Instructions for teaching with our on-line content

Thank you for deciding to use our on-line CNC content to help you teach your CNC classes. We hope you find that it streamlines your teaching process and makes it easier for your students to learn CNC.

Student materials

Here are the 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 – I'll show how in the Instructor Materials later) by simply replying to the email.

"Getting Started" activities

Starting from the second activity in each class, we provide a presentation that explains the eLearning system to help students get started. We then provide some other helpful information, including the Preface for the reading material, a cover sheet for the manual (assuming students print all reading materials), and a quick reference sheet for the most popular CNC words.

Narrated presentations

Next comes the content for each lesson. And our on-line content is very comprehensive. To get material across to students, we use includes narrated presentations and reading material. The presentations contain the same kind of material that you would normally have to present in your lectures. Use the Lesson Plans manual for each class to see the list of topics covered, the lesson objective, and a synopsis of what is included in each presentation. 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

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.

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 the presentation and reading material (or when you tell them to do so), they will take the test. Results are automatically emailed to you (they will see the results right away too). You'll record their grade in the grade book (I'll describe the grade book in Instructor Materials later). And 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.)

Coordinate sheet exercises

Programming-related classes contain a coordinate sheet exercises and programming activities. Like reading material, these are .pdf files that students will print (they'll have to write down their answers). When their finished, they can either turn them in to you – or better yet – you can have students type them and send them

to you in emails. Again, the "Communicate with your instructor" activity makes it easy for them to submit assignments. To help with grading, we have provided answers (that I'll 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).

Programming activities

Grading programming activities is identical to grading coordinate sheet exercises. Again, students will print and write on each programming activity. We urge you to then have students actually type their programs and email them to you (again, using the "Communicate with your instructor" activity). This exposes any bad typing tendencies they may have, like typing a capital letter oh instead of a number zero. Also, with the program typed out in an email, you can copy and paste it into any tool path plotter (like NCPlot) to check it. You'll paste their answer program in the answer file, provide a grade (and record it in the grade book), make any necessary comments to the student, and email it back to them. Again, just like coordinate sheet exercises.

Wrapping up presentation

After the last lesson activity, we provide one more presentation, thanking students for their participation and wishing them well with what they've learned.

Instructor materials

We've already mentioned most of these materials. Here we describe them in further detail.

List of all activities (including presentation time)

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 – or not to view. Notice that the time for each presentation is provided so you can judge how long students will take to view them.

Lesson Plans manual

This manual provides you with detailed information about what is presented in each lesson. Note that it was created for use with our CNC curriculums – to help instructors present lectures. So the times given in the Lesson Plans manual are for live lectures, which of course, take longer than our narrated presentations (the narrated presentations don't include reviews or time spent answering questions).

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.

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 the classes you are teaching. 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 four (above), *MCPO L4 – Coordinate Sheet Exercise* will appear in the subject for the email.

To grade the submission:

1) Call up the template file in Word.
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 you prefer some other method of grading, 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.

Navigating the eLearning system

We have provided you with two user accounts, one for student access and the other for instructor access. Use the student account to see exactly what your students will see. If they 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. With student access, you can only view lesson activities.

Student access

We provide a description of the eLearning system, and how to navigate it in the "Getting Started" presentation (the second lesson activity for each class). Please view this presentation to get acquainted with the system.

Instructor access

With instructor access, you will also have the ability to track your students' progress. There are 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, so you can approximate how long students will be viewing the presentations given in each lesson. Note that this does not consider the time it takes to read the reading materials, take the tests, or complete the coordinate sheet exercises and programming activities.

Filtering content

Also notice the naming structure for each activity. All activities in the machining center content begin with MCPO. In the turning center content they begin with TCPO. If a student is registered for both sets of content, this make it to filter the content, showing only the content they are interested in. If for example, they type MCPO in the filter, only the machining center content will be available. To further filter, they can type MCPO L5 to see only the machining center content related to lesson five. Beginning with lesson ten, they must type Lsn10, Lsn11, and so on. Again, filtering limits the amount of content that will be displayed.

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

Accessories:

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

Getting started:

MCPO GS - Getting started presentation
How to work through this class

MCPO GS - Manual cover and quick reference sheets
Manual cover and quick reference sheets

MCPO GS - Preface to reading material
Introduction to content for this class.

