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SIEMENS

Productivity in Motion

Innovations Sinumerik 808D rounds off CNC family

Gear Grinding **CNC** Software for Production of Advanced **Machine Tools**



Task Force Tips produces parts up to 30 percent faster with Sinumerik-controlled INDEX lathe



Machine tool builder EMAG LLC relies on Sinumerik for multiple machining tasks



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Major Tool & Machine retrofits with Sinumerik CNC for its precision milling and turning

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"Sinumerik 808D completes the CNC product family"



Rajas Sukthankar Business Segment Manager Machine Tools Siemens Industry Inc. Chicago, Illinois

Leading into the International Manufacturing Technology Show (IMTS) 2012, the US machine tool industry has shown robust growth thanks to large capital outlays in the automotive, mining and oil and gas markets. Globally, the machine tool industry presents a mixed picture. Despite a slowdown in economic growth, the demand for imported high-end machinery remains strong in the Chinese manufacturing sector. Electronics manufacturing continues to consume a large number of drill-tap centers in East Asia. The economic downturn in Europe has affected machine tool production in Spain and Italy, whereas the export-driven powerhouse Germany continues to produce a large number of machine tools to satisfy global demand in the high-end market.

In keeping with our motto, Productivity in Motion, we continue to invest heavily in research and development. As a global leader in the machine tool industry, we are proud to present our latest product, the Sinumerik 808D, at this year's IMTS in Chicago. We now have a complete CNC product portfolio ranging from simple two-axis knee mills to complex multi-axis aerospace machines to take care of all your machining needs. Our CNC product family consists of the simple 808D; the midrange 828D; and the high-end, industry-leading 840D sl.

At IMTS 2012, we will also introduce a new control feature called Sinumerik Control Energy (Ctrl-Energy) that helps increase the energy efficiency of your machines by reducing energy consumption. From development and procurement to production and sales, integrating machine and production data into the workflow is becoming increasingly important. The Sinumerik Integrate display in our booth has six modules for the integration of a machine tool into the communication, engineering and manufacturing processes within the machining environment.

We would like to thank our OEM and end-user customers for making the name Sinumerik synonymous with innovation and technology leadership in the machine tool industry.

See you at the show!

And thank

IMTS, Chicago

Productivity in Motion

At this year's IMTS, Siemens will present leading CNC solutions under the motto "Productivity in Motion."

ntroducing new solutions and services at the International Manufacturing Technology Show (IMTS) in Chicago, September 10–15, Siemens will focus on turnkey solutions for the job shop, aerospace, automotive, mold/die, and medical part manufacturing industries. These solutions include the new Sinumerik 808D, a shopfloor CNC specifically designed for the economy-priced market, as well as new value-added services ranging from condition monitoring and manufacturing IT to innovative training solutions and machine tool retrofits.

Offered as a package with Sinamics drives and Simotics motors, the Sinumerik 808D will be demonstrated on a knee mill during the exhibition. The 808D is available for both OEM machine builds and as a retrofit. Also running on various machines and demonstration units at IMTS 2012 for the first time will be the Sinumeric 828D Basic T (turning) and Basic M (milling) enhancements to the midrange machine tool Sinumeric 828D.

Easy to program and maintenance-free

The Sinumerik 828D Basic T is designed to address the needs of shopfloor turning machines by combining the CNC, PLC, operator panel, and axis control for five axes/spindles, including live tooling. Likewise, the new Sinumerik 828D Basic M features the same quality performance for use on milling machines, enabling mirror-smooth surfacing and reduced machining times even in complex moldmaking operations. In tandem with the new Sinamics S120 Combi drive, both the 828D Basic T and 828D Basic M represent a new level of efficiency and virtually maintenance-free operation, as fans, hard disks and batteries have been eliminated. Modern PC and mobile phone technology are now also available for the shopfloor machine tool. USB,

CompactFlash (CF) card and Industrial Ethernet ports enable high-speed data transfers onto storage media or integration of the control system into corporate networks. The Sinumerik 828D offers production status monitoring by text messaging (SMS), transmitting information about workpiece machining status, tool condition reports and machine maintenance bulletins to a mobile phone. The Sinumerik 828D supports full graphical, high-level language commands as well as ISO programming, thus making this control family ideal for single-part and small-batch production. What is more, using either the ShopMill and ShopTurn graphical work-step programming system or high-level language programming with ProgramGuide significantly reduces programming times.

Setting CNC standards

The Sinumerik 840D sl CNC has completed yet another series of advancements that are ready to be presented at the fair. The system platform offers a comprehensive range of functions for machine tools and covers wide-ranging machining technologies used in metalworking operations such as turning, drilling, milling, grinding, laser machining, nibbling and punching — plus it can be used in multitasking machines such as turn-milling or mill-turning centers.

