



Teaching with Fanuc Certified Education CNC Training On-Line Content

Thank you for deciding to use our on-line content to help you teach your CNC classes. We hope you find that it streamlines your teaching process, makes it easier for your students to learn CNC, and frees you up to spend more time with your students in your school's lab/shop.

Two CNC Classes

You can have your students access two classes:

- Machining Center Programming, Setup, and Operation
- Turning Center Programming, Setup, and Operation

Each is quite comprehensive, and we recommend that you have them take one class at a time to avoid confusion. Each class is self-contained, meaning it doesn't matter which class they take first.

Prerequisites include basic machining practice topics:

- Shop safety
- Shop math
- Blueprint reading
- Tolerance interpretation
- Measuring devices
- Machining operations performed on the type of machine being studied
- Cutting tools used to perform the machining operations

Post-requisites (classes commonly taken after these classes) include classes for computer aided manufacturing systems and advanced computer integrated manufacturing. These two CNC classes nicely fill the gap between the two.

Lesson plans for each class (separate documents) provide specific information about class-content, including what is covered in each lesson, suggestions for supplemental lectures and lab activities, tests and exercises, and approximate time to complete each lesson.

Getting Students into the On-Line Class

The initial purchase of Fanuc Certified Education CNC training includes a set of *access code coupons*.



On-Line Content Access Code Coupon

Use this access code to request access

Content: Machining Center Programming, Setup, & Oper. (OLC-MCPO)
Access code: **MCPO-1015**

To complete the registration for your on-line content, you must request access. You can do so on line at this location (case sensitive):

www.cncci.com/register

You will be required to enter your access code (given above), your name, your email address, and a log-in password. Please double check each.

Once you submit your request, please allow up to 24 hours for us to complete your registration (we do this during regular business hours). We will then send you a confirmation email that contains a link to the log-in page for your on-line content.

After you log in, you will see a list of activities that you'll use during your class. Generally speaking, you will simply go through them in the same order that they are provided. But your instructor may provide other instructions in this regard.

On-line content includes:

- Narrated presentations
- Reading material
- Tests
- Coordinate sheet exercises
- Programming activities

Access code coupons may be class specific (machining center or turning center). Distribute the access code coupons to your students. They will have access to the on-line content for the run time of your class (usually 16 weeks, a semester). Students will log-in to the registration page and provide an access code, name, email address, and password. We will complete the registration within two business days.

Student materials

When students log in to the class, they will be greeted with a Welcome Page showing folders containing classes for which they are registered:

Click the folder for the class you want to work on.

Work through the folders, and the activities within each folder, in the order shown. Simply launch activities you want to view.

Use the navigation links above (they will appear just below the yellow line) to back up a folder level. If you press your browser's back button, you will be brought back to this page.

Be sure to begin with the "Getting Started" activity in the Getting Started folder. It explains more about this eLearning system.

Title	Content Type	Duration	Status
CNC Machining Center Programming, Setup & Operation	Folder	04:02:24	In Progress (0 / 12)
CNC Turning Center Programming, Setup, & Operation	Folder	05:38:24	In Progress (0 / 12)

When they click on a folder, they are shown more folders containing major topics and Key Concepts:

Content List • CNC Machining Center Programming, Setup & Operation

CNC Machining Center Programming, Setup & Operation

Title	Content Type	Duration	Status
Communicate with your instructor	Folder	00:00:12	Not Started
Getting started - DO THESE ACTIVITIES FIRST!	Folder	00:03:14	In Progress (2 / 3)
Key Concept 1: Know Your machine from a programmer's viewpoint	Folder	01:38:02	In Progress (0 / 7)
Key Concept 2: Prepare to write programs	Folder	00:13:22	Not Started
Key Concept 3: You must understand the motion types	Folder	00:21:01	Not Started
Key Concept 4: You must understand compensation	Folder	01:14:18	Not Started
Key Concept 5: Create programs using a consistent structure	Folder	00:21:39	In Progress (0 / 2)

When they click on a Key Concept, they will be shown folders containing the lessons related to that Key Concept.

