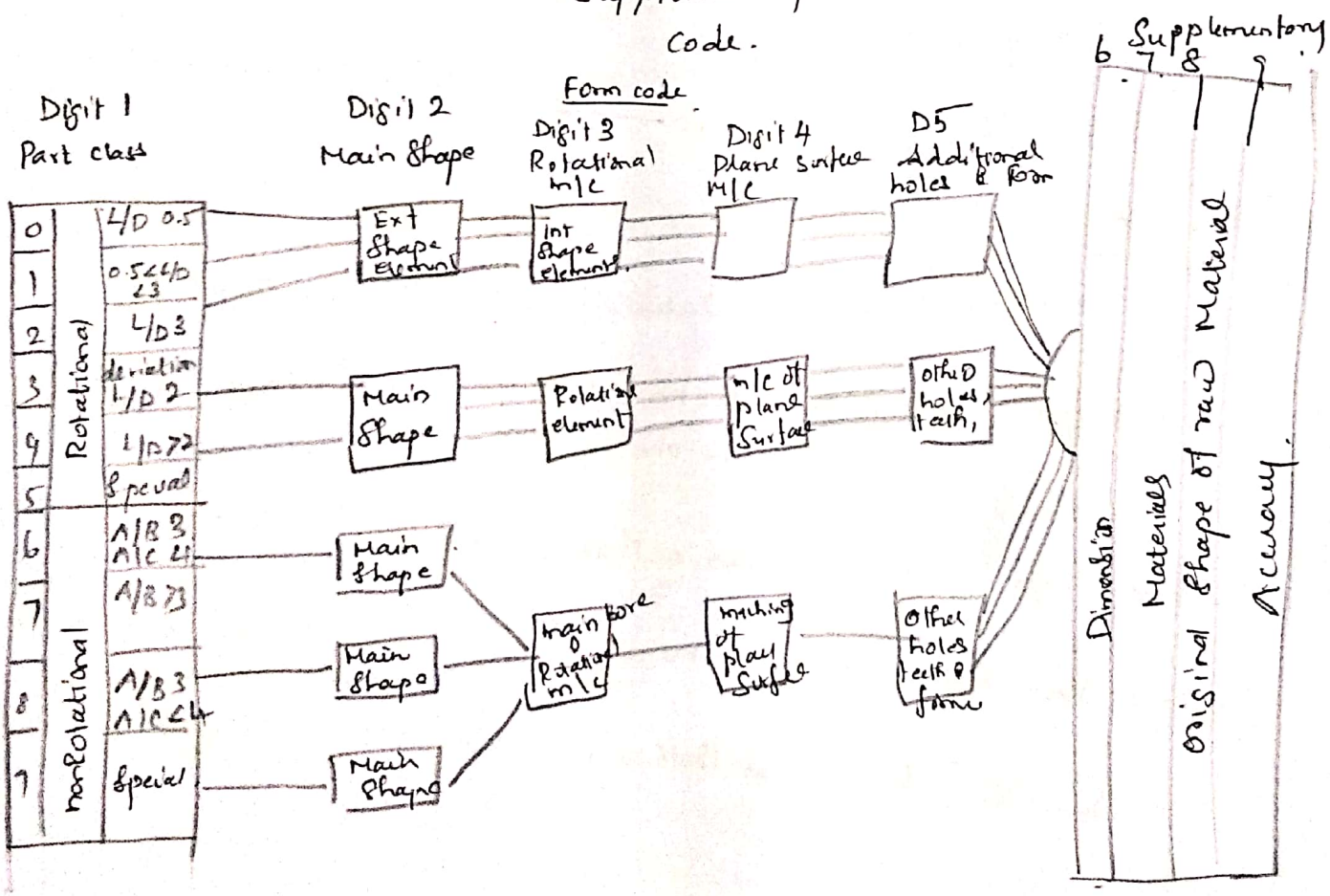
The basics code of 9 digit.

First 9 digit are intended to convey both desig and Mfg data.

12345 → Form code

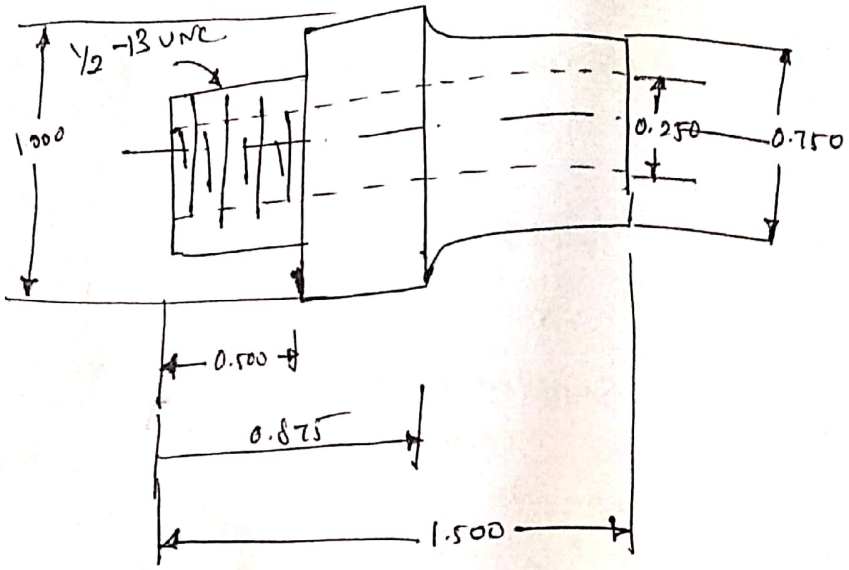
6789 → Supplementary code.

ABCD → Secondary code.



Example: Opitz Part coding System:

(*) Given Rotational Part design in Fig 3 determine the form code in the Opitz Parts classification and coding System.



Solution:

Length to diameter ratio, $L/D = 1.5$ — Digit 1 = 1

External Shape: Stepped on both ends with screw thread on one end — Digit 2 = 5

Internal Shape: Part contains a through hole — Digit 3 = 1

plane Surface machining: none — Digit 4 = 0

Auxiliary holes, Gear teeth, etc...: none — Digit 5 = 0

Form code: 1 5 1 0 0

Production Flow Analysis:

→ PFA is an approach to part family identification and m/c cell formation. It is a method for identifying part families and associated m/c groups.

→ PFA consist of following steps -

1) Data collection.
2) Sortation of process routings
3) PFA Chart
4) Cluster Analysis.

→ Data collection: The minimum no of data needed

→ Sortation of process Routing: In this step the parts are arranged into groups according to the similarity of there process Routings.

