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Building the Next Generation of CNC Machinists: What Employers Want Teachers and Counselors to Know

Helping Students Turn Classroom Skills Into Manufacturing Careers

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When you look around a modern manufacturing facility, you'll find much more than machines cutting metal. You'll see technology, computers, precision measuring equipment, skilled problem-solvers, and people working together to create products that are used in everyday life.

At the center of many of these operations are CNC machinists. CNC, or Computer Numerical Control, machining is the process of using computer-controlled equipment to manufacture parts with a high degree of accuracy and consistency. From automotive and agricultural equipment to medical devices and aerospace components, CNC machining plays an important role in making the products we depend on every day.

As manufacturers, we know how important it is to find people who can do this work well. But here's something we want teachers and school counselors to understand: We're not necessarily looking for students who know everything about machining before they walk through our doors. We're looking for students who have a solid foundation, a good attitude, and a genuine interest in learning.

The next generation of machinists will need more than the ability to operate a machine. They'll need to think through problems, pay attention to details, work safely, and adapt as technology continues to change.

That's where educators and counselors make a difference. The skills students develop in the classroom today can become the building blocks of a successful manufacturing career tomorrow. Helping students recognize those connections and understand how to explore the field is an important first step.

1. What Are Employers Really Looking for in an Entry-Level CNC Machinist?

When we interview someone for an entry-level CNC machining position, we're looking at more than what's listed on their resume. We want to understand how they approach a task, how they handle challenges, and whether they're interested in learning a skilled trade.

There are two important pieces to this: technical knowledge and personal qualities.

Technical Skills: Understanding the Fundamentals

Students don't need prior machining experience to get started with us. We can teach these skills through training and hands-on experience. Exposure in school is a plus and can give students a helpful head start, but it isn't necessary before applying.

Some areas where prior exposure can be helpful include:

- Blueprint reading: Understanding dimensions, tolerances, symbols, and how a finished part should look.
- Measurement and inspection: Becoming familiar with tools such as calipers, micrometers, height gauges, and indicators.
- Machining fundamentals: Having a basic understanding of cutting tools, feeds and speeds, materials, and machining processes.
- Quality control: Understanding why accuracy matters and how a small measurement error can affect a finished part.
- Problem-solving: Recognizing when something isn't right, asking questions, and thinking through possible reasons why.

We don't want students to rule themselves out because they haven't had access to a machining class or these tools. What matters most is that they come ready to learn, follow instructions, work safely, and ask questions. We can build the technical skills from there.

Personal Qualities: The Things That Make a Difference

Technical skills are important, but they're only part of the picture. Some of the qualities we value most are things students can begin developing long before they ever step into a machine shop.

These include:

- Showing up on time and being dependable.
- Taking pride in doing a job correctly.
- Paying attention to details.
- Communicating and working well with others.
- Being patient when something doesn't go as planned.
- Following safety procedures and respecting equipment.
- Accepting feedback and being willing to improve.

We can teach someone how to operate a machine, read a control, or use a new measuring tool. A strong work ethic, reliability, and a willingness to learn are just as important.

In our experience, a student who asks questions, takes responsibility for mistakes, and wants to understand why something works the way it does has tremendous potential.

2. The Classroom Skills That Translate Into Machining

One of the best things educators can do is help students see how what they're learning in school connects to real-world careers.

Students sometimes wonder when they'll ever use certain math or science concepts. In manufacturing, we use those skills every day.

Mathematics: More Than Numbers on a Page

Math is a big part of CNC machining. Machinists regularly work with fractions, decimals, measurements, angles, geometry, and basic algebra.

Some practical examples include:

- Converting between fractions and decimals.
- Calculating dimensions and hole locations.
- Understanding angles and geometric relationships.
- Working with tolerances and coordinate systems.
- Using ratios and percentages.
- Solving for unknown dimensions.

Imagine a machinist measuring a part that needs to be accurate within a few thousandths of an inch. Understanding decimals and measurement isn't just helpful; it's essential.

The more comfortable students become with these concepts, the more confident they'll be when applying them in a manufacturing environment.

Manufacturing and Engineering: Understanding How Things Are Made

Students who have an opportunity to explore manufacturing and engineering concepts gain a valuable head start.

Understanding technical drawings, materials, design principles, and manufacturing processes helps students see the bigger picture. It's one thing to look at a finished part. It's another to understand how that part was designed, how it will be manufactured, and how it fits into a larger assembly.

Exposure to CAD, or Computer-Aided Design, and CAM, or Computer-Aided Manufacturing, is especially valuable. These technologies help connect the design process to the actual machining operation.

When students understand how a part moves from an idea to a drawing and eventually to a finished product, they begin developing the kind of thinking that makes a good machinist.

