

SHANTILAL SHAH ENGINEERING COLLEGE

Production engineering department

Computer Aided Manufacturing (2171903)

Laboratory Manual

Compiled by:

Prof. Khushbu P. Patel

LIST OF EXPERIMENTS

1. Study of Computer Integrated System
2. Study of NC Technology
3. Study of CNC Part Programming
4. Simulation of CNC Lathe operation (Facing cycle)
5. Simulation of CNC Lathe operation (Turning and step turning cycle)
6. Simulation of CNC Lathe operation (Threading and grooving cycle)
7. Simulation of CNC milling operation (Linear and circular interpolation)
8. Problems on Group Technology and Industrial case problems on coding
9. Problems on Computer aided part programming and Industrial case problems
10. Study of Flexible Manufacturing system
11. Study of Robotics Technology
12. Problems on MRP-I, MRP-II

EXPERIMENT NO. 1

Title: Study of Computer Integrated System

Objective: To provide information of Computer Integrated Manufacturing, Impact of CIM on personnel, Role of manufacturing engineers, CIM Wheel to understand basic functions

Details:

- Introduction to CIM
- Evolution of CIM
- Segments of CIM: Computer Aided Design, Computer Aided Manufacturing and Computer Controlled Business Functions
- Study of existing CIM Models

Questions:

1. Justify the need of CAM in today's era.
2. Draw CIM wheel and discuss different aspect of CIM

EXPERIMENT NO. 2

Title: Study of NC Technology

Objective: To provide information of NC and CNC Technology, Types of NC.

Details:

- NC technology
- Tape formats
- NC words
- Usage of codes
- Controllers, Sensors and Actuators
- Axis designation

Questions:

1. Explain the axes designation rules for machine tools employing rotating tools. Sketch a vertical machining center and designate its axes.
2. Explain incremental and absolute dimensioning with neat sketch.

EXPERIMENT NO. 3

Title: Study of CNC Part Programming

Objective: Introduction to G- codes, M Codes, etc and formulating it in to a part program using manual part programming Techniques.

Details:

- CNC components
- Part programming techniques
- Manual part programming technique
- Interpretation of codes
- Usage of codes
- Formulation of part program

