CNC4you

The Shopfloor Magazine

Volume 6, September **2012**

SIEMENS

Complex workpieces with Sinumerik by groundbreaking companies

Hightech from Bavaria

In this issue:

Production of automatic sewing units using Sinumerik and ShopMill

ShopMill increases flexibility in contract manufacturing

Universal turning machineFoundry with relies on Sinumerik 840D sl

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Siemens AG

7

Sinumerik Operate simplifies operation of the CNC during the manufacture of automatic sewing units by ASS


Siemens AG

10

Lerchenmüller uses Sinumerik CNC and ShopMill to make top-quality, highly sophisticated parts


Siemens AG

18

For small-batch production, D.E.C. uses a machine with a transport disc for up to 24 blanks


Siemens AG

21

Users are given the opportunity to learn how to mill a coordinate cube

3 EDITORIAL

CNC TECHNOLOGY IN BAVARIA

4 **Exciting Effects**
Complex workpieces for show lasers produced using 3+2-axis machining

7 **The Perfect Stitch**
ASS AG relies on Sinumerik CNC and ShopMill for the production of automatic sewing units

10 **Sophisticated Solution for Small Batches**
ShopMill increases flexibility in contract manufacturing

12 **Precision on a Grand Scale**
Metalworking company relies on Sinumerik control systems with ShopMill and ShopTurn

14 **Everything from a Single Source**
Universal turning machine fitted with Sinumerik 840D sl

16 **Forward-Looking Use of Software**
Sinumerik Operate revolutionizes operation of a five-axis milling machine

18 **Quickly Up to Speed**
ShopTurn enables a high level of flexibility in day-to-day shop floor use

TRAINING

20 **Fit for Employment**
Training partners in Bavaria

ON THE SHOPFLOOR

21 **Accurately Swiveled**
CNC milling program for producing a coordinate cube

NEWS

22 **CNC for Entry-Level Users**
Sinumerik 808D rounds off the Sinumerik family at the lower end

23 **New mowo App / CNC4you portal**

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Dear readers,

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What does the word **Bavaria** conjure up in your mind? Probably idyllic landscapes with green Alpine meadows, magnificent lakes, and breathtaking mountain views – not to mention the traditional get-together at the Oktoberfest or an inviting beer garden. Of course, this isn't wrong, but it fails to take into account that this state, like other areas of Germany, has been transformed in recent decades from an agricultural location into a high-tech region and a business partner with a global presence.

Bavaria's economic and technological strength is evident not just in the urban regions, but also in rural areas where many highly innovative medium-sized companies have chosen to settle. **Within the metalworking industry,** these companies show a **high level** of technology – frequently as a result of skillfully filling niches.

We will be introducing you to some of them in this issue of our magazine – including a **small contract manufacturer from Allgäu** that works mainly for the automotive industry; a **Franconian machine shop** whose very large milled parts have established the company as a valued partner in the gas turbine construction, reactor technology and aerospace industries; and a **highly specialized company** based in Berchtesgadener Land whose **customized show lasers** are responsible for spectacular lighting effects at the concerts of international stars staged all over the world. With **Sinumerik 828D and 840D sl**, Siemens offers all of these companies a **made-to-measure CNC** that enables them to produce even the most complex parts with maximum productivity. They are assisted by **ShopMill and ShopTurn**, the **intuitive machine shop software** for milling and turning.

It goes without saying that all these successful medium-sized businesses need **highly-qualified employees** to achieve the required precision and perfection on their **machine tools**, and here too, Bavaria has a lot to offer – as a large number of Siemens' **training partners** will confirm.

I hope you enjoy this issue of CNC4you and gain new insights into Bavaria's strengths. Come and learn more about the Sinumerik's performance at our booth C12 in hall 4 at the AMB.

I look forward to seeing you!

Jürgen Ries
Service Sales Specialist and User Support Manager, Bavaria Region

Arctos

Complex workpieces for show lasers produced using 3+2-axis machining

Exciting Effects

Show lasers by Arctos enjoy a global reputation thanks to their impressive effects. For the production of its in-house inventions, the company uses a five-axis milling center with a Sinumerik controller. In addition to precise drilling and milling operations, it also features fast and easy programming, graphically-animated simulation and process monitoring via text message.

No one can beat Christian Marx when it comes to designing lasers. The managing director of Arctos Showlasertechnik GmbH says, "We hold several patents that increase the performance of the equipment or bend the laser beam and allow unusual effects." The company was established around 20 years ago in Saaldorf-Surheim, Upper Bavaria. Together with six employees, Marx develops and produces lasers that are used all over the world in stage shows and concerts.

With the latest development, the 3½ D Magnetic Beam, it is possible to generate a laser tunnel that starts wide and then tapers, as well as other effects that were not possible with previous lasers. The first unit delivered was used for an event tour in Asia beginning in mid-June 2012, during which artists integrated the new effects into their stage show. The prototype of the system was

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created approximately four years ago and is based on two Arctos patents. The first is a method for generating a high-powered laser beam. The second development describes how this beam is split yet again and transferred to two rotating scanners that reflect it outward.

Setting up the Sinumerik CNC using moving image sequences

Except for the diodes and power supply units, Arctos produces all its own equipment. The parts are so precisely fabricated that there is no imbalance in the structure even when it is rotating at speeds of several hundred revolutions per minute. The company's shop floor houses a Quaser MF 400C milling machine from Hommel Unverzagt GmbH with a Sinumerik 828D controller for all milling work. The machine is robustly built, has a swivel-type rotary table (A–C axis) in addition to the three linear axes, and has a swiveling diameter of 400 mm. The swivel bridge is supported on both sides to ensure maximum accuracy and stiffness of the machine.

The Sinumerik 828D with the ShopMill operating and programming interface for turning and milling is designed for programming individual parts and very small production runs. It can be used to create the required solution quickly and easily, which is very important because Marx and his team are almost always working under tight deadlines. The controller's Animated Elements, which illustrate the program functions as moving image sequences during set-up, make inputting very straightforward. This means that questions regarding the difference between chip breaking and chip removal or the exact key sequence during a corner measurement are answered reliably. It is then easy to check the finished programs for errors via a 3-D simulation.

Viewing five-axis parts from all sides

The convenient Cycle800 swivel cycle is very useful for five-axis machining of small parts. Using this program function, it is possible to define an inclined plane in space and program it for 2-D or 3-D machining. This is referred to as 3+2-axis positioning. This means that the rotary axes involved in the transformation are merely positioned, while the linear axes move during machining. Arctos machines many parts in different planes that must be perfectly matched to each other. This is easy to program because the cycle can be used to shift the zero point in a dialog box in the pivoted plane.

In addition, assistance is provided via a 3-D diagram with which the five-axis part can be fully rotated in the simulation, allowing it to be viewed from all sides. This also means that it is possible to check the back, which virtually eliminates collisions and errors. The simultaneous recording function enables moni- >>

Technology in detail

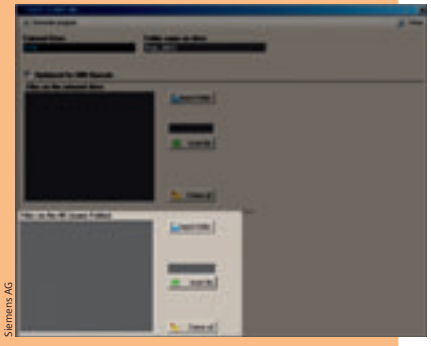
EASY START NC

A mold-making program is usually subdivided into many individual subroutines that are called up one after another on the controller using the EXTCALL command. It is time-consuming to create such an EXTCALL launch program, which is precisely the reason that the EASY START NC tool exists. It can be used to create a launch program very easily from a large number of NC files. This launch program has an internal counter, which means that when the program is interrupted using Reset, it is possible to carry on working from the point at which it was stopped.

