



Understanding the Needs of Local Industry – Product Producing Companies

In the last issue of *Instructor Notes*, we discussed the importance of local industry to your CNC program. For most technical schools, and especially for technical programs in community colleges, the majority of graduates will be placed locally. For this reason, you should consider manufacturing companies in your community to be among your most important customers. In order to provide them with appropriately trained people, you must first, of course, understand what they look for in the people they hire.

Unfortunately, companies vary dramatically with regard to what they expect of their CNC people. As stated in the last issue, the best way to understand the needs of local industry is to get out and meet people in them. Here we're simply providing some generalizations. Expectation variations are based primarily upon company type. All CNC-using companies fall into one of three general categories:

Product producing companies get revenue from the sale of a product. Profit tends to be one step removed from manufacturing.

Workpiece producing companies (job-shops) get revenue from the sale of workpieces to product producing companies.

Tooling producing companies get revenue from the sale of production tooling (jigs, fixtures, dies, molds, gauges, prototypes, etc.) to product- and workpiece-producing companies.

In this issue, we focus on product producing companies. In upcoming issues, we'll look at workpiece- and tooling-producing companies.

Instructor Notes is published quarterly by CNC Concepts, Inc. and distributed free of charge to instructors that teach CNC courses. Simply contact us to begin your subscription!

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.

Bullet-point presentations – Booorrrring!

Don't limit your presentations to a series of slides with bullet points!

Critics of PowerPoint often make the statement that computer-generated presentations limit a presenter's creativity. And in some cases, they may be right. If, for example, you use the *AutoContent-Wizard* (exclusively) to develop your presentations, you may be pigeon-holed into a rather narrow focus – ending up with a series of slides that include only bullet points (main topics) for your presentation.

I've attended lengthy presentations that include slide after slide of bullet points. While bullet points can help you remember what to say (glorified note cards), they can be extremely boring – and even distracting – for your audience. Attendees simply see a list of those things you're going to be talking about during the presentation. If you're not moving quickly enough through the material for them, they're probably looking ahead to see what's coming next – instead of listening to you. And if they're at all familiar with the material you're presenting, they'll assume they already know what you're going to say before you say it!

If you're not going to be including any graphics, animations, pictures, videos, or anything other than your voice during your presentation, you really don't need to present your audience with a PowerPoint presentation. Instead, go with note cards.

A bullet point (outline type) introductory slide is great at the beginning of a presentation to let the

audience know what you're going to be talking about. A similar summary slide at the end of your presentation is also important to summarize what you presented. But these are the *only* two times when bullet point-type slides should be used in presentations.

Truly, PowerPoint should enhance your creativity – not stifle it. Given the vast array of visuals PowerPoint allows, you shouldn't have any trouble coming up with ways to add pizzazz to your presentation. Every slide in your presentation should in some way help you make a point, help people understand your message, or in some other way enhance your presentation's impact. Here are a few ideas:

Website graphics

Current manufacturing-related websites are filled with colorful graphics. Many offer digital photographs of the products being sold on the website – some even incorporate videos. Need a picture of a CNC machining center? Type "machining center" as the search criteria in Google and you'll be shown countless websites that include pictures of machining centers.

Remember that one of your search criteria choices in Google (other than Web) is "Images". With this choice, you'll be shown a series of pictures (much like a photo album) to choose from.

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Teaching with our curriculums?

Recent developments...

- **Two new Palm eBooks!** We've just introduced two Fanuc Quick Reference eBooks – one for machining centers and another for turning centers. Including quick access to explanations of G codes, M codes, letter addresses, and operation procedures, students will find them extremely helpful. \$39.00 ea. Visit our website for more.

PowerPoint Notes... (cont. from pg 1)
computer.

When you see a picture you'd like to include in your presentation, right click on it. One of your choices will be to "Save Picture As:". This choice lets you download the picture to your

Whenever you want to use a photograph downloaded from a website in your presentation, of course, you should ask permission. Most suppliers will be happy to let you use pictures of their products in training presentations.

Creating graphics and animations

Previous issues of Instructor Notes have included articles related to creating animations. See issues two and nine, for example. With the array of tools available from PowerPoint, there's no excuse for resorting to bullet point presentations!

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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!

Local industry...(cont. from pg 1)

Product producing companies tend to break up the tasks related to utilizing a CNC machine tool. Their goal is to keep machines running production as much of the time as possible - and they tend to team up on tasks in order to do so.

People in product producing companies tend to specialize in the task/s they perform, though there may be some overlap in skills. That is, one person may possess the ability to perform more than one task – but for a given production run, they may perform but one specific task.

Generally speaking, one person prepares the machining process. Another person designs/orders the needed workholding and cutting tools. Another develops the CNC program. On the shop floor, one person gathers/assembles workholding and cutting tools. Another makes the workholding setup. Another sets up gauging tooling. Another performs the first workpiece inspection. Once the program is verified, another person competes the production run.

Again, the goal is to minimize CNC machine downtime, and product producing companies are often willing to sacrifice the most efficient use of personnel to keep machines running.

What does your school provide?

With so many different people involved, it can be difficult to target the skills required for each task to be performed. And providing a *single* training program to address all of the related skills will next to impossible. But I've never met a manufacturing manager that didn't want *specific* training for the people working in his/her department.

The CNC curriculums in most technical schools tend to be too comprehensive to meet all of the training needs of product producing companies. Most include instruction for *all* tasks related to CNC machine tool utilization. While this makes students happy (they're getting a well-rounded education), these programs tend to be overkill for the majority of people working in product-producing companies.