Content List • CNC Machining Center Programming, Setup & Operation • Key Concept 1: Know Your machine from a programmer's viewpoint

Key Concept 1: Know Your machine from a programmer's viewpoint

Title	Content Type	Duration	Status
Lesson 1.1: Machine configurations	Folder	00:16:58	In Progress (1 / 4)
Lesson 1.2: CNC job work flow	Folder	00:12:22	Not Started
Lesson 1.3: Visualizing CNC program execution	Folder	00:14:36	Not Started
Lesson 1.4: Understanding the workpiece coordinate system	Folder	00:20:18	Not Started
Lesson 1.5: Determining workpiece coordinate system offset values	Folder	00:12:01	Not Started
Lesson 1.6: Setting workpiece coordinate system offset values	Folder	00:03:17	Not Started
Lesson 1.7: Introduction to programming words	Folder	00:18:30	In Progress (1 / 4)

When they click on a lesson they will be shown the activities in that lesson:

Content List • CNC Machining Center Programming, Setup & Operation • Key Concept 1: Know Your machine from a programmer's viewpoint • Lesson 1.5: Determining workpiece coordinate system offset values

Lesson 1.5: Determining workpiece coordinate system offset values

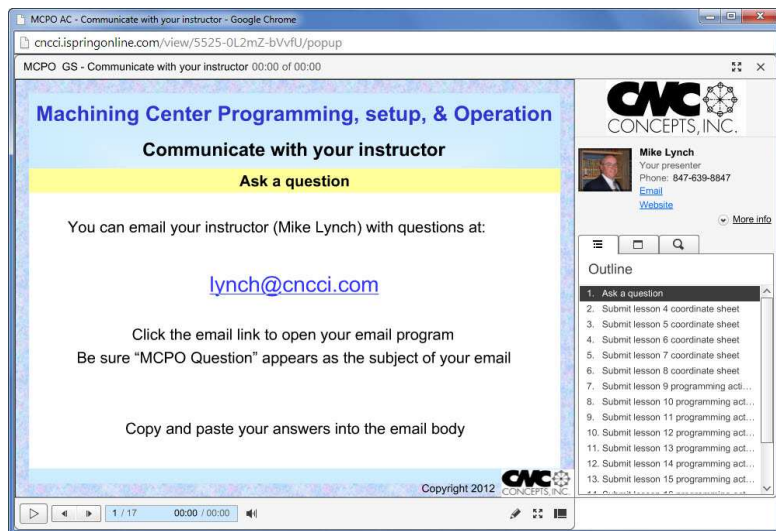
Title	Content Type	Duration	Status
FCTMCPO L1.5 Presentation Determining Workpiece Coordinate System Offset Values History	Presentation	00:12:01	Not Started
FCTMCPO L1.5 Reading Material Determining Workpiece Coordinate System Offset Values History	PDF	–	Not Started
FCTMCPO L1.5 Test Tests comprehension of determining workpiece coordinate system offset values. History	Quiz	–	Not Started
FCTMCPO L1.5 Understand coordinate calculations exercise Tests comprehension of coordinate calculations. History	PDF	–	Not Started

Activities include presentations, reading material, tests, coordinate sheet exercises and programming activities. Students simply click the "Launch" button to view/do an activity. When they complete an activity, it will disappear from the welcome (to-do) page, but will still be available (on the "completed" page).

Here are the on-line activities that students will be working on when they use our on-line CNC content.

“Communicate with your instructor” activity

This is the first activity in each class. It provides the student with a way to communicate with you – to ask a question or to submit a coordinate sheet exercise or programming activity. This activity provides a list of all the assignments contained in the course.



