

Maximizing CNC Utilization

Everything you need to teach an advanced CNC course including computer generated slide shows (over 3,000 slides!), audio guidance, instructor manual, course outlines, comprehensive student manual, and even promotional materials!



The need for higher level training

You've probably taught many basic CNC courses. Since your students are at entry level, you've likely been a little frustrated at times. Just about the time your students are beginning to catch on to one topic, it's time to move on to another. While you'd like to take your presentations to the next level, there just isn't time – and doing so may confuse students more than help them. When students complete your basic course, they're ready to *begin* working with CNC machine tools – but it's unlikely that they have CNC mastered.

While your past students may not have been experts coming out of your course, at least they did receive formal training. There are many people working with CNC machines that did not. Maybe they're self-taught. Maybe they've learned what they know from others on the job. Maybe they've attended the quickie sessions held by machine tool builders. In any event, neither are they taking full advantage of all their CNC machines can do.

While the sheer productivity of CNC machines often masks inappropriate methods, companies are becoming more and more concerned with their CNC machine tools. Changes in manufacturing including lowered lot sizes, shorter lead times, and heightened quality requirements (among other things) have most CNC-using companies struggling to maintain profit margins. They'll need to improve their methods if they are to remain in business.

The primary objective of this course curriculum is to help instructors relate concepts, techniques, and ideas that will help students make their CNC machines more productive. Toward this end we offer eight self-contained modules that are jam-packed with information that is not commonly introduced in basic CNC courses.

Since this curriculum is aimed at experienced CNC people (we recommend at least six months) you'll be drawing from an entirely new potential student base. You'll give your CNC program a real shot in the arm. And you'll finally be able to take your presentations to the next level!

Download free samples!

Our internet site (www.cncci.com) includes the complete course outline, samples of the slide shows, instructor manual, student manual, and the recommended presentation time you should allow for each module. Log on and see just how comprehensive this course truly is!

Eight self-contained modules!

⊕ #1: Basic premises (57 slides)

This short but important module lays the groundwork for what is to come. Included are presentations that acquaint students with important needs of CNC using companies. We discuss application versus utilization and machine utilization versus personnel utilization to help them understand the reasoning behind improving CNC machine utilization. We also introduce the four CNC-using company types and discuss factors making up a company's corporate identity. Finally, we discuss the importance of value added principles in the CNC environment.

⊕ #2: Review of CNC basics (346 slides)

Since you won't have control of how much previous experience your students have (aside from setting some pretty broad prerequisites), you'll want to make sure that they have a good grasp of basic CNC principles before digging in to more advanced topics. Again, many students coming to this course will be (for the most part) self-taught. It's likely that they've missed out on some important basic concepts and techniques. In the advance courses I've taught myself, I'm always surprised at how often a so-called expert is unfamiliar with a very basic CNC feature or function.

This module allows you to review the basics using our proven *key concepts approach*. (This is the same approach used in our basic CNC course curriculums.) There are ten key concepts. We begin each key concept by introducing the reasoning behind the key concept. Then we address how the key concept applies to machining centers and then to turning centers. Again, this is a review. Students should be quite familiar with the presentation – and if they are – you'll be able to buzz through quite quickly. But, if they're questioning each step along the way, it should be taken as a signal that more basic training is needed.

⊕ #3: Advanced implications of basic features (911 slides)

Many CNC features have multiple uses. But most basic CNC courses introduce only the most important use. Additionally, most basic courses don't show all implications related to how a given feature can be best used to meet the company's specific applications. If it's a basic function, and if it's not commonly addressed in a basic CNC course, it's fair game in this module.

Included in this lengthy module (the longest of the course) are presentations on parameters, N words, G codes, M codes, and other CNC words. We go over each code, one by one, and in numerical order.

We also discuss advanced applications for tool offsets, fixture offsets, and wear offsets. Since we show so many alternative methods of handling basic CNC functions, there's plenty of audio guidance during the slide show to help you prepare to teach this module.