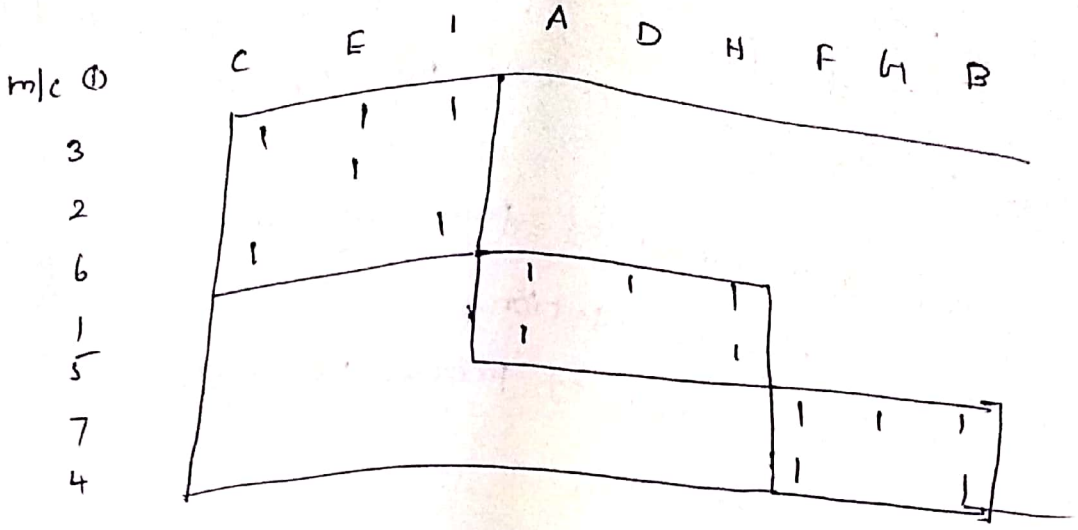
Operation (or) m/c	code.
Cutt off	01
Lathe	02
Turret Lathe	03
Mill	04
Drill - manual	05
NC drill	06
Grind	07

→ PFA Chart:

m/c(i)	A	B	C	D	E	F	G	H	I
1	1		1	1	1		1	1	
2		1	1	1		1			
3							1	1	
4	1		1			1			
5									1
6									

→ Cluster Analysis:

Rearranged PFA chart



Cellular Manufacturing:

Machine cells are grouped called cellular mfg system. Part families have been determined by visual inspection, Part classification and coding, PFA, there is advantage in producing those parts using GT M/c cells.

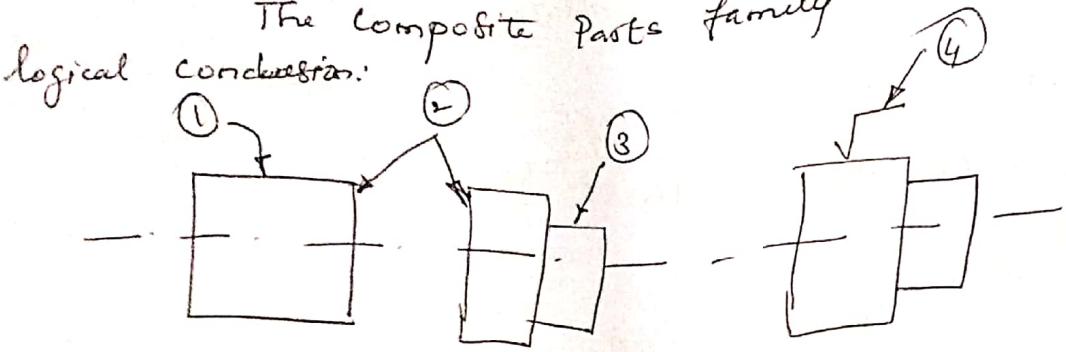
The typical objectives in Cellular Mfg are similar to those of Group Technology:

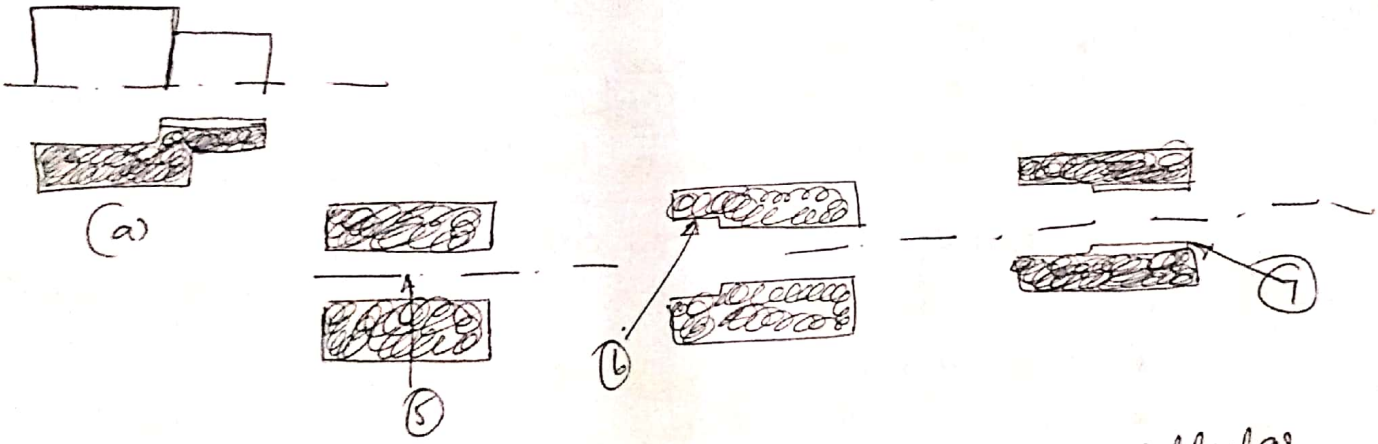
* To shorten mfg lead times by reducing setups, nonoperation handling, waiting times, batch size.
* To reduce work in process inventory, Smaller batch size shorter lead time
* To improve Quality.
* To simplify production Scheduling.
* To reduce setup times.

Composite Part Concept

Part families are defined by the fact that their Members have Similar design and Manufacturing features.

The Composite Parts family definition to its logical conclusion.





Machine cell design: Design of the m/c cell critical in cellular Manufacturing. The cell design determines to a great degree the performance of the cell

- Types of m/c cells
- cell layouts
- key M/c concept.

Types of m/c cells:

- Single m/c cell
- Group M/c cell with Manual handling
- Group m/c cell with Semi-integrated handling
- Flexible mfg cell (or) Flexible mfg System.

