

CNC4you

The Shopfloor Magazine

Volume 4, September 2010

SIEMENS

Machining power plant turbines
using NC programs and an
electronic handwheel

A powerful combination

In this issue:



A specialist
for bridges
and bars



Fitness program
for "senior"
machines



Close to
the Job

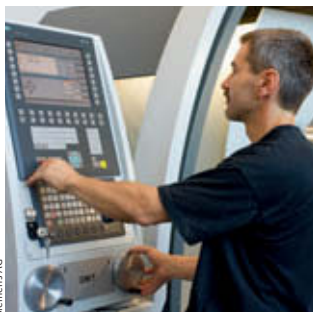
www.siemens.com/cnc4you



SRM

4

Switzerland is well-known for its precision turned parts. SRM counts on Sinumerik for manufacturing



Siemens AG

6

Grimsel Hydro uses ShopTurn and electronic handwheels for manufacturing and machining turbine blades for hydro-electric power plants



Mageba

12

The Mageba lathe is as good as new after an upgrade with Sinumerik 840D sl and its integrated safety features



Tepros

8

Tepros uses ShopMill for greater flexibility in manufacturing customized parts for aviation customers

3 EDITORIAL

CNC TECHNOLOGY IN SWITZERLAND

4 Reduced Costs – Greater Efficiency
Subcontractor benefits from ShopTurn's variety of features

6 A Powerful Combination
Machining power plant turbines with NC programs and an electronic handwheel

8 Solutions for Small-Series Batches
ShopMill allows more flexibility for subcontracting

10 A Specialist for Bridges and Bars
Dental implant products with Sinumerik 840D

RETROFIT

12 Fitness Regimen for Aging Machinery
Retrofit project helps personnel and equipment keep pace with latest technology

EDUCATION

14 Close to the Job
Bunorm sets new standards in its apprentice training program

15 ShopMill and ShopTurn in Practice
First train-the-trainer session held in Switzerland

SINUMERIK 828D-CORNER

16 Animated Elements
Graphic-supported operation and programming

TRAINING

17 More Comfortable to Operate
Sinutrain for Sinumerik Operate

NEWS

18 First Sinumerik Dealer Cooperation Begins / Sinumerik Announces Training Partnership with IHK Schwaben / CNC Shows at a Glance / HSC Roadshow Presents High-Speed Cutting Innovations / Pupils Working on the CNC Machine!

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Dear Reader,

In this issue, we'll explore CNC-based manufacturing in a country that epitomizes "small is beautiful," a country well-known for the **high precision, longevity and punctual delivery** of its products: Switzerland. Swiss watches and jewelry are legendary, and **Swiss-made medical, precision-engineered and ultra-precise parts** are also highly respected on all world markets. With 330,000 employees, the mechanical engineering, electrical and metalworking industry is the largest industrial employer in Switzerland. In 2009, the export trade volume of this sector came to CHF 63 billion, equal to 35 percent of Swiss exports.



Many Swiss companies operate as subcontractors and manufacture **customized products** in small lots as well as large series. These companies place their trust in innovative technology working hand in hand with the most up-to-date automation. Siemens optimally meets machining workshop requirements with its **Sinumerik 840D, 840D sl and 828D CNC controls**, ShopMill milling and ShopTurn lathe tooling software packages. Because these programs can be operated intuitively, users can achieve perfect results after a fairly short introduction phase. The new Sinumerik MDynamics technology package is ideal for milling complex parts requiring a flawless surface.

Swiss industry emphasizes workforce training to ensure that machine operators can fully exploit the technological possibilities available. Our **Sinumerik User Support assists machine tool dealers and contract manufacturers** in this effort by offering courses on operating and programming machine tools. In addition, our support team can deliver a **complete range of services** – from commissioning and configuration of machine tools, to service and repairs, to workshops on advanced machining strategies. This magazine presents a number of interesting Swiss applications of CNC technology with Sinumerik. Happy reading!

Cordially,

A handwritten signature in blue ink, appearing to be 'H. Küng', enclosed within a large, loopy oval shape.

Hans Peter Küng
Sinumerik User Support

More information > www.srm-ag.ch



Photos: SRM

Ali Yesil is pleased with the shorter programming times required for Sinumerik CNC with ShopTurn



Subcontractor benefits from ShopTurn's variety of features

Reduced Costs – Greater Efficiency

To remain competitive on the market, the Swiss subcontractor SRM faced the challenge of lowering throughput times. That also meant reducing time and work effort for generating CNC programs for complex workpieces. The innovative Sinumerik controls and intuitive software help SRM optimally meet those requirements.

> According to Werner Rützler and Peter Strebel, managing directors of SRM Präzisionsmechanik AG in Affoltern am Albis, Switzerland, the company is commissioned by customers to manufacture precision parts for high-end applications such as precision weight scales. "Because we ship directly to the customer's assembly line, our customers require the highest level of flexibility and the shortest possible delivery times," reports Rützler. In order to be less dependent on economic cycles in individual sectors, the company's management team decided early on to position itself with a wide range of turned

and milled parts. Approximately 50 employees manufacture turned parts measuring only a few millimeters in small and medium-sized series as well as larger, heavy milled parts weighing up to 10 kilos and measuring more than 200 millimeters along one edge. Orders come from medical technology and aviation customers, device manufacturers for safety systems and building equipment, as well as machine and plant engineering companies.

A positive response from staff

In addition to the existing Emcoturn 25 turning centers for simple turned parts and a Maxxturn 45 for complete machin-

ing, which have been operated for several years, a Hyperturn with bar loader – also from EMCO – was added in April 2010. This high-performance turning center has two tool revolvers, a Y-axis, and a counterspindle. Together with the machine operators, the company's management decided on the Sinumerik 840D sl CNC. "Our employees were immediately impressed by the excellent characteristics of the new CNC, especially over the simple shopfloor programming with ShopTurn," emphasizes Rützler. And Ali Yesil, who primarily does programming and machining at the new turning center, appreciates the advantages. "Com-



Swiss subcontractor SRM specializes in production of precision parts

pared to entering G-code as specified by the DIN standard, the average time needed for programming has gone down by half," reports the SRM employee.

