

CNC4you

The Shopfloor Magazine

The background of the entire page is a photograph of two children on a playground swing. The swing has a blue, woven, tire-like seat. A boy in a grey hoodie and red shirt is standing on the swing, holding the chains. A girl in a pink shirt and blue jeans is sitting on the swing, also holding the chains. They are in a park with green trees and a clear sky.

High precision
for a fun-filled
experience

High-quality playground
equipment turned
with Sinumerik CNC

Turning technology
redefined

CNC turning solutions with Sinumerik Operate
for all applications and industries

Who will be
world champion?

CNC turning and milling machine operators use
Sinumerik at WorldSkills Leipzig 2013



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Dear readers,

This issue of CNC4you focuses on **turning and training**. To achieve perfect results in turning, users need the right technical equipment. Siemens has the appropriate CNC technology for every turning application, and we offer various successful practical examples of this on the following pages. Take a look on page 10, for example, at how Andreas Schlüter Maschinenbau GmbH uses **Sinumerik 828D** to produce playground equipment components that are so precisely machined that there is no risk of children being injured while playing.

WorldSkills Leipzig 2013 – The World Championship of Professions, which takes place in Germany in July, is a particular highlight for CNC turning and milling machine operators. This is where the best junior CNC employees compete to win the title of world champion in CNC turning or CNC milling. All the machines provided for the participants in these disciplines come from DMG / MORI SEIKI and are fitted with **Sinumerik 840D sl** and **Sinumerik Operate**. Read more about this exciting competition on page 4. If you want to perfect your own CNC skills, you can find the appropriate educational and training courses for all things Sinumerik by visiting our online portal, siemens.com/cnc4you. In the new video tutorials on **Sinumerik 808D** we also provide a step-by-step explanation of the correct operation and programming of this controller.

Enjoy the read!

Karl-Heinz Engels
User Support
(and still active on the subject of training)



CNC turning and milling machine operators use Sinumerik at WorldSkills Leipzig 2013

Who will be world champion?

More than a thousand participants from all over the world will meet this summer in Leipzig, where world championship titles will be awarded in 46 recognized trades at WorldSkills. Germany will be fielding a strong team. The participants in CNC turning and CNC milling will demonstrate their prowess on machines by DMG / MORI SEIKI that are fitted with Sinumerik 840D sl and Sinumerik Operate.

 The beginnings of WorldSkills, the international world championship for the craft and industrial professions, which take place every two years, date back to 1946 in Spain. In the run-up to WorldSkills, preliminary rounds are held in the individual countries taking part – in Germany at SkillsGermany. This competition is supported by DMG / MORI SEIKI for CNC turning and by Chiron for CNC milling.

Herbert Mattes, a trainer at Chiron-Werke GmbH & Co. KG in Tuttlingen, supervises the competitions as the expert in CNC milling. In his opinion, participation is worthwhile for both companies and trainees: "The candidates are trained in areas that would otherwise not be covered in such depth. And, of course, it's a great opportunity to meet up with global competitors, to compete with each other, and to make new contacts."

1 Evaluation criterion: dealing with pressure

Tobias Schanzenbach works as a trainer in the field of metalworking at Siemens. He will act as a workshop supervisor for CNC milling at WorldSkills.

Mr. Schanzenbach, what are your duties as a workshop supervisor?

Tobias Schanzenbach: Among other things, I am responsible for ensuring that all the necessary equipment is available for the CNC milling section in Leipzig's trade fair hall by the time of the competition. There are other things, too, that need to be arranged, such as the health and safety and environmental guidelines. I have an excellent team that includes applications and service engineers from Siemens and DMG / MORI SEIKI. They are on hand to help with the time-consuming and complex organization.

What criteria are used when evaluating the participants?

Tobias Schanzenbach: During the competition, the participants use the CAM system, typically Mastercam, to create the program for the workpiece based on a drawing. This program is then transferred to the machine. Tools and cutting values are set by the participants themselves. The workpiece must be completed within the specified time. The evaluation is based on the level of completion, dimensional accuracy, surface condition, and, of course, time. Basically, the test is to see whether participants can work under extreme pressure. Usually three workpieces are programmed and manufactured within the three days.