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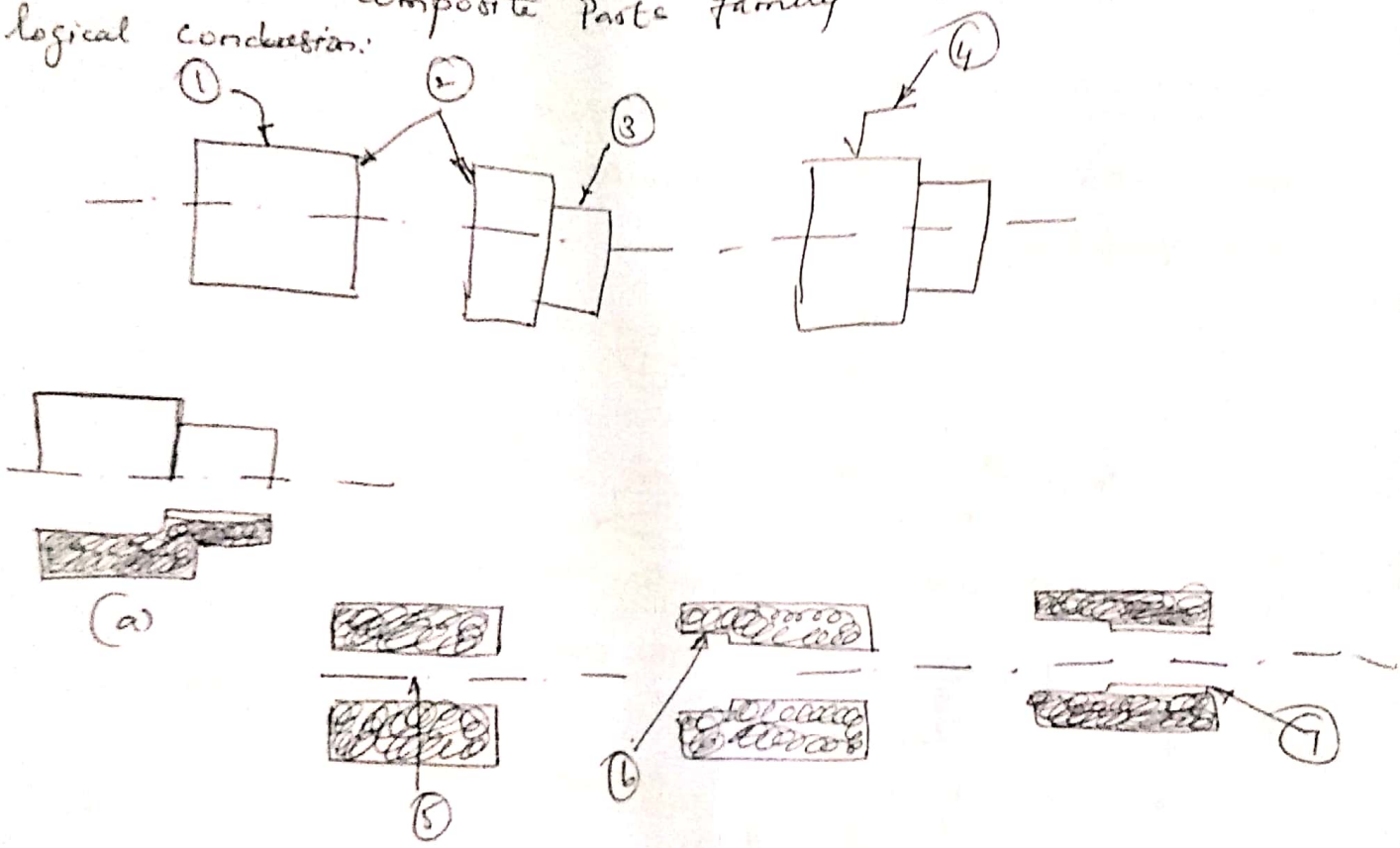


Machine cell design: Design of the m/c cell critical in cellular Manufacturing. The cell design determines to a great degree the performance of the cell

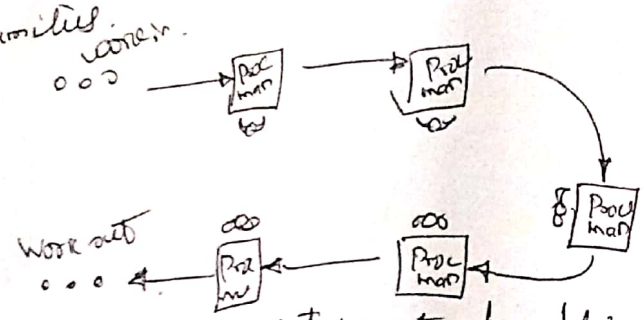
- ⇝ Types of m/c cells
- ⇝ cell layouts
- ⇝ key M/c concepts.

Types of m/c cells:

- * Single m/c cell
- * Group M/c cell with Manual handling
- * Group m/c cell with Semi-integrated handling
- * Flexible mfg cell (or) Flexible mfg System.

Single m/c cell :- consists of one m/c Part plus supporting fixtures and tooling. This type of cell can be applied to workparts whose attributes allow them to be made on one basic type of process, like turning, milling.

Group m/c cell with manual handling :- is an arrangement of more than one m/c used collectively to produced one or more Part families.



Group m/c cell with semi Integrate handling such as conveyor, to move Parts b/w m/c in the cell.

Layout
- In-line layout
- Loop layout
- Rectangular layout

Flexible mfg System : Combines fully integrated material handling system with automated processing station.

Key machine Concept :-

(X) CIT m/c cells operates like a manual system assembly line it is desirable to Spread the workload as evenly as possible among the m/c in the cell. On the other hand, there is typically a certain m/c in a cell

Quantitative Analysis in cellular M/g:

Many Quantitative techniques have been developed to deal with problems in Group Technology of cellular m/g.
In this section we consider two problems area.

(1) Grouping Parts and Machines into families
(2) Arranging M/c in GT cell

(1) Grouping Parts and machines by Rank order clustering

→ The Problem addressed here is determining how m/c in an existing plant should be Grouped into m/c cell.
→ The Problem is the same whether the cells are Virtual or formal.
→ It is basically the Problem of identifying Part families After Part Families have been identified.
→ m/c to produced a given Part Family can be Selected and grouped together.

Three basic Methods to identify Part family

→ Visual inspection
→ Part classification and coding.
→ Production flow Analysis.

Refer PDF 536

(2) Arranging m/c in GT cell:

After Part ~~from~~ m/c Grouping have been identified.