Fast, easy editing

A large number of advanced software functions support the machine operator during rapid programming and setup. Yesil appreciates the automatically generated cycles for workpiece transfer from the main spindle to the counterspindle. Extensive numerical control programs result when carrying out complete machining, especially of complex workpieces. "The work schedule gives me a clear overview of the programmed manufacturing steps in the sequence they will occur. At the push of a button I can select steps individually and switch to the graphic dialog display of the individual cycle. This allows even elaborate NC programs to be quickly and easily edited and – if necessary – optimized," explains Yesil.

As Rützler emphasizes, when his company makes future investments, he will also decide on Siemens' control technol-

ogy. In his eyes, faster programming and the satisfaction of his machine operators are the decisive criteria. "Another advantage we also appreciate a lot is the specialists at the locally based Argonag AG solution provider." One of the key areas in their offer is the machine range from EMCO. Argonag has been an Approved Partner of Siemens for control technology in Switzerland for several years. The company also makes a strong commitment to the education and ongoing development of qualified metalworking specialists. Besides its flexible and innovative manufacturing strategy, SRM also demonstrates how handicapped people can be successfully integrated to everyday work life. Not only are polytechnician apprentices taken on but handicapped employees as well. In summary, Rützler says that "it is only good for collaboration to integrate these people in the workplace and the social environment." In 2007 he received confirmation that his approach was right: the Swiss initiative "This-Pris" commended SRM AG for its community service. <

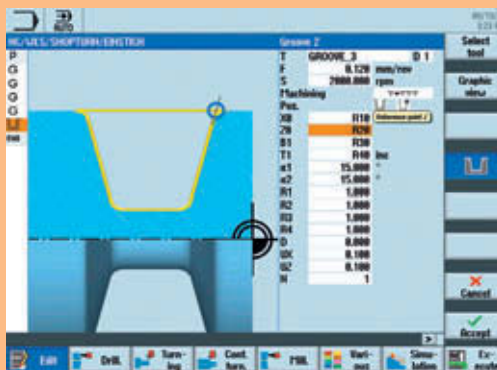
Technology in detail

Programming variables for cycles

Manufacturing several variants of workpieces is often required. To do that, different parts programs are usually created with different values. A simpler approach is to use R parameters or variables instead of program values. An additional benefit to be gained from programming variables is that the parameters can be reconciled and combined using mathematical functions. The Sinumerik Operate user interface makes implementing this complex programming even easier. This is true for the programming with programGuide as well as for ShopTurn and ShopMill. As shown in the "Groove" illustration, the values are replaced by parameters. These must be specified at the beginning of the program or can be loaded by another program. For example, a start program is created for machining that covers the different variants of the group of parts.

Example for combining variables:

```
IF R20 = R10+2/(R5*3,1419)
R15=25
ENDIF
MSG("MAXIMUM DIAMETER REACHED")
```



By using parameters, cycles can be programmed even more flexibly



The parameters are specified directly in the program, just as in the image, or over an initial setup program

Machining power plant turbines with NC programs and an electronic handwheel



A Powerful Combination

The manufacture of spare parts and the reworking of worn parts for a hydroelectric power plant calls for customized manufacturing that can be carried out only based on a drawing. At the Swiss company Grimsel Hydro, the combination of ShopTurn and manual operation using electronic handwheels has proven its value.



Reworking an existing workpiece without a drawing involves recording the contour by approaching the workpiece using handwheels and machining it in cycles created in ShopTurn

Siemens AG

> Based in Innertkirchen, Switzerland, Grimsel Hydro produces a range of machined and manufactured workpieces including shafts, axles, diffusers, turbine blades, complete turbine and pump wheels (usually Pelton wheels measuring up to 3,500 millimeters in diameter), housing elements and complete shutoff valves, safety units, and control elements. The workpieces machined for this pur-

pose almost always measure several hundred millimeters along one edge and weigh from only a few kilos to several thousand kilos.

From reworking to the new part

As the workshop for Kraftwerke Oberhasli AG (KWO), the company primarily manufactures new parts and spare parts for its own power plant operations, which

are widely distributed between Grimsel, Susten, and Brünig. Around one-third of orders come from KWO and the other two-thirds from external power plant operators in the Alpine countries of Switzerland, France, Italy, and Austria. In addition, Grimsel Hydro offers a full range of services, from disassembly of power plant components requiring maintenance to dismantling, repairing, and reworking all the way to assembly at the

hydropower plant. Workpieces are often reworked at the installation location – such as, for instance, closure members in galleries and caverns. Grimsel Hydro recently purchased a heavy DMT Kern CD820 lathe for machining rotationally symmetrical workpieces such as shafts, drums, axles, and wheels. The lathe has more than 46 kilowatts of drive power and can machine workpieces up to 820 millimeters in diameter and 3,000 millimeters in length.

Getting the 11-metric-ton monoblock machine to the company site required considerable effort and was a spectacular endeavor. The operation required traffic safety measures, as the heavy-load transport truck had to negotiate the narrow roads in the mountainous region of Grimsel Pass.

Manual operation, with electronic transmission

The machine has proven its value on the shop floor for several months now. Franz Aemmer, a lathe programmer and operator, appreciates the flexible operating principle. For not only does the CNC Sinumerik 840D feature the workshop-oriented, graphics-enhanced ShopTurn programming; it also has two electronic handwheels. Aemmer explains: “We often carry out machining rework on large parts which have seen decades of service in power plants. There are no longer any drawings or dimensions available for these parts. In this case we tend to use manual functions – in other words, the electronic handwheels. This lets me more rapidly and more flexibly approach the workpiece contour and remove the material requiring rework.” Another factor that enhances flexibility is how the Sinumerik allows Aemmer to vary the traverse speed of the runners with transmission ratios for the electronic handwheels ranging from 1:10 to 1:1,000. After clamping, this allows the operator to use rapid feed to quickly approach the workpiece and then continue at slow speed to approach the workpiece contour in fine increments at the micrometer level.

