

Garrett Reim

Sales Support Coordinator
Southwestern Industries, Inc.
Greater Los Angeles, CA
greim@southwesternindustries.com



FOCUS ON THE **WorkForce**

Wentworth: Lessons from One Year of Teaching CNC Programmers

November marked the one year anniversary of the opening of Wentworth Institute of Technology's new \$3 million Manufacturing Center in Boston, and the school's engineering faculty said they are seeing the fruits of their labor.

As they set out to build a 21st century applications lab where students gain hands-on experience working with modern manufacturing technology, it required Wentworth to rethink its methods for teaching machining manufacturing.

Previously, "old machine usage was very vocational," said Associate Professor Peter Rourke. But "we decided that we needed to break the mold by not teaching manual machining first. CNC has become central to the machining experience."

To make the right move into CNC machining, the process required faculty to road test a number of machines. The process was thorough, but after reviewing a number of different machines, Rourke said: "The decision was nearly unanimous."

Rourke added that "new students are very computer literate" and are "far more comfortable" with CNC than in the past. Of course, they still have to do things such as tram a vise and use an edge finder, but Rourke said the "repetitive tasks are gone," and CNC skills are the new focus.

In fact, manual machinist skills are not being taught anymore at Wentworth because there is not much demand for it. New England manufacturers perform work that is often too complex or has a higher tolerance than can be done manually. These companies are looking to new high-tech CNC equipment to meet their needs and require people with strong CNC skills.

"Many people's skills are outdated so they look to younger people's skills on new equipment," said Rourke.

At the lab, the process of learning CNC is tactile from the start. In their "Introduction to CNC" class, engineering students machine a small two-stroke engine. In the past, technicians would help handle the setup. But now, students work the whole manufacturing process, from design to production.

Manual machinist skills are not being taught anymore at Wentworth because there is not much demand for it.

Wentworth "found ProtoTRAK machines to be the perfect landing spot, because they allow manual operation and the students can continue right into full CNC operation." Also, because "the controls stay pretty much the same from milling to turning to the machining center" students can quickly reapply their programming knowledge from one machine type to another. In total, Wentworth purchased 14 ProtoTRAK CNC machines: six CNC knee mills, one CNC bed mill, six CNC lathes, and one machining center.

"We make the students make the parts," said Rourke.

After that class, the emphasis continues to be hands-on. For example, in the "Computer Aided Manufacturing" course, Rourke said, "we go right from CAM into the TRAKS." Practical experience is held at a premium.

In the Manufacturing Center's Mechanical Engineering and Technology Department, students spend time learning within the lab and in the workforce through cooperative education (co-op) experiences.

The lab features top-of-the-line machining equipment: the 14 ProtoTRAKs and a Feeler VMC with a Fanuc control from Methods Machine Tools, are great launching pads for student co-ops.

Kenny Curran, a 2013 graduate candidate, is pleased with how the new Manufacturing Center's equipment prepared him for his co-op. "I had a great co-op with GE Aviation over the summer," said Curran, who worked with a Fanuc-controlled machine at GE, the same type of machine that he learned to use in the Manufacturing Center. "Having that machine is really going to expose students to the exact same type of controller they are going to see in production."

For educators, teaching CNC machining to students often comes with challenges. A big concern is often the fear of a machine crash. This risk loomed large in Wentworth's process of deciding on which machines to use.

"Can you imagine a first-time programmer just hitting 'Go'?" Rourke asked.

Supervising multiple machines at once is nearly impossible, and the faculty needed a solution that made CNC machining safer. Fortunately, Rourke found the answer in ProtoTRAK's TRAKing capability.

"This feature works with the machine's electronic hand-wheels, allowing the student to have manual control of the job through the entire program. Without this, a mistake in a student's program could crash the machine. TRAKing allows the student to go forward or backward through their entire program while they observe the toolpath. They can stop and back up at any point, make changes right on the controller, then resume the job from that point. This feature is huge in a toolroom full of students."

The TRAKing capability gives Rourke much more confidence when supervising a class full of new users.

The new modern CNC machines are also bringing Wentworth students into the Internet era of manufacturing. When students leave class, they download their homework and



Wentworth students set up a machine for a new assignment.

complete it on ProtoTRAK's off-line programming software. The Manufacturing Center is equipped with a dedicated server so students can practice and perfect their programming "work in their dorm room and send it to the machine," said Rourke. This sort of programming versatility has freed machines and made the manufacturing lab more flexible.

A year since its launch, Wentworth's Manufacturing Center's new equipment is a huge hit with students as more of them are using the facility. Recently, Professor Rourke met with fellow faculty to find ways to squeeze more lab time in for the students. "We are trying to fit more programs into this lab. The demand to use the machines is that high!" **ME**