



Project No.
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المكتب الهندسي لخدمات التكنولوجيا والبرمجيات

Engineering office for Technology and Software Services



CNC Programming and Machining



Course Code: 2048-MECH

Main Branch: United building – E Shams –Front NBE
, El Siouf _Alexandria

Tel: 01102060500-01144470856



الفرع الرئيسي : عمارات المتحدة – عمارة عين شمس – امام البنك
الاهلي – السيوف- الاسكندرية

تليفون: 01102060500 - 01144470856

E-mail. adelramadan@eotss-academy.com
info@eotss-academy.com





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Introduction

This hands-on course covers the fundamentals of **CNC machining and programming**, providing participants with the skills to operate CNC machines efficiently and accurately. It is ideal for engineers, technicians, and students seeking practical knowledge in automated manufacturing.

Course Description

Participants will learn the principles of CNC systems, G-Code and M-Code programming, and how to set up, operate, and maintain CNC milling and turning machines. The course includes CAD/CAM integration and real-world machining projects.

Course Objectives

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

- Understand the working principles of CNC machines (milling, turning)
- Write and interpret **G-Code** and **M-Code** programs
- Set up CNC machines and select appropriate tools
- Use CAD/CAM software to design and generate tool paths
- Perform machining operations and evaluate part quality

Course Duration

- **Duration:** 4 Weeks
- **Sessions:** 12 (3 sessions/week)
- **Each Session:** 2 hours
- **Total Hours:** 24 Hours

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Course Content Overview

Week 1: Introduction to CNC & G-Code Programming

- CNC machine types and components
- Basic structure of G-Code programs
- Manual programming examples and simulation

Week 2: M-Code & Machine Setup

- Machine control using M-Codes (coolant, tool change, spindle control)
- Coordinate systems and tool offsets
- Workholding and machine safety

Week 3: CAD/CAM Integration

- Part design using CAD tools (Fusion 360, SolidWorks CAM)
- Generating CNC tool paths
- Post-processing and exporting G-code

Week 4: CNC Machine Operation and Maintenance

- Running CNC programs on milling and turning machines
- Monitoring machining operations and adjusting parameters
- Preventive maintenance and troubleshooting



Hands-on Projects

- **Project 1:** Write a G-Code program to machine a simple part
- **Project 2:** Design and manufacture a complex mechanical component using CAD/CAM and CNC

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Target Audience

- Manufacturing and Production Engineers
- CNC Operators and Technicians
- Mechanical Engineering Students
- Vocational Trainees in Machining Fields



Tools & Software

- CNC Milling and Lathe Machines
- Fusion 360 / SolidWorks CAM
- G-Code Simulators (NC Viewer, Mach3)



Learning Outcomes

Participants will gain:

- In-depth understanding of CNC programming and operations
- Practical experience in manufacturing precision parts
- Proficiency in CAD/CAM workflows
- Skills to troubleshoot CNC issues and perform routine maintenance



Certification

A Certificate of Completion will be awarded upon successful participation in all sessions and completion of hands-on projects.

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