2

State-of-the-art competition machines

DMG / MORI SEIKI is supporting WorldSkills in Leipzig with more than 33 CNC machine tools. A total of 13 CTX alpha 300 V4 machines will be used for CNC turning and 12 vertical milling centers of the DMC 635 V type for CNC milling. Three DMC 635 V and five Milltap 700 compact processing centers are also available in two other disciplines, the Manufacturing Team Challenge and Plastic Molds Development. All the machines are equipped with Sinumerik 840D sl and the user interface Sinumerik Operate. We spoke about the competition machines at WorldSkills with Jörg Harings, who is responsible for overall management training at the DMG / MORI SEIKI Academy and who will be present in Leipzig as the expert and workshop supervisor for CNC turning.

Mr. Harings, all the competition machines are equipped with Sinumerik controllers. Why was this particular CNC chosen?

Jörg Harings: We decided on Sinumerik 840D sl with Sinumerik Operate because we wanted to showcase our latest state-of-the-art high-end machines in this competition. In addition, Sinumerik is a universal controller and therefore has the same interface for both turning and milling.

Why should companies let their trainees take part in the WorldSkills competitions?

Jörg Harings: At DMG / MORI SEIKI we have discovered that contestants bring a lot of new stimuli into vocational training. The trainees approach difficult topics on their own initiative and work in a manner that is much closer to real-world operation. All in all, the quality of the trainees and the training has increased enormously.

**Thank you very much for speaking with us.
We wish you every success at WorldSkills 2013!**

INFORMATION ABOUT WORLDSKILLS

At WorldSkills Leipzig 2013, Siemens is also the product sponsor for the disciplines of Industrial Electronics, Polymechanics/ Automation, and Electronics. Information can be found at

siemens.com/worldskills

Everything you need to know about the disciplines, the program, and much more can be found at

worldskillsleipzig2013.com or
worldskills.org/

dmgmoriseiki.com



DMG / MORI SEIKI



DMG / MORI SEIKI

12 vertical milling centers of the DMC 635 V type (left) will be used for CNC milling. A total of 13 CTX alpha 300 V4 machines will be used for CNC turning. All the machines are provided by DMG / MORI SEIKI and are equipped with Sinumerik 840D sl



Johannes Rudolf (left) and Tobias Brockfeld, winners in the CNC milling and CNC turning sections, respectively, at SkillsGermany, are hoping to perform well at WorldSkills



3 Gaining experience – professionally and personally

- ▶ SkillsGermany 2012 was held at AMB 2012. The German championship titles went to Tobias Brockfeld in CNC turning and Johannes Rudolf in CNC milling. Now both will compete for the title of world champion in their disciplines in Leipzig. Rudolf was an industrial mechanic trainee at Chiron-Werke GmbH & Co. KG in Tuttlingen and now works there as a journeyman. Brockfeld completed an apprenticeship as a cutting machine operator at GILDEMEISTER Drehmaschinen GmbH in Bielefeld and is now employed as a skilled machine fitter in applications engineering.

Johannes, how did you find out about the SkillsGermany competition and why did you decide to take part?

Johannes: There are a few candidates at Chiron who have already taken part. They said it was a great opportunity to gain experience that you couldn't get otherwise.

You recently spent some time at DMG and were able to train on the competition machine. How did you get on with the machine and the controller?

Johannes: I was already familiar with the user interface Sinumerik Operate from the training workshop. I find the interface very operator-friendly with its diagrams and colored graphics. With this machine I had to rethink the traverse path a bit, as at Chiron the pedestal moves while at DMG it's the table that moves.

What do you make of your chances at WorldSkills?

Johannes: It would be fantastic if I could make the top five. But I can't really gauge it at all. First, I don't yet know the other entrants and how they've prepared for the competition. Second, the pressure at WorldSkills is most certainly greater.

Tobias, why did you decide to become a cutting machine operator when choosing an occupation?

Tobias: After secondary school, I went to a vocational training school specializing in metal engineering, where I learned turning and milling. I was hooked right from the start and decided on an apprenticeship in this field.

Your participation in SkillsGermany was immediately crowned with success as the German champion. What did you find most challenging about the competition?

Tobias: Everything comes together in this competition, from programming in CAD/CAM, when you really have to think about what is the most practical approach, to choosing and measuring the machine tools. Then on top of that you have all the hustle and bustle at the venue – that ramps up the pressure quite a lot.

What other preparations are you making for WorldSkills?

Tobias: In my free time I'm programming a few workpieces in Mastercam for test purposes. I then save the finished program to a USB stick and manufacture the turned parts on the machine.

Thank you very much for speaking with us. We wish you all the best at WorldSkills and hope it's a great experience!