Highly efficient in combination

Another well-planned Sinumerik feature simplifies rework of individual parts. The operator can press a button at any time to toggle back and forth between

Technology in detail

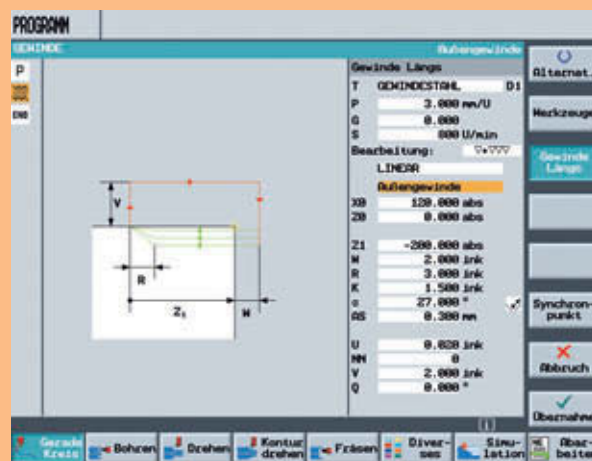
Threading repair with Sinumerik

Many maintenance companies use the “thread repair” cycle to save time and money. This function allows damaged threading on existing components to be reworked. The basic functionality involves synchronizing the current spindle position with the thread cycle. This makes it possible to easily recut the existing thread pitch.

The following steps must be executed to use this function: First, the threading tool must be mounted and activated. Next, the operator must use the handwheels or the traversing keys to carefully thread the tool into the thread pitch. Special care must be taken to ensure that the cutting edge is not damaged. After that, the thread cycle is called up from a program or accessed as a single cycle in JOG mode.

The “Synchronous Point” button is found on the vertical soft key bar. After the position has been compared, the parameter “Q” (starting angle offset) has to be set to “0.” Then the operator defines the rest of the cycle according to the specifications and selects “Apply.” Next, the tool is retracted and the cycle is started in manual mode. In automatic mode, a block search must take place after the thread cycle

before the program can be started with “Cycle Start.”



manual operation with electronic handwheels, working through programmed ShopTurn cycles and editing NC programs in G-code in compliance with the DIN (German Institute for Standardization) standard. Aemmer uses this option regularly. For example, he records a contour for reworking an existing workpiece without a drawing by using the handwheels to approach the workpiece. Afterward, he can process the results with programmed cycles quickly and easily created in ShopTurn. If he creates new parts, there are usually precise drawings for this based on which he can program in ShopTurn using user-friendly dialogs. If he requires special functions or needs to program highly complex contours, he selects the edit function for DIN code. Then he can com-

plete or modify the NC program created with ShopTurn. “We feel this option is an excellent feature because we often have to machine contours which cannot be recorded by using the ShopTurn cycles on their own,” underscores Aemmer. When carrying out comprehensive NC programs, another advanced Sinumerik CNC function assists him in connection with ShopTurn: if a machine tool change needs to be done, the machine automatically moves the runner to a change position. At the control, a blinking display clearly shows it is time to make the tool change and indicates the tool to be mounted. This helps avoid errors and time-intensive scrap while using NC programs to manufacture new parts on a lathe that otherwise is operated manually most of the time.

More information > www.tepros.ch



Tepros manufactures small-series components for the aviation industry on a Spinner machining tool

ShopMill allows more flexibility for subcontracting

Solutions for Small-Series Batches

At Tepros GmbH, a 5-axis machining center equipped with the workshop-oriented ShopMill programming software and a Sinumerik 840D CNC control ensures flexibility and rapid throughput times when processing individual workpieces and small series for aviation customers.

> Based in Altdorf, Switzerland, in the Uri canton, the Tepros company has a philosophy that states, "There are plenty of parts manufacturers – we solve problems," says company CEO Alex Friedrich. With a workforce of 20, the company manufactures steel, cast iron, nonferrous metal, light alloy metal, and plastic components as a contract manufacturer. Among other clients, the company serves hot-air-device manufacturers and manufacturers of machine and plant equipment for the food and beverage industry as well as the aviation and automotive industries.

Individual parts and small series for aviation

The Swiss subcontractor recently purchased a 5-axis U5-620 machining center from Spinner AG for small-series manufacturing of components for aircraft manufacturers. With a drive power of 11 kilowatts at speeds of up to 20,000 revolutions per minute on the main spindle, the machine has a tilting/rotary table with 720 millimeters by 520 millimeters of clamping surface in a working space of 620 millimeters (x-axis) by 520 millimeters (y-axis) by 460 millimeters (z-

axis). A key benefit is the option to carry out all machining on a workpiece after clamping it once. This substantially reduces throughput times. In addition, the degree of precision can be easily observed because multiple reclampings are not necessary.

The subcontractor also benefits from the Sinumerik 840D CNC control that is equipped with the ShopMill operating and programming software. The ShopMill solution allows complex workpiece programming to be completed in the workshop within a very short period of time. Michael von Rotz, workshop manager at the U5-620 machining center, summarizes the benefits: "Generating NC programs based on preprogrammed cycles on the graphic display is so simple that you can be working efficiently after only a few days, even without training." The comprehensive documentation is an effective resource for those learning the functions. He also considers the graphics to be very helpful as well: "The graphics usually show in a straightforward manner what data need to be entered and how the cycles are parameterized." In the future, all manuals will be accessible as PDF files within the control. A useful feature is the keyword search function with

hot links for accessing the respective descriptions from the results. This further simplifies training and use of the ShopMill software.