⊕ #4: Advanced CNC features, functions, & concepts (432 slides)

There are many CNC features that are not addressed in basic courses. Admittedly, many of these features will not be of interest to a given CNC user. However, this module gives you the presentation material you need to discuss features like advanced interpolation types (helical, cylindrical, polar coordinate, and nurbs), scaling, mirror image, coordinate rotation, and three dimensional coordinate conversion. We also include presentations on certain machine accessories like bar feeders, index chucks, U axis, and part catchers. Finally, we provide materials for teaching some important CNC concepts like tool life management, qualifying CNC programs, and appropriate documentation.

⊕ #5: Parametric programming (556)

We've often said that parametric programming is CNC's best kept secret. There are still many in the industry that don't know what it is, let alone how to take full advantage of it. These materials allow you to dive into parametric programming as deep as you want to go. We stress Fanuc's version of parametric programming – custom macro B (the most popular version).

If you just want to present a cursory view of what it is, you'll just be acquainting students with it's applications and basic features. This can be done quite quickly. But if you want to present a full course, these materials still allow you to do so. With limited time for practice (practice exercises with answers are also provided), this full course can be completed in about 16 hours.

⊕ #6: Setup time reduction (295 slides)

All CNC using companies are concerned with how long their machines are down between production runs. This module lets you first present the principles of setup time reduction (that can be applied to any form of production equipment). We then offer specific CNC-related techniques to improving setup time in the same order setups are made (tear down, work holding setup, cutting tools, program zero assignment, program loading, program verification, and first workpiece inspection).

☛ #7: Cycle time reduction (411 slides)

All CNC using companies are concerned with how long it takes to complete their production runs. As with setup time reduction, this module lets you first present the principles of cycle time reduction. We then offer specific techniques to reducing cycle time in four areas, workpiece load/unload, program execution time, tool maintenance, and preventive maintenance.

☛ #8: Spindle probe programming (519 slides)

Actually, the student manual includes discussions on several types of probes (spindle probes, tool touch-off probes, and tool length measuring probes). However, the slide presentation is limited to spindle probes.

Admittedly, most spindle probe uses depend solely on the probing programs supplied by the probe manufacturer. Only a small percentage of probe-using companies develop their own probing programs. For this reason, most students may not be very interested in learning how probes are programmed. You may elect to simply introduce the basics. But if you do need to teach a full course on spindle probe programming, these materials let you do so. Presentations include introduction to probe programming, applications for probing, how the probe works, calibration techniques, and writing spindle probe programs.

Instructor materials:

Microsoft PowerPoint slide presentations

PowerPoint is fast becoming the presentation software of choice by most presenters. These presentations total over 3,000 slides to provide your visuals for the entire course. Note that they're developed in PowerPoint 97 (which is part of Microsoft Office 2000). These presentations are included on a cd and most include audio narrations. There are ten slide presentations included on the cd-rom. Each is locally named from INTRODUCTION.PPT through MODULE 8_SPINDLE PROBES.PPT. These slide presentations can be accessed right from the cd-rom drive or if your hard drive has the room, you can copy them to your computer's hard drive (there's over 300 megs of data).

Each slide includes a visual (in the form of a book icon) that lets students know the page number in the student manual that is currently being discussed.

Guidance during slide shows

Most slide shows includes audio narrations (we call guidance) to help you understand how to make your presentations. Note that these narrations are not intended for your students. Each is directed at an instructor getting ready to teach the course (they help with preparation). A special icon on selected slides can be activated to play the related narration.

Microsoft PowerPoint Viewer

Though we highly recommend that you have the actual PowerPoint software, we do include the PowerPoint Viewer. It does allow you to display the slide shows, but you'll have no way to modify them. Additionally, the slide shows are quite long (most over 300 slides). PowerPoint Viewer does not allow you to move around in the slide show nearly as easily as the actual PowerPoint software does.

Instructor's outline

The outline serves three purposes. First, it lets you know exactly what is presented in each module. You'll be able to quickly see what's there. Second, it shows the slide number for each topic, making it easy to find slides as you move around in each slide show. For most topics, it also includes student manual page numbers so you can reference what the student will see as you give your presentation. Note that this will help you read up on topics you are unfamiliar with.

Workbook and answer book for Parametric Programming module

Since this portion of the course requires practice to master, we provide you with a way of printing exercises and programming activities for students to do during this module. It can be used as homework or done during class. We also provide you with the ability to print the answer book.

