



Department of
MECHANICAL ENGINEERING

Zakura Campus Institute of Technology, University of Kashmir

No:F(schedule/workshop/DoME)/IoT/KU/25

Date: Mar 4, 2025

Two Week Hands-on Workshop titled
“Mastering Innovative CNC Machining Practices”

Detailed schedule of the topics/hands on practice to be covered in the CNC workshop.

Resource Persons:

1. Er. Satyanarain, *MSME-Technology Development Centre, Jaipur*
2. Er. Prabhakar Sahoo, *MSME-Technology Development Centre, Agra*

Module-1: Introduction to CNC Turning	
1.1	Understanding CNC Machines
1.1.1	Difference between conventional and CNC machines
1.1.2	Types of CNC machines (Lathe, Milling, etc.)
1.1.3	Components of a CNC lathe machine
1.2	Basics of CNC Turning
1.2.1	Definition and purpose of CNC turning
1.2.2	Axis configurations (X, Z, and C-axis in advanced machines)
1.2.3	Machine structure and tool post types
1.3	Safety in CNC Turning
1.3.1	Personal Protective Equipment (PPE)
1.3.2	Handling tools and workpieces safely
Module 2: CNC Machine Components and Operations	
2.1	CNC Lathe Machine Components
2.1.1	Headstock, Chuck, Tailstock, Bed, and Carriage
2.2.2	Control panel overview
2.2	Work Holding Methods
2.2.1	Three-jaw and four-jaw chucks
2.2.2	Collets and faceplates
2.2.3	Centers and fixtures
2.3	Cutting Tools for CNC Turning
2.3.1	Types of cutting tools (turning, facing, grooving, threading, etc.)
2.3.2	Tool materials (HSS, carbide, ceramic)
2.3.3	Tool nomenclature and selection
Module 3: CNC Programming Basics	
3.1	Introduction to CNC Programming
3.1.1	Types of CNC programming (Manual, Conversational, CAM-based)



Department of
MECHANICAL ENGINEERING

Zakura Campus **Institute of Technology, University of Kashmir**

3.1.2	Understanding G-codes and M-codes
3.1.3	CNC programming structure
3.2	Basic CNC Turning Programming
3.2.1	G-code structure for turning operations
3.2.2	Commonly used G-codes (G00, G01, G02, G03, etc.)
3.2.3	M-codes for machine control (M03, M05, M08, M30, etc.)
3.3	Tool Offsets and Workpiece Zero Setting
3.3.1	Tool length compensation
3.3.2	Work coordinate system (G54, G55, etc.)
3.3.3	Setting tool offsets on the CNC lathe
Module 4: CNC Turning Operations and Programming	
4.1	Basic Turning Operations
4.1.1	Facing, straight turning, and taper turning
4.1.2	Grooving, threading, and parting off
4.1.3	Boring and drilling on a CNC lathe
4.2	Writing CNC Programs for Basic Operations
4.2.1	Example program for facing and turning
4.2.2	Example program for grooving and threading
4.2.3	Example program for drilling and boring
4.3	Canned Cycles in CNC Turning
4.3.1	G71: Rough turning cycle
4.3.2	G72: Finishing cycle
4.3.4	G73: Peck drilling cycle
4.3.5	G76: Thread cutting cycle
Module 5: Advanced CNC Programming	
5.1	Subroutines and Macros
5.1.1	Using subprograms (M98/M99)
5.1.2	Parameters and variables in CNC programming
5.1.3	Looping and conditional statements
5.2	CNC Simulation and Debugging
5.2.1	Running programs in simulation mode
5.2.2	Identifying and correcting errors
5.2.3	Troubleshooting common CNC programming issues
5.3	Optimization and Efficiency
5.3.1	Cycle time reduction techniques
5.3.2	Tool path optimization
5.3.3	Reducing tool wear and improving surface finish
Module 6: Advanced CNC Programming	



Department of
MECHANICAL ENGINEERING

Zakura Campus **Institute of Technology, University of Kashmir**

6.1	Practical CNC Turning Exercises
6.1.1	Practice on a CNC simulator
6.1.2	Creating programs for real-world components
6.1.3	Running programs on an actual CNC lathe
6.2	Industrial Project Work
6.2.1	Programming and machining a complex part
6.2.2	Quality inspection of machined components
6.2.3	Final project assessment
6.3	Assessment and Certification
6.3.1	Multiple-choice and practical tests
6.3.2	Evaluation of CNC programs written by students
6.3.3	Certification upon successful completion

sd/-

Coordinator

Department of Mechanical Engineering