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CNC turning solutions with Sinumerik Operate for all applications and industries


Turning technology redefined



Whether simple or complex turned parts are required, the functions of Sinumerik guarantee perfect turning results

Siemens AG

From simple turned parts to highly complex complete machining, diverse applications place many and varied demands on cutting-edge CNC solutions. We spoke to Siemens CNC applications engineers and turning experts Bernd Barthelmann and Claudio Jans about the advantages of Sinumerik on the shopfloor.

 Mr. Barthelmann, Mr. Jans, global production methods are constantly evolving. Consequently, the demands placed on CNC turning machines are also changing. How do you, as manufacturers of CNC controllers, respond to this stream of new challenges?

Claudio Jans: We observe the manufacturing trends in all industries world-

wide, of course, and respond to them with appropriate products in both the hardware and software sector.

The requirements in the two cases are very different. Everything is possible, from the high-output mass production of consumer goods to the manufacture of small batch sizes in medium-sized companies, in prototype construction, or in repair workshops to the customized

and yet still affordable manufacture of individual products.

Nowadays, with CNCs ranging from Sinumerik 808D and 828D to 840D sl, we offer the appropriate control concepts for all requirements. For years, with Sinumerik 840D sl, Siemens has dominated the high-end segment of the CNC market, where openness, extreme performance, and flexibility ►►



► are paramount. Four years ago, we brought Sinumerik 828D onto the market as a controller optimized for the wide range of shopfloor applications and concentrating exclusively on turning and milling technology. The latest addition to our stable is Sinumerik 808D, a compact, user-friendly entry-level CNC for simple turning applications. All three controller classes have one thing in common: great ease of use with Sinumerik Operate. That is the crucial advantage in the integrated use of our solutions.

Ease of use is key. With the introduction of Sinumerik Operate, Siemens has brought an operating concept onto the market that has been very well accepted by users. What makes this operating concept so successful?

Bernd Barthelmann: The intuitive user interface is largely self-explanatory, with the result that even novices manage to master it quickly. The clearly laid out Windows-style display and graphically supported entry and programming with animated elements are responsible for this. Every machining step is proactively rendered as a simulation.

The set-up of a CNC machine in particular presents a repeated challenge and represents nonproductive time. A wide range of set-up functions helps the operator get to the workpiece faster. For example, it is possible from a clearly arranged tool table to change a tool simply by pressing a few buttons,

thus reducing the nonproductive time to an absolute minimum. Even determination of the zero point, for instance, is supported by operator-friendly measuring cycles.

Claudio Jans: The crucial advantage, however, is that Sinumerik Operate supports all the programming methods in one controller. For the shortest machining times in large batch production, the operator usually uses DIN/ISO programming from production planning, which can be freely combined with high-performance technology and measuring cycles in programGuide.

For productive machining of small batches and individual parts, there is the convenience of graphical programming in ShopTurn. In addition to this, a large repertoire of high-level language commands can be used in all programming methods, further increasing flexibility.

“Sinumerik Operate always offers a standard method of operation – regardless of whether the operation is turning, milling, or multitasking.”

Claudio Jans, CNC Applications Engineer

Which production models is Sinumerik suitable for?

Bernd Barthelmann: A cycle turning machine that is equipped with the Sinumerik function Manual Machine is frequently used in the production of individual parts, such as parts of wheels for railroad cars or components for hydroelectric power plants. The electronic handwheel function enables the user to be particularly flexible and to approach the machining process slowly, which is very beneficial when reworking, finishing, or carrying out repairs.

Standard CNC machines with Sinumerik are in demand for the production of simple turned parts in small to medium-size batches. And, of course, Sinumerik is also the right choice for large-batch production. The Sinumerik product line, with its huge number of technology cycles, offers the right CNC for every application. All Sinumerik CNCs have intelligent turning functions

With the portfolio featuring the entry-level CNC Sinumerik 808D, the compact CNC Sinumerik 828D, and the premium CNC Sinumerik 840D sl, users will find the right controller for every turning operation





Siemens AG

such as tapping, recess, undercut, thread turning, and grooving cycles.

Could you say that a certain Sinumerik is particularly suitable for a specific application?

