



The second step to develop a training course (step 1 is in issue 4)

Develop course materials

The quality of course materials will make or break any training course. Course materials include any resources, equipment, or supplies that facilitate learning. They form the backbone of your curriculum. Course materials into three basic categories:

Presentation course materials include supplies that help you get new ideas and concepts across to students. Perhaps the single-most important presentation-related course material is the course text (manual, textbook, etc.). Students must have a way to learn or review what has been presented in class on their own, during class and even after completing your course. It's likely that you'll be asking that students perform reading assignments from this important resource. Other examples of presentation-related course materials include visuals like slide shows and videos – but can also include anything that helps you get a point across, like demonstrations and analogies.

Review course materials include supplies that help you quickly and effectively re-cover information that's already been presented in class. Remember, most students retain only a small percentage of what they hear the first time. The longer your presentations and the greater the time between sessions, the less they retain. *At least* ten percent of each session should be spent reviewing information that's been previously presented. The more complex the topic and the longer the period between classes, the more time you should spend in review. A good review will help students get

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PowerPoint Tips

Editor's note

Microsoft PowerPoint is fast becoming the software product of choice for professional presenters. Each issue of *Instructor Notes* will include PowerPoint Tips to help you improve your slide show development skills.

New features in PowerPoint 2002

Having just upgraded to Microsoft Office XP, which includes PowerPoint 2002, I may not be familiar enough with this new product to act as an authority on its use. However, I've seen enough to be able to relate what I consider the most important new features – features that most CNC instructors should find interesting. Though the Office XP upgrade is a little expensive (I spent about \$200.00 on-line for my copy), you should find it to be a worthwhile investment, at least considering the improvements to PowerPoint.

Command panes – The first thing you'll probably notice is the extensive use of command panes, which replace or enhance pop-up menus. These panes appear at the left and right sides of your screen and let you enter much more information about an action than the pop-up menus did. Examples of command panes include new presentation, slide transition, and custom animation. With the *new presentation* pane, for instance, you're given several choices, including open a presentation, create a new one (blank, from design template, or from auto-content), create a new one from existing presentation, or create a new one from a template).

Improved slide transition control - PowerPoint has always provided a variety of ways for transitioning from one slide to the next. With PowerPoint 2002, there are now over fifty different slide transitions.

Improved custom animations - This is probably the most important enhancement for instructors developing CNC-related presentations. I've always wanted to have more control of a specific object (like a graphic representing a cutting tool). With previous versions of PowerPoint, if you want to animate a cutting tool moving along a custom path, you had to do it by creating a series of very similar slides. In each progressive slide, you'd position the cutting tool graphic to another position. When the series of slides are played, the viewer is given the illusion of the cutting tool moving through a path. (By the way, this was the topic of a previous PowerPoint Tips column. See issue 2, Summer 01.)

Animation effects now fall into four categories: entrance effects, emphasis effects, exit effects, and motion paths. The entrance, emphasis, and exit effects are great for emphasizing new topics to be displayed on each new slide. You're given a variety of choices when it comes to what kind of animation effect is used. Entrance and exit effects include (among many others) blinds, box, checkerboard, diamond, fly in, spiral in, and wipe. Emphasis effects include change font, change font size, grow/shrink, and spin.

But in my opinion, the real power comes from being able to describe motion paths for your animated objects.

If, for example, you want to animate a cutting tool making a rapid approach motion (even including the "dog-leg" into position), you can now easily do so on one slide. Motion paths include movements along a straight line in any direction (linear interpolation), along a circular path (circular interpolation), or along any number of special shapes (heart, circle, star, triangle, etc.). Additionally, you can create custom

motion paths (the most helpful of which is “free form”, allowing you to define your own motion path). You can even control the motion rate (like feedrate), choosing from four rates ranging from very slow to very fast. I feel that this enhancement alone makes upgrading worth the investment.

Improved navigation within

slideshow – While getting around within a slideshow was never difficult (you still have the elevator bar on the right side of the screen that lets you easily get from slide to slide), PowerPoint 2002 has a special pane (in the normal view) that appears on the left of the screen. This pane gives you a series of thumb-nail images representing each slide in your slideshow, and makes it very easy to tell slides apart. You can even do some quick editing with this pane, deleting slides, copying and pasting them, or moving them from one place to another.

One major negative! Microsoft has not updated PowerPoint Viewer to match all of these new features. This means that none of the new features described in this article can be used if you’re going to be using PowerPoint Viewer to display slideshows (like we’re doing with our CD-rom courses and instructor curriculums). This problem won’t be very important if you’re using the actual PowerPoint software to display your slideshows.

