

CASE STUDY ROCHESTER INSTITUTE OF TECHNOLOGY

»SMILE 400/PILOT 3.0« WITH OKUMA THINC INTERFACE

Creating the future of manufacturing

If you're skeptical of the future of North American metalworking manufacturing, make a visit to the Earl W. Brinkman Manufacturing and Machine Tools Laboratory at the Rochester Institute of Technology, Rochester, NY. It is here that a state of the art machine shop operates to teach future degreed engineers the essentials of materials processing using the Okuma THINC interface.

An Okuma vertical machining center, Kennametal ToolBOSS tool storage, and ZOLLER tool measurement and inspection are linked in the lab, helping students learn valuable techniques for saving time and ensuring the accuracy of manufacturing processes they design.

The Brinkman Laboratory was the vision of Bob Brinkman, a leader in manufacturing in the Rochester area and the USA. It's a thoroughly modern shop dedicated to research and to teaching manufacturing. Located in the Kate Gleason College of Engineering, part of the Industrial and Systems Engineering Department, its mission is to help the advancement of the manufacturing industry through applied research, education, and

industrial outreach. The Brinkman Family Foundation provided support to set up the lab.



Earl W. Brinkman Manufacturing and Machine Tools Laboratory at the Rochester Institute of Technology, Rochester, NY

John Bonzo is Lab Director of the Brinkman Lab & Facilities Manager of the Industrial and Systems Engineering Department at RIT. "This is where students learn the concepts, particularly in the materials processing course where they get their first exposure to a machine shop, and learn the fundamentals of machining," he said. "Students learn that manufacturing is taking something and making it more valuable--a value-added process," John asserted. About 250 students are in the industrial and systems engineering programs and others are exposed to the lab through the materials processing class.

"One of the biggest parts of manufacturing is reducing waste

in a manufacturing system and getting the task accomplished as quickly as possible," John said. "This includes reducing waste in a manufacturing facility like this, and that is where ZOLLER tool inspection and presetting comes into play.

"The THINC system allows us to take one of our Okuma CNC vertical mills with an open architecture controller on it and connect the peripheral devices, such as the ToolBOSS tool inventory system, the ZOLLER presetter, bar feeders, and inspection equipment and help streamline the communication between all these inputs, therefore reducing potential error and wasted time."



The Brinkman Laboratory is comprised of a 3000 square foot machine tools lab, a metrology lab, and a wood shop

Learning tool management

John points out that the lab uses the THINC system to help

reinforce classroom instruction and provide practical, state of the art practice. "The main thing our students learn is how to efficiently set up a manufacturing system in a real world situation. They can see the time and accuracy advantage of setting up a machine off-line with the ZOLLER as opposed to standing at a machine and doing trial cuts with each different tool in the machine. They can see the real time benefits," John said.



Tyler Brent, a 3rd year Industrial Engineering student and a co-op engineering lab assistant is a primary user of the ZOLLER »smile«

The ability to produce and test real time solutions at a single location means the same solutions can also be quickly replicated on your machine shop floor.

The THINC system in the lab starts with a student request of all tools necessary to perform the part process as they have designed it, based on a CAD/CAM file they develop. The tools are measured, inspected, and set on the ZOLLER »smile« presetter and CNC data (actual values) are stored. The ZOLLER also stores a parts list for tool assembly and tool setting sheets. Measured and set tools are stored in the Kennametal

ToolBOSS tool storage and inventory management system. During machining, actual current tool life is sent to the ZOLLER presetter and measuring machine, then tools are stored again into the ToolBOSS.

According to John, "We use the ZOLLER »smile« presetter the way any shop would: measure tools and setup offsets off-line. Plus, we use it to inspect our tools. Using the THINC system, students communicate with the controller on the CNC mill and the Kennametal ToolBOSS tool inventory system. Primarily we use the »smile« to setup all our CAT40 tooling for the mills.

For ZOLLER's part, the company has also been developing an interface with Mastercam, another THINC partner, to permit students to import jobs from Mastercam – plan the job in Mastercam, prepare the job, and measure the tools required for the job and to send the results to Okuma.

»smile« makes students smile

"The students were ecstatic when they saw the capabilities of the ZOLLER »smile«," John said. "The traditional method of setting tools on the machines is to touch off the tool tip some known distance within the machine – which puts the students inside the work area of the machine, which is dangerous, frankly. The ZOLLER is also vastly more accurate than on-machine tool setting."

And students save setup time by an average of 3-5 minutes for each individual tool due to presetting and measuring offline. The students also see the measurable cost savings of presetting and measuring off-line.

"If a machine operator 'fat-fingered' a tool offset, entering an incorrect figure, into the menu, it could make a significant difference when machining starts," John pointed out. "Just the error-reduction alone has prevented many tools in the lab from being demolished in the machines. The ZOLLER evaluates the offsets, compares them to the CAD data, and alerts the user to the potential error before the tool is loaded into the mill."

The »smile« was a good choice for the manufacturing lab.



John Bonzo, Lab Director of the Brinkman Lab & Facilities Manager of the Industrial and Systems Engineering Department at RIT with the ZOLLER »smile« presetter

»smile« is a universal vision-based tool presetter and measuring machine that can accommodate every type of drilling, turning and milling tool. Especially designed for small job shop production, it is compatible with all types of machine tools

and its operation is quickly learned. Through a display by CCD-camera and LED illumination, students inspect cutting edges for wear and indentation and can measure tool geometries manually.

The ZOLLER vision system software can store 99 zero points and thousands of tools. The automatic zero point control prevents the wrong tool from being installed on the machine and eliminates crashes and downtime. And since the »pilot 3.0« software is expandable, the lab at RIT can continuously benefit from new developments at ZOLLER.



ZOLLER »smile 400/pilot 3.0« with Okuma THINC control and Kennametal ToolBoss interface

According to John, the students see the benefits of presetting very clearly in the lab. "They see a minimization of scrap parts as a result of measured and preset tools, and an increase in the service life of tools. Students have also found that they can prevent tool crashes with measured and preset tools and therefore significantly reduce

repair costs and avoid downtime."

The lab also uses the ZOLLER to research tool wear and quality trends in certain applications, comparing the effects of coolant, speeds, feeds, and other factors. "Our students also can use that data to optimize their part processes, much as any good shop would do," John said.

This ties in well with the program's goal of applied research. Senior students also can create an interdisciplinary project to develop processes or products.

"Another important use of the manufacturing lab is to show local shops what is possible with new technology," John said. "Most small shops, while they need to be globally competitive, do not have the time or resources to evaluate and purchase new machines and software. So the lab opens up once a year to show local shop owners how to shave seconds off production, the benefits of a multitasking machine vs a 2-axis machine, or the benefits of a CAD/CAM package.

So a part of the lab's mission is educating not only students but also industry to help manufacturing companies remain competitive and inventive. RIT calls it industrial outreach.

According to the THINC partners, its goal is to provide a complete manufacturing solution to its customers through leading technology providers that can

provide the lowest cost, best solution to meet the needs of manufacturing worldwide. And students at RIT's Brinkman Lab are using what they learn to help create the future of US manufacturing.

*The Arnesen Company in cooperation with The Rochester Institute of Technology and ZOLLER Inc.
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