The ShopMill solution provides a wide range of standard machining cycles. These include bore holes, thread drilling/milling, and contour pockets with islands and residual material detection, but also new technologies such as plunge cutting and trochoidal milling of open grooves. Multiple machining operations of the same kind can be programmed particularly efficiently. For example, ShopMill automatically generates extensive drilling patterns after the entry of a few parameters. The integrated tool database also minimizes setup time. The correction data stored there for each tool are



Technology in detail

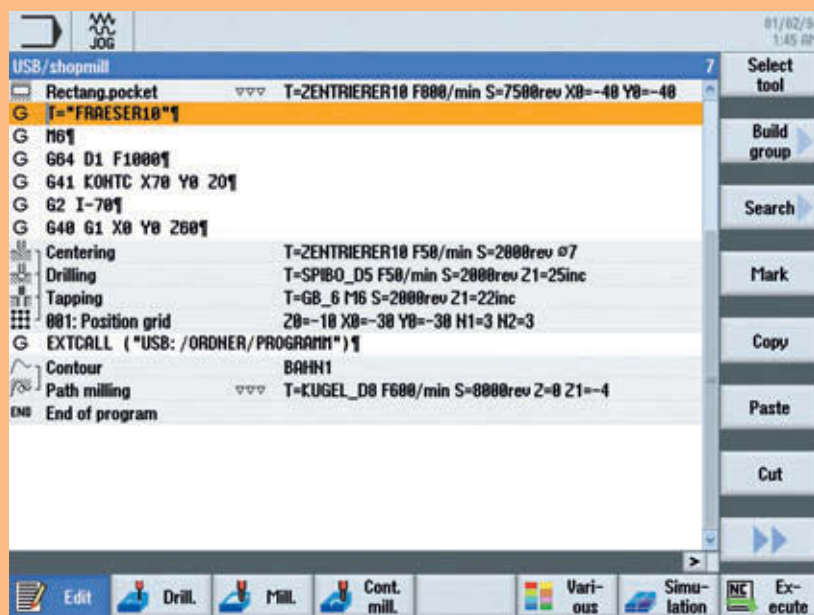
It's all in the mix ...

The advantages of ShopMill in the workshop are unmistakable, but some workpieces also have free-form surfaces that cannot be machined using cycles. In this case, a good approach is the combination of a ShopMill program and a program-Guide program. Pressing the "INPUT" key in ShopMill automatically generates a group of G-codes. This enables the operator to use the full functionality and freedom of G-code programming in a ShopMill program. ShopMill even allows processing from external storage media such as a CompactFlash card or USB stick. NC programs such as those created in a CAM program are processed in the sequence in which they were programmed via the EXTCALL command. This programming approach allows the operator to use and combine both programming variants.

The syntax for the EXTCALL command under Sinumerik Operate is as follows:

```
EXTCALL („USB:/Folder/Program“)
```

```
EXTCALL („CF_CARD:/Folder/Program“)
```



automatically transferred, and feeds and speeds can be programmed individually in the program.

Concentrating on the geometries to be processed

When programming cycles in ShopMill, the operator only needs to specify the workpiece geometries according to a drawing. ShopMill even automatically generates the tool movements not directly related to a tool operation on the

workpiece. This includes, for example, retooling and approaching the workpiece. In addition, ShopMill automatically optimizes the tool movements within a machining sequence. The operator simply needs to enter the safety distance between the tool tip and the workpiece – the retract plane.

ShopMill automatically generates the travel commands required for rapid traverse and positioning of the tool. This simplifies and speeds up programming.

Simulation identifies errors

Workshop manager Michael von Rotz considers the graphic 3-D simulation another highlight in ShopMill. This feature allows him to check all manufacturing steps during more complex machining. Thus, any programming errors can be detected quickly and prevent damage to the machine or workpieces.



Dental implant products with
Sinumerik 840D

A Specialist for Bridges and Bars

Small but meticulous – allshape AG in Lengnau, Switzerland, near Biel specializes in high-precision products for all common shapes of dental implants. Thanks to the reliable Sinumerik 840D CNC, allshape AG gives dental laboratories customized and fast delivery service.



> Switzerland is known for detailed precision work – one only needs to think of the legendary Swiss watches. Founded in 2008, allshape AG unites expert technical knowledge in the dental field with high-precision mechanics “made in Switzerland.” Together with dental technology partners, co-founders Bruno Aschwanden, Pieter Wackener, and Bruno-Reto Aschwanden have developed a product that is in high demand in a booming industry sector.

Dental labs commission allshape to manufacture dental bridges and bars and custom abutments (the implant structure only or technical crown portion on the implant). The process employs all conventional prosthetics materials such as titanium, chromium cobalt, and zirconia. As it says in the company logo, “bio-compatible solutions” refers in particular to the technologically very demanding milling of hard and brittle zirconia to produce a product that is highly compatible with the human body. “Precision is not enough; it also has to look good,” un-

derscores CEO Bruno-Reto Aschwanden. At allshape the finest details for a perfect denture are therefore worked in with utmost care and devotion. Mass market products such as crowns or caps on the so-called tooth stump are left for others to do. allshape is not dependent on the implant systems of major manufacturers and thus can satisfy almost any requirements when completing custom patient job orders.

Delivery in as little as 24 hours

In addition to customized order completion, allshape also sets itself apart from large manufacturers by promising to deliver the finished product as soon as 24 hours after receiving an order. That can be done only if technology in the workshop is absolutely reliable. And allshape has such technology – after closely studying various machine and control solutions, the company chose Ultrasonic 20 from DMG Sauer for hard and high-speed milling with the Sinumerik 840D. For perfect results, co-owner Pieter Wackener modified off-the-shelf CAD/CAM soft-

ware to meet his high demands. He is very satisfied with the CNC because the nonproprietary Sinumerik standard and the numerous options for programming parameters pay off even in complex workpieces. The entrepreneurs are especially pleased by the high number of zero offsets and the ease with which zero offsets can be managed: “This allows optimal use of the integrated automation system.” The installed network functions make it possible to rapidly process orders from the network. Because managing the program is similar to using a personal computer management of the various job orders is clearly structured and easy to handle.