For this reason, most product producing companies will utilize their

local technical school for only a small percentage of the people they hire – most likely programmers and setup people. For the bulk of CNC-related positions they need to fill, many product producing companies develop their own in-plant training courses and train people from scratch.

What area should you address next?

If there are a large number of product producing companies in the community that your school serves, consider expanding your program to address more of their needs. In most cases, this will mean adding courses that address *lower* proficiency levels. Consider, for example, the number of people in the various CNC-related positions. Say a product producing company that works three shifts has ten CNC machine tools. They may have one or two programmers. They will likely have two or three setup people. But it's possible that this company will have as many as *thirty* machine operators (three shifts times ten machines). Operator-specific training may attract the most new students.



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A Curriculum for CNC Operators – Required Skills

Most technical schools address training for CNC operators as a subset of the training they provide for other CNC skills (commonly setup people and programmers). It's possible that people studying to achieve an operator's certificate are sitting in class next to people who are participating in an associate degree program for programming. While this minimizes the number of courses a school must offer, any compromises you make may detract from the quality of the operator's curriculum.

A definition of CNC Operator

Companies vary when it comes what they expect of their CNC operators. We're defining a CNC operator as a person who's responsibility is limited to *maintaining a production run*. Someone else programs and sets up the machine before the operator takes over. CNC operator tasks are limited to loading/unloading workpieces, measuring workpiece attributes and making adjustments (commonly to offsets) for the purpose of maintaining workpiece size during a production run, and replacing worn tools. While they may have other tasks to perform (cleaning & de-burring completed workpieces, for example), your curriculum should be focused on CNC-related tasks. This definition applies best in product producing companies.

Skills a CNC operator must possess

Your curriculum must, of course, teach the skills a CNC operator must acquire. Here we list them.

Knowledge of basic machining practices

CNC operators must possess certain basic machining practice skills. They must be able to read and **interpret blueprints**, having the ability to visualize a three-dimensional workpiece from a series of two-dimensional views. They must be able to determine the size of workpiece attributes from the dimensioning on the print. And, they must be able to interpret the tolerance specifications given on the print.

Operators must also be able to **use the appropriate gauging tool/s** to measure workpiece attributes –and be able to determine whether the

measured attribute is within tolerance limits. They must be able to **perform arithmetic calculations** to determine the target value for each dimension and tolerance – and to determine the deviation from measured values to target dimensions. They must also be able to **use hand tools** in order to assemble/replace cutting tools and possibly to load workpieces.

Operators must **understand the machining operations** being performed on the CNC machine they run in order to determine whether cutting tools are machining properly and when tools are getting dull.

Understand the CNC machine

A CNC operator must understand the basic configuration of the machine tool they operate. Important machine features include components, directions of motion (axes), and accessories of the machine (tool changer, pallet changer, tailstock, etc.). Of particular importance are functions they must work with on a regular basis, including those required to load workpieces, replace cutting tools, and make sizing adjustments.

Important programming concepts

While an operator isn't expected to develop programs, there are certain programming concepts an operator must understand. These concepts include understanding program zero assignment, motion types, compensation types, and the general structure of a CNC program. Instruction should also include any program modifications operators may be expected to make (like speed and feed changes).

Know production maintaining tasks

Operators must, of course, understand the tasks they will be expected to perform. Topics should include workpiece load/unload, sizing adjustments & trial machining, and replacing worn tools, as well as any other tasks they will be expected to perform.

Be sure to spend ample time on workpiece sizing. Students must understand how to determine target dimensions as well as how much to adjust offsets when sizing must be done. They must also understand what must be done when cutting tools are replaced, since the first time a new

Two New Operator's Guides!

- ❖ Machining center operator's guide
- ❖ Turning center operator's guide

Instructors!

You may be getting requests from companies in your area to provide **operator training**. Many companies want people that can maintain production on CNCs, but they're not concerned with teaching them programming. These two operators guides will work nicely as your course text.

Visuals available! – Be sure to ask about the PowerPoint slideshows that act as your visuals. While we haven't (yet) developed complete curriculums, we have completed the slide shows to accompany these manuals.

Machining center operator's guide: 170 pgs
Turning center operator's guide: 230 pgs
\$29.00 each

For more info., visit www.cncci.com

(replaced) tool cuts, trial machining is often necessary.

Understand buttons and switches

Operators must understand the various buttons and switches that are on the machine/s they operate. This is another reason why certain programming concepts are so important. It's hard to explain/understand certain buttons and switches without first understanding the related programming concept/s (consider the *optional stop switch*, for example, that relies on an M01).

Know the modes of operation

Since the mode switch is the heart of any CNC machine, CNC operators must be well versed with each position on the mode switch, as well as when/how the mode is used. Emphasis should be placed on manual mode tasks like zero return, jog, and using the handwheel.

Understand key operation procedures

Running any CNC machine is little more than following a series of procedures. Be sure to provide entry level operators with specific step-by-step procedures for the tasks they must perform on the most regular basis – including power-up and shut-down, loading parts, changing offsets, and replacing tools.



44 Little Cahill Road
Cary, IL 60013
Ph: (847) 639-8847
Fax: (847) 639-8857

Instructor Notes Newsletter Enclosed!

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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.

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The price for unlimited training? ... \$149.00 (courseware only)
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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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If all items are purchased, we include a one-year subscription to our newsletter, The Optional Stop.



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

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