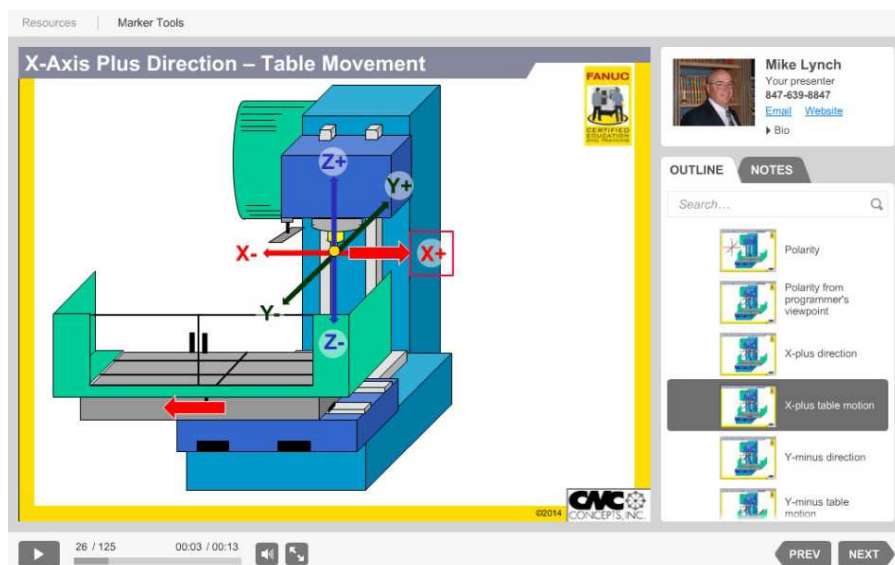
The student simply chooses the one they are submitting. If, for example, they are submitting the coordinate sheet exercise for lesson five, they click the appropriate link from the list. This will invoke their email software, select your email address as the recipient, use their email address as the sender, and place the class name and lesson number in the subject. They'll then paste the assignment in the email body and send it. When you receive it, you'll know exactly who sent it and what assignment is being submitted. You can easily respond (with a grade, answers, and comments) by replying to the email. We'll provide some suggestions for doing so when we describe the Instructor Materials a little later.

“Getting Started” activities

We provide a presentation that explains the eLearning system to help students get started. We then provide some other important information in the the Preface for the reading material.

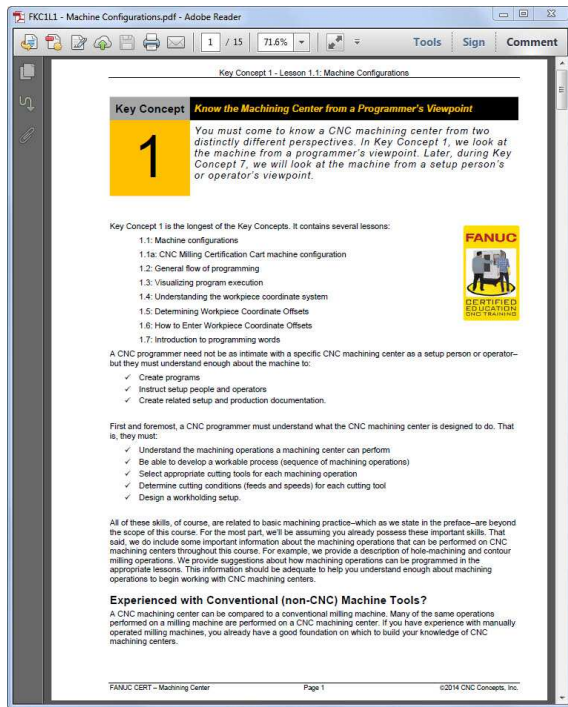
Presentations

Next comes the content for each lesson. Again, content includes presentations, reading materials, tests, and possibly coordinate sheet exercises or programming activities. Students learn by studying presentations and reading material. Presentations contain the same kind of information you would present in face-to-face lectures. They are very graphic and illustrative, played in an easy to control and use media player. Use the Lesson Plans for each class to see the list of topics covered in each lesson, the lesson objective, the main topics covered in each presentation, and the approximate time it will take students to complete each lesson. You can rest assured that all of the topics listed in “Key Points To Make For Each Topic” are well covered in the narrated presentations.



Reading material

Again, the second way we get material across to students is reading material. These are Adobe Acrobat (.pdf) files that can be downloaded, saved, and printed or viewed on a computer display. They contain exactly the same material that is included in our self-study manuals. Be sure students know they can save the the reading materials to have a permanent reference for the class.