Three steps Algorithm:

1) Develop the From To chart
2) Determine the From To ratio"
3) Arrange m/c in order of decreasing From To ratio.
m/c with high From TO ratio distribute

Ref PDF 539

Unit - IV

Flexible Manufacturing System (FMS) Automated Guided Vehicle System (AGVS)

Types of Flexibility:

Three capabilities of Flexibility:

1) The ability to identify and distinguish among the different incoming Part or Product styles processed by the system.
2) quick changeover of operating instructions
3) Quick changeover of physical setup.

Test of Flexibility in An Automated mfg system:

- Part variety test
- Schedule change test
- Error recovery test
- New Part test.

FMS: Flexible mfg system is highly automated GT m/c cell, consisting of a group of processing workstations interconnected by automated Material handling and Storage system, controlled by a distributed computer system called FMS.

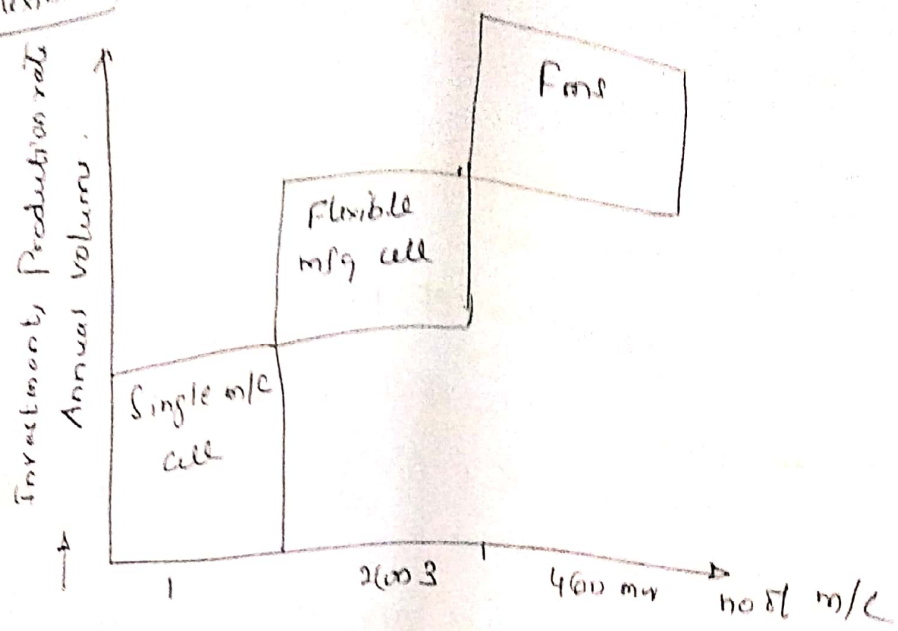
Types of FMS:

FMS According to kinds of operation.

- Processing operation (or) Assembly operation
- Rotational Part (or) non rotational Part

FMS
- No of m/c → Single m/c cell FMC, FMS.
- Level of Flexibility

Level of Flexibility



FMS Components

① Workstation
② material handling and storage system.
③ Computer control
④ People are required to manage and operate the system

Workstation:

* Loading / unloading station
* Machining station
* Other processing station
* Assembly
* Other station and equipment

MHSS → Allows random
→ Enables handling of a variety of workpart configuration
→ Provides temporary storage.
→ Provides convenient access for loading and unloading
→ Creates compatibility with computer control

FMS configuration:

in-line layout
loops layout
ladder layout
open field
Robot centered

FMS Application and benefits:

Application: Fms Technology mostly widely applied in machining operations.

Other application:
- → Sheet metal press working.
- → forging
- → Assembly
- → Some case study

Fms machining system:
- → milling and drilling [non rotational Part] by using CNC m/cing centers.
- → Turning [rotational Parts]

Ex: Flexible Fabricating System Refer Pg-No 568.

Fms benefits: The principal benefits are:
- → Increased m/c utilization.
- → Fewer m/c Required.
- → Reduction in the amount of factory floor space required.
- → Greater responsiveness to change.
- → Reduced inventory requirements.
- → Lower mfg lead time.
- → Reduced direct labour requirements & high labour Productivity
- → Opportunity for unattended production.

FMS planning and implementation

→ Fms planning and design issues

* Part family consideration
* Processing Requirements.
* physical characteristics of the work parts
* Production volume.

After the Part family, Operation Fms design is

↳ Types of workstation.
↳ Variations in process routing & Fms Layout
↳ Material handling system.
↳ Work-in-process and storage capacity
↳ Tooling
↳ Pallet Fixture.

→ FMS operational issue:

* Scheduling and dispatching.
* Machine loading.
* Part Routing.
* Part grouping.
* Tool Management
* Pallet and Fixture allocation.

Quantitative Analysis of Fms:

Most of the design and operational problems identified can be addressed using Quantitative analysis Eg. techniqu.

Simple Problem Pg. No. 576

Classify the QA Fms

1) deterministic models
2) Queueing Models
3) descrete event Simulation
4) other approaches, including heuristics.

Sizing the FMS:

↳ The task number of workstations and servers called Sizing the FMS.

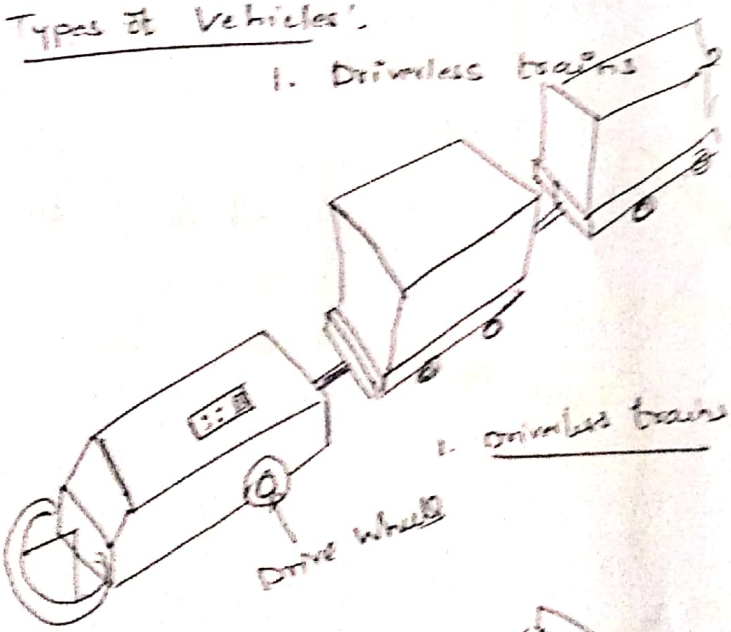
↳ The bottleneck model can be used to calculate the number of servers required at each workstation to achive a specified production rate, such calculation would be useful during the initial stages of FMS design.