Science and Physics: Why Materials Behave the Way They Do

Machining is also a great example of science in action.

Heat, friction, force, motion, and material properties all affect how a part is manufactured. Different metals respond differently to cutting tools, and understanding those differences helps machinists make better decisions.

Why does one material require different cutting conditions than another? Why does heat build up during machining? What causes a cutting tool to wear?

Students who explore these questions begin building a foundation for troubleshooting and improving machining processes.

Computer Skills and Technology: Connecting Instructions to Actions

Today's manufacturing environment relies heavily on computers and digital technology.

CNC machinists may work with machine controls, digital drawings, programming software, production documents, and CAD/CAM systems throughout the day.

Students don't need to be computer experts, but basic computer skills, logical thinking, file management, and an interest in technology are valuable. Basic programming and CNC simulation can also help students understand how computer instructions translate into physical machine movements.

The important takeaway is that manufacturing combines hands-on work with technology.

Questions to Bring Into the Classroom

These connections can become discussion topics or short activities:

- Two students measure the same object and get different results. What should they check before deciding which measurement is correct?
- A finished project does not match the drawing. How would students identify, document, and explain the difference?
- A dimension must fall within a specified tolerance. What measurements would be acceptable, and which would not?

- A project didn’t turn out as expected. What did students try, what did they learn, and what would they change?
- How did math, science, planning, or communication affect the outcome of a recent hands-on project?

These activities reinforce more than technical knowledge. They give students practice explaining their reasoning and responding constructively when something goes wrong.

3. Give Students Exposure to the Equipment and Tools

Hands-on experience is one of the best ways to help students understand what a machining career looks like.

Not every school has access to a fully equipped machine shop, and that’s okay. Students don’t need to operate every type of industrial machine before entering the workforce. Even basic exposure to equipment and manufacturing concepts can make a difference.

Some equipment and technologies worth introducing include:

- CNC mills and machining centers: Used to produce pockets, holes, slots, contours, and complex shapes. Students can learn about cutting tools, workholding, and different machining operations.
- CNC lathes and turning centers: Commonly used to manufacture cylindrical components. Students can explore diameters, threading, and turning operations.
- Inspection and measurement equipment: Calipers, micrometers, indicators, and other inspection tools help students understand the importance of accurate, consistent measurement.
- Manual mills and lathes: These provide a foundation for understanding machine movement, cutting tools, workholding, and how adjustments affect the material being machined.
- CAD/CAM systems and CNC simulators: These help students explore how a digital design becomes a machining program.

Here’s the important part: Don’t get too caught up in the specific equipment or machine brands available at your school.

The fundamentals matter much more than the name on the machine. A student who understands measurement, blueprint reading, safety, and basic machining principles has a foundation that can be developed across different machines and control systems.

4. Why Technical Schools and Manufacturing Programs Matter

Technical schools and manufacturing programs help bridge the gap between learning concepts in a classroom and applying those concepts in an actual manufacturing environment.

There's something valuable about being able to take a drawing, make a plan, set up a project, measure the results, and see how your decisions affect the finished product.

Technical education provides opportunities for students to:

- Gain hands-on experience by working with tools, measuring parts, and completing projects.
- Apply classroom knowledge so math, science, and technology become more meaningful.
- Become familiar with industry equipment, software, and manufacturing processes.
- Develop good work habits, including safety, organization, documentation, and accountability.
- Build confidence by discovering what they're capable of accomplishing.
- Prepare for continued learning through additional training and experience.

It's important to remember that technical school isn't the only path into machining. People enter the trade through apprenticeships, on-the-job training, and other educational routes. The appropriate starting point depends on the student, the position, and the opportunities available.

From an employer's perspective, opportunities to practice the fundamentals are valuable. They give us something to build on.

5. What Makes a Student Stand Out When Applying for a Job?

Let's say two students apply for the same entry-level CNC machining position. Both have completed a manufacturing course, and neither has much professional experience.

What might make one stand out?

It isn't necessarily the student who knows the most about programming or has operated the newest machine. Often, it's the student who can explain what they've learned and demonstrate that they're ready to keep learning.

We like to see students who can:

- Talk about a project they've completed and explain the steps they followed.
- Demonstrate the drawing-reading or measuring skills they have learned.
- Describe a mistake they made and what they learned from it.
- Explain how they follow safety procedures.

- Ask thoughtful questions and accept constructive feedback.
- Show that they understand the importance of being dependable.
- Explain how they've applied classroom knowledge to a hands-on project.

One suggestion is for students to keep examples of their school projects. Photos, drawings, project descriptions, and examples of completed work can help them talk about their experience during an interview.