After the program is launched, the following window appears:

The first entry field is used to specify which storage medium will be used (CF card, USB stick), and the second entry field shows which folder on the storage medium will be used. The selection field shows whether a file output should be created for Sinumerik Operate (with block output).

There are two different fields for MPF files: the first is for NC files that are executed by the NC. The second field – the more important of the two – is for files from a storage medium, for example, a USB stick of CF card. Using the Import button allows the selection of a folder that contains the files so that they can be applied (see diagram). The Start Output button then creates an MPF launch program that can be saved to a USB stick and launched on the controller.



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For more information about the tool, go to www.siemens.com/cnc4you.

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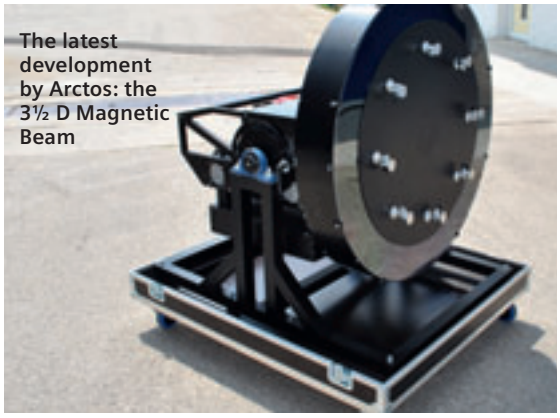
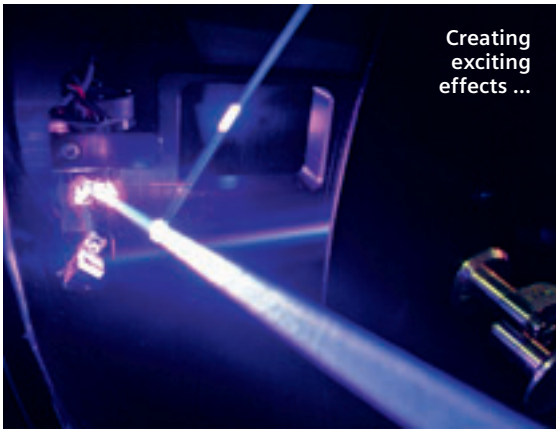
Arctos uses the graphic functions of the Sinumerik 828D with ShopMill


The latest development by Arctos: the 3½ D Magnetic Beam


Creating exciting effects ...


... takes a lot of technology

All photos: Siemens AG

>> toring during the milling process. What is happening in the machine is therefore always transparent. This is hugely important, particularly in the case of soft materials such as aluminum, which Arctos uses almost exclusively because the relatively large quantity of drilling emulsion used as a coolant and lubricant prevents a direct view of the workpiece and tool during the milling process.

The opened aluminum housing of the latest show laser clearly displays the technology and the number of individual parts that make up this high-performance unit: mirror holders, collimators for generating a parallel beam path, beam raising blocks, beam turning unit retainers, and so on. Marx stresses, "The mirror holders in particular must be very precisely fabricated and installed so that the laser's cut is absolutely right." Although the holders sometimes look identical, they nevertheless differ in details. To identify the components, the new version of the ShopMill operator interface of Sinumerik Operate offers an engraving cycle with which the mirror holders can be labeled and numbered consecutively.

Process monitoring by SMS text message

Identical parts that are fitted in the laser are produced as a small production run. During machining, Marx can devote himself to other tasks because the machine's process status is sent to his mobile phone as a text message. If an error does occur, or if a part is ready, the controller sends him a text message via the Easy Message function. This is beneficial for the business because the tools used require a comparatively long machining time and there is therefore no need for constant monitoring.

Marx explains, "Unlike a disco laser, which is simply installed and then operated exclusively in one location, a tour laser must be much more robust. Saving on materials here is saving in the wrong place. Our aluminum housings are solid and suitable for touring so that they can handle being used today in the United States and at an open-air concert in England three days later." This investment in reliability pays off: Arctos units have a correspondingly good reputation. Around 95 percent of customers are from the United States, many of them large tour outfitters that supply the artists with light and laser equipment together with the appropriate staff.

The range of services offered by Arctos is specifically aimed at this market. Much of the equipment is developed and produced on a customer-specific basis. Close contact – with the artists as well – is very important; innovations are often presented to the bands directly. Marx was determined to be present in person when the new laser had its premiere at a huge soap-bubble show in Singapore. The managing director of Arctos was extremely pleased with how well the unusual effects were received. "No one can match this unit," he says confidently. "And just as we know and meet the needs of our customers, the machine concept of the Quaser MF 400C with the Sinumerik 828D is a good fit for us and our requirements." <

ASS AG relies on Sinumerik and ShopMill for the production of automatic sewing units

The Perfect Stitch

The development and construction of automatic sewing units requires the highest level of precision. For that reason, ASS AG has upgraded its shop floor with a three-axis CNC milling machine and a Sinumerik 828D with the ShopMill operating software. Although the employees had no previous experience with Sinumerik controllers, they were able to use the machines in production within just a few days.

In all probability, everyone of us has come into frequent contact with products made on automatic sewing units produced by Automated Sewing Systems (ASS) AG. As a specialist in the construction of automatic units, the company based in Bessenbach, Germany, supplies manufacturers in the textile industry all over the world. What started out with one serging machine has since grown into a product line comprising more than 20 automatic sewing units. Serging systems overlock the edges of skirt and trouser panels and, depending on the configuration, are fitted with a second or third sewing head that enables articles of clothing to be sewn completely in a single operation. The line is supplemented by specialized automatic units – for example, for sewing trouser pockets or zippers. In this case, the >>

An automatic sewing unit for sewing trouser pockets with an automatic stacking device for finished sewn parts

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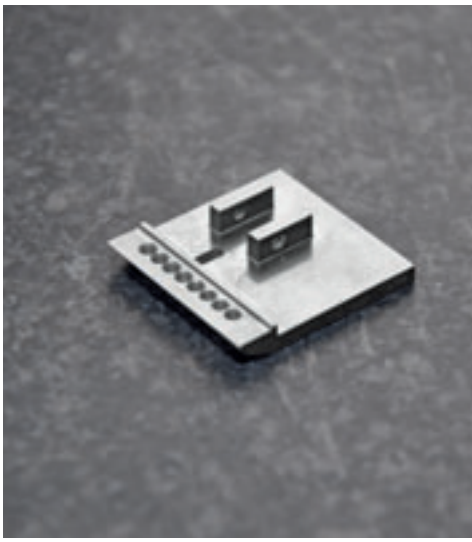
Antonin Spacek - Fotolia.com

>> automatic sewing units go far beyond the basic functions of a sewing machine. A specially developed control system allows free programming of the stitch variations, controls the feed, monitors the laser markings for positioning of the individual parts, and checks the position of the fabric panels using photodiodes. Automatic feed-in and transfer devices using pneumatic activation ensure a semi-automated process. Only a small fraction of the components used in the automatic sewing units are purchased ready-made. The vast majority of the parts are produced to order for ASS AG in Germany. Design, assembly, and quality assurance all take place at the Bessenbach plant.

Low hourly machine rates were a strong selling point

Since the majority of mechanical production was contracted out, the company often experienced long delays, particularly in the development of prototypes, as the supplier could not manufacture redesigned or modified workpieces at short notice. The idea was to avoid these bottlenecks by adding a three-axis CNC milling machine to the mechanical production facility to increase capacity. The basic parameters were specified by the compact size, the budget, and the short-notice delivery date. In Optimum Maschinen Germany GmbH, based in Hallstadt, ASS found a manufacturer whose range of machines satisfied all the requirements.