Tests

We provide three ways to evaluate the students' understanding of presented material, tests, coordinate sheet exercises, and programming activities. Every lesson contains a test. Once the student has studied a lesson's presentation and reading material, they will take the test.

Question 4 of 16 ▾ Point Value: 10 | Total Points: 30 out of 160

For a vertical machining center, the motion direction for the X-axis is (when viewed from the front of the machine)

☐ the spindle rotation.

☐ fore/aft.

☐ left/right.

☐ up/down.

Submit

Results are automatically emailed to you (students will see their grades right away too). You'll record their grade in the grade book (we'll describe the grade book in Instructor Materials later). We recommend emailing them a confirmation of your receipt as well as complete results. Doing so is easy. Simply respond to the test results email – it has the student set up as the sender so your response will go to the student taking the test. And it will contain complete results - every question, whether the student got it right, and correct answers.

Coordinate sheet exercises

Programming-related classes contain a coordinate sheet exercises and programming activities. Like reading material, these are .pdf files that students can print (it allows them to write down their answers). When their finished, they can either turn them in to you or you can have students type answers into the .pdf file (it contains form fields), and save it. Again, the “Communicate with your instructor” activity makes it easy for them to submit assignments. If they saved the .pdf file containing their answers, they can simply attach it to the submission email.

To help with grading, we have provided answers (that we describe in Instructor Materials later). In essence, you’ll be pasting their submission into a template Word file that contains the answers. Then you can check provided answers against the answers we’ve given in the Word file and provide a grade. A place is provided in the template Word file make comments should you need to do so. The word file can then be copied and pasted into a reply email to the student. Don’t forget to record the student’s grade in the Excel grade book (discussed in Instructor Materials later).

Lesson 10 Tests comprehension of motion types

Name: _____ Date: _____ Score: _____

Instructions: First use the points to come up with the coordinates going into the program by filling in the coordinate sheet. This ring has been machined on a turning center and only the milling and drilling operations must be done. For the Ø.75 diameter end mill, use a rapid approach position 0.1 inch away from the work surface for all positions. Note that many of these points require that you do some trig, measuring you can use the trig chart shown on page ten of the lesson five text to help.

Second, study the process to confirm that you understand what the program will be doing. Third, fill in the blanks in the program with the appropriate G codes, spindle speeds, feedrates, and tool positions. This exercise stresses the value skills in programming activity number one.

Diagram: A circular workpiece with a diameter of 1.00 inch. It has a central hole of diameter 0.25 inches. The workpiece is divided into 8 equal segments. The points for the holes are labeled as follows: Point 1 (Ø.75), Point 2 (Ø.75), Point 3 (Ø.75), Point 4 (Ø.75), Point 5 (Ø.75), Point 6 (Ø.75), Point 7 (Ø.75), and Point 8 (Ø.75). The distance from the center to the edge of the workpiece is 0.50 inches. The distance from the center to the edge of the central hole is 0.125 inches.

Coordinate sheet:

#	X	Y	Z
1			
2			
3			
4			
5			
6			

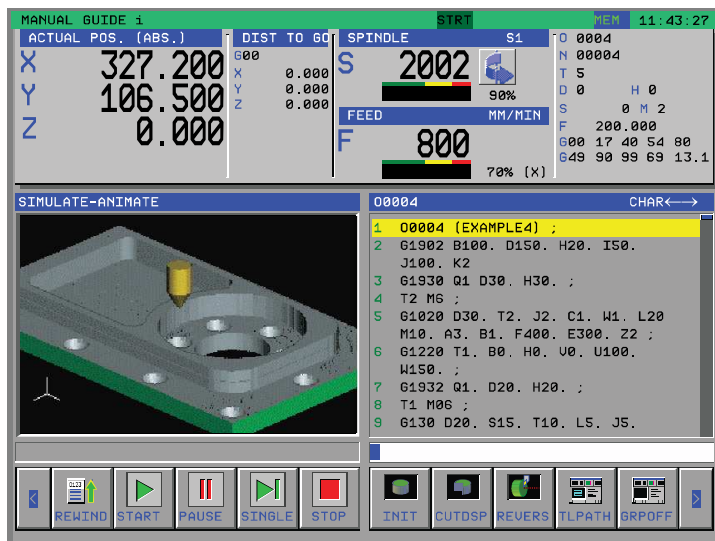
Process:

Seq	Operation description	Tool	Spindle Speed	Feedrate
1	Milling (end mill) (one pass each)	Ø.75 end mill	1000 rpm	4.5 ipm
2	Center drill (1) holes	#1 center drill	2000 rpm	5.0 ipm
3	Drill (1) Ø.25 holes	Ø.25 drill	1200 rpm	6.1 ipm

Page 1

Programming activities

Like coordinate sheet exercises, programming activities are provided in .pdf files that students will print (again, they must write down their answers). Once they are finished, have them use NC Guide to enter and verify the program. Since there are eleven programming activities in this class, they will get plenty of practice entering, modifying, and verifying programs with a Fanuc control.



Grading programming activities is the same as grading coordinate sheet exercises. Again, students will print and write on each programming activity, and hopefully using NC Guide to verify them. When finished, have them email the program file to you or send you a screen shot from NC Guide (again, they should use the “Communicate with your instructor” activity). Typing and verifying programs exposes any bad typing tendencies students may have, like typing a capital letter oh instead of a number zero. You’ll paste their answer program in a reply, provide a grade (and record it in the grade book), make any necessary comments to the student, and email it back to them. Again, this is much responding to like coordinate sheet exercises.

Instructor materials

We’ve already mentioned many of these materials. Here we describe them in greater detail.

List of all activities

A list of activities for each of our on-line CNC classes is provided at the end of this document. This provides you with a comprehensive outline of the class and will help you choose content you want students to view.

Lesson Plans manual

This manual provides you with detailed information about what is presented in each lesson. For each lesson, we present the objective for the lesson and a list of topics that will be covered, so you’ll know exactly what students will be learning. Should you come across a topic that you don’t want students to view, simply let them know. They can easily skip it when they view the presentation and read the reading material. You can rest assured that all of the “Key points to make for each topic” are well covered in the presentations and reading material.

Though it’s not part of our on-line CNC content, the Lesson Plans manual also includes suggestions for what you can be doing in your lab/shop to emphasize and demonstrate what has been learned in each lesson. We also show examples of homework exercises.

Finally, we provide approximate study times for each activity related to each lesson. Times are based on students with moderate aptitude for learning CNC and average reading skills.

Answers to coordinate sheet exercises and programming activities

These are a series of Microsoft Word documents. They are templates that will help you grade assignments and respond to students. With these templates, you can easily provide their grade, any comments you need to make about their work, and you can include a complete set of correct answers. Here is an example for a coordinate sheet exercise:

Dear Student,

I have graded this assignment for the Machining Center Programming, Setup, and Operation class. You have scored ____%. If any of your answers are incorrect, I have stated such and provided correct answers below for comparison.

If you have questions or need further assistance, please respond to this email with your question.

Comments on your work:

Enter your comments here.

Your answers:

Paste the student's submission here.

Answers to coordinate sheet exercise:

#	X	Y
1	0.375	0.375
2	1.0	0.375
3	3.625	0.375
4	3.625	2.625
5	3.0	2.625
6	0.375	2.625
7	2.0	1.5

Explanation: Notice that all of these coordinates are specified from one central location – the lower-left corner of the drawing. Some do require arithmetic to calculate, but all coordinates are calculated from the same place – again, the lower-left corner.

Again, a complete set answer templates is provided for each class. When a student submits an assignment (again, using the “Communicate with your instructor” activity), you will receive an email containing their submission. Their name and email address will be shown as the sender. The activity and lesson number will be provided in the subject. And the exercise itself will be in the body. If, for example, the student is submitting the coordinate sheet exercise for lesson 1.4 (above), *FCTMCPO L1.4 – Coordinate Sheet Exercise* will appear in the subject for the email.