Those examples don't all have to come from a machining class. A project that required planning, careful work, troubleshooting, and follow-through can give a student something meaningful to discuss.

We're not expecting an entry-level candidate to walk in and immediately program, set up, and operate every machine independently. What we want to see is potential.

6. What Can Teachers and Counselors Do to Help?

You don't need a million-dollar machine shop to help students develop skills that translate into manufacturing.

Many of the most important fundamentals can be introduced through classroom activities and projects. Educators can:

- Incorporate real-world measurement and tolerance exercises into math lessons.
- Use sample engineering drawings to help students understand dimensions and visualize parts.
- Introduce calipers and micrometers through precision measurement activities.
- Include CAD projects, basic programming, or manufacturing simulations when possible.
- Create projects that require accuracy, planning, documentation, and troubleshooting.
- Ask students to explain their process, not just present the finished result.

Teachers and counselors can also help students explore the field by:

- Inviting local manufacturers to talk about their careers.
- Arranging tours so students can see manufacturing firsthand.
- Building relationships with technical colleges, apprenticeship programs, and local employers.
- Exploring available job-shadowing and work-based learning opportunities.

- Helping students understand the requirements and training associated with different positions.

Questions Counselors Can Use With Students

A conversation about manufacturing doesn't have to begin with, "Do you want to be a machinist?" It can begin with what the student already enjoys:

- What have you enjoyed building, repairing, designing, or troubleshooting?
- Can you describe a project where accuracy mattered?
- How do you feel about work that combines computers with hands-on tasks?
- What do you do when your first attempt doesn't work?
- What would you want to learn during a manufacturing tour or a conversation with a machinist?

These are starting points for exploration, not a test students must pass.

It's also worth reminding students that machining is one part of a much larger industry. Manufacturing offers opportunities in CNC operation, machine setup, programming, quality inspection, maintenance, manufacturing engineering, supervision, and other areas.

Students don't have to choose their entire career path before taking the first step.

7. The Future of CNC Machining: More Than Pushing Buttons

One misconception about manufacturing is that CNC machining is simply a matter of loading a part, pushing a button, and waiting for the machine to finish.

Anyone who has spent time in a machine shop knows there's much more to it than that.

Modern CNC machining requires a combination of mechanical knowledge, mathematics, computer skills, precision, and problem-solving. Machinists need to understand what the machine is doing, recognize when something isn't right, and know how to respond.

Technology and automation will continue changing the manufacturing industry. As equipment and software change, understanding the fundamentals and learning new processes remain important.

For students who enjoy working with their hands, solving puzzles, figuring out how things work, and seeing a finished product come together, CNC machining can be a career worth exploring.

Entry-level opportunities can lead to further development in machining, programming, quality, technical leadership, and other specialized areas.

8. Working Together to Prepare the Next Generation

Preparing students for careers in CNC machining is a team effort.

Teachers introduce concepts and help students develop the fundamentals. Counselors help students explore their interests and understand their options. Technical schools provide opportunities to put skills into practice. Employers build on those foundations through training, experience, and continued development.

As manufacturers, we have a responsibility to help develop the next generation of skilled workers. That starts by working with educators, supporting technical programs, and providing opportunities for students to see manufacturing firsthand. It also means providing clear expectations, instruction, and feedback as new employees learn.

We don't expect students to know everything on their first day. What matters is that they understand the importance of accuracy and safety, take pride in their work, and come ready to learn.

Some of the most important skills a future machinist can develop aren't necessarily learned while standing in front of a CNC machine. They're developed every time a student works through a challenging math problem, carefully measures a project, reads a technical drawing, or figures out why something didn't turn out as expected.

Those experiences matter. Helping students recognize their value can open the door to a career they may not have considered.

Explore Opportunities With Metal Craft and Riverside

At Metal Craft and Riverside, the connection between classroom skills and real-world applications goes far beyond everyday parts. Riverside manufactures components used in the F-35, cutting-edge air defense radar, and some of the most advanced electronic attack systems in the world. At Metal Craft, we produce surgical instrumentation used in some of today's most advanced surgical procedures.

For students, these applications bring the importance of precision, quality, and attention to detail into focus. The math they practice, the drawings they learn to read, and the measurements they take can become the foundation for work that supports national defense and helps surgeons care for patients.

Each year, Metal Craft and Riverside provide paid, hands-on employment and training opportunities to high school students participating in apprenticeship and Career and Technical Education (CTE) work-based learning programs, as well as students attending technical colleges. These opportunities are available at both our Minnesota and Wisconsin locations and offer valuable real-world experience, while creating pathways to long-term employment, career development, and advancement within our organizations.

To learn more about careers at Metal Craft and Riverside, please visit:
https://mcandrs.com/careers/