All-in-all, I’ve found the new features in PowerPoint 2002 to be well worth the upgrade. Most people that use PowerPoint on a regular basis should agree. By the way, if you’ve discovered new features you’d like to share, be sure to submit them. We’ll publish them in a future issue of Instructor Notes!

Publicize your school

We maintain a **schools forum** on our website (www.cncci.com). It’s free – and it’s a great way to let potential students know about your CNC-related courses!

Simply fill in an online form that asks for some general information about your CNC courses, lab equipment, and degree information. About half the schools currently listed are using our CNC curriculums to help them teach CNC courses!

The 2nd step... (*continued from pg 1*) back into the right frame of mind for leaning new material, setting the stage for what’s coming up in this session. An example of review-related course materials is a series of “summary slides”, bullet-pointing important topics that have been presented.

Practice course materials include supplies that let you test a student’s comprehension of presented materials. Of course, practice assignments must be realistic, reflecting what students will be expected to do once they complete the course and begin working in industry. While I sometimes like to push students into new areas with the practice they do, to be fair, exercises should concentrate on material that has been presented to date. Examples include homework, quizzes, tests, and lab exercises.

Digging in

The development of appropriate course materials can be the most difficult part of creating a new curriculum. With a complex topic (like CNC), this can take a great deal of preparation time. While you’ll want to enter a new class with the bulk of course materials prepared, it may be too much to develop in one sitting. And once completed, you’ll want to self-critique your materials as you present the course. Good instructors are always on the lookout for new and improved materials. Here are a few suggestions.

Course text - In my opinion, the course text (manual or textbook) is the most important of the course materials. Most instructors don’t want to write one completely from scratch, so they choose from the textbooks on the topic to be taught. While a textbook may be adequate, it’s likely that you’ll have to pick and choose only those chapters and pages you’ll want students to read. Again, if you want perfection, you’ll have to write the course text yourself. If you’re using a standard textbook, don’t be afraid to supplement it with writings of your own, articles from technical magazines, or pages from machine tool manuals. Just be sure not to infringe on any copyrights.

Visuals – With the wide variety and availability of presentation software programs available today, there’s really

no excuse *not* to incorporate visuals in your presentations. Almost all schools have presentation equipment (projection systems) that make it easy to display computer-generated slide shows. At the very least, develop a series of bullet points for key topics (to keep you on track). But your visuals can include *much* more. With PowerPoint, for example, you can include graphics, animations, video clips, and even sound in your presentations. Good visuals will make it easy for students to understand even complex topics without you having to say much.

Demonstrations – While lecture and visuals may be enough to get your points across, a good, real life demonstration provides an example of what you’ve covered. Your demonstration will likely raise new questions. Students that thought they understood will find something that doesn’t match their understanding.



NEW Curriculum!

Setup Reduction!

This curriculum will allow you to relate the setup reduction from the ground up. The objective is to help instructors relate concepts, techniques, and ideas that will help students go back to their companies and implement a successful setup reduction program, making better use of their CNC machine tools.

Two parts:

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- ☆ Setup reduction techniques

You’ll begin by relating the principles of setup reduction – principles that can be applied to any form of production equipment – including the two task-types related to setup, the three ways to reduce setup time, and the four steps to setup reduction.

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Favorite analogies

You can't have enough analogies in your basket of teaching tools. Analogies make it easier for students to understand complex topics by relating them to things that are familiar and easier-to-understand. In these discussions (which will be included in each issue of *Instructor Notes*), We will relate a few favorites. Note that these analogies are commonly incorporated right into the slide shows included with our curriculums.

Compare CNC programming to learning a new language

When a newcomer views a CNC program for the first time, it's likely that they'll feel quite intimidated. The task of remembering (memorizing) so many new words and commands will seem quite daunting. You must relieve this trepidation before students become frustrated. I like to do it as part of our first key concept, during the last lesson of this key concept when we're introducing the various words used in programming.

I say that learning how to manually program a CNC machine (mill or lathe) is like leaning a foreign language – a foreign language that has only thirty to forty words! Using visuals (our curriculums include these visuals as part of the PowerPoint slide shows), I'll place the entire set of CNC words on the screen. I'll include all G and M



Beginners are often intimidated by the number of words they think they must memorize.

codes, as well as the letter addresses for all CNC words (N, X, Y, Z, F, S, T, etc.). And yes, this long list will have the tendency to intimidate newcomers. But I'll be quick to point out that only about thirty of these words are used on a regular basis. On the screen showing all the words, I'll circle those words that are regularly used. (It may also be wise to remove all words that are not commonly used from the screen.)