Fifteen bridges a day

allshape manufactures approximately 15 bridges on each workday. “That would be inconceivable using conventional technology,” emphasizes Bruno-Reto Aschwanden. Services offered by the company include scanning of models and designing dental bridges and bars as well as abutments.

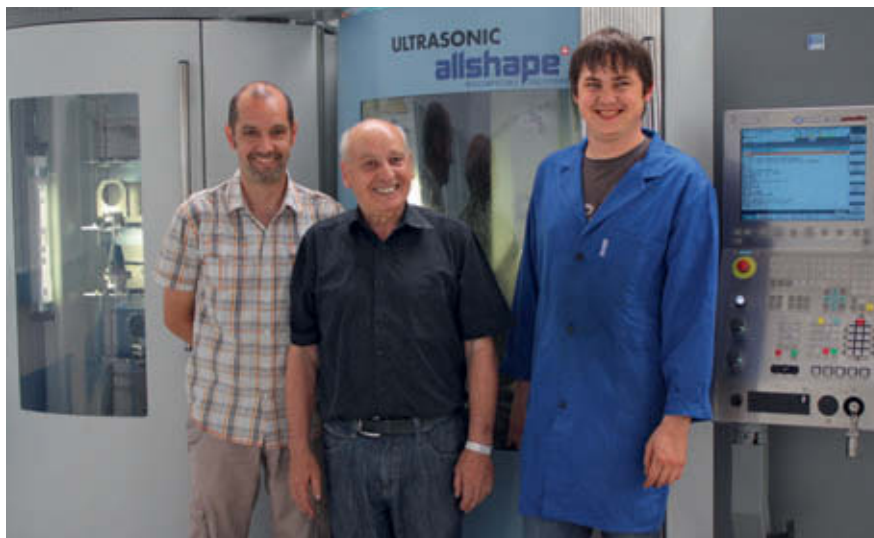


Manufacturing custom dental bridges and bars from difficult-to-mill materials is one of allshape's core strengths

Photos: allshape

allshape receives orders from dental labs through its own scanning center, but also from external scanning centers in Switzerland and the Benelux countries, and prepares them for production. The predesign is displayed for the dental lab on a viewer where further adjustments can be made before the order is milled from solid material on the 5-axis milling machine.

According to Bruno-Reto Aschwanden, his own company's expertise is in producing precision-engineered workpieces, and he relies on his customers for expertise in dental technology. And he has no worries about what lies ahead. Although he anticipates that the dental technician profession will transform from a craft-based profession to one based on CAD programming, at the same time he sees the know-how for cutting technology and elaborate, customized solutions continuing to be the field of expertise for companies like allshape AG.



CEO Bruno-Reto Aschwanden, his father, Bruno, and co-owner Pieter Wackener are not worried about the future thanks to specialization in dental technology and innovative automation

Technology in detail

Work offset management with Sinumerik

Sinumerik Operate now makes zero offset management even easier, better structured, and more intuitive. The zero offset currently selected is displayed on-screen through the new "Active" mask. This allows the operator to immediately see what frames are active. Icons for Mirror/Rotate/Scale show at a glance what transformations are active in the current zero offset.

		X	Y	Z	R	C
G54	Fine	0.000	0.000	0.000	0.000	0.000
G55	Fine	-32.848	-22.395	0.000	0.000	0.000
G56	Fine	0.000	0.000	0.000	0.000	0.000
G57	Fine	0.000	0.000	0.000	0.000	0.000

One can process inactive zero offsets in the overview G54 ... G599

the "=" sign. Experienced users also have the option of taking values from an NC program and writing them to an active zero offset:

```
$P_UIFR[2]=CTTRANS(X,123 ,Y,210 ,Z,13):CFINE(X,0,Y,0,Z,0)
```

The CTRANS command writes the values X123 Y210 Z13 to the G55 coordinate. CFINE sets the fine offset to 0.

The overview of all available zero offsets can also be accessed using soft keys G54 ... G599. That overview even allows one to process inactive zero offsets. All the values of a zero offset – such as fine offset, the value of a rotation, or degree of scaling – can be viewed by pressing the "Details" soft key. Because all the fields in the "Work offset" area are calculation fields, the operator can launch a calculator and easily make corrections by pressing



The result of the retrofit: the same cutting performance and precision, but with more convenient operation and an extended range of speed

Photos: Siemens Switzerland

Retrofit project helps personnel and equipment keep pace with latest technology

Fitness Regimen for Aging Machinery

The products of the Swiss Mageba AG are expected to work flawlessly for decades even under the harshest conditions. The company's management also applies the same high quality standard when it comes to the continuous and reliable use of Mageba's own production machines and controls.

> Production machines are often in operation for a period of several decades. Their mechanical components usually remain in good condition – only the controls and electrical components become obsolete or out-of-date. This can quickly lead to faults and failures. The older the machine, the more difficult it is to procure spare parts. Replacing the entire machine tool requires considerable investment and in some cases takes a long time.

In contrast, not only is it far less costly to ensure the required productivity and production reliability by retrofitting the

existing machine, but the process is also faster than a complete replacement. "If our lathe for manufacturing large parts were to unexpectedly fail, that would create a serious problem," says Marcel Kaiser, production manager at the Mageba SA plant, about a worst-case scenario. Based in Bülach, Switzerland, and with customers throughout the world, the company specializes in manufacturing bridge bearings, expansion joints, and seismic protection shock absorbers for structural and civil engineering. Since the early 1990s the company has operated a Ravensburg KH100 CNC lathe for

manufacturing pot and spherical structural bearings. The machine can handle a lathing diameter of up to 2,300 millimeters, workpiece measuring of up to 2,000 millimeters, and unfinished parts weighing up to four metric tons.

Searching for the right partner

It was primarily the 20-year-old control technology that was causing the production manager the most headaches. At the beginning of 2009, company management decided to carry out a retrofit of the lathe as a preventive measure. This primarily meant installing a new control.