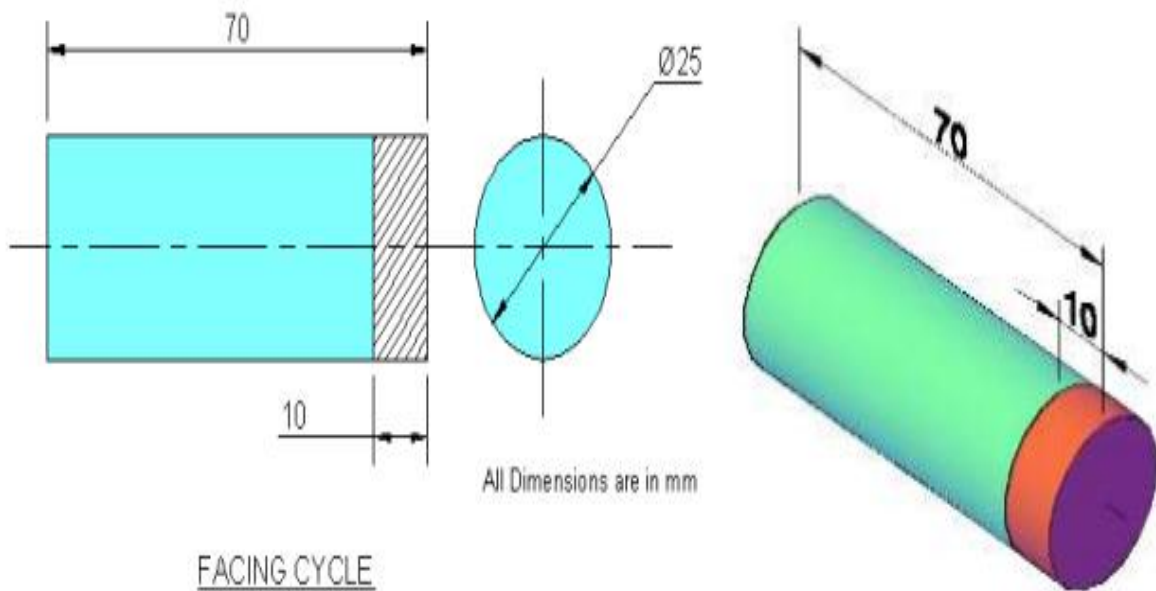
EXPERIMENT NO. 4

Title: Simulation of CNC Lathe operation (Facing cycle)

Objective: To translate the part program into actual working on CNC Lathe machine.

Details: write a program to obtain the facing cycle in the CNC lathe

SKETCH :



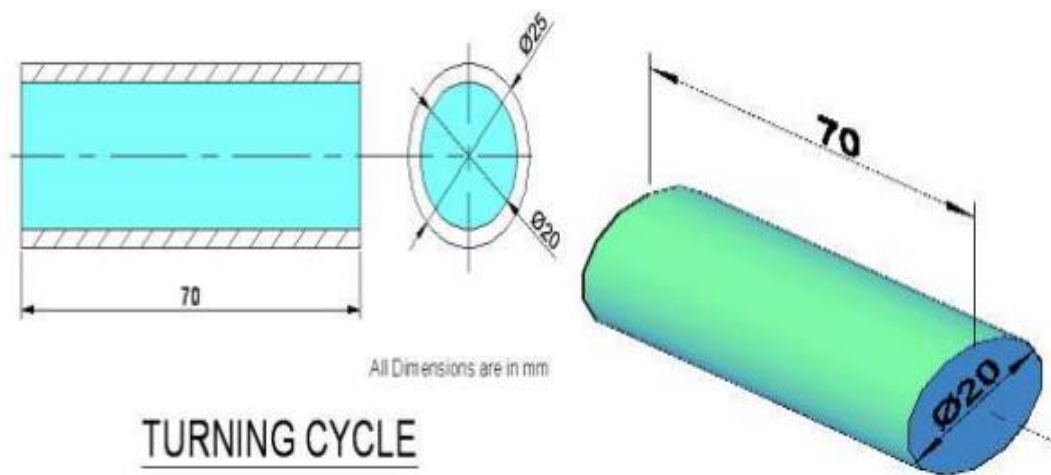
EXPERIMENT NO. 5

Title: Simulation of CNC Lathe operation (Turning and step turning cycle)

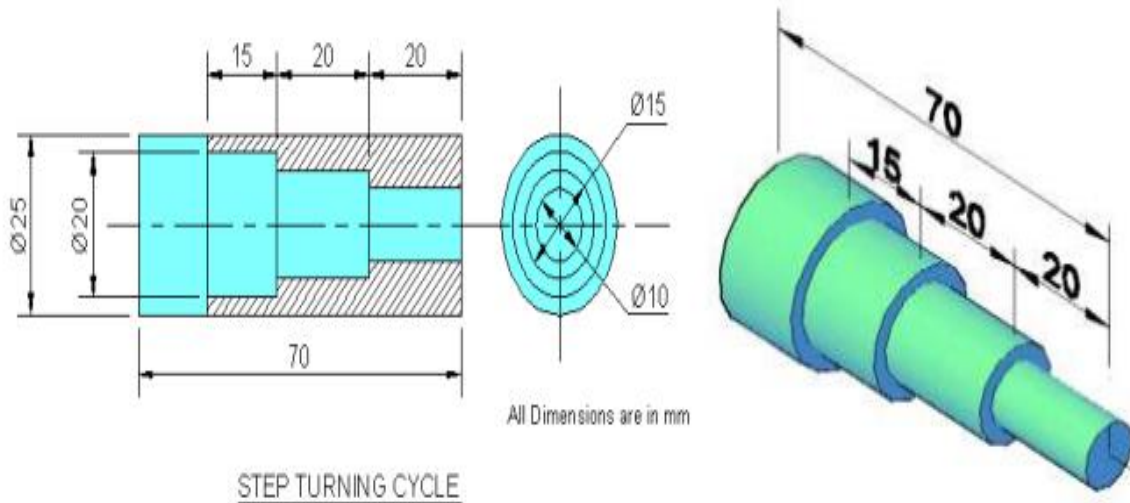
Objective: To translate the part program into actual working on CNC Lathe machine.