Automated Guided Vehicles:

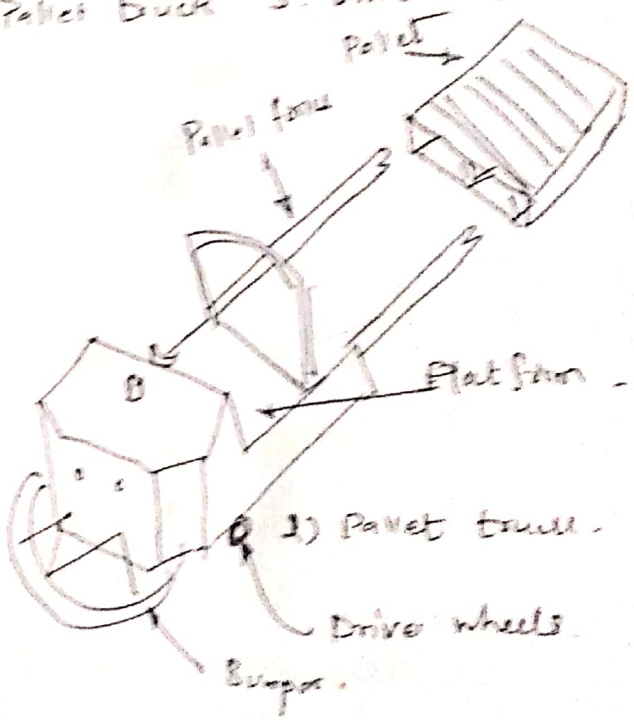
is a material handling system that uses independently operated, self-propelled vehicles guided along defined pathways. The vehicles are powered by on-board batteries

Types of Vehicles:

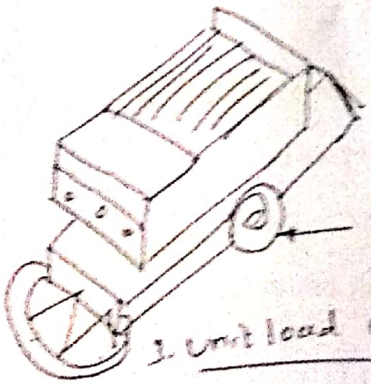
1. Driverless trains 2. Pallet truck 3. Unit load carrier



1. Driverless trains



2) Pallet truck.



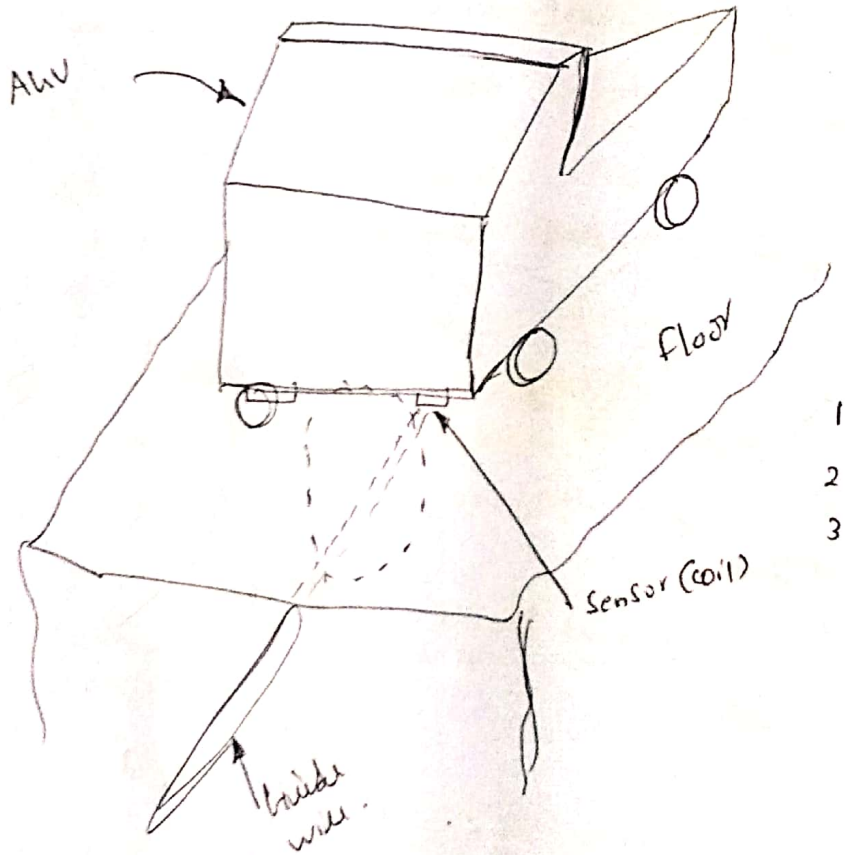
3. Unit load Carrier.

Three types of automated guided vehicles

AGVs Applications:

The principal AGVs Applications in Production and logistics are
- → Driverless train operation.
- → Storage and distribution.
- → Assembly line applications
- → Flexible Manufacturing System.

Vehicle Guidance Technology:



1. imbeded guide wires
2. Paint strips
3. Self-guided vehicles

Two principal Methods of making this decision in commercial wire guide system. ~~path Hooks into two~~

① → The frequency select Method

② → The path switch Select Method.

Vehicle Management:

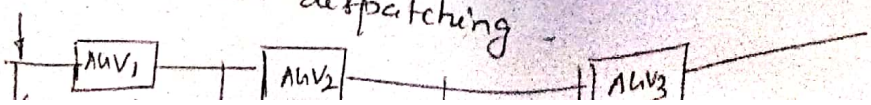
For AGVs to operate efficiently must be well Managed. Traffic congestion in the guide path must be minimized.

Two aspects of vehicle Management

① Traffic control

② Vehicle dispatching.

Guidepath.



Vehicle Safety

- The safety of humans located along the Pathway is an important objective in AGVs design.
- An inherent safety feature feature of an AGV is that its traveling speed is slower than the normal walking space of a human.
- A safety feature included in most guidance systems is automatic stopping of the vehicle.
- More than short distance, typically 50-150 mm (2-6 in)
- Safety device included on virtually all commercial AGVs is an emergency "bumper. The bumpers are prominent in the vehicle is programmed to brake immediately.
- When the bumper makes contact with an object
- other safety devices on a typical vehicle include warning lights (blinking or rotating light) or warning bells, which alert humans that the vehicle is present.