Claudio Jans: The decision as to which Sinumerik is used for which type of production depends first on the relevant machine configuration (that is, how many axes, driven tools, y-axes, and so on, are used) and second on the complexity and batch size of the fabricated parts. Just to give you an example: It is vital to equip a multichannel turning machine that has two saddles with Sinumerik 840D sl. Single-saddle turning machines, which have at most main and counter spindles, driven tools, and a y-axis, can be equipped with Sinumerik 840D sl and also with Sinumerik 828D.

Sinumerik 808D may be the right choice in the lower performance range up to three axes. In addition to control characteristics, however, issues such as the networking of machines with the scaled use of integrated IT functions are also deciding factors.

Many turned workpieces also include some milling elements. What opportunities does Sinumerik offer for machining with both technologies in a single operation?

Claudio Jans: Let me put it like this: milling technology has always been an integral part of turning operations due to the driven tools. The functions in

Sinumerik Operate – Transmit for face machining and Tracyl for peripheral surface machining – transform the machining plane at exactly the right place and therefore Sinumerik 828D and 840D sl inherently have any number of milling functions.

When it is a matter of machining highly complex parts with some free-form surfaces, such as in medical technology or the aerospace industry, our premium CNC Sinumerik 840D sl is used. Thanks to intelligent kinematic transformations, it turns a lathe into a full-fledged milling machine. This means that all the milling functions are fully available, from cycle technology to

Here too we have made Sinumerik Operate even more efficient. With the programSYNC function, we have an editor available that enables simultaneous editing, calibration, and optimization of the programs in line with the channel structure. This is regardless of whether you program in DIN/ISO or in ShopTurn work-step programming. All in all, we can say that users will easily obtain the appropriate turned part with the combination of a Sinumerik CNC and Sinumerik Operate.

Mr. Barthelmann, Mr. Jans, thank you very much for speaking with us. <

“The Sinumerik product line, with its huge number of technology cycles, offers the right CNC for every application.”

Bernd Barthelmann,
CNC Applications Engineer



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simultaneous clearance surface machining. And the best part is that Sinumerik Operate always offers a standard method of operation – regardless of whether the operation is turning, milling, multitasking, or multichannel machining.

What is your solution then for multichannel machining?

Bernd Barthelmann: In multichannel machining, a workpiece is machined with two or more saddles simultaneously. It is used primarily when the emphasis is on large piece numbers or complex complete machining.



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Fork head holder
for the basket of
a swing, made of
stainless steel

Kaiser & Kühne Freizeitgeräte GmbH

High-quality playground equipment turned with
Sinumerik CNC

High precision for a fun-filled experience

Andreas Schlüter Maschinenbau uses the CNC Sinumerik 828D to produce components for the playground equipment industry. This requires a high level of precision because the stainless steel must be expertly machined so that there is no risk of children being injured when playing on the equipment.

▶ When Andreas Schlüter passes a playground and sees children romping around, what he first notices is the equipment they are playing on. For some 17 years, Andreas Schlüter Maschinenbau GmbH has been producing machined parts for playground equipment for children; more precisely, these parts are used in the equipment produced by Kaiser & Kühne Freizeitgeräte GmbH. Playground equipment, however, is not a toy – at least not in the opinion of those producing it. It is a huge challenge to achieve the right balance between childish adventure and the necessary safety. However, thanks to the CNC Sinumerik 828D, the company can produce machined parts that guarantee that children can play safely and happily on the playground equipment.

Sinumerik enables flexible production

Even the first turning machine that Schlüter purchased many years ago included a Siemens controller. Schlüter says, "We rely entirely on Sinumerik controllers."

The CNC expert justifies his choice based on the controllers' high level of reliability and performance, the excellent service provided by the supplier, the nearness of service personnel, and the



Schlüter uses Sinumerik 828D for precise production of components for playground equipment

Siemens AG



Siemens AG

Metosa Pinacho uses Sinumerik 828D Basic T in its line of turning machines

Quality ensures demand

Spanish machine tools are present in the German market – for instance, Metosa Pinacho's smart-turn 8 line of turning machines, which are fitted with the CNC Sinumerik 828D Basic T and stand out due to their functionality and durability.