With the benefit of modern touchscreen operation, the new Sinumerik OP 019 operator panel now allows high-speed key actuation at the large 19" glass front, which conforms to the IP66 protection rating. In addition, the OP 019 features wide LEDs and an integrated key lock. Sinumerik Ctrl-Energy complies with the strict requirements of the international energy efficiency standard EN16001. Ctrl-Energy provides a full assessment of the energy consumed by the machine tool and enables specific

power loads to be shut down automatically during downtimes. Braking energy can be stored or fed back into the power grid, thus significantly increasing energy efficiency. Sinumerik Integrate is an onboard CNC solution that allows machine tool data to be integrated quickly, simply and reliably into other company processes.

Industry-specific solutions and services

The Sinumerik 840D sl increases performance and user productivity for the aerospace market. The distributed, scalable, open and interconnecting system features the innovative Sinamics S120 drives, which can be used with up to 31 axes.

In the automotive industry, the Transline system integrates diverse metal-cutting technologies and the assembly of powertrain parts under a common system architecture. Also based upon the latest Sinumerik 840D sl, the Simatic PLC and Simotics motor technologies, the Transline solution provides for faster start-up times, better equipment serviceability, and increased productivity.

Sinutrain, the Siemens package of corresponding CNC training software on CD-ROM, is designed to run on the Windows XP or Windows 7 operating systems, developing and simulating actual NC programs. Other exhibits on display at the Siemens booth will include the new Simotics motor family S-1FK7/S-1FT7 high-inertia servomotors, the M-1PH8 main spindle motor, linear motors and direct-drive torque motors. The presentation will also provide valuable information on machine tool retrofits, field service, customer service, spare parts and repair — all of which support the machine tool builder and enduser. Special displays will feature industry-specific solutions for medical part manufacturing and power generation.

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With the INDEX C100 automatic production lathe and Sinumerik, TFT produces parts 30 percent faster

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Task Force Tips Inc., Indiana

Well Worth the Price

A manufacturer discovers how much money is saved by investing in high-priced, high-speed machines.

Task Force Tips (TFT) is a manufacturer of highly engineered fire suppression tips, nozzles and other agent delivery equipment used by fire departments globally. For more than four decades, the company has consistently invested in premium machine tool brands associated with quality, performance and, logically, higher price tags. Even so, it was the latter variable — the perceived barrier of price — that prevented company owner and president Stewart McMillan from considering the higher-priced, highspeed machining options on the market. "I hadn't really looked at the economics when it came to an INDEX machine," recalls McMillan. "And why? Because it always seemed like the INDEX brand was so prohibitively expensive. I never even thought its machines were within our reach."

That was prior to the International Manufacturing Technology Show (IMTS) 2008, before TFT brought the company's first INDEX machine into its 168,000 sq. ft. (15,600 m²) facility in Valparaiso, Indiana, where TFT manufactures more than 5,000 products across three shifts, seven days a week, year-round. "It was an INDEX C100 automatic production lathe, ultimately fitted with a Sinumerik 840D sl control package," McMillan says. "We started making parts on it, and our production times became typically 30 percent. I don't mean a 30 percent reduction — I mean our runtime for a part dropped to 30 percent of what it was before." As to why the company's new machine made such an unprecedented productivity impact, McMillan points to both the high-speed design of the machine and the equally capable Sinumerik control package, which represented yet another paradigm shift for TFT.

Before the INDEX C100 machine came into the plant, powered not by a Sinumerik control package but by a more commonly used brand of CNC, TFT did not realize how significant the Sinumerik control was to optimizing the performance of the INDEX C100. With the Sinumerik control, the full capabilities of the machine could be exploited. Upon learning that its new machine was underperforming for TFT, INDEX swapped out the machine with a model that was identical except for one difference. This time, the INDEX C100 was powered by a Sinumerik CNC package, and TFT was able to set out in earnest to explore what price/performance lessons could be learned from its machine tool investment.

Sinumerik at TFT

- Reduction of production time to 30 percent of what it was before
- ▶ 80 percent reduction in set-up time
- Quick and easy programming
- Efficient control for the operator through ample shortcuts
- Optimized managing of error messages
- ► Faster tool loading

Zero to 5,000 rpm in one second

McMillan recalls that an immediate revelation was seeing the difference a few thousand rpm can make. The company began to run jobs at 5,000 to 6,000 rpm, ramping up from zero to 5,000 rpm in less than one second and ramping down just as fast. Several economic lessons soon emerged from this capability, as the sustained speed of the machine maximized motion in new time- and cost-saving ways. "We never realized before just how much time we were losing waiting on the spindle to stabilize at a new commanded speed," McMillan reports. "The turret indexing was also extremely fast, with the multiple tools overlapping to cut at the same time with incredibly fast accelerations."