To grade the submission:

- 1) Call up the template file in Word. File names match lesson numbers, so they're easy to find.
- 2) Copy the submission from the email and paste it into the template file.
- 3) Compare the student's answers to those we have provided.
- 4) Make any needed corrections and comments.
- 5) Determine a grade (I use a general percentage of correct answers) and type it into the blank space provided.
- 6) Highlight the entire text in the Word file (Control C with Windows systems). DON'T save it or you'll lose the “template” form.
- 7) Use the Reply function of your email software to reply to the student's submission email.
- 8) Paste the text into the submission email body.
- 9) Send it to the student.
- 10) Don't forget to record the student's grade in the Excel grade book.

While the procedure may sound a bit complicated, the time it takes after a bit of practice (not including grading) is less than a minute. If students are using NC Guide to enter and verify their programs, grading should be quite easy, especially if you have them submit a screen shot from NC Guide. If you prefer some other method of grading or recording grades, of course, feel free to use it.

Grade book

You may already have a way to record/track your students' progress. But we have provided a simple Microsoft Excel file for each class to help with this task. It has been formatted with the correct number of lessons. And there is an appropriate registers to enter grades for all tests, coordinate sheet exercises, and programming activities. When students complete a class, you will be shown a final (percentage) grade for each student.

[illegible]

Navigating the eLearning system

We have provided you with an on-line access account that does not expire. You can access the same content that students see. If students have any problems with the system, this will prepare you help them. The list of lesson activities at the end of this document is taken from a student account.

Be sure to view the on-line content so that you know what students are doing. If you feel at all weak in your CNC skills, of course, or if you feel weaker with one machine type than the other, you can use this content to improve your understanding of CNC.

Instructor access

You will also have the ability to track your students' progress. There may be other things you will have access to (like entering new students into the system), but it is not our intention for you to use these functions. Again, please limit your instructor access use to monitoring student progress.

When you log in, you will notice a series of blue tabs at the top of the page. The “Content” tab will be highlighted, meaning you will be able to see ALL of the content provided on the eLearning platform. Feel free to look through anything you wish, but there is nothing of importance in content that helps you monitor students.

Please limit your use of instructor access to “Users” and “Reports”. Indeed almost everything you’ll need to see is shown in “Users”. When you click the “Users” tab, you will see a list of students in your classes. If you click on the student’s name or “Edit User”, you’ll see the data I entered when I registered them for your class. More importantly, if you click on “View Activity Report”, you will see a history (for the period selected) of the student’s progress. This includes test scores and lesson activities viewed.

Please be careful on this page. You have full access at this point, meaning if you select the student (with the check box) and click delete, you will delete the student from the class. Also, you do have access to adding students with the “Users” tab. But please contact us if you need to add a student to your classes.

Assigning activities and allowing time for work

The activity lists below (one for machining centers and the other for turning centers) show all of the activities in each class. We show them below in precisely the same order they show up in the virtual classroom. The list is in outline form, providing the names and numbers for each Key Concept and Lesson. This should make it easier for you to specify to students what it is you want them to work on – during class and/or as homework.

Notice that presentation times are provided for each lesson presentation, but even more time-related information is provided in the lesson plans. You can approximate how long students will be viewing the presentations given in each lesson.

Filtering content

Also notice the naming structure for each activity. All activities in the machining center content begin with FCTMCPO. In the turning center content they begin with FCTTCPO. If a student is registered for both sets of content, this starter makes it to filter the content, showing only the content they are interested in. If for example, students type *FCTMCPO* in the filter, only the machining center content will be available. To further filter, they can type *FCTMCPO L1.5* to see only the machining center content related to lesson five.

Activities in the Machining Center Programming, Setup, and Operation class

Accessories:

FCTMCPO AC - Communicate with your instructor
Ask questions, submit assignments, etc.

Getting started:

FCTMCPO GS - Getting started presentation
How to work through this class
FCTMCPO GS - Preface to reading material
Introduction to content for this class.

