KOENIG
step forward

KOENIG SOLUTIONS · COURSE OUTLINE

CNC & VMC Programming with Applications

Learn to programme, set up and maintain CNC and VMC machines, from G-codes and toolpaths to multi-axis machining.

10
MODULES

40
TOPICS

COURSE OVERVIEW

This course provides an in-depth understanding of CNC (Computer Numerical Control) and VMC (Vertical Machining Center) operations, programming, and applications. Participants will gain knowledge of CNC machine components, coordinate systems, G-codes, M-codes, and advanced machining techniques. The course covers fundamental and advanced programming concepts, CNC program execution, machine setup, maintenance, and real-world applications. By the end of this training, learners will be equipped with the necessary skills to operate and program CNC and VMC machines efficiently.

WHO THIS COURSE IS FOR

This course is designed for:

- **Manufacturing engineers and technicians**
- **CNC machine operators**
- **Mechanical and production engineers**
- **Tool and die makers**
- **Engineering students and professionals seeking to enhance their knowledge in CNC and VMC programming**

PREREQUISITES

- Basic understanding of machining and manufacturing processes
- Familiarity with engineering drawings and measurements
- Fundamental knowledge of computer operations

LEARNING OBJECTIVES

What You Will Learn

By the end of this course, participants will be able to:

- Understand the fundamentals of CNC and VMC machines and their role in modern manufacturing
- Identify CNC machine components, their functions, and the coordinate systems used in CNC programming
- Interpret and create basic CNC programs using G-codes and M-codes
- Apply advanced CNC programming techniques, including contouring, interpolation, and parametric programming
- Set up VMC machines, including workpiece clamping, tool selection, and tool offsets
- Develop 2D and 3D toolpaths and verify programs using simulation tools
- Implement high-speed machining techniques and multi-axis programming
- Perform routine maintenance and troubleshooting of CNC and VMC machines
- Analyze real-world applications and case studies to enhance industry readiness

COURSE SYLLABUS

10 Modules, 40 Topics

01

Introduction to CNC & VMC

TOPICS

- What is CNC?
- Understanding VMC (Vertical Machining Center)
- Advantages of CNC and VMC in Manufacturing
- CNC and VMC Applications in Different Industries

02

Basic CNC Concepts

TOPICS

CNC Machine Components and Their Functions · Coordinate Systems and Axis Configuration · Understanding G-codes and M-codes · Interpreting CNC Program Structure · CNC Program Execution and Monitoring

03

CNC Programming Fundamentals

TOPICS

- Writing Basic G-code Commands
- Tooling and Tool Compensation
- Introduction to CAM (Computer-Aided Manufacturing) Software
- Creating Simple CNC Programs Using CAM

04

CNC Programming Techniques

TOPICS

Contouring and Circular Interpolation · Drilling and Tapping Operations · Pocketing and Profiling Techniques · Thread Milling and Boring Operations · Introduction to Subprogramming

05

Advanced CNC Programming

TOPICS

- Parametric Programming
- Using Variables and Loops in CNC Programs
- Macro Programming for Increased Efficiency
- Customizing CNC Programs for Specific Applications

06

Introduction to VMC Setup

TOPICS

VMC Machine Setup and Workpiece Clamping · Tool Selection and Toolholders for VMC · Work and Tool Offsets for Precise Machining

07

VMC Programming Fundamentals

TOPICS

- Basics of VMC Programming
- Creating 2D and 3D Toolpaths
- Simulation and Verification of VMC Programs
- Error Handling and Troubleshooting in VMC Programming

08

Advanced VMC Programming

TOPICS

- High-Speed Machining Techniques
- Multi-Axis VMC Programming
- Using Probing and Sensor Integration
- Implementing Tool Changes and Automatic Tool Management

09

CNC and VMC Maintenance

TOPICS

Regular Machine Maintenance and Inspection · Lubrication and Coolant Systems · Troubleshooting Common CNC and VMC Issues · Safety Precautions and Best Practices

10

CNC & VMC Applications and Case Studies

TOPICS

- Real-World Applications of CNC and VMC
- Case Studies of Successful CNC and VMC Implementations
- Future Trends in CNC & VMC Technology

WHAT IS INCLUDED

Everything You Need to Succeed

- Koenig course material for every module
- Delivery by certified instructors and subject matter experts
- Hands-on exercises throughout the course
- Course completion certificate from Koenig

ABOUT KOENIG

Who We Are

Established in 1993, Koenig Solutions is a globally recognised training provider with 35+ technology partnerships, 5,000+ training programmes and a network of certified instructors and subject matter experts, supporting individuals and enterprise teams worldwide.

FLEXIBLE DELIVERY

Learn the Way That Suits You

Classroom Training | Live Online Classes (ILO) | Fly-Me-A-Trainer (FMAT) | Flexi (Self-Paced) | 1-on-1 Training

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