The INDEX C100 also leverages speed in new ways, as TFT discovered. The company can run more than 1,000 parts without having to change an offset. In addition, an automated remnant removal feature enables the machine to run continuously, by rapidly reloading bar stock without operator interaction. "On the rest of our machines, we have to pick the remnant out and load a new bar into it," McMillan explains. "That step should take just a few minutes. But the way things work, a machine can sit idle for six minutes before somebody realizes it, and then it takes five minutes to reload, and all that lost time adds up." Another speed-related discovery was the integration of rapid traverse rates, which have always been less than rapid in the company's experience. "A lot of machines advertise rapid traverse rates at maximum speed, but the fact is, unless you're traveling 10 or 12 inches, traverse speeds have never reached maximum for us."

Taking motion accuracy literally

As to how the machine eliminates slower traversing and other cost-related functions, McMillan says the design of the INDEX C100 is unlike the design of conventional and, yes, lower-priced machine bed coordinate systems. "The INDEX doesn't use the same coordinate system as other machines. It uses what INDEX terms double-scissor kinematics, a unique system that provides extreme speed and rigidity," McMillan explains. "The machine has a picture frame mount for its turret. It's close to where it's sliding, so there's not a big length-over-diameter ratio in terms of the tools of the turret hanging out from its support structure. This gives the machine a lot of rigidity for turning and you can accelerate the axes so fast that you really do achieve faster traverse rates. The window on this machine is just a blur of motion."

TFT's lead programmer, Nate Price, sees additional efficiency advantages made possible by the INDEX machine's unique coordinate system, whereby measurements and motion can be programmed based on actual numerical reference points and not on arbitrary points in space. "On the INDEX, every machine space coordinate, every offset, every measurement that's used to define how the machine operates has a legitimate explanation of why it exists, what it is and what location it relates to," Price explains. "This makes it much easier to automate these measurements, whereas in the past we would measure manually because these were arbitrary points. On the INDEX, they are defined, literal points. We know exactly what they relate to, so we can define them automatically before the program ever gets to the machine — before the set-up ever starts."

Advanced cost control

With the Sinumerik 840D sl driving the INDEX C100, TFT would document yet more lessons in machine tool economics, including reduced set-up times. The faster indexing speed of the turrets contributed to an 80 percent reduction in set-up times compared to the set-up times of TFT's other premium machines.

According to Price, the Sinumerik 840D sl interface brought a refined and intuitive approach to machine programming, set-ups, and operation — an approach



»With the INDEX C100 automatic production lathe and Sinumerik 840D we reduced our runtime for a part to 30 percent of what it was before.«

Stewart McMillan, President and CEO, Task Force Tips Inc.

that was especially empowering to him as a programmer. "I don't know if anybody doing set-ups would understand how much of a difference the Sinumerik control has made in the programming," Price explains. "It has enabled me to more quickly and easily write the programs and the postprocesses, thus making the set-up of special routines go much faster."

In addition to easier programming and faster set-ups, Price says the machinists have found that the Sinumerik 840D sl enables them to more efficiently control and capitalize on the production potential of the INDEX machine. "The control gives you ample shortcuts," says Price. "There is a method of presenting messages to the operator that was not present in the other control. There is so much happening on the machine that it is really difficult to capture all that information on a single screen, but the control helps you keep track of what everything is doing. It's really easy to get into more detail without having to go through a lot of pages."

As another example of the CNC's operational efficiency, Price points to the way the control manages error messages. "The machine wants to see several conditions exist before it will start a cycle," Price explains. "The previous control was not real good at telling you that it was not in a condition to start a cycle. It wants the chucks closed. It wants the gantry in a safe position. It wants the subspindle in a safe position. It wants to know where everything's at, and it presents a giant list for the operator to reference in order to start a cycle on the machine. But when you press 'Cycle Start' on the Sinumerik control, if those conditions aren't met, the control will guide you through what needs to change to meet those conditions, so you can start your cycle."

Another advantage brought about by the Sinumerik control was faster tool loading, made possible by faster and easier CNC programming. "Tool loading was a big area of improvement," Price says. "You essentially give the control a mini-program that tells it what tools you're going to be putting in for this job



that you're setting up. The control will then present the stations on the turrets for you and tell you what tools to put in and what tools to take out. And it's entirely guided. This has been a huge departure from what we traditionally had dealt with. It really accelerates set-up time."