Visitors to intec, the trade fair for production engineering, machine tools, and special machine construction in Leipzig, Germany, discovered some surprises among the countless exhibitors this year. Who would have thought that cutting-edge lathes would be

constructed in a small Spanish village around 200 kilometers from Barcelona and that, thanks to the robust and precise Sinumerik 828D Basic T CNC, these turning machines would also have conquered the German market? At present, around 130 employees working at

Metosa Pinacho, a family enterprise established in 1946, are responsible for the more than 3,000 machines that leave the plant each year. The family enterprise is the largest European manufacturer of conventional and CNC parallel horizontal turning machines –



even though it is based in Castejón del Puente, a village with a population of just about 360. The turning machines produced by the Pinacho family are distributed in Germany through wholesalers. In Berlin and the new federal states of Germany, Scheidt Maschinen und Eisen GmbH & Co. KG plays this role. This Berlin-based company has now been working with Metosa Pinacho for around eight years. Area manager Karsten Scheidt, says, "The Pinacho machines have a very attractive price/performance ratio and are of very high quality. We also appreciate the excellent working relationship we have established with Pinacho." He continues, "And the satisfaction of customers who already have a Pinacho machine also plays a part."

High performance, accuracy, and availability

Only with the appropriate CNC can the Spanish turning machine reach its full potential. This is why Metosa Pinacho chose Sinumerik 828D Basic T, which has now become the standard controller across the entire product line. The robust and precise CNC is perfectly tailored to the demands of cutting-edge lathes and ensures the high performance, accuracy, and availability of the

machine. The additional technology cycles are also very useful for turning and can easily be put to use with the help of Sinumerik Operate, the state-of-the-art user interface. Enrico Ehrhardt, applications consultant at Siemens in Chemnitz, explains, "In Sinumerik Operate, all the familiar operating and programming interfaces are combined in one user interface." Sinumerik

Operate also facilitates the connection between work-step and high-level language programming. Ehrhardt adds, "As a result, it ensures easy NC programming on the shopfloor with full 3-D simulation options." Anyone who prefers to program offline can also do this with the help of Sinutrain software.

"Demand has increased significantly"

The smart-turn 8 turning machine is the best example of the Spanish machine manufacturer's skills. The CNC machines in this product line are functional, durable, reasonably priced, and effective. Thanks to the unmatched performance of the CNC used, it is also possible to guarantee maximum workpiece accuracy with a minimum of machining time. Taken together, all these advantages have impressed many customers. Scheidt says, "Demand has increased significantly since we began offering the machines with the Siemens controller." <



Karel Huisman of Metosa Central Europe shows how easy it is to create NC programs with Sinumerik 828D Basic T



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TECHNOLOGY IN DETAIL

Web-based training "Turning and milling made easier"

Sinumerik Operate offers a web-based training (WBT) program for ShopTurn, with which you can quickly get up to speed on the user interface for CNC turning in seven easy chapters. Chapters one to five supply everything you need to know about the general principles of working with the software. Chapters six and seven enable you to interactively reproduce the steps required for creating the work plans for the workpieces illustrated. Finally, you can test your knowledge in a multiple-choice quiz, and those who answer 70 percent of the questions correctly receive a certificate. The WBT is available not only for ShopTurn but also for ShopMill. This means you can become



acquainted with Sinumerik Operate functions for CNC milling just as easily and quickly.

You can take part in the WBT at
siemens.com/cnc4you
or
sie.ag/LkMvDT



Threaded-spindle manufacturer benefits from cutting-edge CNC technology

Flexible production of large threaded spindles

The flexible production of high-quality spindle shafts requires the use of appropriate technology. Gewinde Ziegler AG / GSA AG uses a heavy-duty Leadwell LTC-60CXXL turning center equipped with the CNC Sinumerik 840D sl and its standardized user interface Sinumerik Operate for this purpose. How has the new control system proven itself so far to employees on the shopfloor?

▶ Today, Reto Ziegler feels a sense of satisfaction when he walks through his plant and looks over his employees' shoulders as they are working. The managing director of Gewinde Ziegler AG / GSA AG, which is based in the tiny Swiss village of Horriwil, is certain of one thing: he made the right decision when he chose the heavy-duty Leadwell LTC-60CXXL turning center equipped with the CNC Sinumerik 840D sl. His colleague Christoph Meier, who works as CNC technology manager at Gewinde Ziegler, agrees: "Instead of waiting months and months for an external subcontractor, we are now able to preturn even large threaded spindles inside a week or two, thanks to the innovative CNC technology." By using the additional support chuck behind the spindle drive, the turning center processes shafts measuring up to 9 m in length and up to 400 mm in diameter. Meier explains, "This reduces delivery times to two to three months and gives us an excellent competitive advantage." Yet another invaluable benefit of the CNC is that it guarantees maximum flexibility. A manufacturing company that produces 90 percent customer-specific components in small batches relies heavily on such flexibility.