However, there were also problems with mechanical parts such as the tool revolver. "After so many years of service mostly performing heavy machining operations, it comes as no surprise. But at the same time the machine was and is in good mechanical condition," emphasizes Kaiser. Before the retrofit, Mageba had to find a partner that could upgrade the machine components to meet the most recent technological standards. Thanks to the overall technical concept, the offer submitted by Siemens was easily the most convincing. With Siemens acting as general contractor, mechanical work was subcontracted to the specialist company Schurter-Retrofit AG.

An unpleasant surprise was waiting during dismantling: process water intrusion had caused even worse corrosion of the ball-and-nut spindles than anticipated, and the spindles had to be replaced. The timetable had to be moved back one month due to the delivery time needed for the new spindles. Because of that change, instead of planned partial refurbishment, Mageba decided to carry out a total machine refurbishment. As a precaution, all the hydraulic components and telescopic sheet metal covers were replaced with new ones.

Sinumerik and ShopTurn newly deployed

All electrical components and cabling were also replaced. The number of cable and plug-in sockets was substantially reduced by using Profibus, the ET 200S distributed I/O system, and the Drive-Clq drive interface. Absolute linear scales for high-resolution measurements were mounted on the machine as well. Of the

electrical components, only the 47-kW spindle motor was retained because it had been replaced only a year earlier.

Like new after the retrofit – the Ravensburg lathe at Mageba



Technology in detail

Safety Integrated in machine upgrade projects

As part of a machine upgrade project, the safety of the machine can be increased substantially by Safety Integrated functions. Functions for safely monitoring speed, standstill, and position are required in particular for machine tools where the machine and plant danger zones are frequently accessible.

> Safe standstill

This is an Emergency Stop function or opening of the protective door, both of which ensure that the energy feed is electronically disconnected.

> Safe Operating stop

If the protective door is open, the danger zone can be accessed. During this time, the drives are monitored to ensure they are at a safe standstill.

> Safe stopping process for personal safety (Stop C)

This consists of the rapid, safe stop of a motor and release of torque after a standstill has been reached.

> Safe stopping for machines and work piece protection (Stop D)

Triggered by an Emergency Stop, the machine is shut down with the protective door closed. As this happens, the tool stays on the programmed path so that tooling failure or workpiece scrap is avoided.

> Safely-limited speed

The drive does not exceed a preset speed/speed threshold even if individual axes are traversed with the protective door open.

> Safe speed detection of a drive

When dropping below a noncritical speed, a protective door can be unlocked – for example, if the spindle speed is "0."

> Safe limit position

This is the safe monitoring of the axis limit positions. If exceeded, the axis drives are braked as quickly as possible; no hardware limit switches are required.

In the meantime, the control system used on the lathe is the Sinumerik 840D sl with the ShopTurn shopfloor software. Tailored Sinamics S120 converters with 1FT6 servomotors are installed on the drive side. In terms of safety technology, external protective circuits were converted to Safety Integrated. Despite the extensive rebuilding work, Mageba is very satisfied. "Even when meeting very tight delivery deadlines, we can now manufacture our smallest pot and spherical bearings on the Ravensburg," says Kaiser. "For just under one-third of what a new lathe would have cost, we have a completely refurbished machine that will continue to operate for many years to come." <



Bunorm sets new standards in its apprentice training program

Close to the Job

Training future specialist staff is an important concern for Bunorm AG. By investing in a Matec-30 HV/K used primarily for training purposes, the company gives polytechnicians hands-on experience working on a 5-axis milling center.

> Based in Aarwangen, Switzerland, Bunorm AG delivers outstanding quality and a high level of flexibility, whether for individual parts, small batch lots, or complete assemblies and plants. With this objective in mind, the company is committed to qualified employees and has an apprenticeship program. Bunorm currently offers this program to manufacturing technicians, plant and component engineers, and polytechnicians. Apprentices in these fields do not work on outdated conventional machines but instead on a Matec-30 HV/K universal machining center – the ideal machine for complex manufacturing operations in 2.5D, 3D, and 5-axis machining. Peter Sägesser, responsible for apprenticeship training at Bunorm, explains: “We want the apprentices to gain an introduction to everyday working life so that they quickly become productive on the job.” The young people working on the machining center gain a knowledge advantage and have more opportunities after completing their apprenticeship. “Nowadays this can be a decisive advantage in the recruitment of specialists,” underscores Sägesser.

Matec and Sinumerik – a dream team

Because it was searching for a powerful CNC system, Bunorm chose the Sinumerik 840D because the control had already proven itself on many large machines. Bunorm has equipped five machines with the control system, including three Matecs. The parts manufacturer is very

pleased about the sizable gains in productivity in manufacturing thanks to the modern CNC. In addition, the open architecture of the Sinumerik allows Bunorm to respond to customer wishes in more detail. Bunorm is well equipped for any task with the Sinumerik 840D, whether it be graphic programming with a comprehensive package of cycles for ShopMill (especially helpful in the manufacture of individual parts), DIN/ISO programming, or even the use of workpieces created using external CAD/CAM software.

Long parts up to six meters long are machined at the five machining centers. The specifications of the machines with

various CNC round tables allow machining with axes (3 + 2) set at an angle, all the way to 3D machining of workpieces.

A one-stop shop

The expectation Bunorm has of itself is not only to complete customer orders with the highest possible precision on schedule but also to provide advice to customers on the construction of their components. In addition to professional competence and creativity, this requires the right technology and a high degree of flexibility and reliability. In selecting the Sinumerik 840D CNC, Bunorm has augmented its ability to provide CNC training. <

Machine operator Daniel Wiss appreciates the machining options offered by the Matec HV/K equipped with Sinumerik 840D sl



First train-the-trainer session held in Switzerland

ShopMill and ShopTurn in Practice

Siemens has completed its first train-the-trainer seminar on ShopMill and ShopTurn in collaboration with the Swiss association of employers Swissmechanic and the Sinumerik dealer cooperation Argonag. Key users can apply the skills learned at the train-the-trainer sessions when teaching their own course participants. Event organizers as well as course participants were very pleased with the success of this event.