More profit per square foot

McMillan and Price claim that the lessons derived from their machine-tool investment can be measured in broader and perhaps even more dramatic ways. "I started to look at the numbers from a different perspective," McMillan relates. "You have all these initial and ongoing costs to build a shop, to put in a floor, to put a roof over it, to heat it, to cool it, and all these costs can equate to so much per hour. Now you buy a machine that's \$600,000 versus a machine that's \$300,000 over 10 years. We run almost 24 hours a day, seven days a week, which helps our analysis. For us, it comes out to about an eight dollar per hour difference to buy the \$600,000 machine. And for eight bucks more an hour, we're getting triple the production out of that same square footage."

Another way the company has measured the return on its investment in advanced machine-control manufacturing has been to witness the change in the people assisted by the technology. Now, the owner, programmers, machinists and others at TFT are enthusiastic about the possibilities of their more advanced, CNC-based manufacturing. McMillan says that it will be such investments in machines and in people that will keep his company successful, having proven that with the right machine and the right motion control technology, anything is possible.

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Shopfloor Manufacturing

Machine Tool Breakthrough

At this year's IMTS, machine tool builders will demonstrate new levels of performance with Sinumerik technology while reducing end-user costs.

he International Manufacturing Technology Show (IMTS), one of the largest industrial trade shows in the world, will host more than 1,700 exhibitors and 82,000 visitors in Chicago this year. A theme for 2012 is that machine tool manufacturers will bring a new level of capability, automation, and economy to American job shops. Three companies with something new to say and show at IMTS are Republic-Lagun, YMT and the Index Group.

Sinumerik 828D technology highlights

- ► Panel-based CNC
- ▶ 10.4" color TFT display
- ► Full QWERTY CNC keyboard
- Maintenance-free (no battery, hard disk, or fan)
- Vertical and horizontal variants
- ► USB, CompactFlash, and Industrial Ethernet ports on the front panel
- ► Powerful CNC functions
- ▶ 80-bit NANO floating point accuracy
- Simplified tool and workpiece management
- Easy to setup and use (interactive help)
- ShopMill and ShopTurn graphical programming experience

Republic-Lagun precision vertical machining

The VMC 3016 vertical machining center with improved performance, produced by Republic-Lagun, features an umbrella-type tool changer, linear guideways and a high-speed 12,000 rpm spindle. At last year's IMTS, Republic-Lagun demonstrated the VMC 3016 producing a



David McGee, Vice President of Manufacturing, Republic-Lagun

bone implant, starting with the scanning of the patient's fracture site and using that data to create a 3-D model of the bone. A custom metal plate precisely matching the bone geometry was produced on the VMC 3016 from a solid blank. The demonstration showed off the capabilities of three key technology offerings: Republic-Lagun's VMC 3016, the Sinumerik 828D CNC and CAD/CAM software from Siemens' PLM Software business unit.

David McGee, vice president of manufacturing at Republic-Lagun, said: "The company's entire VMC line features Siemens controls, and many of the performance advantages of the new VMC 3016 derive from the Siemens 828D CNC." The VMC 3016 is especially easy to use because the 828D guides set-ups and programming much more graphically. For example, users can quickly copy and paste control speed and other set-up parameters. "Being able to program at the machine avoids the problem of work getting backlogged at the programming stage. In the event of an alarm, one button gives you all the information you need, and the process monitoring system can send text messages to advise the operator of process data such as workpiece counts or tool wear alarms," McGee explained.

YMT / Quaser — the debut of multiaxis simplicity

YMT Inc. is a machine tool importer headquartered in California. The company made its debut at IMTS 2010, showing a range of machines, including the new MF400 five-face machining center from Quaser. The four-plusone multiaxis milling machine is capable of producing complicated workpieces with a single set-up, yet is 40 to 50 percent more economical than pure five-axis machines. The trunnion rotary table on the MF400 provides a wide range of multiaxis milling options. The 360° rotary-action table tilts from plus 30° to minus 120° and can carry a workpiece up to 400 mm in diameter. Parts can be cut with a very broad range of motion, using up to 30 tools from the machine's tool magazine.

Making such complex motion possible and affordable is the Sinumerik 828D CNC. According to Paul Custer, YMT's national sales manager, the CNC control easily handles four-axis-plus-one milling, and it makes the machine extremely easy to set up, pro-

> gram and operate. Set-up can be done interactively at the machine, or programs written offline can be downloaded.

