Walking through the machine shop at Clackamas Community College’s Manufacturing Lab room is like a trip through time. In one large room are dozens of manually-operated mills and lathes, ranging from 40 to 60 years old. A student, Kirill Ignatyev, labors at one, shreds of metal curling away as he works on a tapered shaft. In another space sits a machine so large CCC staff had to cut the wall open to bring it in. The Okuma is a Computer Numerical Controlled mill, which uses a computer to guide the spinning teeth of a bit and transform a block of metal into a complex part of a machine.

Students, teachers and elected leaders gather around and watch as the tungsten teeth tear through a piece of aluminum, slicing a perfect wave pattern into one side and writing “Gosiger,” the name of the company that distributes the machine, diagonally across the complex surface. These tools can make things that are way beyond human hand-eye capability, but they must be programmed by a someone who knows languages such as G-code.

“Being a machinist requires a very technical skill set,” says Bob DelGatto, who teaches Machine Fundamentals at CCC.

“It used to be if you were looking for a job and you knew CAD (Computer Assisted Design), your resume went to the top of the list. Then if you were able to set up and program a Computer Numerical Control three-axis machine, your resume went to the top of the list. Now that’s expected. Now if you can program a four or five or multi-axis or multi-spindle machine, you’re at the top of the list.”

DelGatto says he has had CCC students hired by companies such as Machine Services in Wilsonville.

“They’re now working next to people who are pushing six figures,” he says. If the 16-year-olds in attendance are impressed by the big money, they’re not showing it. They’re on their best behavior: quiet and orderly.

The occasion is Manufacturing Day or MFG Day 2014, a national day of factory tours to promote keeping family wage, manufacturing jobs in America.

Started in 2012, the day has achieved more than 1,600 manufacturing plant tours and events with an estimated 100,000-plus attendees.

Politicians go where the new jobs are, so the Mayor of Oregon City, Doug Neeley, Clackamas County Commissioner Martha Schrader, Rep. Reardon and Oregon City Commissioner Carol Pauli were all in attendance.

The college, which needs the newest technology but can’t afford $200,000 per unit, borrows the machine from Gosiger. The students train on it. Other companies send their staff to train on it too, since it’s the only one between Seattle and Southern California. It’s marketing for Gosiger; the professional machinists update their skills without hogging a production machine; and the students inch towards a sustainable career.

DelGatto explains that students still must learn on manual machines so they can make inexpensive mistakes and develop their intuition.

“They have to feel the metal, and hear the sounds it makes to understand what they’re doing.”

The school is using its bond money to invest in better machines. That includes the six-axis robot which can be
programmed to stack boxes, or the welding robot which will debut on Oct. 20.

But humans need to watch over them.

“You’ll always need someone to man the robots, to feed the beast. Robots are great but they’re only as smart as the operator.”

With technology changing so quickly it’s hard work keeping people employed.

“Most of the companies in Clackamas are less than 150 employees, and they just don’t know if they have a potential supply chain customer in their area, or someone they can partner with,” says Bridget Dazey of the Workforce Investment Council of Clackamas County. WICCO is a non-profit organization and advocate for workforce development within Clackamas County and the State of Oregon. It’s working with Clackamas-Career & Technical Education Consortium (CTEC) Youth Services program which provides education, employment, and training support for low-income youth with barriers to employment.

Dazey says WICCO often pays half the wages of workers while they are getting trained by private companies.

“It helps to reduce some of the risk to the employer.”

She explains there’s a common misperception that “dark, dangerous factories are designed for low-skilled workers,” when in fact they have more in common with labs and offices.

On MFG Day the group is shuttled bussed to Wilsonville to Machine Sciences. The Director of Manufacturing, Paul Wheatcroft grew up in dreary Blackburn in the north of England and apprenticed as a machinist in Scotland. He was 16 and he was told to do his work and keep quiet.

After fixing anything that broke on North Sea oil rigs, he made his way to the United States in 1993 and eventually joined Machine Services. The company makes parts for aircraft (including the Boeing Dreamliner and a drone company), speedboats, flying cars (imagine an octocopter) and scooters among other things.

The factory is well-lit and clean, only distinguishable from the office by machine noise. In a central aisle, robotic arms pick and pull blocks of metal and feed them into machines, the pride of which is an 11-axis mill.