Sinumerik demonstrates universal programmability and operability

To make full use of the turning center's advantages, Ziegler and Meier decided to use Sinumerik 840D sl. The key feature here is the Sinumerik's extensive functionality. It is easy to set up and program the VDI 60 turret with its 12 tool slots, the tailstock with rotating center, the main spindle, and the feed drives using the cycle technology and the tool management provided. CNC expert Meier is impressed by the control

The slender rods, which are up to 6 m long, are supported by two movable steady rests and an actively rotating tailstock center during the highly precise turning of the diameters and transmission threads



concept, mainly due to the standardized programming and user interface, Sinumerik Operate. He explains, "It displays animated graphics for every work step, meaning that less experienced staff are able to create sizable NC programs within a very short time. Thanks to the NC programs created directly on the machine using Sinumerik, our staff are able to work reliably from the very first piece."

The Swiss CNC experts are also enthusiastic about the animated 3-D simulation of the programmed production steps, as this ensures maximum process reliability. With the procurement of costly high-quality chrome-nickel alloy blanks often taking several months, process reliability plays a crucial role in ensuring continued economic viability. The benefits of the 3-D simulation are particularly apparent in the manufacture of single and small-series items, including heavy-duty long spindle shafts used for driving all-electric injection molding machines, for example. This drive technology is increasingly replacing conventional hydraulic drive technology, with its associated risks to the environment and difficult commissioning and adjustment procedures.

Simplified operation thanks to standardized user interface

To ensure that the trainees in Reto Ziegler's company do not lag behind when it comes to operating the new technologies, Ziegler has acquired a smaller Leadwell LTC-25ALM turning center equipped with Sinumerik 828D for training purposes, which can be used in parallel with the heavy-duty turning center. Like its larger, high-end sibling, this compact CNC offers all the required functions for efficient programming through the same Sinumerik Operate interface. No matter if

Sinumerik Operate, with its animated graphics and 3-D simulation feature, makes work on the controller considerably easier



TECHNOLOGY IN DETAIL

Comparison of Sinumerik 828D and Sinumerik 840D sl controllers

Similarities:

Sinumerik Operate interface with maximum ease of use and functionality that intelligently supports the operator of a turning or milling machine during his or her daily work.

Differences:

Sinumerik 828D: Panel-based compact control system with a robust and compact design in which the CNC is installed directly in the command panel with the display and keyboard. The number of axes and spindles is controllable only to a limited extent (maximum eight for turning or six for milling).



Sinumerik 840D sl: Modular, scalable universal CNC that is effectively indefinitely configurable and can control highly complex machining centers with up to 93 axes in up to 10 machining channels.

Sinumerik 828D or Sinumerik 840D sl is used – Sinumerik Operate is the integrated CNC solution for all Sinumerik machine classes. This allows trainees to immediately apply what they have learned here in the company's production environment. Ziegler says happily, "That is a highly practical benefit of the Sinumerik control system concept. All the PLCs on our turning and milling centers have exactly the same programming and user interface. This means an increase in flexibility in relation to our specialist staff."




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Trainees make use of Sinumerik's milling and turning options to produce excellent work

Little television tower makes it big

Five Berlin-based trainees produced a workpiece that is both unique and decorative as part of an in-house competition between Siemens training facilities. Their commitment was rewarded: the miniature TV tower was awarded first prize by the jury.

 The trainees of Siemens Professional Education (SPE) Berlin were aiming high with their workpiece: Berlin's TV tower. And they were very successful: Supported by their trainers, they designed the decorative workpiece and then created the complete set of drawings, including the programs. The miniature consists of three turned parts – the tower, dome, and antenna – in addition to the foot as a milled part. And although the 350 mm tall workpiece is only a midget in comparison to its big brother, its production nevertheless required more than a little skill and ability. For those who would like to have a go at making their own TV tower, we describe below what must be taken into account in the process.