INDEX — dual five-axis machining

The INDEX Group recently announced its new multitasking Index R200 turn-milling center. The machine can produce a complicated part from round stock with only one chucking by virtue of its dual milling spindles. One five-axis articulated milling spindle cuts the front side of a part while an identical fiveaxis counter-spindle simultaneously completes the back-side



milling. The CNC control is an integral element in the success of the machine and is based on the Sinumerik 840D sl.

Extensively used in the aerospace and automotive sectors, the Sinumerik 840D sl is a sophisticated system platform for high-end machine control applications. The open and modular structure and flexibility of the Sinumerik CNC enable it to be tailored to the application, including interfacing with third-party tools. Randy Carlisle, applications engineer at Index, explained, "The Sinumerik control enables our standalone machines to be integrated with other equipment such as gauging stations and robots. Our systems integrators find it straightforward to work with, either via digital I/O or processing through Profibus."

CNC speed and accuracy are key performance variables in the design of every new Index machine, Carlisle added. "The integration of the Siemens drives and motors enables us to achieve 1G acceleration on our equipment, including the R200. Achieving that speed and accuracy requires a very accurate drive and controls package. The control has to have a very quick processing time and communicate with the drive and motor packages. That control enabled us to build the R200 with two fiveaxis spindles."

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Randy Carlisle, Applications Engineer, INDEX



EMAG LLC, Michigan

Savings in Common

Siemens helps a machine tool builder and its customer realize substantial savings through the use of the Sinumerik 840D sl common control platform for multiple applications.

MAG LLC is the US subsidiary of EMAG Holding GmbH (Salach), a German company that produces machine tools for making automotive, off-highway, agricultural and oil field components. These machine tools range from basic round part turning centers to alternative equipment such as electrochemical machining centers. This wide variety of equipment requires an assortment of control technologies. One recent customer, an agricultural equipment builder, needed grinding, turning and turn-grind machines.

Siemens' standardized CNC solution

EMAG CEO Peter Loetzner said, "We needed a control solution that would enable easier design, integration, start-up, on-site commissioning and training for our customer's operations and maintenance personnel. The operators needed cross-training because they might run a turning center one day and then a grinding or turn-grind center the next."

The control used is the Sinumerik 840D sl, usable for up to 31 axes of motion and incorporating CNC, HMI, PLC, closed-loop control and communication into a single NC unit. It easily accepts input from competing CNC devices and can capture, standardize and transmit all data seamlessly. Sinumerik Safety Integrated provides a comprehensive suite of personnel and machine protection functions that are fully compliant with accepted international standards. "This service is another example of a forward-thinking supplier, such as Siemens, responding to brownfield conditions in the marketplace," said Loetzner.

Global scope

Thanks to Siemens' global reach, the controls can function in US, German and Asian factories with seamless data integration. In any location, EMAG and its customer can monitor any machine and even

Whether turning or turn-grinding, the Sinumerik CNC enables easier design, integration, start-up and on-site commissioning

compare production data from one continent to another. Said Loetzner, "Cultural differences can be substantial and controls must be adaptable to such variations. We have been most satisfied with the help Siemens has provided, worldwide, in this area."

He continued, "Many operators were more comfortable with a CNC that is very popular in American job shops. But we were able to demonstrate the immediate advantages of the Siemens control to them." Key was the Sinumerik 840D sl's ability to run different machine types, which meant large savings on training and commissioning. This flexibility, coupled with the remote monitoring and programming aspects of the Siemens solution, convinced the customer.

Remote monitoring leads to savings

The controls allow enhanced remote monitoring, so changes can be made on the fly with very little down-



»We've received great support from Siemens, for on-site service, application engineering, parts distribution, remote monitoring implementation and communication between our customers and us.«

Peter Loetzner, CEO, EMAG LLC

time. More than 20 machines of various sizes and styles can be monitored over a wireless network, enabling process engineers to see what the operator sees. Most of the EMAG machines have robotic devices that do after-hours manufacturing, another instance in which remote monitoring is useful.

Loetzner said, "Remote monitoring of machine tools can be done directly through the Sinumerik CNC in a one-to-one exchange between our customer and us. We can also communicate with Siemens and our customer in a three-way exchange of machine data and cycle information, all protected through a firewall for security and customer peace of mind." One customer used Siemens' remote monitoring on a wide variety of EMAG machines for more than three years. Significant reductions in downtime, service calls and troubleshooting time were achieved, translating into savings for everyone.

Savings and support in many areas

The smaller-sized controls mean a smaller machine. In brownfield applications, space is used to maximize production for an OEM, so the space savings are an advantage, along with reduced wiring, lower power consumption and lower operating temperatures due to less ambient heat.

EMAG has been in the American market for more than 20 years. Loetzner said, "We've received great support from Siemens, for on-site service, application engineering, parts distribution, remote monitoring implementation, and communication between our customers and us."