Key Concept number one

MCPO L1 - Key Concept number one presentation (1:00)
Know your machine from a programmer's viewpoint

MCPO L1 – Presentation (14:36)
Machine configurations

MCPO L1 - Reading material
Machine configurations

MCPO L1 - Test
Machine configurations. 16 questions.

MCPO L2 – Presentation (11:26)
Flow of the CNC process

MCPO L2 - Reading material
Flow of the CNC process

MCPO L2 - Test
Flow of the CNC process. 10 questions.

MCPO L3 – Presentation (11:25)
Visualizing CNC program execution

MCPO L3 - Reading material
Visualizing the execution of a CNC program

MCPO L3 - Test
Visualizing the execution of a CNC program. 10 questions.

MCPO L4 – Presentation (17:18)
Understanding program zero

MCPO L4 - Reading material
Program zero and the rectangular coordinate system

MCPO L4 - Test
Understanding program zero. 15 questions.

MCPO L4 - Understand coordinate calculations assignment
Fill in the coordinate sheet

MCPO L5 – Presentation (10:46)

Determining program zero assignment values

MCPO L5 - Reading material
Determining program zero assignment values

MCPO L5 – Test
Determining program zero assignment values. 8 questions.

MCPO L5 - Understand coordinate calculations assignment

MCPO L6 – Presentation (06:00)
The two ways to assign program zero

MCPO L6 - Reading material
Assigning program zero

MCPO L6 - Test
The two ways to assign program zero. 12 questions.

MCPO L6 - Understanding coordinates assignment
Fill in the coordinate sheet

MCPO L7 – Presentation (17:15)
Introduction to programming words

MCPO L7 - Reading material
Introduction to programming words

MCPO L7 - Test
Introduction to programming words. 15 questions.

MCPO L7 - Understanding coordinates assignment
Fill in the coordinate sheet

Key Concept number two

MCPO L8 - Key Concept number two presentation
Preparation for programming

MCPO L8 – Presentation (10:16)
The importance of preparation

MCPO L8 - Reading material
Preparation for programming

MCPO L8 - Test
Introduction to programming words. 12 questions.

MCPO L8 - Understaning coordinates assignment
Fill in the coordinate sheet

Key Concept number three

MCPO L9 - Key Concept number three presentation
You must understand the three basic motion types.

MCPO L9 - Presentation part 1 (10:32)
Programming the motion types - Understanding interpolation, motion commonalities, point programmed

MCPO L9 - Presentation part 2 (08:01)
The three basis motion types - Rapid motion, linear motion

MCPO L9 - Presentation part 3 (05:09)
The three basis motion types

MCPO L9 - Reading material
Three basic motion types

MCPO L9 - Test
Three basic motion types. 24 questions

MCPO L9 - vProgramming activity
Tests comprehension of motion types

Key Concept number four

MCPO Lsn10 - Key Concept number four presentation
You must understand the compensation types

MCPO Lsn10 – Presentation (10:09)
Introduction to compensation

MCPO Lsn10 - Reading material
Introduction to compensation

MCPO Lsn10 – Test
Introduction to compensation

MCPO Lsn10 - vProgramming activity
Tests comprehension of motion types

MCPO Lsn11 – Presentation (15:56)
Tool length compensation

MCPO Lsn11 - Reading material
Tool length compensation

MCPO Lsn11 - Test
Tool length compensation. 25 questions.

MCPO Lsn11 - vProgramming activity
Tool length compensation

MCPO Lsn12 - Presentation part 1 (10:30)
Cutter radius compensation

MCPO Lsn12 - Presentation part 2 (11:55)
Cutter radius compensation

MCPO Lsn12 - Reading material
Cutter radius compensation

MCPO Lsn12 - Test
Cutter radius compensation. 21 questions.

MCPO Lsn12 - vProgramming activity
Cutter radius compensation

MCPO Lsn13 – Presentation (11:53)
Fixture offsets

MCPO Lsn13 - Reading material
Fixture offsets

MCPO Lsn13 - Test
Fixture offsets. 12 questions.

MCPO Lsn13 - vProgramming activity
Fixture offsets

Key Concept number five

MCPO Lsn14 - Key Concept number five presentation – providing structure to your programs
You must use a strict format to provide consistent structure to your programs

MCPO Lsn14 – Presentation (5:55)
Introduction to program formatting

MCPO Lsn14 - Reading material
Introduction to program formatting

MCPO Lsn14 - Test
Introduction to program formatting. 11 questions.