Programming skill and ability are required

The foot forms the base of the tower and is produced on a milling machine in two clampings from a round aluminum section with a diameter of 120 mm. The underside is produced in the first clamping. To do this, the blank is clamped in a three-jaw chuck so that the battery compartment and the holder for the microswitch can then be created using the face milling and pocket milling cycles of Sinumerik. When producing the upper side in the second clamping, the programmer introduces three threaded holes with the help of the drilling cycles and the circle position pattern. This is where the programmer's skills are really needed, because in this program, R parameters are used for the specification of speeds and feed rates. R parameters are predefined user variables that can be assigned numerical values. They are defined in the program header, with the



The replica of the Berlin TV tower required all the turning expertise of the Siemens Professional Education trainees



Proud prizewinners: the trainees of Siemens Professional Education Berlin with Joachim Zoll, head of the Machine Tools Business Segment

How to reproduce the TV tower is explained in detail on the CNC4you portal:
siemens.com/cnc4you
 (—> CNC workpieces)
 or sie.ag/vXmoxN

roughing speed and feed rate of the face mill at $R8=400$ and $R6=300$, for example. $S=R8$ and $F=R6$ are programmed there for the tool call-up so that the NC program can be adjusted very quickly to modified values.

The outside contour is created with the help of the internal contour editor and is roughed in several passes using standard G-code start-up and run-down strategies (for example, G247 for start-up in a quadrant) and is then finish-machined. Subsequently, the table is swiveled by $X=13^\circ$ using the Cycle800 swiveling plane cycle so that the chamfers on the foot of the workpiece can be milled. The inclined surface can also be engraved as desired with the aid of the Cycle60 engraving cycle.

Tailstock center enables precise production

When it comes to turning the tower and antenna, the length of the tower and its smaller diameter present a huge challenge, which is why it is necessary to work with a tailstock center. Depending on the type of turning machine, the tailstock center is programmed differently, and it is therefore imperative to adapt these sections of the program to the lathe in question. The blank is positioned at the beginning of the program for both the tower and the antenna. To do this, the "Stop ANS" tool is inserted and positioned and the blank pulled out up to this stop. The tailstock is then positioned on the tower and the contour previously created in the contour editor with the help of the Cycle95 stock removal cycle is roughed and finish-machined. For the antenna, one main program and three subroutines are used for the contour, where each subroutine describes one section of the contour in each case. The workpiece is pulled out up to the stop in three steps and the relevant contour section is machined. Small infeed depths are used so that the workpiece is not pushed away in the process.

Dome lights up due to built-in LED

The dome consists of a spherical center part and two recesses with grooves. An LED with a synthetic fiber-optic cable as the light guide makes them light up. First, the light openings are drilled using the Cycle83 deep-hole drilling cycle. To do this, the spindle is turned in stages by 30° .

MCALL is used to call up the cycle as the position pattern each time so that the drilling process does not need to be reprogrammed for each step. After this the fiber-optic cables are bonded in. Turning is then carried out when the adhesive has cured. The stock removal cycle is used to produce the contour, and the Cycle93 groove cycle is used for the grooves. The LED is supplied with power via a battery with a microswitch in the foot of the tower. Finally, all the individual parts just need to be assembled and the replica is complete. All the programs for producing the mini TV tower are created in G-code or ShopMill and ShopTurn 6.4.

Commitment of trainees was rewarded

The commitment of the Berlin-based trainees paid off. With their workpiece they not only won an in-house competition but could also look forward to a cash prize and free tickets to a national football league game of their choice. <



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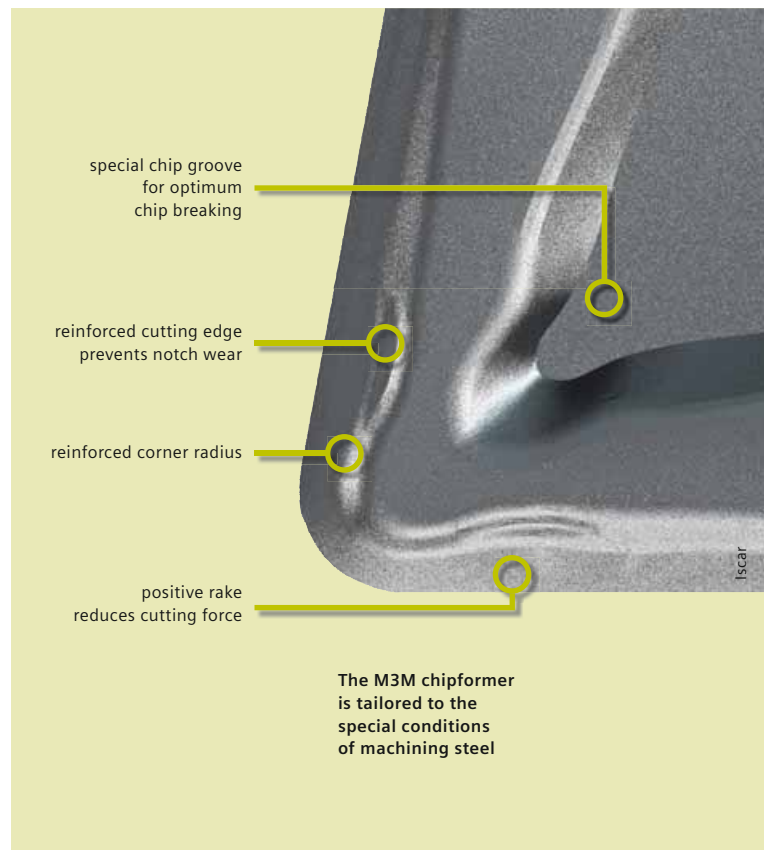
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New solutions for turning stainless steel

