



COMPUTER NUMERICAL CONTROL PROGRAMMING

Programming & development

Course Curriculum

Basic – 16 Hours

COMPUTER NUMERICAL CONTROL PROGRAMMING

Module 1 : Introduction to CNC Programming

Introduction to CNC Programming

Basic principles of CNC operation

Module 2 : Installing the CNC Software

Environmental Setup of CNC

Module 3 : Introduction to CNC Technology

Explore the historical context and evolution of CNC Technology

Understand the fundamental principles behind CNC machining and its significance in modern manufacturing

Identify key applications and industries where CNC machining is commonly used

Module 4 : Coordinate systems

Understand the importance of machine and workpiece coordinates

Cartesian coordinate system and its application in CNC programming

Module 5 : CNC Machine Components

Study the major components of CNC machines

Controller

Motors

Tooling System

Function and operation of CNC machine parts

Module 6 : G-code Basics

Introduction to G-code

CNC program structure and syntax

Simple CNC programs

Module 7 : Toolpath Basics

Basic milling and turning operations

Creating simple toolpaths

Simulation and verification of toolpaths

Module 8 : CNC Machine Setup

Workpiece setup and fixturing

Selection and installation of cutting tools

Module 9 : Basic Machining Operations

Milling and turning operations

Introduction to drilling and tapping

Simple contouring and pocket milling

Module 10 : Advanced G-Code Programming

Detailed study of G-code commands

Writing more complex CNC programs

G-code programming for specific machining operations

Module 11 : Toolpath Optimization

Fine-tuning toolpaths for efficiency

Use of CAM software for optimized toolpaths

Module 12 : Multi-Axis Machining

Introduction to multi-axis machining concepts

Programming for 4-axis and 5-axis machines

Simultaneous and indexed machining

Module 13: Advanced Machining Operations

High-speed machining techniques

Thread milling and other advanced milling operations

Turning operations for complex geometries

Module 14: CNC Machine Features

Understanding and programming for advanced machine features

Tool changes and tool magazines

Module 15: Debugging

Identifying and resolving common CNC programming errors

Debugging toolpath issues

Module 16: Advanced CAM Software Features

Advanced features of CAM software

Custom post-processors

Module 17: Complex Machining Strategies

High-precision machining techniques

Machining composite materials

Module 18: Automation and Integration

Implementing automation in CNC Programming

Integration with other manufacturing systems

Module 19: Industry-Specific Applications

Understanding industry standards and requirements

Case studies and real-world applications