Details: write a program to obtain the turning cycle in the CNC lathe

Sketch.1



Sketch.2



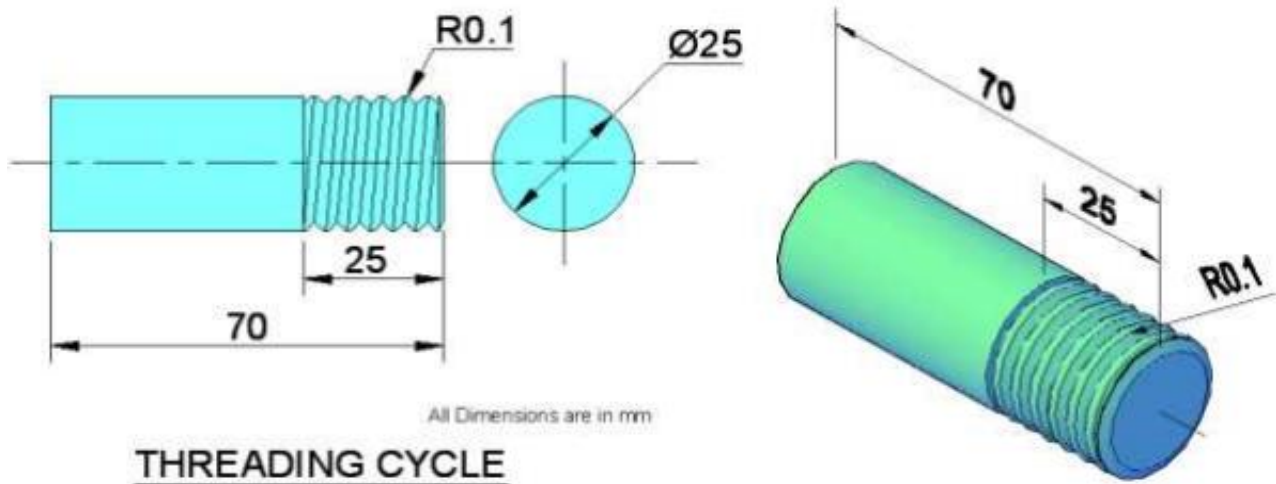
EXPERIMENT NO. 6

Title: Simulation of CNC Lathe operation (Threading and grooving cycle)

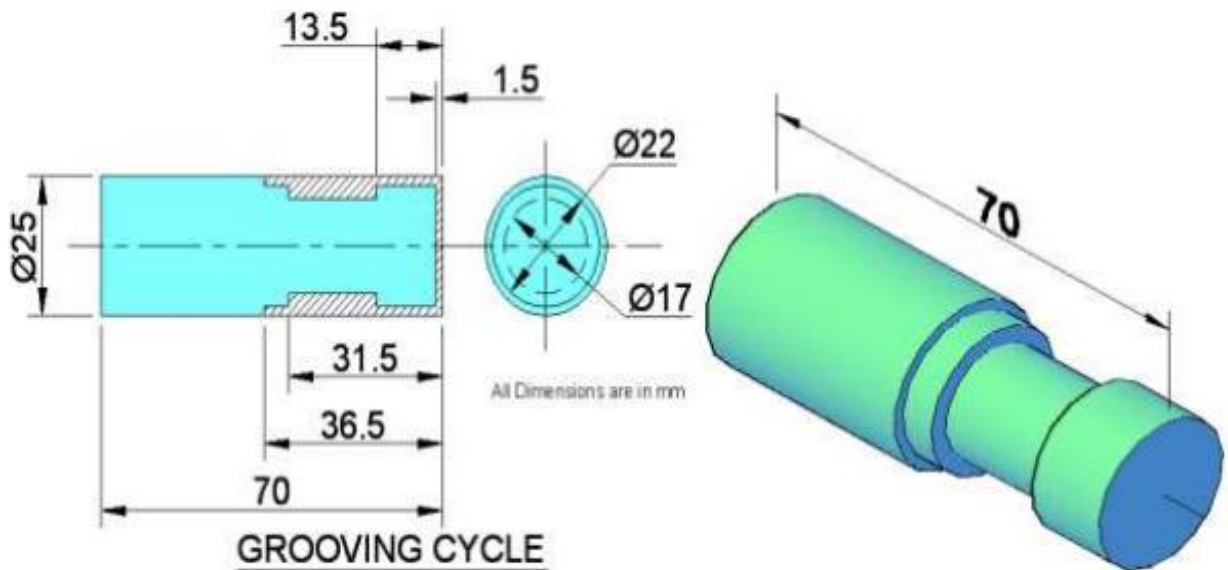
Objective: To translate the part program into actual working on CNC Lathe machine.