More efficient material processing

Stainless steel can now be machined effortlessly, thanks to new cutting-material grades and chipformers – ensuring both a significant increase in productivity and greater process reliability.



▶ The machining of stainless steel poses major problems for many manufacturing companies. The diverse reasons for these problems range from severe batch fluctuations in the raw material and altered properties to complicated component geometries that represent a challenge for the metal-cutting tools used. Iscar Germany GmbH, a leading manufacturer of metal-cutting tools, has now developed new cutting-material grades and chipformers for the machining of these steel grades.

Higher cutting parameters possible

The SUMOTEC cutting-material grade IC6025 (M20-M35) was brought onto the market specifically for the machining of stainless steel and is distinguished by optimum toughness with maximum wear resistance. The SUMOTEC postcoating treatment significantly reduces friction in the chipforming process. The advantage for the user is

obvious: it means the ability to use considerably higher cutting parameters. To further reinforce the effect, Iscar has also developed the M3M chipformer configuration – adapted to the special requirements involved in machining steel. It has a chip groove for optimum chip breaking, a reinforced cutting edge, and a positive rake angle. Due to the adapted macro geometry, the chipformer enables reduced cutting forces and in turn improves productivity thanks to higher cutting values.

The tool manufacturer also has the appropriate solution available for cut-off machining of stainless steel: the second new cutting-material grade, IC5400, also features optimum toughness with maximum wear resistance. And in this case too, the SUMOTEC postcoating treatment ensures that friction is significantly reduced, which again enables the use of considerably higher cutting parameters. The corresponding chipformer for cut-off

machining of stainless steel is designated LF. It has a positive rake angle, a recess in the main cutting edge, and a chipformer groove for constriction of the chip. This chipformer also has the adapted macro geometry and the advantages associated with it.

Improved safety and higher productivity

The two new cutting material grades from Iscar form two perfect pairs when combined with the appropriate chipformers. In addition to excellent process reliability, the user benefits from a significant increase in productivity when machining stainless steel. <



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iscar.com



Sinumerik 808D explained step-by-step

▶ It is very easy and straightforward to learn how to operate and program Sinumerik 808D by referring to video tutorials. The English-language tutorials show the entire manufacturing process of a workpiece based on Sinumerik 808D, using specific partial sequences so that the steps are reproducible.



You can watch the tutorials at siemens.com/cnc4you or by going directly to sie.ag/11mUaYf (milling) sie.ag/12b8lil (turning)

CNC4you portal now also available in Turkish

▶ Turkey has recently been given its own web page in the CNC4you portal. Turkish-speaking users can now go to this page to call up information in their native language, including videos and country-specific event dates.



Visit our Turkish web page at: siemens.com/tr/cnc4you



CNC4you magazine in Italian

▶ An Italian version of the CNC4you magazine was published in March for the MECSPE trade fair for special mechanics in Parma.



Download the pdf at siemens.it/cnc4you —> [Rivista CNC4you](#)

Events

Below is a summary of upcoming events addressing turning and milling with Sinumerik. These and other events can be found at siemens.com/cnc4you —> Events.

Event	Location	Date
WorldSkills	Leipzig	July 2–7, 2013
EMO	Hannover	September 16–21, 2013

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SinuTrain® is a control-identical training software for the PC. It facilitates user-friendly operation and CNC programming close to that in reality — based upon the new SINUMERIK® Operate user interface. SinuTrain is suitable for all of the usual programming methods, is available in

several languages and can be optimally adapted to the axis configurations of various machines. Therefore, ensuring a maximum degree of compatibility between CNC programs generated offline and machines in the production environment.

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