Unit - V

(219)

INDUSTRIAL ROBOTICS

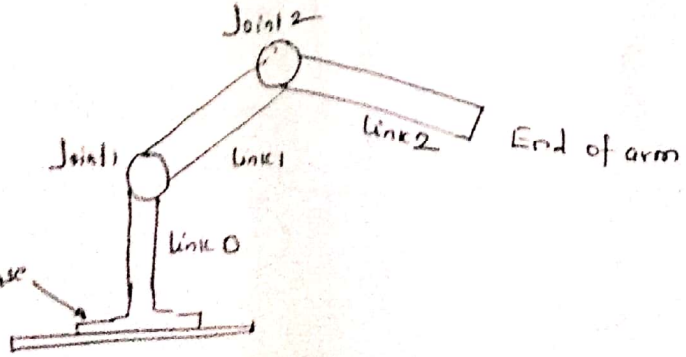
Robotics: is define as the Multifunctional Manipulator and General Purpose, Programmable m/c processing to Variety of tasks, to moves such as tools, Parts, Wrist, materials is called Robotics.

Robot Anatomy and Related Attributes:

The manipulator of an Industrial robot consist of a series of joints, links. Robot anatomy is concerned with the type of size of these joints and links and other aspects of the manipulator's physical construction.

Joint and Links:

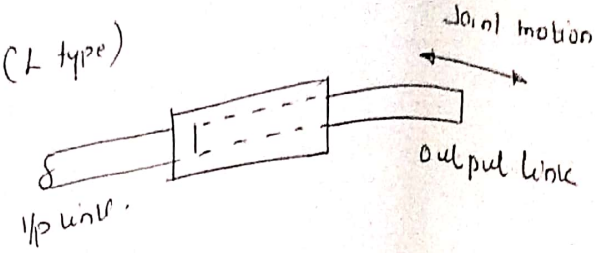
Degree of freedom: It provides relative motion b/w two Parts of the body. Each joint (or) axis as it is sometimes called, provides the robot with a so called DOF of motion



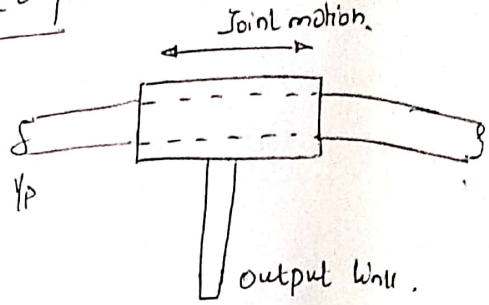
Types of Joints:

1. Linear Joint (L Joint)
2. Orthogonal Joint (O)
3. Rotational Joint (R)
4. Twisting Joint (T)
5. Revolving Joint (V)

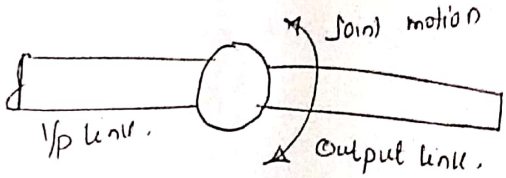
1. Linear joints (L type)



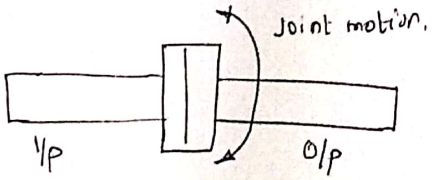
2. Orthogonal joints (O type)



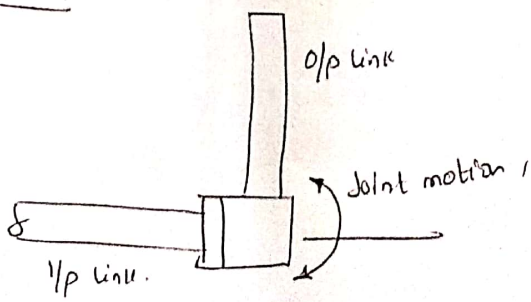
3. Rotational joint (R type)



4. Twisting joint (T type)

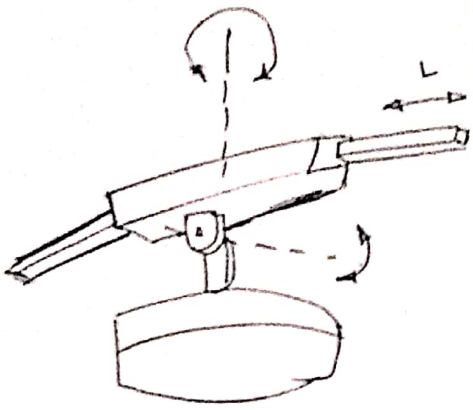


5. Revolving joint (V type)

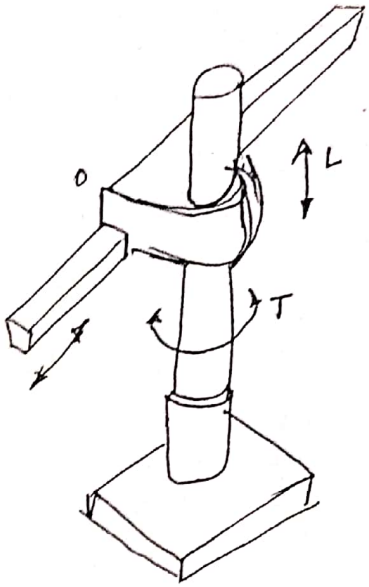


Robot configuration.

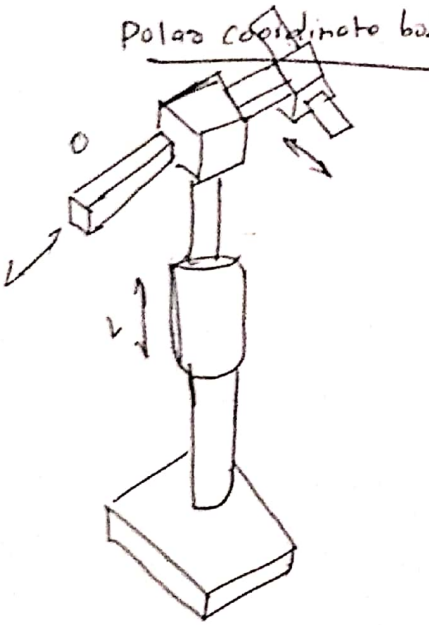
1. polar configuration
2. Cylindrical configuration
3. Cartesian co-ordinate Robot
4. Jointed - arm - robot
5. SCARA,