Following extensive testing of the suitable machines at Optimum Maschinen Germany GmbH, the decision was ultimately made in favor of an F110 TCCNC. Simon Oreskovic, master technician at ASS, explains the rapid decision-making process, "Customer service was fantastic and the milled test parts all fit perfectly. So based on this, we went ahead and ordered the machine." The excellent price/performance ratio was also a significant factor. "Low hourly machine rates were a strong selling point because we are not contract manufacturers and mainly build prototypes." The Optimum CNC is a compact three-axis milling machine and has a traverse path of 450 mm in the X direction, 300 mm in the Y direction, and 400 mm in the Z direction. It has a repeat accuracy of ±0.007 mm and a positioning accuracy of ±0.009 mm. An automatic tool-changing system with a magazine disc for 10 tools covers the tool requirements for standard applications. The milling machine is equipped with a Sinumerik 828D CNC and the Sinumerik Operate graphical user interface version 2.7.



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ASS produces milled parts for automatic sewing units

Quick familiarization thanks to ShopMill programming

Both Oreskovic and his colleague Daniel Braun were covering new ground when operating and programming with the Sinumerik 828D. Until then, the ASS master technician had experience programming only in DIN/ISO on other controllers. Convenient functions for setup with graphical support, such as the setting of the zero point and tool management using images and plain-text names for the tools, impressed him after only a short time. He found graphical programming using ShopMill and the extensive cycles particularly helpful when creating programs. After only two days of familiarization, he was able to operate and program the machine to mill the first parts.

Oreskovic explains the sequence of operations: "We mainly produce simpler parts with holes, threads, pockets, and contours that can be programmed in just a few minutes with ShopMill." Programming takes up very little time due to the self-explanatory illustrations in the work plan and the practical cycles designed for real-world use. Since similar parts with slight modifications are

New collaborative partner for CNC training in Bavaria

A strong team

Siemens has been a system supplier for the CNC and drive technology of the turning and milling machines made by Optimum Maschinen Germany GmbH for many years. Based on the long-standing and successful relationship, a collaborative partnership for CNC training was established in June this year.

Target-group-specific courses familiarize the participants in the training program with the functions of the various Sinumerik controllers. For this training, Optimum uses CNC machines with the Sinumerik 828D, 802S and 808D controllers. The Sinumerik Operate software with the ShopMill and ShopTurn operating step programming is also part of the training course. The machine operators learn about rapid NC programming, work preparation, and intuitive use of the software. Trainers certified by Siemens train the technicians either at their own workplaces or at Optimum's company headquarters in Hallstadt near Bamberg.

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Handover of the collaborative partnership document in Pettstadt (from left): Michael Schroer (Siemens), Kilian Stürmer (Optimum), Jürgen Ries (Siemens), Martin Trepesch (Optimum)

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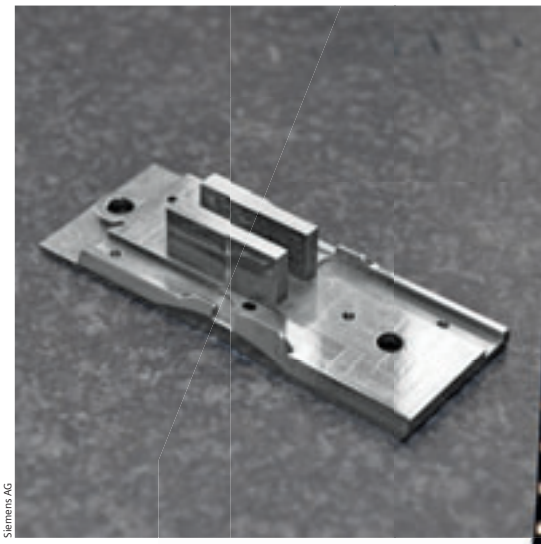
Technician Daniel Braun (left) and shopfloor foreman Simon Oreskovic (ASS AG) in discussion in front of the Sinumerik 828D



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A special needle plate

frequently produced for the prototypes, it is very easy to make adjustments to an existing work-step program. To do this, it is only necessary to adjust the measurements in the cycle's dialog box or to insert or delete a work step and the program for the new part is ready to go. ShopMill not only enables rapid and self-explanatory programming; it also offers convenient functions for program optimization. For small production runs, Braun works with two machine vices on the milling table to reduce the clamping and reclamping of workpieces and to reduce tool changing. He modifies the program of the individual part by copying and moving the individual machining steps. In the case of workpieces with a large number of work steps, this procedure is prone to errors, as he acknowledges himself. So he was thrilled by the multiple clamping function, which he now uses very frequently. He simply calls up the program in the program manager and specifies the two zero points. Then ShopMill automatically generates a new program for the multiple clamping with optimized tool changes.

Another milling machine gets a Sinumerik CNC

Braun also finds little aids, such as the integrated calculator and the fit specifications in the input field, very useful when programming. When having a diameter specification 50 of a circular pocket and entering "F50H7", the machining dimension is automatically placed in the center of the tolerance field. With more than 10 years of experience with other CNC control systems, the technician very quickly became acquainted with the Sinumerik controller and the advantages of the new user and programming interface after just a short familiarization period. Braun says, "Creating programs is so easy that anyone can work efficiently after just a few days, even without training."

Although the new milling machine with the Sinumerik controller has been in use at ASS AG for only a year, the management has already decided to invest in another machine. Based on the positive results experienced and the increased production volume, the plan is to acquire a CNC milling machine with Sinumerik 840D sl in the very near future. In addition to a larger milling table, this machine also has a measuring device for switching 3-D probes. Oreskovic says, "Then we'll be able to work on two machines side by side and transfer the programs via USB stick. We often rework existing parts. We can use the measuring cycles to set the zero points in drilled holes or tenons automatically on the new machine." <

Lerchenmüller always supplies the best quality, even when manufacturing demanding workpieces

ShopMill increases flexibility in contract manufacturing

Sophisticated Solution for Small Batches

Two newly installed five-axis machining centers expand the machinery of the Lerchenmüller metalworking company. Positive results prompted the contract manufacturer to fit the new CNC machines with Sinumerik controllers and the shop floor-oriented ShopMill programming software. As a result, even complex 3+2-axis programs are created very quickly.

Markus Lerchenmüller knows exactly why his contract manufacturing business is so successful. He says, "Customers can be confident that they will be supplied with the products ordered in the quality required and within the time specified." The company, which is headquartered in Immenstadt in the Allgäu region of southern Germany, has 10 employees who produce mainly individual parts but also small batches on the CNC machine tools. Complex three-axis and five-axis milling is as much a specialty of the company as the production of turned parts. To meet the high requirements – a large car components manufacturer has since classified Lerchenmüller as a premium supplier – the master precision mechanic regularly invests in cutting-edge technology. Most recently, he purchased two five-axis centers from his preferred machine supplier, Spinner – a U5-620 and a U5-1520 – with which he has increased both productivity and production accuracy. Like all the company's other CNC machines, the two new Spinner U5 machines are fitted with Sinumerik CNC.

Sinumerik demonstrates universal usability and operability

The head of the company, who gained approximately 20 years of professional experience in a nearby mechanical engineering company prior to striking out on his own, explains, "We were using five different controllers over there. Production was inflexible as a result because the majority of employees could only handle one or at most two controllers." It was a foregone conclusion that in his own company Lerchenmüller would use con-

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The clear layout of Sinumerik Operate is particularly helpful in the manufacture of complex machine tool workpieces

All photos: Siemens AG

trollers from only one manufacturer if at all possible. "Even back then, from my point of view the Sinumerik was the best and most universally usable and operable system. This is an enormously important factor for us because we program virtually everything on the machine."

The most recent enhancements by Siemens, some of which are incorporated into the Sinumerik Operate user interface, confirm yet again the master precision mechanic's opinion that he made the right decision. The software has a Windows-based operating and programming structure. Consequently, key combinations such as Ctrl+A for "select all" can be used, as can "copy and paste" – which employees are familiar with from their own computers. The Spinner U5 controlled by the Sinumerik 840D sl has three different modes for programming and setting up the workpieces: graphically animated ShopMill work-step programming, cycle-supported G-code programming with programGuide, and pure DIN/ISO programming. At Lerchenmüller, the preference is for ShopMill because it can be used to create even complex 3+2-axis programs with great speed. Because the Immenstadt-based company produces mainly individual parts and very small batches, this saves more time than using the faster production process possible with programGuide.