MCPO Lsn14 - vProgramming activity
Introduction to program formatting

MCPO Lsn15 – Presentation (11:48)
Four kinds of program format

MCPO Lsn15 - Reading material
Four kinds of program format

MCPO Lsn15 - Test
Four kinds of program format. 10 questions.

MCPO Lsn15 - vProgramming activity

Four kinds of program format

Key Concept number six

MCPO Lsn16 - Key Concept number six presentation
Special programming features

MCPO Lsn16 – Presentation (10:56)
Hole machining canned cycles

MCPO Lsn16 - Reading material
Hole machining canned cycles

MCPO Lsn16 - Test
Hole machining cannned cycles. 18 questions.

MCPO Lsn16 - vProgramming activity
Hole machining canned cycles

MCPO Lsn17 – Presentation (08:49)
Sub programming techniques

MCPO Lsn17 - Reading material
Sub-programming techniques

MCPO Lsn17 - Test
Sub-programming techniques. 10 questions.

MCPO Lsn17 - vProgramming activity
Sub-programming

MCPO Lsn18 – Presentation (17:50)
Other special programming features

MCPO Lsn18 - Reading material
Other special programming features

MCPO Lsn18 - Test
Other special programming features. 20 questions.

MCPO Lsn18 - vProgramming activity
Special programming features

MCPO Lsn19 – Presentation (06:50)
Rotary device programming

MCPO Lsn19 - Reading material
Rotary device programming

MCPO Lsn19 - Test
Rotary device programming. 14 questions.

MCPO Lsn19 - vProgramming activity
Rotary device programming

Key Concept number seven

MCPO Lsn20 - Key Concept number seven presentation
Know your machine from an operator's viewpoint.

MCPO Lsn20 – Presentation (07:08)
Tasks related to setup and the production run

MCPO Lsn20 - Reading material
Setup versus production running tasks

MCPO Lsn20 - Test
Tasks related to setup and maintaining production - 18 questions.

MCPO Lsn21 – Presentation (18:09)
Buttons and switches on the operation panels

MCPO Lsn21 - Reading material
Buttons and switches on the operation panels

MCPO Lsn21 - Test
Buttons and switches. 20 questions.

Key Concept number eight

MCPO Lsn22 - Key Concept number eight presentation
Three modes of operation

MCPO Lsn22 – Presentation (08:45)
Three modes of operation

MCPO Lsn22 - Reading material
The three basic modes of operation

MCPO Lsn22 - Test
The three modes of operation. 10 questions.

Key Concept number nine

MCPO Lsn23 - Key Concept number nine presentation
The importance of procedures

MCPO Lsn23 - Presentation Part 1 (06:59)
The key operation procedures - Manual procedures

MCPO Lsn23 - Presentation Part 2 (07:07)
The key operation procedures - MDI procedures

MCPO Lsn23 - Presentation Part 3 (08:34)
Key operation procedures, part three - Setup procedures

MCPO Lsn23 - Presentation Part 4 (07:03_
Key operation procedures - program editing

MCPO Lsn23 - Presentation Part 5 (05:19)
Key operation procedures - Program running procedures

MCPO Lsn23 - Reading material
Importance of procedures

MCPO Lsn23 – Test
Key operation procedures

Key Concept number ten

MCPO Lsn24 - Key Concept number ten presentation
You must be able to safely verify and run CNC programs.

MCPO Lsn24 - Presentation part 1 (10:04)
Safely verifying and running CNC programs

MCPO Lsn24 - Presentation part 2 (05:18)
Safely verifying and running programs

MCPO Lsn24 - Reading material
Program verification

MCPO Lsn24 - Test
Safely verifying and running programs - 12 questions.

Wrapping up

MCPO WU1 - Wrapping up
You're finished with the class? Well here are just a few more comments...

Total time of lesson presentations: approximately 5 hours, 31 minutes

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

Accessories

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

Getting started

TCPO GS - Getting started presentation
How to work through this class

TCPO GS - Manual cover and quick reference sheets
Print the cover for your manual and very helpful quick reference sheets.

TCPO GS - Preface reading material
Introduction to reading material content.

Key Concept number one

TCPO L1 - Key Concept number one presentation
Know your machine from a programmer's viewpoint

TCPO L1 – Presentation (11:12)
Machine configurations

TCPO L1 - Reading material
Machine configurations.