Key Concept number one

FCTMCPO L1.1 – Presentation (14:36)
Machine configurations
FCTMCPO L1.1 - Reading material
Machine configurations
FCTMCPO L1.1 - Test
Machine configurations. 16 questions.

FCTMCPO L1.2 – Presentation (11:26)
Flow of the CNC process
FCTMCPO L1.2 - Reading material
Flow of the CNC process
FCTMCPO L1.2 - Test
Flow of the CNC process. 10 questions.

FCTMCPO L1.3 – Presentation (11:25)
Visualizing CNC program execution
FCTMCPO L1.3 - Reading material
Visualizing the execution of a CNC program
FCTMCPO L1.3 - Test
Visualizing the execution of a CNC program. 10 questions.

FCTMCPO L1.4 – Presentation (17:18)
Understanding program zero
FCTMCPO L1.4 - Reading material

Program zero and the rectangular coordinate system

FCTMCPO L1.4 - Test

Understanding program zero. 15 questions.

FCTMCPO L1.4 - Understand coordinate calculations assignment

Fill in the coordinate sheet

FCTMCPO L1.5 – Presentation (10:46)

Determining program zero assignment values

FCTMCPO L1.5 - Reading material

Determining program zero assignment values

FCTMCPO L1.5 – Test

Determining program zero assignment values. 8 questions.

FCTMCPO L1.5 - Understand coordinate calculations assignment

FCTMCPO L1.6 – Presentation (06:00)

The two ways to assign program zero

FCTMCPO L1.6 - Reading material

Assigning program zero

FCTMCPO L1.6 - Test

The two ways to assign program zero. 12 questions.

FCTMCPO L1.6 - Understanding coordinates assignment

Fill in the coordinate sheet

FCTMCPO L1.7 – Presentation (17:15)

Introduction to programming words

FCTMCPO L1.7 - Reading material

Introduction to programming words

FCTMCPO L1.7 - Test

Introduction to programming words. 15 questions.

FCTMCPO L1.7 - Understanding coordinates assignment

Fill in the coordinate sheet

Key Concept number two

FCTMCPO L2.1 – Presentation (10:16)

The importance of preparation

FCTMCPO L2.1 - Reading material

Preparation for programming

FCTMCPO L2.1 - Test

Introduction to programming words. 12 questions.

FCTMCPO L2.1 - Understanding coordinates assignment

Fill in the coordinate sheet

Key Concept number three

FCTMCPO L3.1 - Presentation part 1 (10:32)

Programming the motion types - Understanding interpolation, motion commonalities, point programmed

FCTMCPO L3.1 - Presentation part 2 (08:01)

The three basis motion types - Rapid motion, linear motion

FCTMCPO L3.1 - Presentation part 3 (05:09)

The three basis motion types

FCTMCPO L3.1 - Reading material

Three basic motion types

FCTMCPO L3.1 - Test

Three basic motion types. 24 questions

FCTMCPO L3.1 - vProgramming activity

Tests comprehension of motion types

Key Concept number four

FCTMCPO L4.1 – Presentation (10:09)
Introduction to compensation

FCTMCPO L4.1 - Reading material
Introduction to compensation

FCTMCPO L4.1 – Test
Introduction to compensation

FCTMCPO L4.2 - vProgramming activity
Tests comprehension of motion types

FCTMCPO L4.2 – Presentation (15:56)
Tool length compensation

FCTMCPO L4.2 - Reading material
Tool length compensation

FCTMCPO L4.2 - Test
Tool length compensation. 25 questions.

FCTMCPO L4.2 - vProgramming activity
Tool length compensation

FCTMCPO L4.3 - Presentation part 1 (10:30)
Cutter radius compensation

FCTMCPO L4.3 - Presentation part 2 (11:55)
Cutter radius compensation

FCTMCPO L4.3 - Reading material
Cutter radius compensation

FCTMCPO L4.3 - Test
Cutter radius compensation. 21 questions.

FCTMCPO L4.3 - vProgramming activity
Cutter radius compensation

FCTMCPO L4.4 – Presentation (11:53)
Fixture offsets

FCTMCPO L4.4 - Reading material
Fixture offsets

FCTMCPO L4.4- Test
Fixture offsets. 12 questions.