Maximum accuracy even with complex components

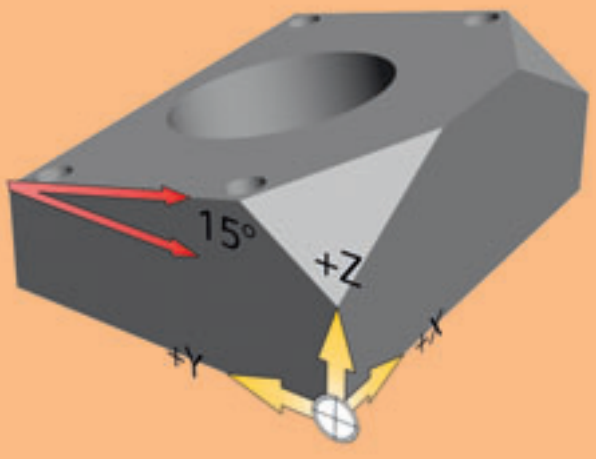
The company head explains, "I also think it's great that I'm guided by graphical displays and animated images when setting up the machine. The tools are clearly structured in a self-explanatory list with excellent identification via icons." This clear layout is particularly important for the production of complex workpieces.

Siemens drive and CNC technology that is perfectly matched to the new Spinner U5 machines is critical for high precision. According to Michael Schulz, managing director of Böhm Werkzeugmaschinen GmbH, it should be possible to move the linear axes of the machine tools accurately to a few thousandths of a millimeter. The result is workpieces whose deviations in dimensional accuracy are at times less than 5 µm. It is possible to adhere to these values even with complex components – not least because with the new five-axis centers by Spinner they can be manufactured without reclamping. "That really is brilliant," the metalworker is happy to report. "This means that we work even more precisely and significantly shorten the throughput times. An employee can already be programming a new component while the machine is running." <

Technology in detail

Swiveling with Cycle800 in programGuide

In 3+2-axis machining, you can work very quickly with inclined planes using Cycle800. A plane inclined by 15° will be face milled in the example shown.



Face milling of an inclined plane

Notes on Cycle800 in programGuide

- Programs with swiveled planes should always start in the machine's basic position.
- In a workpiece simulation, it is necessary to program the zero offset first (e.g., G54).
- The definition of the blank always relates to the active zero point set.
- Prior to first calling up the swivel cycle in the main program, it is necessary to program a tool (cutting tool D>0) with which the workpiece was scratched or measured.

The complete program can be downloaded at www.siemens.com/cnc4you.

Metalworking company relies on Sinumerik control systems with ShopMill and ShopTurn

Precision on a Grand Scale

Buchberger GmbH has established itself as a supplier of individual parts and small production runs in the gas turbine construction, reactor technology, and aerospace sectors. The metalworking company relies on Sinumerik control systems using the ShopMill and ShopTurn operating and programming interfaces to meet high quality requirements, simplify operations, and keep nonproductive times as short as possible.

Company founder Ottmar Buchberger started out in the late 1960s in a garage in Nuremberg, Germany, where he produced precision parts that he sold to companies in the surrounding area. He continued to expand and develop his company, becoming a valued contact for large industrial enterprises when jig construction or precision mechanics were required. This successful expansion has reached a high point at the company's new site in Tuchenbach, located in Bavaria. Seventy-five skilled CNC operators work here in two- and three-shift operation. There are also three apprentices who are training to become cutting machine operators.

Milled parts up to 22,000 mm long or turned parts with a diameter of 2,500 mm and a length of 6,000 mm – formidable dimensions for any cutting machine operator – are the norm for Buchberger GmbH. The extensive machine shop includes not only conventional turning, milling and grinding machines, but also CNC machines of every size, from horizontal turning

Turned parts with large diameters (here part of a gas turbine) are common for Buchberger

All photos: Siemens AG

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machines and three- and five-axis milling machines to a moving column milling machine and several long-bed milling cutters.

Ideally equipped for a wide production range

The metalworking company has been working with Sinumerik control systems for more than 20 years, and in the early days was one of the first ShopMill users in Bavaria. In the intervening years, the systems initially used have been almost completely replaced with Sinumerik 840D or 840D sl, and the machines have been equipped with ShopMill for milling tasks. Positive results prompted the boss of the company, Ottmar Buchberger, to take the next step and have the turning machines fitted with the ShopTurn programming interface.

Last-minute jobs with little lead time make up a large part of the company's business. Prefabricated blank parts frequently have to be reworked and finished. This includes skimming contours, cutting threads, and milling pockets on the end faces and lateral surfaces of workpieces. The owner of the company believes the Sinumerik control system is perfectly suited to these tasks due to its extensive range of cycles.

Junior manager Michael Buchberger, who is in charge of sales, bids and human resource management, appreciates the outstanding flexibility of the Sinumerik 840D and the ShopTurn programming interface. "We always go for the most efficient programming depending on the specific task at hand," he says. "Normal machining operations are created directly in DIN on the machine or using the operating and programming software. We have a dedicated CAD/CAM workstation for very complex workpieces, and we generate the NC program via the postprocessor."

Substantial operation and programming help

For transferring the NC programs generated and saving the set-up data, the controllers have network connections that link them to the company network. "All our CNC machines are networked. That's state-of-the-art these days," says Michael Buchberger emphatically. "In the case of larger turned parts, such as the gas turbines, the machining time on the machine alone is 30 hours." So for competitive production he keeps the programming and nonproductive times during set-up as short as possible. Flexibility is a major concern in any case. Due, among other things, to the dimensions and weights of up to 35 metric tons, a great deal of time is spent aligning and setting up the workpieces. The controller's many manual functions, such as the setting of the zero point and the use of measuring cycles in manual and automatic mode, are a great help. Buchberger adds, "We use many of the existing cycles to make operations easier for ourselves."

All CNC machines with Sinumerik control systems have service agreements that guarantee short response times for support questions and 24-hour emergency service. The junior manager says, "The hotline means there's always a contact available for immediate help." The company owner has already experienced positive results with Siemens service during the retrofit of several large CNC machines that were overhauled to reflect the state-of-the-art and retrofitted with Sinumerik 840D. Both the networking capability and the opportunity to use ShopMill and ShopTurn were important reasons for this decision. <

"We use many of the Sinumerik control system's existing cycles to make operations easier for ourselves."

Michael Buchberger, Junior Manager, Buchberger GmbH

Service contract

Individually tailored service

Even with the best care and attention, it is never possible to guarantee the prevention of all faults in the electrical equipment. This is why company owner Ottmar Buchberger has concluded a service agreement that not only guarantees a high level of availability for service and spare parts but also optimizes productivity. Added to this are plannable and transparent costs due to fixed fees for service, maintenance, and spare parts. Preventive maintenance and repair of the machine tools also limits the risk of unscheduled plant downtime.

Universal turning machine fitted with Sinumerik 840D sl

Everything from a Single Source

To guarantee the product quality desired by its customers, the Esterer foundry established its own mechanical production facility using a state-of-the-art CNC turning machine and the Sinumerik 840D sl CNC. Since then, the number of orders received for its in-house mechanical machining has risen dramatically.

The traditional and the modern are closely linked at the Esterer foundry in Altötting, Upper Bavaria, which was established in 1862. Many employees have remained faithful to the foundry for decades, and a correspondingly vast amount of experience has been gained in handling a wide variety of casting materials. Since last year, however, a new family has become the majority shareholder in Esterer Giesserei GmbH: Hans Topol and his son Patrick purchased the company with a workforce of 140 and will manage it together from now on. Their aim is to consistently deliver customized complete solutions from a single source. Patrick Topol says, "We cast materials in more than 160 different alloys. The production and cutting of cast stainless steel in particular requires a huge amount of material expertise and instinctive skill. Fortunately, we have a few experts among our ranks so we can supply the required workpiece quality within the desired time frame." Nevertheless, since the machining of cast steel components presents a special challenge, it also requires sophisticated technology.