TCPO L1 - Test
Machine configurations. 12 questions.

TCPO L2 – Presentation (08:44)
Understanding speeds and feeds

TCPO L2 - Reading material
Understanding turning center speeds and feeds

TCPO L2 - Test
Understanding speeds and feeds. 16 questions.

TCPO L3 – Presentation (08:07)
Flow of the CNC process

TCPO L3 - Reading material
Flow of the CNC process

TCPO L3 - Test
Flow of the CNC process. 10 questions.

TCPO L4 – Presentation (08:20)
Visualizing program execution

TCPO L4 - Reading material
Visualizing CNC program execution

TCPO L4 - Test
Visualizing the execution of a CNC program. 10 questions.

TCPO L5 – Presentation (12:01)
Understanding program zero

TCPO L5 - Reading material
Program zero and the rectangular coordinate system

TCPO L5 - Test
Understanding program zero. 15 questions.

TCPO L5 - Understanding coordinates assignment
Tests comprehension of the rectangular coordinate system

TCPO L6 – Presentation (08:05)
Determining program zero assignment values

TCPO L6 - Reading material

Determining program zero assignment values

TCPO L6 - Test
Program zero assignment values. 9 questions.

TCPO L6 - Understanding coordinates assignment
Tests comprehension of the rectangular coordinate system

TCPO L7 – Presentation (07:56)
Ways to determine program zero assignment values

TCPO L7 - Reading material
Assigning program zero

TCPO L7 - Test
Ways to assign program zero. 10 questions.

TCPO L7 - Understanding coordinates assignment
Tests comprehension of the rectangular coordinate system

TCPO L8 – Presentation (11:46)
Introduction to programming words

TCPO L8 - Reading material
Introduction to programming words

TCPO L8 - Test
Introduction to programming words. 17 questions.

TCPO L8 - Understanding coordinates assignment
Tests comprehension of the rectangular coordinate system

Key Concept number two

TCPO L9 - Key Concept number 2 presentation
You must prepare to write programs

TCPO L9 - Presentation part 1 (06:46)
Preparation steps for programming

TCPO L9 - Presentation part 2 (04:06)
Preparation steps for programming

TCPO L9 - Reading material
Preparation steps for programming

TCPO L9 - Test
Preparation steps for programming. 12 questions.

TCPO L9 - Understanding coordinates assignment
Tests comprehension of the rectangular coordinate system

TCPO Lsn10 - Key Concept number three presentation
You must understand the three basic motion types

TCPO Lsn10 – Presentation (12:19)
The three basic motion types

TCPO Lsn10 - Reading material
Programming the three most basic motion types

TCPO Lsn10 - Test
The three basic motion types. 23 questions

TCPO Lsn10 - vProgramming activity
Tests comprehension of motion types

Key Concept number four

TCPO Lsn11 - Key Concept number four presentation
You must understand the compensation types

TCPO Lsn11 – Presentation (08:07)
Introduction to compensation

TCPO Lsn11 - Reading material
Introduction to compensation

TCPO Lsn11 - Test
Introduction to compensation. 13 questions.

TCPO Lsn11 - vProgramming activity
Tests comprehension of motion types

TCPO Lsn12 – Presentation (06:46)
Geometry offsets

TCPO Lsn12 - Reading material
Geometry offsets

TCPO Lsn12 - Test
Geometry offsets. 13 questions

TCPO Lsn12 - vProgramming activity
Tests comprehension of motion types

TCPO Lsn13 – Presentation (17:06)
Wear offsets

TCPO Lsn13 - Reading material
Wear offsets

TCPO Lsn13 - Test
Wear offsets. 14 questions.

TCPO Lsn13 - vProgramming activity
Tests comprehension of motion types

TCPO Lsn14 – Presentation (09:55)
Tool nose radius compensation

TCPO Lsn14 - Reading material
Tool nose radius compensation

TCPO Lsn14 - Test
Tool nose radius compensation. 19 questions.

TCPO Lsn14 - vProgramming activity
Tests comprehension of tool nose radius compensation

Key Concept number five

TCPO Lsn15 - Key Concept number five presentation
You must strictly structure your CNC programs

TCPO Lsn15 – Presentation (10:21)
Introduction to program formatting

TCPO Lsn15 - Reading material
Introduction to program formatting

TCPO Lsn15 - Test
Introduction to program formatting. 12 questions.