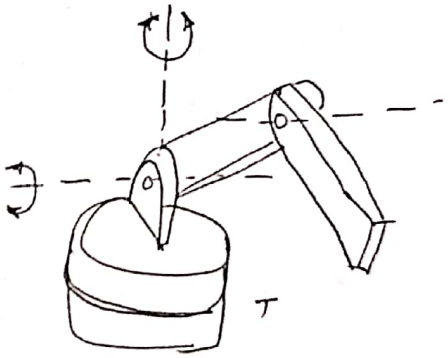
Polar coordinate body



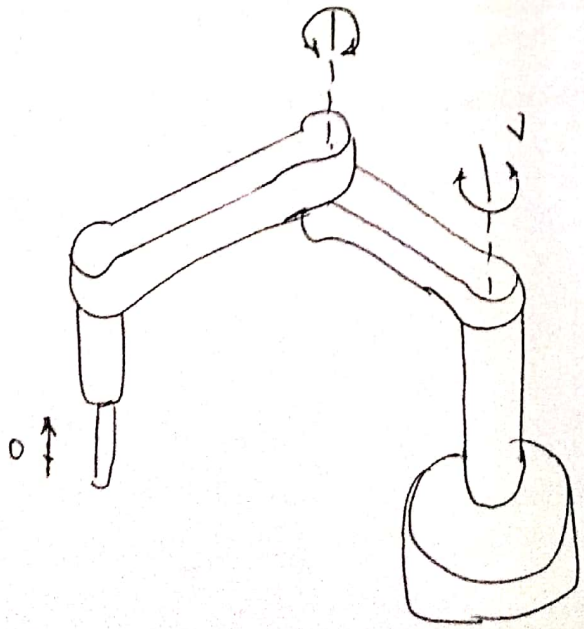
Cylindrical body arm assembly



Cartesian coordinate body



Jointed arm body



Gantry body

Joint Drive System:

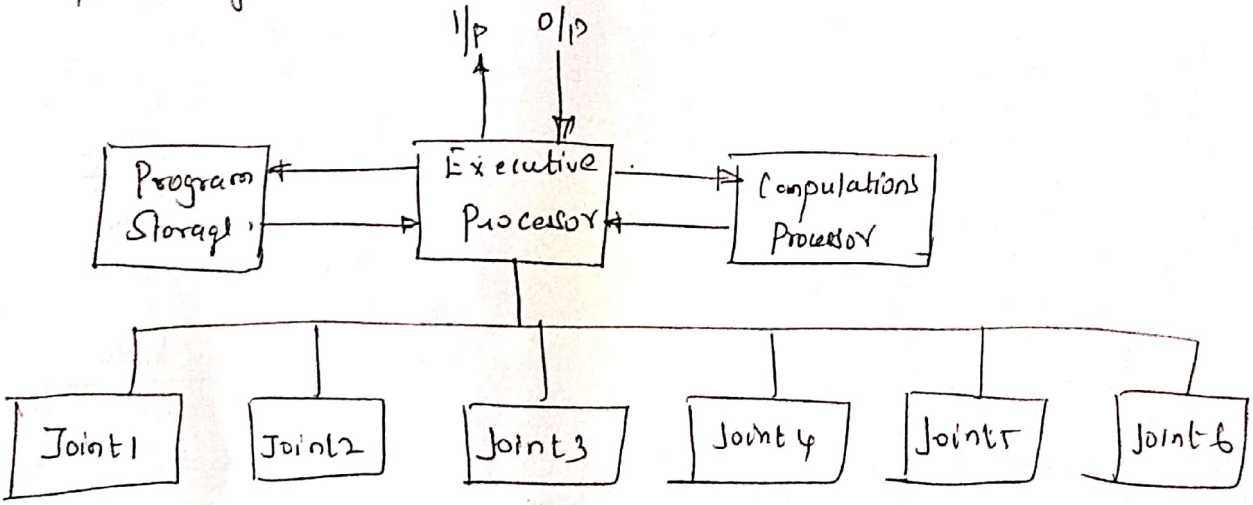
Types

1. Electric Drive System
2. hydraulic Drive System
3. Pneumatic Drive System

Robot control System:

Robot controller can be classified into four categories.

1) limited sequence control
2) playback with point to point control
3) playback with continuous path control
4) intelligent control



Microprocessor Microcomputer controller.

Classification of Robot

Vehicle Safety

↳ The safety of humans located along the Pathway is an important objective in AHVs design..

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↳ A safety feature included in most guidance systems in automatic stopping of the vehicle.

↳ More than short distance, typically 50-150 mm (2-6 in)

↳ Safety device included on virtually all commercial AHVs is an emergency bumper. The bumper are prominent in the

↳ When the bumper makes contact with an object the vehicle is programmed to brake immediately.

↳ other safety devices on a typical vehicle include warning lights (blinking or rotating lights) or warning bells, which alert humans that the vehicle is present.

———*———

ME6703 - Computer Integrated Manufacturing Systems.

Should be prepare all the Qtn Papers

Question paper - I

28/9/2016

2 marks

1. Define Automation. List out Levels of Automation. Pg.NO: 91, 108
2. Types of Production and its Advantages. 49
3. Define Process planning. 720
4. Shorts notes on Inventory Control. 755
5. Define Group Technology and its Advandges. 513,
6. Define machine cell design and its Types. 524
7. What is meant by Fms and Application. 549,
8. List out few AGVs Application. 561
9. Define Robotics. 220
10. Types of Robot programming. 242

16 marks

11. (a) (i) Draw the block diagram of Concurrent Engineering and Explain. (4) Pg.NO: 728 (8)

(ii) The automatic lathe department has five m/cs cell devoted to the production of the same products. (4) The m/c operate two 8-hr shifts, 5 days/week, 50 weeks/year. Production rate of each m/c is 15 unit/hr. Determine the weekly production capacity of the automatic lathe department (8) Pg NO: 68

(or)

(b) (i) (4) Explain about basic Elements of an Automated Systems and Suitable block diagram Pg.NO: 94 (10)

(ii) Short notes on Lean Production. 767 (6)

12 (a) Define CAPP and Explain about Retrieval CAPP Systems with Flow chart and its Advantages and limitation Pg. No 725, 726: (16)

(or)

(b) (i) Explain about Shop Floor Control with Suitable block diagram Pg.No: 749 (10)

(ii) Short notes on Capacity planning Pg.No:747 (6)

13 (a) Explain about Group Technology and Draw a Simple diagram of Process planning and GT Layout and its Application. 514 (16)

(or)

(b) (i) Explain about Quantiative Analysis in cellular manufacturing 529 (10)

(ii) Short notes on Hollier method 531 (6)