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Sinumerik 808D

Entry-Level Machines with High Quality Control

Siemens is rounding off their CNC family with the Sinumerik 808D. The new CNC is used in standard turning and milling machines that can be found in dealer catalogs and showrooms at a price range of \$25,000.

Simple flat-bed turning machines with two to three feed axes and one spindle are the primary area of use for the new Sinumerik 808D Turning. Alternatively, the Sinumerik 808D Milling can be used equally well in three-axis vertical milling machines. Thus, the new Sinumerik 808D family replaces the previous Sinumerik 802S.

Some global machine tool manufacturers have already decided to equip their standard machines with the new Siemens control, which was presented for the first time at CIMES in China in June 2012. There are plenty of reasons for this. For example: It has the same high-quality NC kernel that is used in the Sinumerik versions 828D and 840D sl. When it comes to look and feel and usability, the Sinumerik 808D fits seamlessly into the visual appearance of the Sinumerik family. "The difference in comparison to the Sinumerik 828D only becomes obvious when the operator panels are placed next to each other. The 808D is considerably smaller," explains Tom Schulz-Heise, the responsible siemens segment Manager.

Application areas: Asia and South America

According to market studies, it is anticipated that end users of the Sinumerik 808D will particularly be found in Asia. As a result, one of the first integrated languages apart from English will be Chinese. Portuguese (for South America) and Russian will follow soon. However, wherever the machine is operated, expectations regarding machine and control are always similar, as Tom Schulz-Heise explains: "It is crucial that the machining of the part be carried out as quickly as possible and in the required quality."

Even the smallest Sinumerik uses the high-end NC kernel and provides a high level of precision and productivity since it calculates with the 80-bit NanoFP accuracy as the larger-sized Siemens CNC do and prevents internal rounding errors. In addition, the 808D Milling is equipped with the innovative Advanced Surface intelligent path control as part of the MDynamics technology package. This includes an intelligent look-ahead function, enabling optimized speed control. Neighboring tool paths are thus machined with nearly identical speed and dynamics profiles, improving the surface guality and accuracy while increasing productivity at the same time. Equally important for performance are the high computing power and optimized technology cycles. Segment manager Schulz-Heise explains, "In various comparison tests with other basic CNCs, cycle programming enabled us to produce turned parts around 15 percent faster. We were as much as 20 percent more productive when milling for sure, without any compromise on accuracy and surface finish."



Simple user interface

Fast, safe creation of programs is just as important as executing them perfectly. The foundation for this is a basic version of the Sinumerik Operate operator interface. The differences are mainly the size of the operator panel including the screen as well as the significantly reduced functionality set containing necessary functions only. Schulz-Heise's argument is this: "It's just like having a mobile phone. If all I want to do is make calls, then an expensive smartphone is clearly worse than a reasonably priced mobile with a keypad and phone number memory. This is why in Operate Basic we have not bothered with step sequence programming, for example. G-code with a variety of cycles is the established way of programming here and is easy to use for simple parts. Already existing program sections that have been configured following ISO specifications can even be adopted completely."

Commissioning made easy

One highlight of this basic Siemens control is that all users have access to the Sinumerik Start Guide, containing helpful function packages for manufacturers, dealers and end users of simple turning and milling machines. During initial commissioning of the machine, for example, the start-up assistant provides specific and dialog-based guidance to take the user through all the necessary setup and input tasks. In a similar way, the series startup assistant helps the manufacturer to make the machine-specific adjustments required for series production of the machines. The sales assistant is designed specifically for machine tool dealers, providing a presentation with all the important sales arguments concerning both the Sinumerik 808D and the relevant machine tool — thus making sales calls easier.

With "808D on PC" every user receives an additional PC version of the new Sinumerik free of charge. Beginners can practice with it and experienced CNC experts are now able to create executable programs while the machine is producing other components. Context-sensitive online help can be used for this in the same way as the help menu on the machine. There is also a useful 2-D simulation available for checking the program. Finally, transmission or even direct execution of the programs from external storage media can be performed via the USB port on the control's front cover. Commissioning of the machine control panel is equally simple and straightforward – it simply needs to be plugged directly into the CNC via USB.

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Rattunde Corporation, Michigan Error-Free and Three Times as Fast

Through the use of Sinumerik CNC technology, a customer achieves triple the output on small engine exhaust components.

attunde Corporation of Grand Rapids, Michigan, is a five-year-old subsidiary of Germany's Rattunde & Co. GmbH, a machine tool builder of tube, pipe and bar processing equipment. The company is making its mark in America and recently achieved success at Cosmos Manufacturing of South Chicago Heights, Illinois, a major supplier of small engine exhaust tubes to outdoor power equipment manufacturers.