Mechanical production designated as a profit center

Last year, to enable further process optimization, the foundry established its own mechanical production facility and designated it as a profit center. Patrick Topol explains, "A powerful turning machine with a high-end CNC forms the backbone of the profit center. The cutting-edge user interface allows us to create and switch programs within a very short time so that we can satisfy individual customer requirements as quickly as possible." Master precision machinist Konstantin Jansen explains some of the most significant demands placed on the turning machine, using the example of what is known in the food industry as a "column": "First and foremost, the machine must have extremely high torque and a certain level of stability." According to Jansen, the TC800 MC universal CNC turning machine from Spinner is the right choice for the company. Together with Jansen, who is head of mechanical machining, the management decided on the Sinumerik 840D sl system platform for the control of the machine. Esterer had tested various other turning centers before selecting the TC800

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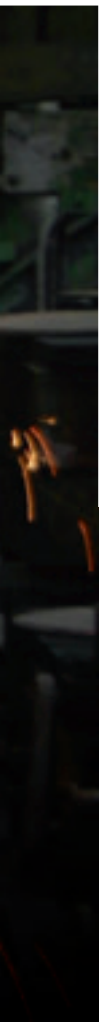


The Sinumerik-controlled Spinner turning machine with a subsequent finishing cycle ensures burnished, dimensionally accurate workpieces

Master precision machinist Konstantin Janzen has his own external Sinutrain workstation

All photos: Siemens AG

"The collaboration between Spinner and Siemens really impressed us. Everything went without a hitch."

Patrick Topol, Managing Partner, Esterer Giesserei GmbH

with the Sinumerik 840D sl. Janzen says, "Many of them did not even come close to meeting the necessary performance specifications." The master precision machinist and the company management are both pleased with the decision they made. They were also hugely impressed by the collaboration between Spinner and Siemens. Patrick Topol says, "The partnership was absolutely seamless." Janzen also has only good things to report: "The changeover to in-house machining went without a hitch."

Clear programming thanks to the graphical user interface

Sophisticated CNC programs are intended to keep the machining time as short as possible in large production runs. The lower the number of items, the more important a short programming time is. Janzen says, "It's possible to guarantee this thanks to the Sinumerik Operate user interface. We've even been able to optimize the whole process as a result. In the meantime, even the column running in large-batch production can be machined around 30 percent faster." Machining operations can also be described perfectly in programGuide. According to Janzen, "programGuide is designed for high machine productivity and therefore meets our requirements perfectly." The master precision machinist can make full use of the machine's functionality with the help of G-code programming. Janzen explains, "And yet the visual structure is identical to the operating step programming of ShopTurn." The production manager uses ShopTurn almost exclusively when programming simple individual parts and small batches.

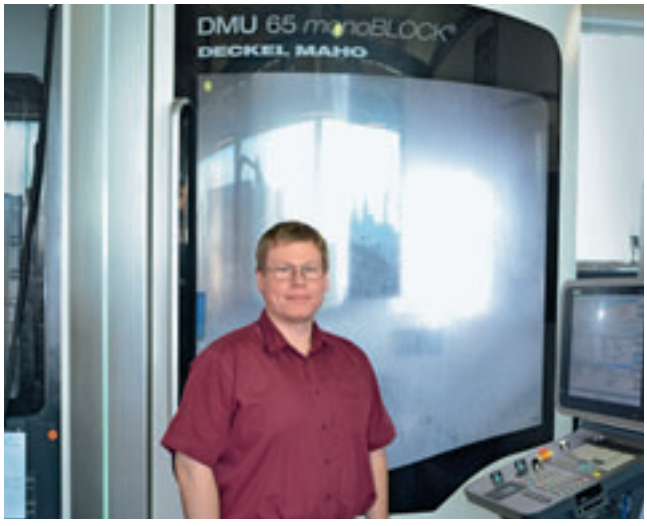
Cutting-edge technology facilitates productive machining

The number of orders received for in-house machining work at Esterer is growing steadily. Patrick Topol says, "As a result, the workshop will soon be home to a milling center too." Janzen has already set up an external programming workstation that is equipped with Sinutrain. This single-user license adapted to the TC800 makes it possible to program using the same Sinumerik Operate user interface. Once the programs have been finalized, the master precision machinist transfers them to the Spinner machine on a USB stick and sets them up. He adds, "And there you are – machining can go ahead without a hitch." <

Sinumerik Operate revolutionizes machine tool operation of a five-axis milling machine

Forward-Looking Use of Software

Andreas Pfeiffer runs a medium-sized CNC company in Zirndorf, Germany. To set the course for the future, he has invested in high-end technologies and in the qualification of his employees. When looking for a new five-axis milling machine, his choice of the Sinumerik 840D sl and the Sinumerik Operate graphical user interface was a logical result of the positive experiences he has had for many years with various Sinumerik systems, including ShopMill and ShopTurn.



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The DECKEL Maho DMU 65 monoBLOCK with a Sinumerik CNC meets all the requirements of company head Andreas Pfeiffer

For many businesses, a new generation signifies a dramatic change in the company's history. This was the case at W. Andreas Pfeiffer - Maschinen- und Apparatebau in Zirndorf when Willi Pfeiffer handed the company over to his son Andreas at the beginning of the year. And new blood often brings with it new ideas – which was also what happened in Andreas Pfeiffer's case: "What I want in the future is to produce a larger number of complex workpieces at the Pfeiffer company's acknowledged level of quality. I will certainly not shy away from five-axis simultaneous machining in the process." However, in order to achieve this Pfeiffer had to invest in both the machinery and the process sequences. At the same time, he made a point of ensuring that despite all the changes the so-called "workshop charm" was retained with established lot sizes ranging from 5 to 50 items for a wide variety of applications such as optics, precision mechanics, mechanical engineering, and medical technology.

Milling machine covers entire production range

Pfeiffer says, "I could never have realized my vision without the use of cutting-edge machines." The most important criterion for the purchase was that there should not be any limitations on the parts to be produced. In the end, the DECKEL Maho DMU 65 monoBLOCK met all the young entrepreneur's requirements. It delivers very good results, and, with a footprint of only 7.5 m², it also takes up very little space. Pfeiffer sums up: "DMG offers the best price/performance ratio for our purposes. At the same time, the machine also expands our production range at the upper end." The purchase of the five-axis milling machine ushered in a new era for Pfeiffer. Until then he had never worked on a machine like this, although, he says, "that didn't stop me from investing in the future of our company anyway." From the outset, he has seen the investment as a logical follow-on from his earlier decisions, "It was a matter of expanding the machinery gradually after three-axis and four-axis machining."

