Major Tool & Machine has flexible machine capabilities for running all kinds of different parts

■ Major Tool & Machine, Indiana

Retrofitting for Success

With the right CNC platform, a large, state-of-the-art job shop has discovered that "anything is possible."

Siemens Industry, Inc.

Major Tool & Machine (MTM) is a large job shop that produces precision-milled and precision-turned hardware in its 500,000 sq. ft. (46,000 m^2) Indiana facility. Performance is essential, because MTM contracts with aerospace, energy, nuclear and defense companies on many mission-critical one-off projects. Owner and CEO Steve Weyreter chose to keep MTM competitive by retrofitting machines with improved CNC technology.

Günther Zimmermann, CNC controls engineer at MTM, said changing to the Sinumerik CNC brought new enthusiasm and momentum to MTM. Over the last two years, it significantly reduced the time and cost involved in programming, maintenance engineering and machine operations. "The initial goal in early 2010 was to retrofit two Cincinnati U5 gantry machines," Zimmermann said. "After considerable analysis, CEO Steve Weyreter announced that Siemens would best support the company's future."

Deciding to move to a single CNC platform was not difficult, said Zimmermann. The larger challenge was to integrate unfamiliar CNC technology. Bill Henderson, MTM's manager of large machining and maintenance, said the Sinumerik CNC with advanced part and tool probing was critical, because in the shop there are constant changeovers from one job to the next, making set-up times a critical time and cost constraint. The flexibility of the Sinumerik CNC was also a big advantage, since machinists and maintenance personnel need to learn only one type of control. "Naturally, there's resistance to change," Henderson said. "But after our discussions with the people on the plant floor, they understood the overall objective. Our retrofit program is not finished, but it's already showing tremendous benefits."

Heads-up interchangeability

Retrofitter Doug Huber said having Siemens as a new CNC technology partner has also provided a boost to his retrofitting company, Indiana Automa-

tion. “Indiana Automation has increasingly retrofit using Sinumerik controls in recent years,” Huber said. “On a retrofit, we always try to exceed what the original machine could do, and that’s just kind of inherent when you put on a Sinumerik 840D sl. Major Tool’s first retrofits were the Cincinnati U5 machines. The processing power of the control is so much better that it just whips through the blocks faster. So right off, cycle time is a major performance enhancement.”

Huber also said that as his firm finished retrofitting the first three giant machines, employees saw that the machines were not just more efficient now, but that they performed as very different machines. “On many of the U5 machines, the axes come off with the heads,” Huber said, “and we rebuilt these machines to accept any one of three different heads. One of Major Tool’s key strategies is to have flexible machine capabilities, so that they can run all kinds of different parts. They have straight heads for serious metal cutting, and contour heads for five-axis and finesse work. They have 90° heads for more flexibility and durability than a contour head offers. And they wanted to interchange all of these heads to automatically go pick up a head out of the shuttle and, on the fly, reconfigure the axes and the zero positions.”

The interchangeable head strategy was a challenge because the machines were not originally capable of sharing heads. But with support from Siemens, the strategy has been successfully implemented, including the ability to interchange rotary tables as well as heads. “Each head or rotary table has a configuration file with all the settings and compensations that travels with it from machine to machine,” said Huber. “So now when you mount that head, the configuration file goes with it and it’s all set up for you. MTM’s ability to smoothly transition to a more advanced CNC is largely due to the HMI’s ease of use,” said Huber. “The Sinumerik Operate graphical user interface is a huge help to us and to Major Tool. The HMI helps make better parts. It didn’t take long for the operators to fall in love with it.”