Details: write a program to obtain the threading and grooving cycle in the CNC lathe

Sketch.1



Sketch.2

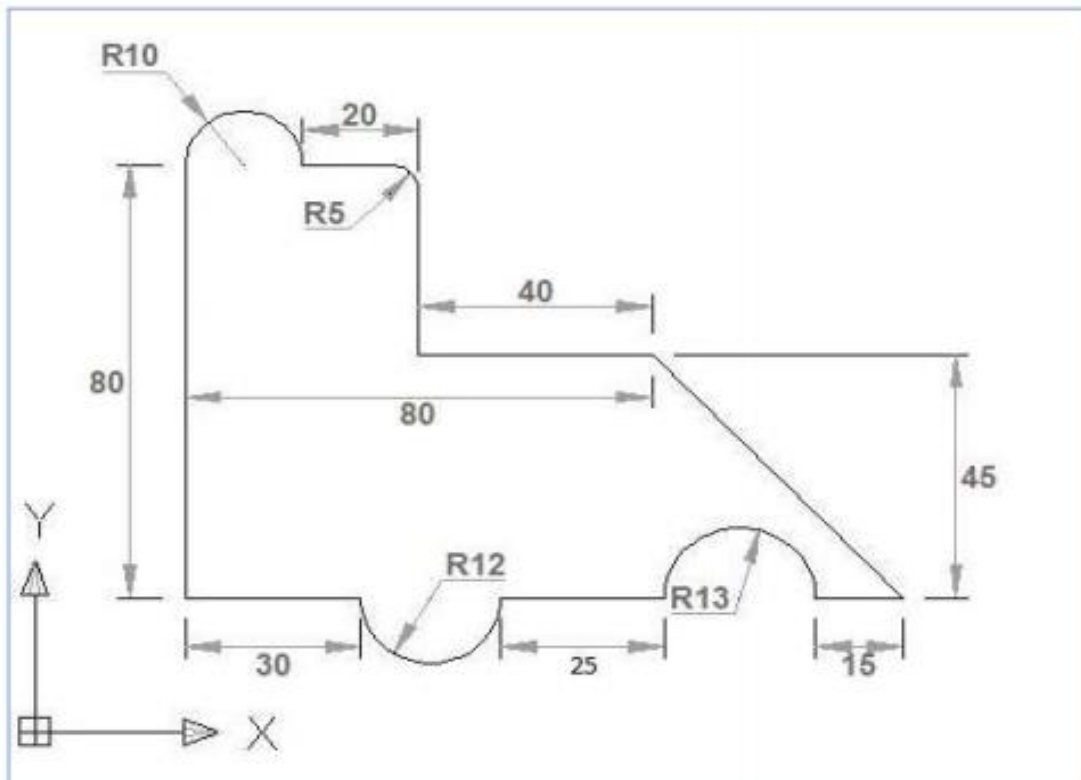


EXPERIMENT NO. 7

Title: Simulation of CNC milling operation (Linear and circular interpolation)

Objective: To write a program to obtain linear and circular interpolation on the given work piece.