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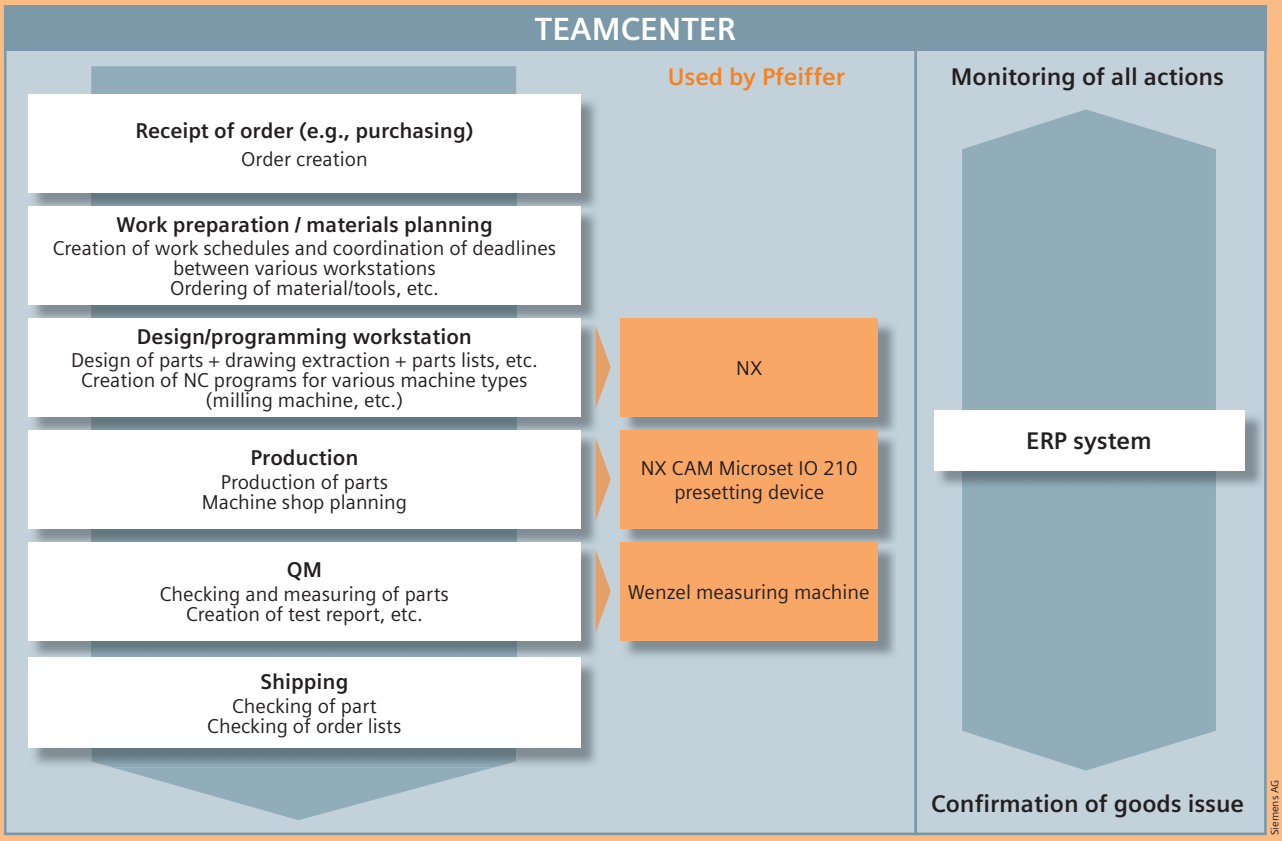
Technology in detail

Process chain sequence

The diagram shows the sequence of a production process chain from materials planning to quality management (QM). Teamcenter was used as the front end. The enterprise resource planning (ERP) system (e.g., by SAP) offers complete networking from the receipt of the order or setting up of the project to delivery of the goods.



Innovative software makes programming easier

However, as soon as the right type of machine had been found, Pfeiffer also had to give some thought to an appropriate controller. "There are only a handful of fully skilled workers in our 35-man company. And venturing to operate a five-axis machining center is no easy matter. It's no problem to load a finished program onto the machine and press 'NC Start.' By comparison, sitting down at the machine yourself and creating a part program requires quite a lot of experience," Pfeiffer explains. Nevertheless, it did not take him long to choose the appropriate controller. His many years of experience and the positive results obtained with ShopMill and ShopTurn made the decision easy, and as a result, he chose the Sinumerik Operate software. Pfeiffer says, "I decided on Sinumerik Operate because this software carries forward the consistent, simple operating philosophy of ShopMill and ShopTurn. Anyway, I've always leaned toward innovative technologies. I was also confident that the Windows-based interface would make it easy to set up and operate a five-axis machine." Thanks to the innovative swivel cycle, Pfeiffer is happy to use ShopMill to program up to 3+2-axis machining directly on the machine. However, the plan in the future is to run increased numbers of complex five-axis workpieces on the machine. For this, a CAD/CAM system – NX CAM – has been acquired from Siemens PLM, thus taking advantage of the complete Siemens process chain. Pfeiffer, however, is going one step further: to make sure that he can meet future requirements, he has invested from the outset in the entire process chain, including virtual machine, order processing, and so on. All the activities will be coordinated and monitored via the Teamcenter solution from Siemens PLM (see illustration).

Now, with the complete Sinumerik 840D sl system, Sinumerik Operate, and the continuous process chain with NX CAM and Teamcenter, Pfeiffer is perfectly prepared to meet the challenges of the future. <

ShopTurn enables a high level of flexibility in day-to-day shop floor use

Quickly Up to Speed

"Even an employee without programming experience can easily handle the controller after two days." These are the words production manager Markus Stübing uses to greet visitors to D.E.C. Metallbearbeitung GmbH as they enter the machine hall. Then he explains them how he became a Sinumerik fan.

With a workforce of 14, D.E.C. Metallbearbeitung GmbH in Ingolstadt produces turned and milled parts for the automotive industry and tool construction. In addition to typical standard parts, the company also produces fixtures and contract parts in small and medium batches. The machinery includes three-axis and five-axis CNC milling machines as well as vertical and horizontal turning machines. Three years ago, when considering the purchase of a new CNC turning machine, Stübing's interest in the new Sinumerik controller was awakened during a visit to a trade fair. Above all he liked the ShopTurn user and programming interface's intuitive operating concept as well as programming in the work-step editor. Stübing does not for a second regret switching to ShopTurn. As the company replaces the turning machines every four years and the milling machines every five years, there are now two CTX beta 500 and CTX beta 800 horizontal turning machines in addition to a CTV 250 vertical turning machine in use. All the Gildemeister turning machines are fitted with Sinumerik 840D sl controllers with

D.E.C. Metallbearbeitung produces standard parts for the automotive industry and tool construction

All photos: Siemens AG

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ShopTurn 7.5. "The CTV 250 is currently second to none for our small batches," says Stübing. The production manager is convinced that "managing the volume of orders would be impossible without the Sinumerik." The machine is equipped with a transport disc for 24 blanks, which can be refilled during operation. Typical small batches are 200 to 300 parts, and sometimes there are larger orders for up to 1,500 parts.

For small-batch production, the Gildemeister CTV250 is fitted with a transport disc for 24 blanks

Production manager Markus Stübing (left) and Jürgen Ries from Siemens at the Sinumerik 840D sl

Quickly and easily programmed with ShopTurn

Stübing is equally enthusiastic about the horizontal turning machines. The product manager describes the benefits: "The interaction between driven machine tools and controller is impressive. It's so much easier to program tasks such as milling and engraving of wrench sizes." With the existing milling cycles, front-face machining can also be programmed and milled very quickly on the turning machine. The cycles can also be used for machining lateral surfaces, as long as the machine has a y-axis, and are so universally usable that the company produces small milled parts on the turning machine if the milling machines are working to full capacity with other orders. Stübing is just as pragmatic about the programming. His motto is "Quick and easy programming." As a great deal of written work is necessary when programming in pure DIN code, ShopTurn with configurable work steps is the faster solution for him. After defining the blank, all he has to do is insert the individual steps – centering, drilling, contour turning, plunge cutting – with details of the tool and the the cutting parameters and geometries. The production manager particularly appreciates the calculation options and feasibility tests, as input errors are highlighted in red and a cycle cannot be saved until the errors have been corrected.

"I can program quickly and easily with ShopTurn. After defining the blank, all I have to do is insert the individual steps with details of the tool and the cutting parameters and geometries."

Markus Stübing, Production Manager, D.E.C. Metallbearbeitung GmbH

Practical program management

It must be possible to call up existing programs quickly given the frequent retooling procedures on each machine. Stübing explains the advantages of the practical program management function: "As we produce recurring standard parts for the automotive industry, all the programs are stored with details of the main and sub standards plus the drawing numbers as the file name. With other controllers, because there was an input limit of no more than 8 characters, we had to keep an external list so that we could find the programs. ShopTurn permits file names with up to 24 characters, and even special characters are allowed."