I'll say something like: "Think of learning CNC programming as like learning a foreign language – a very simple language that contains only thirty words. When you think about it, you're learning to communicate with a machine in a language it can understand."

At this point, I'll introduce the various word types (letter addresses) used in programming, acquainting students with the words they'll be using. I'll point out that many word types are aptly named, making them easy to remember (like T for tool, S for spindle, and F for feedrate). Others may not make as much sense (G for preparatory function, N for sequence number, etc.). Again, the idea is simply to acquaint students with the various letter addresses, *not* to have them memorize anything.

In fact, I'll point out that if students use our recommended formats for developing CNC programs (shown in our key concept number five), they will not have to actually memorize any of these words. Instead, they'll simply need to recall a word's meaning when they see the word (see the next analogy).

The road sign analogy

With our curriculums, students are taught to use a *template program* to help them create their own CNC programs (part of our key concept number five). I'll use this analogy prior to introducing the templates.

I'll say, "It is unlikely that any driver could recite from memory all road signs they might see as they drive a car. But when a driver sees a road sign, they can easily remember the road sign's meaning."

"In similar fashion, it is unlikely that any CNC programmer could recite from memory all words used in CNC programs. But when a programmer sees an often used word, especially in the context of a CNC program, they'll easily remember its meaning."

I'll test this with a few commonly used words like M08, the T word, F word, S word, and so on, polling the class for the meaning of each often-used word.

I'll finish with, "As you begin writing your first few programs, you won't be doing so from scratch. You'll use our template programs as a crutch, and you should be able to easily remember what's going on in each command. After writing a few programs, you will have the format memorized, and you won't need the templates!"

What are your best analogies?

If you'd like to share a favorite analogy, just let us know and we'll publish it in a future issue of *Instructor Notes*!

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Instructor Notes Newsletter Enclosed!

Tips for teaching CNC courses from CNC Concepts, Inc.

Machining Center Course!

CNC Instructors!

If you're using one of our proven curriculums to teach CNC machine tool usage, be sure your students know that your course is also available on a reasonably priced CD-rom disk. They'll already have the manual and workbook, so they'll only have to purchase the courseware (\$149.00 for six hour presentation).

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see below



New computer based training course! CD-ROM disk: over 6 hours!

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CNC machining centers are among the most popular types of CNC machine tools. Most companies that have any CNC machines have at least one. Unfortunately, companies are finding it more and more difficult to find and hire qualified CNC people. Many are realizing that they must provide extensive training to new hires and provide at least some continuing training to established employees.

A proven method

This affordable courseware makes it possible to train CNC people from scratch. While we assume the student has some basic machining practice experience, we assume nothing about their previous CNC skills. Using our proven *key concepts approach*, we bring students up to speed gradually – constantly building upon previously presented information – and we stress the reasons *why* things are done as importantly as *how* they're done. Six of the ten key concepts are most related to programming, and four are related to setup and operation.

24 lessons!

We further divide the key concepts into twenty-four lessons. Lessons range from under five minutes to just over twenty minutes in length (total course presentation time is just over six hours on one CD-rom).

The most popular control!

All examples are shown in the format for the most popular control in the industry – the Fanuc control. Note that many control manufacturers claim to be Fanuc-compatible.

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The CD-rom disk is jam-packed with over six hours of information about CNC machining centers. By itself, it makes formidable training tool. It's price is \$149.00. When purchased with the workbook answer combination (\$30.00), you'll be able to confirm that you truly understand the material (24 exercises, one for each lesson). When purchased with the optional student manual (\$60.00), you'll have a way to easily review information after you finish the course. If all items are purchased (total: \$239.00), we include a one-year subscription to our newsletter, The Optional Stop.



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A proven method

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28 lessons!

We further divide the key concepts into twenty-eight lessons. Lessons range from under five minutes to just over twenty minutes in length (total course presentation time is five hours fifty-two minutes on one CD-rom).

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The price for unlimited training? ... \$149.00 (courseware only)

Companion manual: \$60.00, workbook/answer combination: \$30.00

Turning Center Course!

with CNC. For those instructors that may feel a little weak with their CNC skills, or for those who may be trying to teach a different machine type, these concise courses let you bone up on subject matter as quickly as possible.

Each course follows its companion curriculum to the letter (ten key concepts, number of lessons, presentation method, graphics, etc). In fact, we use the same manual and workbook in the courseware that you use with our curriculums! So if you're already using our curriculums, all you need is the courseware.