Leveraging the machinist’s skills

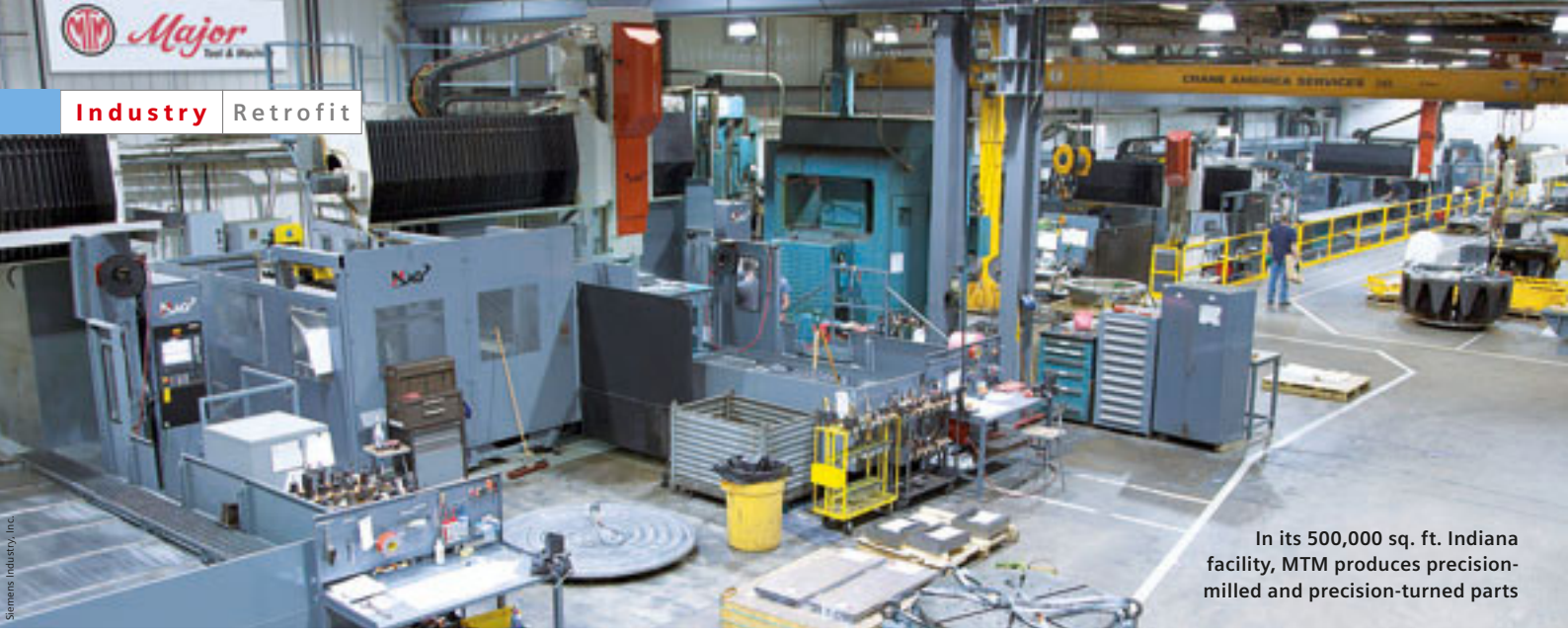
“I had never used a Sinumerik control before,” said MTM machinist Mike Burthay. “I have extensive knowledge of G-code and CNC controls, and I would say the Sinumerik 840D sl with the Sinumerik Operate interface is the easiest one I’ve ever run.” Burthay mentioned several ways that the Sinumerik Operate interface has made his life easier. “There’s not as much G-code,” he said. “The control does it all for you as long as you put in the parameters for size, length and width. Once you’re in Job Mode, there’s a screen where you can tool change or jog the machine around to certain positions, or turn the spindle on, or turn the coolant on — anything that traditionally required G-code. So now you can push a ‘Cycle Stop’ button to pause the machine, enter a change such as turning coolant on and then restart the program.

“Another function I love is Block Search, which allows me to start or restart right in the middle of a program. Say you’re finishing a pocket and you have to run the tool two or three times to get a tight tolerance. I can enter in a line number and hit ‘Block Search,’ and the control picks up every line before that and restarts the spindle and everything for you.” Burthay said the Sinumerik control enables him to program parts right on the machine, using a simple yet robust program called ShopMill.

»The Sinumerik Operate interface is a huge help to us. It didn’t take long for the operators to fall in love with it.«

Doug Huber, Vice-President, Indiana Automation

Siemens Industry, Inc.



Siemens Industry, Inc.

In its 500,000 sq. ft. Indiana facility, MTM produces precision-milled and precision-turned parts

▸ "Say I want to drill a hole 2 inches (5 cm) deep. I open ShopMill, pick my tool and tell it the depth — these steps are all interactive on the screen. It even shows me 3-D motion images of the tool path and confirms the drill going down as expected into the part. So I hit 'Go' and it puts a drill cycle into the program for me."

Programmed for collaborative growth

Lead programmer Tim Hayden conducted all the processor set-ups for the newly retrofitted machines. Hayden said integrating the Sinumerik CNC was an empowering experience that he had not expected, since he had not used Sinumerik controls before. "Now, when I look at the Sinumerik control, I think, man, it would have been so much better to have had it all along," Hayden said, "because the other control I've been using is just a lot more cryptic. The Sinumerik control with the Sinumerik Operate interface is more powerful for writing macros and the language seems modern, whereas the other control seems like it is still based on an old Fortran-type language."

"We do a lot of work on compound angles," Hayden said, "and with the Sinumerik Frames function, you can scale and rotate your coordinate system on the control — just plug it in with your work offsets. On the other control you've got to enter G-code. You can't just plug it into your work offsets like you can with the Sinumerik control." Hayden said that although the Sinumerik Operate graphical user interface enables him to enter G-code, the intuitive design and evolved capabilities of the HMI eliminated the need for G-code entry.

Another example of this HMI evolution is in the area of data management. "When we post a program, we no longer have to use a G-code-based MDI," Hayden said. "We no longer need to type in 'T=' and enter a nine-digit number and then enter 'M6' to make a tool change. With the Operate HMI, you pick your tool off a screen and hit 'Cycle Start.' It's just as easy to program going to a position. Instead of typing G0X0Y0Z0 into the MDI, you open the Sinumerik Operate interface, click on 'Position,' then click how you want to wrap it, and then just type the numbers into those fields. So it's a lot more user-friendly."

Hayden said the Siemens CNC platform supports greater collaboration at MTM between him and the machinists, and increases performance and efficiency. He said shorter set-up times and greater operator freedom are making a significant difference. "One of our production bottlenecks has been programming," Hayden said. "The machinists who run our machines are professionals — they're not button pushers — and with the Sinumerik Operate interface, they can control and program certain parts right on their machines, while we programmers work on the more complex projects."

"Siemens was the best fit," Hayden said. "Siemens' CNC is set up as an open control, and with that kind of flexibility, it seems anything is possible." ■

Sinumerik at MTM

- Sinumerik has reduced programming time and costs, and allows endless possibilities.
- Because of its processing power, the Sinumerik 840D sl is used to retrofit five-axis machines.
- The Sinumerik Operate graphical user interface makes the control easy to use, even for users without experience.

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