After two years of experience with the Sinumerik 840D sl and ShopTurn, the company's course is set for the future: the existing CNC milling machines will also be replaced by machines with Sinumerik controllers. One reason for this is the lack of skilled workers in this region. Stübing admits that with the big car manufacturers on his doorstep there is little willingness to work in small companies. He adds, "With the self-explanatory ShopTurn user and programming interface, I don't need to put a CNC specialist on the machine. The main requirement is an ability to read drawings and an interest in technology. We teach them the technology gradually." <

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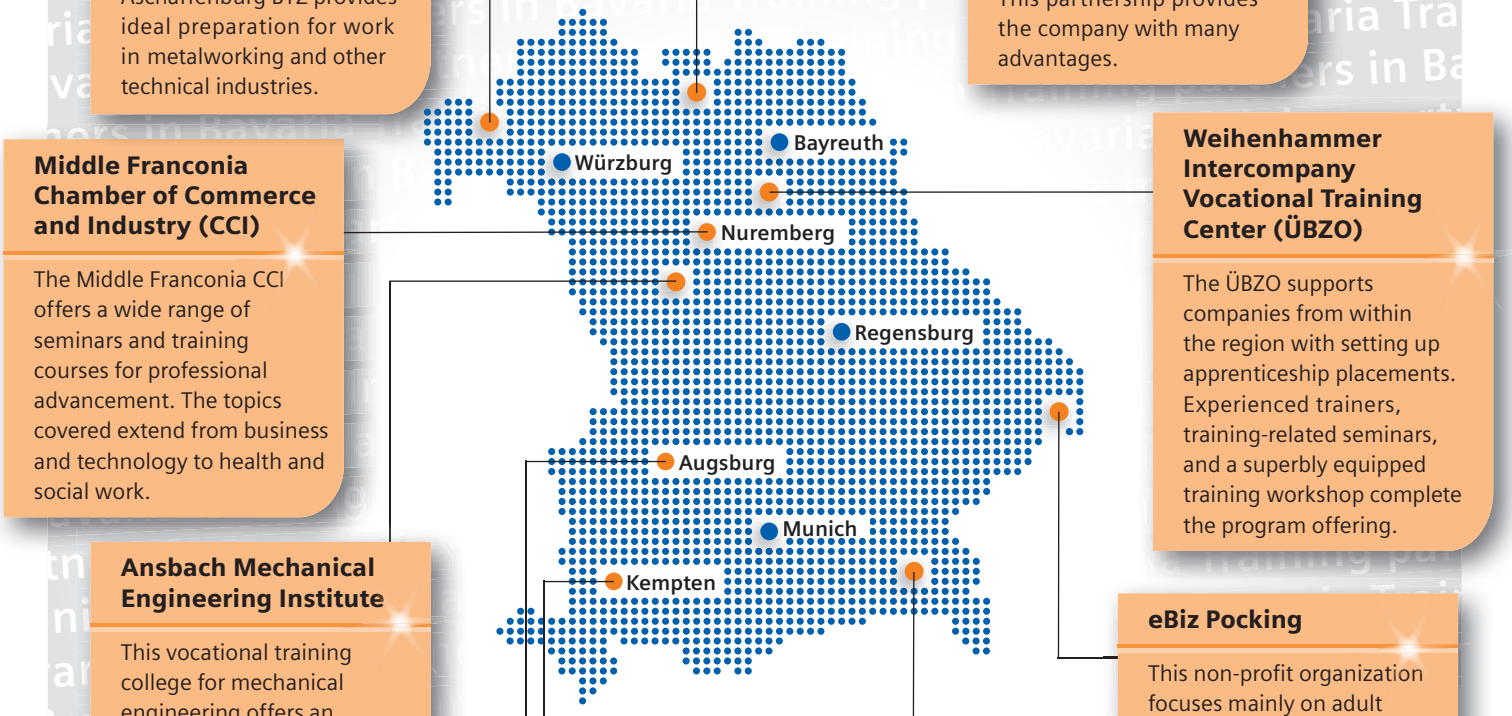
Training partners in Bavaria

Fit for Employment

Whether the need is for entry-level training for new employees, advanced training for skilled workers or the integration of job seekers, Siemens, together with its Bavarian training partners, offers an extensive range of basic and advanced training opportunities. <



Aschaffenburg Training Center for Cutting Machine Operations (BTZ)

As a training center for cutting machine operations and machine, tool and fixture construction, the Aschaffenburg BTZ provides ideal preparation for work in metalworking and other technical industries.

Optimum Maschinen Germany GmbH, Hallstadt

Thanks to a long-term working relationship with Siemens, Optimum has been designated as a collaborative partner in the training sector. This partnership provides the company with many advantages.

Middle Franconia Chamber of Commerce and Industry (CCI)

The Middle Franconia CCI offers a wide range of seminars and training courses for professional advancement. The topics covered extend from business and technology to health and social work.

Weihenhammer Intercompany Vocational Training Center (ÜBZO)

The ÜBZO supports companies from within the region with setting up apprenticeship placements. Experienced trainers, training-related seminars, and a superbly equipped training workshop complete the program offering.

Ansbach Mechanical Engineering Institute

This vocational training college for mechanical engineering offers an alternative to in-company initial vocational training. The dual system implemented here offers trainees a wide range of subjects.

eBiz Pocking

This non-profit organization focuses mainly on adult education and qualification. Its core tasks include the qualification and integration of job seekers.

Alzmetall Machine Tool Manufacturing Plant, Altendorf

Alzmetall teaches all milling technologies on in-house machines, including complete five-axis machining and mill-turning, both in theory and in practice.

Swabian Training Center

The Swabian Training Center supports the qualification of skilled workers in the manufacturing industry. The advanced training program extends from skilled workers to engineers.

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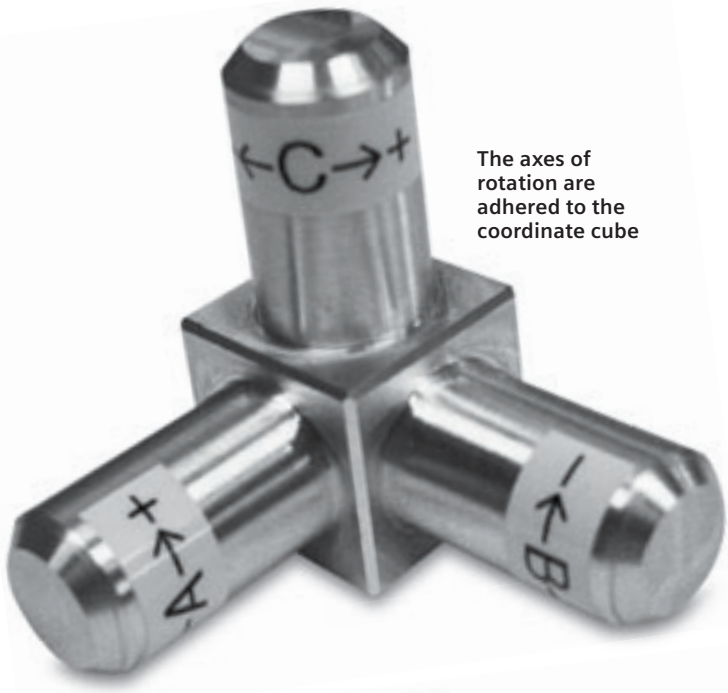
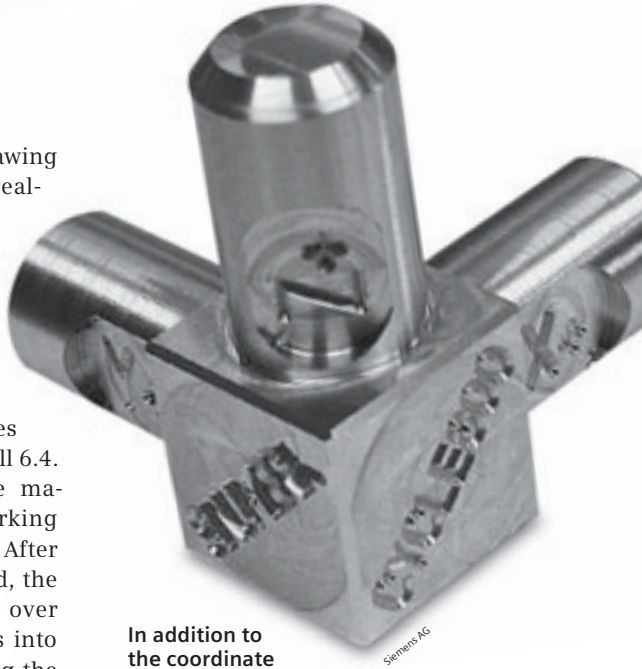
CNC milling program for producing a coordinate cube

Accurately Swiveled

To show colleagues in the CNC machine tool industry sector the right way to swivel the fourth and fifth axes on a CNC machine, the Siemens CNC community has provided all the information needed to mill a coordinate cube on its CNC4You website.