> With around 1,300 member companies and over 63,000 employees, Swissmechanic is one of Switzerland's leading industry associations for small to medium-sized mechanical engineering and electrical engineering companies. Swissmechanic plays a leading role in comprehensively training member companies and their staff. The Siemens train-the-trainer concept received extremely positive feedback from the responsible Swissmechanic representatives during their recent visit to Siemens in Erlangen. Which is why the first train-the-trainer seminar for Swissmechanic instructors took place in Lenzburg at the Aargau offices of Swissmechanic.

Successful instruction

Ten participants traveled to Lenzburg, Switzerland to complete training on ShopMill and ShopTurn from Siemens using the newly developed training documentation. The training material was developed by Siemens and focuses on operation and programming. Karl-Heinz Engels, an application technology specialist from the Technology and Applications Center (TAC) in Erlangen, led the seminar, assisted by Bruno Schneider from Swiss-based Sinumerik partner Argonag and local Siemens sales representative Hans Küng. With 12 computer learning stations and four EMCO machine tools available, course participants acquired extensive theoretical knowledge and could immediately apply what they learned. One of the highlights of the seminar was that participants received authorization to use the Siemens extranet. This way, trainers taking the



The ShopMill and ShopTurn training course – on machine tools and PCs – received top ratings from the Swissmechanic participants

course can download instructional material from anywhere in the world, at any time, and in the language of their choice.

Positive reviews

The objective of the seminar is to train as many trainers as possible in CNC-controlled machines equipped with Sinumerik, and the Sinutrain software that simulates the control system. All

seminar participants gave positive feedback about the session and are interested in taking part in further seminars of this kind. One participant sums up how he experienced the training: "The more knowledge I have of ShopMill and ShopTurn, the more I can teach my own students." Because not all those interested were able to take part in the seminar, another train-the-trainer seminar will be offered next year.

Graphic-supported operation and programming

Animated Elements

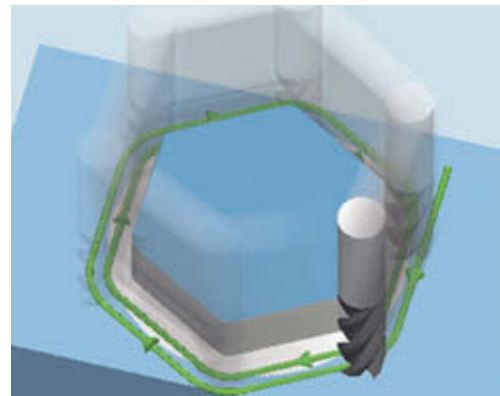
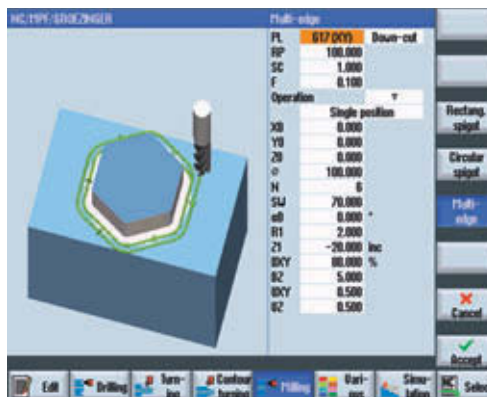
> The compact CNC Sinumerik 828D for the shop floor stands out for its high level of performance. In addition to its durability and high efficiency, the Sinumerik 828D sets new standards in terms of user-friendly commissioning and handling. Its intuitive operation is highly valued by subcontractors. Thanks to its unique display using moving image sequences, the Animated Elements function offers a completely new level of comfort, making programming and operation inputs far easier.

Interactive input

Parameters which are entered into the control system by users every day affect the movements of the machine. These can only be displayed to a limited extent using static auxiliary images. The graphics-enhanced entry of parameters

using Animated Elements makes it possible for operators to reliably set up and accurately program machines. Brief animated sequences enable, for example, the determination of the workpiece zero point using a circular spigot. The operator quickly and unambiguously sees in what sequence the probe must be positioned and how the control retracts the probe. Other probe sequences can also be easily determined in this way.

If a distinction needs to be made between material removal and chip breakage during deep-hole drilling, Animated Elements also offers the optimal solution. A static auxiliary image would only consist of a large number of arrows which would be hard to decipher. An animated sequence, on the other hand, provides a highly precise rendition of the exemplary movement sequence. <



Photos: Siemens AG

Sinutrain for Sinumerik Operate

More Comfortable to Operate

The Sinutrain training system will be soon available for Sinumerik Operate. Thus, It enables straightforward and user-friendly Sinumerik operation and intuitive CNC programming on a PC.



> The Sinumerik CNC family covers the complete range of machine tools, from sophisticated high-level factory automation to individual turning or milling machines. For practice-oriented CNC training on the machine Siemens has developed the Sinutrain training system. Sinutrain provides a complete training and system simulation package and runs on a PC with no additional hardware required. Sinutrain provides an on-screen control that looks and behaves exactly like that of the target machine. This is possible because Sinutrain is based on the real Sinumerik CNC kernel. The software enables the student to become familiar with machine details such as control, working range, and tool changing. The student can learn to work proficiently with the coordinate sys-

tem and then go on to generate machining plans. A machining program can be safely simulated, with the on-screen display reflecting exactly what would occur as the job proceeds. But the real-world consequences of a mistake – such as tools breaking or cutting edges getting too hot – are still revealed to the student.

Sinutrain will be soon available for Sinumerik Operate, a new HMI integrating the control and programming interfaces for HMI-Advanced, ShopMill, and ShopTurn into a single unified programming environment, that can be used in different technologies. The clearly structured layout with context-based functions and self-explanatory icons enables faster and more intuitive handling by machine operators and quicker familiarization with new machines.