Sinumerik 840D: the CNC of choice

The Rattunde system for this customer has a servocontrolled cutoff saw and brush deburring mechanism. At its heart is the CNC system: a Sinumerik 840D CNC; a Simatic S7 PLC with various analog and Profibus modules; and numerous Simotics servomotors, motor protection devices, circuit breakers and other Siemens components.

This Rattunde system processes mill-length tubes to customer-specified dimensions, measures them for accuracy, and deburrs them. Production runs up to 11,000 units per hour. Improvements in automation, speed and parts handling, plus the precision of the Sinumerik CNC system, have significantly reduced the time needed for parts handling, secondary operations and final assembly. The primary products produced at Cosmos include mountings, connectors and sections for muffler tubes in dozens of lengths, typically in 3/8", 7/16", 12 mm and 1/2" sizes. Products are run in mild steel, aluminized steel and stainless steel on the same Rattunde system, with offline pre-programming performed by the Cosmos engineering team. The final products are sold to manufacturers of chain saws, leaf blowers, lawn mowers and other small engine-powered equipment.

Siemens helps Rattunde look good

Mike Jemilo, Cosmos general manager, said of Rattunde, "From the initial contacts with their application engineering, through the build process, commissioning and on-site training, we've been extremely impressed with their work — very professional and responsive. Our previous system had nowhere near the production capability of the Rattunde solution, and we are already working with this supplier on our next system." Rattunde vice president Alec Banish said the same of Siemens: "We were asking Siemens to do some fairly complex operations in motion control, including 13 total axes with an articulating gearbox, plus the conveyor and part articulations, spindles and servomotors."



The Rattunde system processes mill-length tubes to customerspecified dimensions

Sinumerik at Rattunde

- The solution uses the Simatic IT manufacturing execution system (MES).
- Rattunde relied on the Sinumerik 840D for a recent customer with complex machining requirements.
- Use of the Sinumerik software has tripled production speed, with zero defects.
- The remote monitoring capability of the Sinumerik CNC is a great advantage for the company.

He said the scalloped motion of the ID/OD brushing with disc transfers presents unique motion challenges for control hardware and software. "The Siemens servo technology automated our entire process in a totally controlled, high-precision manner, allowing customers such as Cosmos to process a wide variety of materials, dimensions, shapes and lengths with easy-to-manage presets." Banish added, "The Siemens support is greatly enhanced by the remote monitoring capability of the Sinumerik CNC. About 70 percent of our issues are resolved remotely, working between us and Siemens or directly with the customer's plant personnel."

Dramatic time savings during production

Before the Rattunde system was implemented, all the piece part work carried out at Cosmos required two or three saws, with associated costs for fixturing, parts handling, logistics and labor. Now a fully automated single operation processes four tubes per cycle, with servo control of the entire bundle as it moves through the saw, brush and loading zones.

The previous system at Cosmos ran in three shifts, six days per week. Today, the Rattunde system occupies a far smaller footprint and produces the same output with only one shift per day for five days a week, with far superior quality and virtually no rework. Rattunde president Richard Stadler said, "We're using all 10 channels and pushing the axis capability to some extreme limits, but we've seen absolutely no problems with signal degradation or processing speeds." Stadler said the Sinumerik CNC program storage capabilities were impressive: "All the operator needs to do is provide a size range indication on-screen and all the relevant programs appear for easy selection. Repeatability is obviously critical for our customer, who often processes dozens of shapes and sizes per shift."

The Rattunde system consistently produces up to 11,000 parts per hour at Cosmos. "This number represents triple the production output for Cosmos," said Jemilo. "Better still, the system has been in operation for more than a year and we have not reported a single reject, with only routine maintenance and zero downtime due to machine problems. This is truly a win-win scenario for both the machine tool builder and us."

info www.usa.siemens.com/cnc4you contact john.meyer@siemens.com Forest City Gear Inc., Illinois

Keeping Control

Using Sinumerik CNC technology aids quality production of advanced machine tools, leading to global sales and market leadership.

oscoe, Illinois, has more gear companies than the average town of 10,000 people, but the reason is obvious. During the peak of the machine tool boom in nearby Rockford, Illinois, it was critical to have components made locally. Over the years, the market changed and most gear companies shifted their focus in other directions.

But Forest City Gear Inc., founded in 1955, took a different track, which made the company globally competitive. CEO Fred Young said, "We decided to do two things. First, make the best fine- and medium-coarse pitch gears in the world by using the best machines, people and quality assessment practices possible. Second, we committed to reinvesting company profits in better machinery, based on global standards and ongoing technical advancements."