The axes of rotation are adhered to the coordinate cube



In addition to the coordinate axes, individual engravings can also be milled in the machine

The coordinate cube is a convenient tool to determine the coordinate axes and the sign for the direction of rotation. Here we'll illustrate how easy and accurately it can be produced.

Practical route to the finished workpiece

The manufacturing instructions are intended for all those with hands-on experience working with a CNC machine. Certified Sinumerik trainer Hans-Peter Moser's goal when creating the documentation for the coordinate cube was also to provide an opportunity for users to gain practical experience during training.

Production of the cube quickly familiarizes users with the Sinumerik's functions, such as the Cycle800 swivel cycle, and imparts CNC skills in a manner that closely reflects real-world procedures. In the process, users quickly learn the machine-shop-compatible CNC user interface and how to label the coordinate axes in the milling machine itself using the engraving cycle. Trainees also familiarize themselves with the main features of work planning using operator-friendly action sequences and practice moving comfortably from drawing to finished workpiece under real-world conditions.

Smooth production on different machines

The coordinate cube made from an aluminum alloy has already been produced during training sessions on several CNC machines with Sinumerik 840D and ShopMill 6.4. The solution demonstrates the machines' performance when working with a fourth and fifth NC axis. After the swivel parameters are entered, the controller automatically takes over the swiveling of the two NC axes into the correct position for machining the workpiece. Although the program serves only as an example due to the wide variety of conditions present in machine shops, it can easily be used on other machines with Sinumerik user interfaces by adjusting the swivel data record for the user's own environment.

Sinumerik Operate enables simulation

For users working with the Cycle800 swivel cycle, the new Sinumerik Operate user interface also provides the opportunity to simulate the process directly at the controller.

Manufacturing descriptions of the coordinate cube may be downloaded free of charge at www.siemens.com/cnc4you. <

For more information > www.siemens.com/cnc4you Contact > tom.schulz-heise@siemens.com

Sinumerik 808D completes the Sinumerik family at the lower end

CNC for Entry-Level Users

With the Sinumerik 808D, Siemens has developed a CNC for the lower performance range. The compact, user-friendly entry-level solution replaces the Sinumerik 802S and is used for simple turning and milling applications. Its simplicity also makes it interesting for the shop floor sector. The CNC is particularly suitable for use with standard machines in the lower performance range, as it includes only the functions that the user in this environment really needs. Sinumerik Operate Basic provides a very easy and clear-to-understand graphical user interface. Thanks to Sinumerik MDynamics, however, the 808D also scores highly on precision and productivity. The onboard ports, which eliminate complicated wiring in the control cabinet, are yet another point in the new CNC's favor. <

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Advantages of the Sinumerik 808D at a glance

- CNC system for standard turning machines
- Available for turning and milling
- Configured as a panel-based machine tool CNC
- Up to 3 axes + 1 spindle in one machining channel (turning) or up to 4 axes + 1 spindle in one machining channel (milling)
- Sinumerik Operate Basic graphical user interface
- Semi-servo solution with Sinamics V60 drive system and 1FL5 servomotors
- S7-200-based PLC with 72 inputs / 48 outputs

The Sinumerik CNC family

For more information > www.siemens.com/cnc4you

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mowo app – *motion world* for iPad

The third issue of *motion world* for the iPad is now ready for download. The iPad magazine combines the print edition with multimedia and interactive features. Videos, animated graphics, photo slideshows, and other content provide you with a rich environment to learn even more enjoyably about the latest trends and technologies in the world of Sinumerik.

Launch the *motion world* app you already have installed and download the latest issue. You don't have *motion world* on your iPad yet? No problem! Simply scan the QR code and install the app from the App Store – free of charge, of course. <

More information can be found online:
www.siemens.com/mowo-app

***motion world* as app**

Simply scan the QR-code with your iPad and download our CNC magazine as app.

The CNC4You portal – the virtual starting point for Sinumerik users

The CNC4You portal has been covering anything and everything having to do with turning and milling with Sinumerik CNC for five years. But there's still always something new to discover. We've taken your requests, comments and suggestions for improvement to heart and have restructured the portal as a result. Now you'll find all the new articles on the home page as teasers – simply click on each of them in turn and you'll be up-to-date within minutes. Important topics such as basic and advanced training, as well as downloads now have their own categories. Under Downloads, you'll also find the CNC4You app, which you can use to call up information from the CNC4You community anywhere, anytime. Check it out and see for yourself.

Of course, the CNC4You portal still provides tried and tested information about every aspect of CNC production – from current trends, tips and dates of events to Sinumerik CNC updates.

Those wanting to dive deeper into the topic can learn how to create original workpieces from detailed instructions. Last but not least, there's also the opportunity to test Sinutrain PC-based training software or to take a look at programming and production examples in the form of video tutorials. <

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The CNC4You portal keeps CNC users up-to-date

www.siemens.com/cnc4you

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The only address for cool CNC workpieces and useful tips

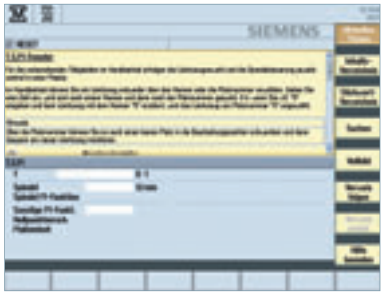
The SINUMERIK® Operate user interface makes programming quite simple, every step of the way.

Many new and useful functions:

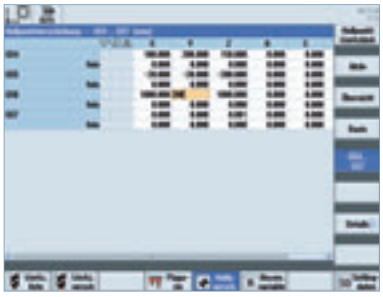
SINUMERIK Operate provides you with a wide range of functions and makes machine operation even more efficient. As a result, programming and operator control are clear and easy-to-understand thanks to the tool list and animated help elements. Simple tips and tricks make SINUMERIK Operate easy-to-use.

SINUMERIK Operate – programming and operator control made simple

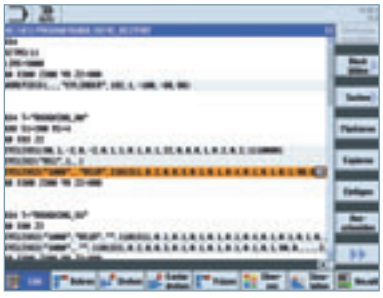
Tips and tricks:



The language-independent help key, tooltips, as well as improved search functionality with CTRL+F, are available in all screen forms.



The undo function using the "Insert" key – as long as an Input key has not been pressed or data already transferred into the fields.



Recompiling, commenting out or processing cycles with just one or two keys.

Download useful tips and tricks free-of-cost:

There are many additional functions and softkeys for fast programming and operator control. All this and more can be found online – visit www.siemens.com/cnc4you.

Answers for industry.