More than a training tool

Sinutrain based on Sinumerik Operate can also be used for offline CNC programming. This contributes to higher productivity and more efficient resource utilization. Sinutrain can be perfectly adapted to the axis configuration of different machines. This enables maximal compatibility of CNC-programs created offline to the machines in the shop-floor. Plus, Sinutrain can be used to compile professional CNC presentations for both training and sales purposes. Student and instructor workstations can also be networked with real machine tools so the student's efforts can be tested by cutting real metal after the programs have been fully debugged offline.

Sinumerik Operate offers a set of new, powerful features for operation and programming



Sinutrain for Sinumerik Operate

- > Easy learning of Sinumerik operation and CNC programming on a PC
- > Suitable for all globally established CNC programming methods
- > Maximum machine "feeling" with integrated software machine control panel
- > Optimal machine adaptation for maximum CNC-program compatibility
- > Multitude of operator languages available
- > Possibility to install multiple Sinutrain versions on a PC

More information > www.siemens.com/cnc4you

First Sinumerik Dealer Cooperation Begins



Those joining the Sinumerik Dealer Cooperation (from left: Detlef Engel, Thomas Kolb, Markus Gmeiner, Stefan Luther, Marianne Kristel, and Hans-Peter Küng)

Swiss-based Argonag AG has been certified as the first "Sinumerik Dealer Cooperation" partner in Europe. Argonag AG supplies machines and systems for production and training in the CNC field and has worked together with Siemens for many years. The Sinumerik Dealer Cooperation certificate is proof of the dealer's high level of expertise in the Sinumerik and guarantees preferred support by Siemens. <

More information is available at:
www.siemens.com/cnc4you

Sinumerik Announces Training Partnership with IHK Schwaben

Based on the motto "Teaching Industry-tested Practices" the IHK Bildungshaus Schwaben – a training institute of the Swabian Chamber of Commerce and Industry – promotes vocational learning with a practical orientation. In order to



Georg Lutzenberger (left) and Manfred Lang at the certificate presentation

ensure the value of computerized numerical control (CNC) training, the institute relies on Sinumerik controls and Siemens as its training partner. The CNC training partnership program is now official: At a jointly held customer workshop in Augsburg, Georg Lutzenberger, branch manager of Siemens AG Augsburg, presented the certificate to Manfred Lang, head of the Technische Akademie Schwaben. More than 60 participants attended the certificate presentation ceremony at the IHK Bildungshaus. <

More information is available at:
www.siemens.com/cnc4you

CNC Shows at a Glance

The AMB in Stuttgart, the most important international trade show for metalworking, is opening its gates from September 28 to October 2.

Under the motto of "Productivity in Motion" Siemens will be presenting solutions for the automation of machine tools in Hall 4 at booth C 12. In addition to interesting special presentations, Siemens is also supporting the "Sustainable Technologies and Processes for the Future" event with contributions on innovative CNC technology.

The PRODEX'10, which is considered the most important international trade show for machine tools, tools and production measuring technology, is being held at the Basel Exhibition Center from November 16 to 20. With its excellent range of presentations it is Switzerland's biggest performance



show and is attracting more and more decision makers and opinion leaders. At the Siemens booth G02 in Hall 1.1 many interesting new products and applications all to do with CNC technology are again awaiting the guests.

Siemens will also be represented with an extensive program at the Euromold show for tools and molds from December 1 to 7 in Frankfurt. <

HSC Roadshow Presents High-speed Cutting Innovations



The DMG milling machine and Sinumerik 840D sl are a perfect high-speed cutting duo

Siemens and its partners DMG, Haimer, OSG, and Tebis explained all the components of the complete process chain and provided answers to key questions during a jointly held High Speed Cutting (HSC) Roadshow.

Not only are high spindle and feed speeds required for HSC, all parts of the process have to be finely coordinated as well. Using the example of manufacturing a deep-drawing tool, the various requirements within the operational steps are presented and possible sources of errors explained.

At each roadshow, partners first give specialist presentations to provide an overview of the entire workflow for manufacturing a workpiece – from the CAD/CAM system to tools, tool holders and presetting devices, right through to the machine and control. During the hands-on session the process ranging from tool measurement to manufacturing of the workpiece is presented in detail. Roadshow audiences are impressively shown that high-speed cutting is a team effort.

Pupils Working on the CNC Machine!

Named after the institution running them, the BOLTZ and BOLTZplus projects are currently being given at the Berufsorientierendes Lern- und Trainingszentrum (vocational learning and training center) in Gotha, Germany for seventh- and eighth-graders. There are 16 Regelschulen (secondary schools up to grade 9) and five preparatory high schools from the Gotha district involved in the project that allows pupils to test their professional interests in a practical context. At BOLTZ the pupils gain basic skills in metalworking as well as working based on technical drawings. The sessions are held at a machining center and on a Compaktturn lathe equipped with Sinumerik 810d.

At first, the course participants plan and program simple workpieces such as key rings and door signs. After programming in ShopMill on a PC, the programs are transferred, the tools adjusted and machining can begin. The pupils have a lot of fun doing the work because they can quickly go from an intuitive graphic interface of the operator program to a successfully completed task. Pupils in their graduation year are also offered a one-week specialization course in CNC milling and turning where they can expand their basic knowledge gained in the courses.



An early start – Gotha pupils at a Sinumerik



Always a strike.



With the new SINUMERIK 828D.

www.siemens.com/cnc4you

You can always get a strike with the new SINUMERIK 828D®: Simple and quick setup and programming of machine tools with graphic support. Even custom workpieces can be machined with great precision in no time at all. Compact, strong, simple... Simply perfect! For the job shop. More detailed information on the tailor-made CNC solution for the job shop is available on the Internet. Machining descriptions of cutting-edge workpieces are also available for free download.

Answers for industry.

SIEMENS