FCTMCPO L4.4- vProgramming activity
Fixture offsets

Key Concept number five

FCTMCPO L5.1 – Presentation (5:55)
Introduction to program formatting

FCTMCPO L5.1 - Reading material
Introduction to program formatting

FCTMCPO L5.1 - Test
Introduction to program formatting. 11 questions.

FCTMCPO L5.1 - vProgramming activity
Introduction to program formatting

FCTMCPO L5.2 – Presentation (11:48)
Four kinds of program format

FCTMCPO L5.2 - Reading material
Four kinds of program format

FCTMCPO L5.2 - Test
Four kinds of program format. 10 questions.

FCTMCPO L5.2 - vProgramming activity

Four kinds of program format

Key Concept number six

FCTMCPO L6.1– Presentation (10:56)

Hole machining canned cycles

FCTMCPO L6.1- Reading material

Hole machining canned cycles

FCTMCPO L6.1- Test

Hole machining canned cycles. 18 questions.

FCTMCPO L6.1- vProgramming activity

Hole machining canned cycles

FCTMCPO L6.2 – Presentation (08:49)

Sub programming techniques

FCTMCPO L6.2 - Reading material

Sub-programming techniques

FCTMCPO L6.2 - Test

Sub-programming techniques. 10 questions.

FCTMCPO L6.2 - vProgramming activity

Sub-programming

FCTMCPO L6.3 – Presentation (17:50)

Other special programming features

FCTMCPO L6.3 - Reading material

Other special programming features

FCTMCPO L6.3 - Test

Other special programming features. 20 questions.

FCTMCPO L6.3 - vProgramming activity

Special programming features

FCTMCPO L6.4 – Presentation (06:50)

Rotary device programming

FCTMCPO L6.4 - Reading material

Rotary device programming

FCTMCPO L6.4 - Test

Rotary device programming. 14 questions.

FCTMCPO L6.4 - vProgramming activity

Rotary device programming

Key Concept number seven

FCTMCPO L7.1 – Presentation (07:08)

Tasks related to setup and the production run

FCTMCPO L7.1 - Reading material

Setup versus production running tasks

FCTMCPO L7.1 - Test

Tasks related to setup and maintaining production - 18 questions.

FCTMCPO L7.2 – Presentation (18:09)

Buttons and switches on the operation panels

FCTMCPO L7.2 - Reading material

Buttons and switches on the operation panels

FCTMCPO L7.2 - Test

Buttons and switches. 20 questions.

Key Concept number eight

FCTMCPO L8.1 – Presentation (08:45)

Three modes of operation

FCTMCPO L8.1 - Reading material

The three basic modes of operation

FCTMCPO L8.1 - Test

The three modes of operation. 10 questions.

Key Concept number nine

FCTMCPO L9.1 - Presentation Part 1 (06:59)

The key operation procedures - Manual procedures

FCTMCPO L9.1 - Presentation Part 2 (07:07)

The key operation procedures - MDI procedures

FCTMCPO L9.1 - Presentation Part 3 (08:34)

Key operation procedures, part three - Setup procedures

FCTMCPO L9.1 - Presentation Part 4 (07:03_

Key operation procedures - program editing

FCTMCPO L9.1 - Presentation Part 5 (05:19)

Key operation procedures - Program running procedures

FCTMCPO L9.1 - Reading material

Importance of procedures

FCTMCPO L9.1 – Test

Key operation procedures

Key Concept number ten

FCTMCPO L10.1 - Presentation part 1 (10:04)

Safely verifying and running CNC programs

FCTMCPO L10.1 - Presentation part 2 (05:18)

Safely verifying and running programs

FCTMCPO L10.1 - Reading material

Program verification

FCTMCPO L10.1 - Test

Safely verifying and running programs - 12 questions.

Total time for presentations: approximately 5 hours, 31 minutes (More specific time-related information is provided in the lesson plans.)

Similar activities are provided for the twenty-eight lessons in the Turning Center Programming, Setup, and Operation class, though they all start with FCTTCPO