“A lot of the easier stuff is going offshore, so we focus on low volume, high accuracy parts,” says Wheatcroft.

The company started with four people and two machines. Now it has 50 people and 16 machines.

There is some routine work: apprentices start out on the sanding bench, filing off rough bits from parts. Wheatcroft says is a “big no-no” for a client to cut their hand on a part from his factory, and staff are told to take the same care over a $10 part as a $1,000 one. Production work might involve cutting hundreds of the same part. The staff look forward to the one off jobs and the complicated stuff.

CCC’s President, Dr. Joanne Truesdell, makes the point that the colleges alone can’t manage all the training, that private industry needs to partner with public education.

And that’s exactly what’s happening.

Kyle Laier, the Principal of the Clackamas Academy of Industrial Sciences (CAIS) is on hand with some of his students. Some of them take classes at CCC. The school has 225 students now, with the hope of reaching 500.

“Our goal is to get all of our students to graduate with their high school requirements, and also with a certification, such as welding or a machine certification, or an associate’s degree.” They become plumbers, they go into construction, they become electricians, with the possibility of one day going into management.

Laier is especially proud of two students who got their national welding certificate and were hired by Oregon Iron Works as soon as they turned 18.

CAIS tenth grader Jesse Horn has a father who owns JJ Construction, which does remodeling and excavation work.

So far, Horn has made a step shaft with three different threads, and a metal pen.

“I was looking for a school that could offer me some education in construction, but I’ve changed my opinion and want to go into manufacturing. I want to become a machinist and operate a CNC.”

The program’s English class focuses on soft skills: “Communication skills, the ability to work with other people, to present yourself well, the skills employers look for…”

That morning, Horn had already been through a mock interview with A-Dec Dentistry, which makes dental tools. In
math, he studies Construction Math (calculating the load on beams and the angle of trusses) and in Social Studies, “the economy, what makes it go around, fall and grow.”

He was 10 years old when Lehman Brothers triggered the Great Recession. And here’s a rare thing: he can expect to live in a time of full employment, at least in his early 20s.

“I’d like to work for Boeing, or A-Dec, or Benchmade,” he says.

Horn snowboards, wakeboards and hunts elk in Eastern Oregon with his extended family. He seems like an ordinary Clackamas County kid with some advantages: a family business, talent and focus.

His schoolmate Edward Schaefer, a senior at CAIS, is on a similar path. He likes fishing and hunting duck and quail. He used to hunt squirrel at $5 a head in a filbert orchard on his walk to school.

He describes Machine Sciences as “pretty awesome” for being so high tech. His class has made low tolerance parts for Benchmade, but this is different.

“I’ve never seen an 11-axis machine before,” Schaefer says, although he is not sure he wants to go into machining.

At Machine Sciences, Wheatcroft explains more of the human element. For instance, how drilling a tiny hole with a different size drill could reduce work time from an hour to a few minutes. Then he explains how the client said no, because to change it would take six months of bureaucracy back at corporate office.

“There are good engineers and not so good engineers, or imagineers.” The latter refers to engineers who design things that can’t really be made.

“There area lot of different ways to get into this industry but the bottom line is you gotta work with work with metals. The good guys have cut metal, they understand how metal behaves. If they haven’t cranked the handles…” Wheatcroft shakes his head.

The industry is moving into “growing” parts, or 3D printing them with lasers. He shows a wingtip for a Boeing plane made elsewhere. Casting a prototype would have cost $100,000, but in plastic, Boeing can test the fit and move on.

He introduces Andy Elliot, who was an award-winning machinist at St Helen’s High School, but not only that, was aggressive, personable and willing to do public speaking. Elliot worked his way up from the sanding bench to Department Lead.

“I am lucky I had the encouragement of a teacher who understood there are kids who don’t want to go get an information degree, they want to work with their hands,” says Elliot.

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**Growth sector**

According to a recent release, over the next decade, the manufacturing sector in the region is projected to need to replace more than 30,000 workers. Through this collective effort, MFG Day will provide the awareness and outreach the industry requires to participate in developing a highly qualified manufacturing workforce.

To find out more about Clackamas Community College’s Manufacturing program, visit:

[clackamas.cc.or.us/Programs/Manufacturing-Technology.aspx](http://clackamas.cc.or.us/Programs/Manufacturing-Technology.aspx)