Ability to print slide show hard copy

PowerPoint allows you to print a hard copy of each slide show (Microsoft calls this printing *handouts*). This may help you prepare if you don't always have a computer available. You can include 4, 6, or 8 slides per page. Even so, there are over 3,000 slides. Be ready for a lot of printing!

Promotional materials

We've even included a brochure that you can use to help you promote this course. It's in the "promotions" folder of the cd-rom. It's in PowerPoint format, so you can easily modify anything you want! Note that there is space to include your school's registration information (logo, phone number, fax number, etc.).

Free phone assistance

Again, there's a lot of information in this curriculum. If you have questions about any topic while you preparing to teach the course, we welcome your phone calls (847-639-8847). Or email us at lynch@cnci.com.

644 page student manual

This extremely comprehensive manual follows along with your presentation each step of the way, and again, the slide presentations reference page numbers throughout the course. It will make for excellent homework reading assignments and it's an excellent way for students to go back and review material once the course is finished.

What you'll still need

In order to show the PowerPoint slide presentations to a group of people, you need the following items.

A computer with Windows 98 (or higher) Just about any current model computer with a cd-rom drive will work. For best results, Pentium class is recommended (minimum 64 megs internal). If using a desktop computer, you can easily watch the monitor of the computer (facing your audience) to see the slide show as slides are displayed behind you by the projection system. Since the left mouse button advances the slides, you even have a remote slide advance button (as is commonly used with a 35 mm slide projector).

If portability is an issue, keep in mind that many of the notebooks and sub-notebooks have ample power to run the presentation software.

However, be careful in your selection. Many notebooks do not allow you to send data out through the VGA port *and* see the slide show on the LCD screen of the notebook at the same time. Without this ability, you may have to turn around to see your slides, which can be distracting to your audience. Also, for maximum flexibility, look for a laptop that has the TV-OUT feature. This lets you send composite video to any television that has a TV-IN port with a simple RCA cable.

Microsoft PowerPoint 97 Software (or above)

Though you can display all presentations with PowerPoint Viewer (included with this curriculum), you will need Microsoft PowerPoint if you intend to modify the slide shows.

PowerPoint 97 also makes it much easier to get around in the slide shows than the viewer. We highly recommend that you have this ability.

A way of displaying the screen show - You have several alternatives in this regard. First, many schools already have a projection system that can display information from a personal computer. Basically, anything that can be shown on the computer screen can be displayed through the projection system. Second, and especially if price is a concern, you can use a simple scan converter (about \$200.00 - \$300.00) and display your screen show on any television that has a *video in* connector (as most do). Note that many laptops are now coming with a TV-OUT port, having this scan converter built in to the computer.

A note about the students you'll attract

Remember that your attendees will have (possibly extensive) CNC experience. I've found that most catch right on to the presentations being made, even for those topics that they've never been exposed to. Frankly speaking, most aren't interested in a grade at all - they're interested in learning things that can be applied immediately in their shops. When they latch on to an idea that will help them, they'll stick with it until they figure it out! For this reason, we minimize the amount of practice assigned in this course. With the exception of the parametric programming module, it's mostly lecture.

Be sure to take advantage of your students' strong points. As you present the course, solicit ideas and comments each step along the way. We encourage student participation quite often during the slide presentations. The more you can get people to contribute during the class, the better the class will be. And you'll be able to collect ideas for future classes!

Free with initial textbook order!

Not only will you be teaching with the best state-of-the-art CNC curriculums in the industry, you'll be doing so free of charge! All we ask is that your school bookstore buys the student manuals from us! With an initial order of just 20 manuals, we'll ship the instructor's materials free of charge! All instructor materials (slide shows, PowerPoint Viewer, instructors manual, and Adobe Acrobat Reader to view/print the manual) come on one cd-rom disk.

Our net price to your school (or bookstore) for manuals is \$95.00 each. Suggested retail price is \$120.00 each. Future orders can be in any quantity. This cost will be recovered, of course, as students enroll in your classes and buy the manuals. In essence, your first 20 students will be paying for the curriculum!