Specialized gear software in use

This precision gear and spline maker performs nearly every aspect of production, including blanking, turning, hobbing, shaping, milling, gear grinding with form wheels, thread grinding, broaching, honing, straightening, laser marking, magnetic particle inspection, metaletching, hardness testing and final surface inspection. The company uses nearly every leading brand of gearmaking machine tool. Said Young, "In a typical year, we invest between 25 and 40 percent of our gross sales back into better gear machines and metrology." Among the most advanced gear-making machines in this shop are four Gleason shapers, two Samputensili grinders (form and generating style) and a Hoefler gear grinder.

The heart of a machine tool is the CNC that drives it, controls the motion, detects and integrates all the cutting parameters, and compares production with specifications. The operator-to-machine interaction must be easy to use because a control





»I've used all the brands of controls we have, and no other control can do what the Siemens 840D can do.«

Kevin Chatfield, Employee, Forest City Gear

that's difficult to learn will delay production. The control on Forest City Gear machines is the Sinumerik 840D with specialized gear software. Said Young, "The gear software is remarkable. It developed as a cooperative venture between a machine builder, the CNC builder and folks like us. The result is software that's specific to hobbing, shaping, gear grinding and thread grinding." He said the Sinumerik CNC has helped production, including "sophisticated executive software for all machine movements and fast program reading that allows faster cutting and grinding, with more options such as reverse direction, segment cutting and combined operations." The CNC has multiple standard cycles for cutting with degressive feeds and increasing speeds, plus special cycles for gear tooth removal and reversing directions to improve finish or reduce cutter wear.

Powerful yet easy-to-use controls

Forest City Gear cuts a wide variety of standard and exotic materials. These include titanium, Inconel, 4340, 300M, Vascomax 250 and 300, Nitralloy 135M, 9310, 4150, 4140, 8620, aluminum bronze, 13-8, 15-5, 17-4, 316 and 440 stainless, Hastelloy, Ferrium and numerous thermoplastics. The shop can carbide rehob to 60-62 RC and gear grind at all hardnesses. Kevin Chatfield, a Forest City Gear employee, said, "I've used all the brands of controls we have, and no other control can do what the Sinumerik 840D can do. One example is the internal, external and form grinding on the Samputensili machine. If other controls could perform these operations, which is doubtful, it would be a very slow process." Mark Cunningham, another employee, said the controls are very user-friendly: "The screens are easy to program and modify, and they give a clear picture of what's happening at every step." Employee Brian Turnbull worked previously with a competing brand and was initially hesitant. "Then, as soon as I saw the easy layout, plus how quickly it could be set up and go into action," he said, "I was convinced Siemens was simply a better control."

Sinumerik at Forest City Gear

- Forest City Gear cuts a wide variety of hard materials the Sinumerik 840D is the ideal control for that.
- The company depends on the Sinumerik 840D to ensure that the machines are easy to use and that no mistakes are made.
- Use of the Sinumerik CNC software has led to error-free production runs and satisfied employees.

As Young says, these machine tools produce most complex parts, including helical splines and internal gears most other shops simply cannot or will not make. "The cycle and program read times on the Siemens controls are critical to our production work, plus these are the most expensive machines in the shop, so their runtime cost is the highest." He added, "Most of our jobs are short runs on very expensive materials. If the machine takes too long or has repeat rejects, we lose money. I'm proud to say that hasn't happened. The controls on the machines are a big reason why."

Helping create an industry leader

The company has remained a leader in the market for high-precision gears. Young said, "Our equipment is so sophisticated that even our competitors bring us their work to have it checked. It's one of the things that has helped us build our current customer base of about 400 companies, about 20 percent of which are other gear companies or gear producers themselves."

contact

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

Major Tool & Machine, Indiana

Retrofitting for Success

job shop has discovered that "anything is possible."

With the right CNC platform, a large, state-of-the-art

ajor Tool & Machine (MTM) is a large job shop that produces precision-milled and precision-turned hardware in its 500,000 sq. ft. (46,000 m²) 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 Automation. "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





"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 Fortrantype 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

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.

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."

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Dialogue

New app

G-Code Compatibility app



This handy CNC G-Code Compatibility app helps you quickly find compatible codes for Siemens and ISO G-codes. In addition, formatting examples are provided, making easyto-use Sinumerik CNCs even easier. A Glossary of Terms function is your easy reference guide to CNC abbreviations. Looking for service or support is quick and easy with a web-link tool, and CNC social media feeds open the doors to a vast online user community. Download the G-Code Compatibility app for iPhone and iPad for free.

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G-Code Compatibility app

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