TCPO Lsn15 - vProgramming activity
Tests comprehension of program formatting

TCPO Lsn16 – Presentation (08:00)
Four kinds of program format

TCPO Lsn16 - Reading material
The four kinds of program format

TCPO Lsn16 - Test
Four kinds of program format. 15 questions.

TCPO Lsn16 - vProgramming activity
Tests comprehension of program formatting

Key Concept number six

TCPO Lsn17 - Key Concept number six presentation
You must understand the special features that help with programming

TCPO Lsn17 – Presentation (03:15)

One-pass canned cycles

TCPO Lsn17 - Reading material
One-pass canned cycles

TCPO Lsn17 - Test
One-pass canned cycles. 9 questions.

TCPO Lsn17 - vProgramming activity

Tests comprehension of one-pass canned cycles

TCPO Lsn18 – Presentation (15:55)
Rough and finish turning and boring (G71 followed by G70)

TCPO Lsn18 - Reading material
Rough turning and boring followed by finishing (G71/G70)

TCPO Lsn18 - Test
Rough and finish turning and boring (G71 and G70). 16 questions.

TCPO Lsn18 - vProgramming activity
Tests comprehension of rough turning and boring followed by finishing (G71/G70)

TCPO Lsn19 – Presentation (08:05)
Other multiple repetitive cycles (G72, G73, G74, and G75)

TCPO Lsn19 - Reading material
Other multiple repetitive cycles (G72, G73, G74, G75)

TCPO Lsn19 - Test
More multiple repetitive cycles. 8 questions.

TCPO Lsn19 - vProgramming activity
Tests comprehension of rough facing cycle (G72)

TCPO Lsn20 – Presentation (15:51)
Threading cycle (G76)

TCPO Lsn20 - Reading material
G76 threading command

TCPO Lsn20 - Test
Threading cycle (G76). 14 questions.

TCPO Lsn20 - vProgramming activity

Tests comprehension of threading command (G76)

TCPO Lsn21 – Presentation (07:20)
Sub-programming techniques

TCPO Lsn21 - Reading material
Sub-programming techniques

TCPO Lsn21 - Test
Subprogramming techniques. 10 questions.

TCPO Lsn21 - vProgramming activity
Tests comprehension of sub-programming

TCPO Lsn22 – Presentation (04:01)
Control model differences

TCPO Lsn22 - Reading material
Control model differences for special programming features

TCPO Lsn22 - Test
Control model differences. 8 questions.

TCPO Lsn23 – Presentation (14:19)
Other special features related to programming

TCPO Lsn23 - Reading material
Other special programming features

TCPO Lsn23 - Test
Other special programming features. 15 questions.

TCPO Lsn23a - Reading material
Appendix to programming - Special machine types and accessories

Key concept number seven

TCPO Lsn24 - Key Concept number seven presentation
You must understand the machine from an operator's viewpoint

TCPO Lsn24 – Presentation (09:07)
Tasks related to setup and operation

TCPO Lsn24 - Reading material
Tasks related to setup and running production

TCPO Lsn24 - Test
Setup and production running tasks. 18 questions.

TCPO Lsn25 – Presentation (12:50)
Buttons and switches on the operation panels

TCPO Lsn25 - Reading material
Buttons and switches on the operation panels

TCPO Lsn25 - Test
Buttons and switches. 15 questions.

Key Concept number eight – three modes of operation

TCPO Lsn26 – Presentation (08:13)
The three basic modes of operation

TCPO Lsn26 - Reading material
Three modes of operation

TCPO Lsn26 - Test
The three modes of operation. 10 questions.

Key Concept number nine – Key operation procedures

TCPO Lsn27 – Presentation (13:18)
Key operation procedures

TCPO Lsn27 - Reading material
Key operation procedures

TCPO Lsn27 - Test
Key operation procedure. 10 questions.

Key Concept number ten – safely verifying programs

TCPO Lsn28 – Presentation (26:46)
Safely verifying programs and running production

TCPO Lsn28 - Reading material
Program verification

TCPO Lsn28 - Test
Safely verifying programs and running production. 10 questions.

Wrapping up

TCPO WU1 - Wrapping up
You're finished with the class? Well here are just a few more comments...

Total time for lesson presentations: approximately 5 hours, 2 minutes