

Mechatronics CNC Mill| Multimedia Courseware

Basic CNC Mill Programming - WX24950-AA02UEN-E1

Objective 2: Describe the Structure of a CNC Program

Sequential Execution

When a CNC machine's controller executes a part program, it executes one block at a time. The controller executes all commands in each block before moving to the next block.

Therefore, it is extremely important that the blocks of code in a program are organized in the order in which they should be executed.

Click here to see an example of sequential execution.

```
G00 X3.3733 Y-3.8805 Z-0.0174 J1.5212  
G01 M1000  
G02 M1002 P-2.4085 I1.217 J0.3127  
G03 M1004 P-2.4563 I-1.4085 J0.3042  
G04 M1000  
G05 M1002 P-1.5213 J0.  
G06 M1002  
G07 M1000 P-1.2036 I1.4085 J-0.3042  
G08 X3.3733  
G09 Z0.1727 P-0.0201 I-1.217 J-0.3127  
G10 X3.3733  
Y-3.8805  
Z0.1727 P-0.0201 I-0.8170 J1.5212  
G11 M1000  
G12 M1002 P-2.4085 I1.217 J0.3127  
G13 M1000  
G14 M1002 P-2.4563 I-1.4085 J0.3042
```

FD 20.0
SP 2448

This page is interactive. Click here to show the instructions.

Page 11 of 100

Mechatronics CNC Mill: M24950

This CNC mill eLearning course covers basic CNC programming, CNC mill safety, and the fundamentals of operating a CNC mill, as well as more advanced topics such as using a robot to load and unload parts and how to effectively integrate a CNC mill into a mechatronics line. Other topics include: linear interpolation; startup and shutdown blocks; tooling selection; locating zero; absolute and incremental positioning; and circular interpolation. From this building block, learners begin practicing industry-relevant CNC machine skills, like writing startup and shutdown block programming.

Mechatronics Learning

Amatrol's eLearning curriculum is unique in that it thoughtfully combines in-depth theoretical knowledge with practical, hands-on skills. This powerful combination of knowledge and skills solidifies understanding and creates a strong foundation for pursuing more advanced skills.

For example, the precision gauging eLearning course covers important topics, such as:

Introduction to CNC Programming

Learners begin with an introduction to CNC programming, including CNC mill simulation, safety, and operation. Individual lessons focus on topics like operation of a CNC mill, function of CNC mill programming software, steps for simulating a CNC mill program, nine basic CNC operation safety rules, and function of an end mill. Learners will also practice skills, such as identifying components of a CNC mill, entering and editing a CNC mill program using a text editor, simulating a CNC mill program, and determining the size and cutting direction of an end mill.

Basic CNC Mill Programming

Using Amatrol's CNC mill eLearning course, learners will study linear interpolation, startup and shutdown blocks, tooling selection, and locating zero. Individual lessons focus on topics like structure of a CNC program, function and operation of the inch and metric G-codes, two methods of selecting tool size, and three different techniques for locating the edge of a part. Learners will also practice skills, such as programming a CNC toolpath, designing a CNC

program using linear interpolation, selecting tooling, and creating a precision part using PRZ and tool offset measurements.

Circular Interpolation

In this module, learners will study various aspects and components of circular interpolation, including absolute and incremental positioning, program interpretation, and pausing CNC programs. Individual lessons focus on topics like operation of the absolute and incremental positioning methods, function of direct radius specification, interpreting a CNC program, and operation of the program stop M-code. Learners will also practice skills, such as converting coordinates between absolute and incremental positioning, programming a part path using circular interpolation, interpreting a CNC mill program that uses basic G- and M-codes, and designing a part that uses the program stop command.

Robot Workstation

Learners will conclude the CNC mill module by studying components of a robot workstation, including robot traverse axis, discrete robot communications, CNC machines discrete I/O, and CNC machine workcell. Individual lessons focus on topics like operation of a Servo robot traverse axis, how to interface a robot to solid-state discrete I/O, function of a CNC machine discrete I/O, and operation of CNC discrete I/O program commands. Learners will also practice skills, such as programming a robot that uses a Servo traverse axis, developing a robot discrete I/O interface wiring diagram, interfacing a robot with a CNC mill, and designing a CNC program to communicate to a robot via discrete I/O.

Multimedia

Amatrol's CNC Mill eLearning course curriculum features a highly-interactive multimedia format. Stunning 3D animations, videos, pictures, voiceovers of all text, and interactive quizzes and exercises bring learning to life. Amatrol's multimedia curriculum contains elements that will appeal to every learning style, keeping learners motivated and engaged.

Anytime, Anywhere Access Promotes Self-Paced Learning

In today's fast-paced, technology-driven world, it's more important than ever to extend the reach of industrial skill training beyond the borders of traditional classrooms. Amatrol's eLearning meets the challenge for flexibility by offering in-depth, comprehensive technical skills training via an intuitive, easy-to-use web-based Learning Management System (LMS).

With anytime, anywhere online access, Amatrol's eLearning allows learners to set their own pace at home, on the job, in a traditional class setting, or a blended approach of these options. Click here to learn more about [Amatrol's eLearning and LMS](#).

Address

**Amatrol
2400 Centennial Blvd
Jeffersonville, IN 47130**

Contacts

**email: contact@amatrol.com
phone: (800) 264 8285**