14 (a) Define Fms. and block diagram of Fms Components and Explain it 549, 554 (16)

(or)

(b) (i) Define AGVs. and Application, 294, 295 (8)

(ii) Explain about Vehicle Management & Safety 294 (8)

15 (a) Define Industrial Robotics. and Explain about Classification of Robotics, Refer, local author (16)
CAD Groover in Robotics

(or)

(b) (i) Industrial Robot Application (8)

(ii) Short notes on Robot Part Programming (8)
242

Question Paper - II

7/9/2016

2 marks

1. Denife manufacturing planning. 110
2. What is meant by production Rate? 63
3. Name some of the factors that are derived from Computer Aided process planning. 726, 726.
4. What are the three phases of shop floor control? 749 Provide a brief definition of each activity. 749, 750, 751.
5. What is the composite part concept, as the term is applied to Group Technology? 502
6. What are the typical objectives in cellular manufacturing? 502.
7. What are the alternative approaches to FMS? 577.
8. Name three production situation in which FMS Technology can be applied. 548.
9. What is an end effector? 232.
10. What is the work volume of a robot manipulator? 228

16 marks:

11. (a) (i) Short notes on CAD and CAM. 701, 711 (8)
(ii) Draw the Cam wheel and Explain it (8)
Refer last author

(or)

b) (i) Draw the flow chat of level of automation and Explain it 105 (10)
(ii) Short note on Just in time 771 (6)

- Retrieval CAPP

12 (a) (i) Explain about logical steps in Computer Aided process planning. (10)

(ii) Explain about Aggregate production planning 738 (6)

(or)

(b) (i) Draw the block diagram of three phases in SFC and Advantages 749 (10)

(ii) Draw the line diagram of Enterprise Resource planning. 760 (6)

13 (a) (i) Define production flow analysis. and Explain about four steps of PFA 520 (10)

(ii) Advantages of Group Technology 527 (6)

(or)

(b) (i) Explain about types of machine cell Layout & draw the suitable diagram 524 (10)

(ii) Short notes on Rank order clustering 529 Method. (6)

14 (a) (i) Define Fms. Explain about fms Application and benefits. 549, 561, 564. (10)

(ii) Explain about fms planning and control 562, (6)

(or)

(b) (i) Draw the AUVs and Explain it and 294, 295 Application (8)

(ii) Explain about Vehicle Guidance Technology 296 (8)

15 (a) (i) Explain and draw the Robot joint 223 configuration (10)

(ii) Explain Robot sensors and Application 229 (6)

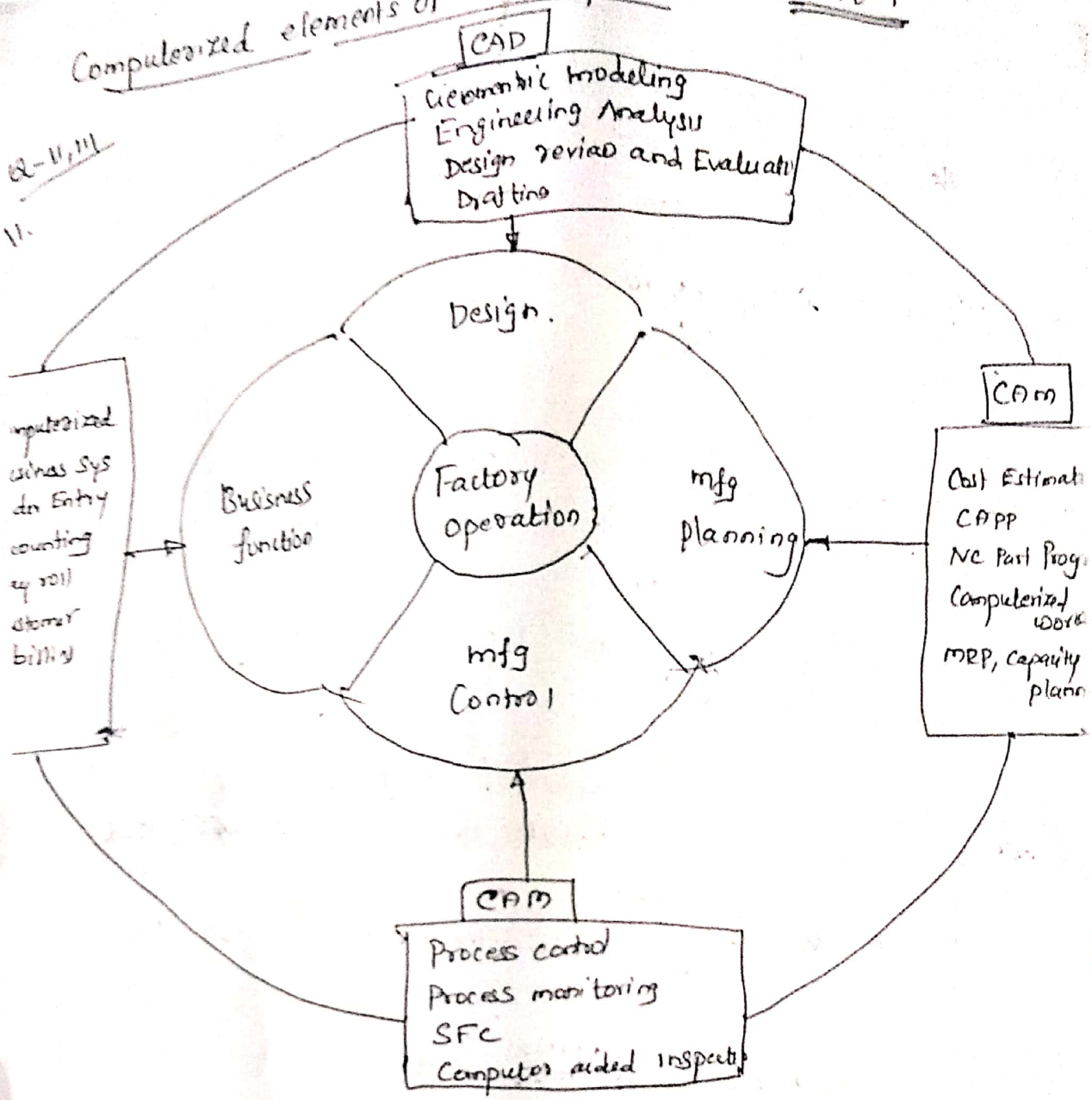
(or)

(b) (i) List out Industrial Robot Application 233 (8)

(ii) Short notes on Robot Accuracy and Repeatability 250 (8)

Computerized elements of CIM System

Unit-I



Unit-IV Fms

Components of Fms