Details:



LINEAR AND CIRCULAR INTERPOLATION

EXPERIMENT NO. 8

Title: Problems on Group Technology and Industrial case problems on coding

Objective: To provide information of Group Technology benefits of Group Technology

Details:

- Introduction to GT
- part families
- part classification and coding systems: OPITZ, PFA, FFA
- Cell design
- rank order clustering, composite part concepts

Questions:

1. Suppose that four machines, 1, 2, 3, and 4 have been identified as belonging in a GT machine cell. An analysis of 50 parts processed on these machines has been summarized in the From-To chart presented below. Additional information is that 50 parts enter the machine grouping at machine 3, 20 parts leave after processing at machine 1, and 30 parts leave after machine 4. Determine a logical machine arrangement using Hollier method. Draw the flow diagram indicating flow of parts into and out of the cells.

From-To Chart

	<i>To:</i>	1	2	3	4
<i>From:</i> 1		0	5	0	25
2		30	0	0	15
3		10	40	0	0
4		10	0	0	0

2. What is Part Family? List different methods used to make part families and explain each in brief.
3. List benefits of Group Technology
4. Explain concept of composite part in GT.

EXPERIMENT NO. 9

Title: Problems on Computer aided part programming and Industrial case problems

Objective: To provide information of Computer aided part programming

Details:

- Approaches to Process Planning,
- Different CAPP system
- application and benefits of CAPP

Questions:

1. What is CAPP? List various CAPP systems and explain any one in detail.

EXPERIMENT NO. 10

Title: Study of Flexible Manufacturing system

Objective: To provide information of Flexible Manufacturing system and need of FMS

Details:

- Introduction & Component of FMS
- Needs of FMS
- general FMS consideration
- Objectives, Types of flexibility and FMS
- Automated material handling system: Types and Application
- Automated Storage and Retrieval System
- Automated Guided Vehicles
- Cellular manufacturing
- Tool Management, Tool supply system, Tool Monitoring System

Questions:

1. Discuss need of FMS. List and explain different types of flexibilities with reference to FMS concept.
2. List component of AS/RS system. Explain function of each component in AS/RS. Discuss importance of AS/RS in FMS.

EXPERIMENT NO. 11

Title: Study of Robotics Technology

Objective: To get acquainted with modern industrial of Robotics and its applications apart from basics of robotics it gives complete ideas of usage of robots in hazardous conditions also

Details:

- Introduction to Cybernetics
- Robot Anatomy
- Joints and Links
- Common Robot configurations
- Drive System
- End Effectors
- Types of sensors
- Robot programming
- Reliability maintenance and safety of Robot
- Robot applications in manufacturing

Questions:

1. Select a Robot configuration for loading and unloading a part from CNC turning center and place it in a rack near to the machine. Draw neat sketch of the configuration and define degree of freedom of each joint. Assume suitable data as required. Also justify your selection over other options.
2. Describe the terms with reference to Robot: 1. Payload, 2. Work envelop, 3. Wrist motions: Roll, Pitch and Yaw

EXPERIMENT NO. 12

Title: Problems on MRP-I, MRP-II

Objective: To provide information of MRP-I, MRP-II. Just in Time philosophy: JIT and concepts of Expert System in Manufacturing and Management Information System

Details:

- Introduction to MRP
- Introduction to MRP-II
- Introduction to Just in time philosophy

Questions:

1. What is the objective of MRP 1? List its benefits.
2. Explain concept of JIT. List various advantages of JIT in manufacturing.
3. What is MRP-II? Differentiate MRP and MRP-II.
4. Product P is assembled out of 2 units of S1 and 1 unit of S2. Both S1 and S2 are subassemblies. S1 is made of 2 unit of C1 and 2 units of C3. S2 is made of 1 units of C1 and 2 unit of C2. Draw product tree structure diagram.