

CNC4you

The Shopfloor Magazine

Volume 3, September 2009

SIEMENS

Sinumerik 828D — the new CNC for
the shopfloor

Powerhouse in the Compact Class

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Compact,
Powerful, Simple



Passing the
Shopfloor Test



Small Parts – Big
Impact

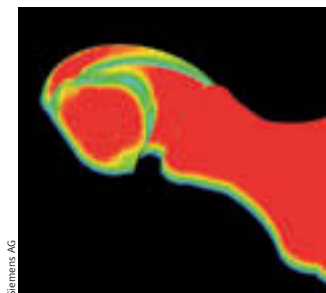
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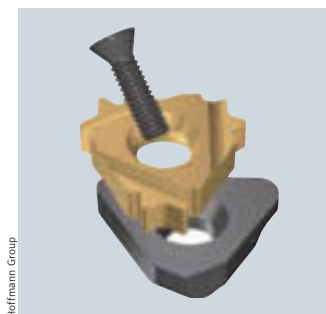
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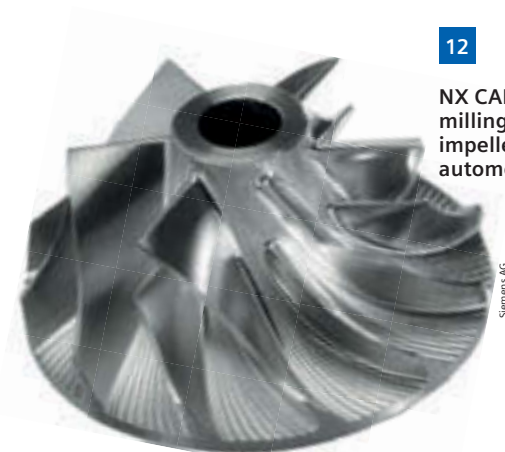
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Dear reader,



Today more than ever, we are all required to guarantee **top product quality combined with the shortest possible machining times**. A number of innovations reflecting this trend have appeared on the market since the last EMO.

Siemens has developed the new **Sinumerik 828D** CNC for the **mid-range market**, which accounts for the majority of CNC machine tool users around the world. In terms of performance, the 828D is situated somewhere between the Sinumerik 802D sl and the Sinumerik 840D sl CNC and it has been especially designed for the specific requirements of shopfloor **turning and milling machines**. Turn to page 4 for a detailed report on the benefits the Sinumerik 828D controller has to offer for end-customers.

For the shopfloor, we offer user-friendly and powerful hardware, along with **unique user support**. Sinumerik user support provides assistance throughout the value-adding chain, from the machine manufacturer and the dealer through to the end customer.

Be inspired by our **innovations for the shopfloor**.

A handwritten signature in black ink that reads "Armin Bärnklaus". The signature is fluid and cursive, with a long horizontal stroke at the end.

Armin Bärnklaus,
Senior Manager
Head of User Market Development



Sinumerik 828D — the new CNC for the shopfloor

Powerhouse in the Compact Class

The new Sinumerik 828D is tailored to the requirements of sophisticated machine tools typically used in a modern shopfloor. Key criteria during development of the controller included compact dimensions, maximum performance, extremely simple operation and easy servicing and maintenance.



Compact, powerful, simple. These three words describe the expectations of CNCs used in shopfloor production. The Sinumerik 828D was developed with these factors in mind and specifically for this area. The focus of applications for the new CNC are vertical milling centers that also can be equipped with machine units for machining cylindrical work-

pieces and inclined workpiece surfaces. It is also suitable for inclined-bed turning machines with a tool turret. One of the toughest challenges for the developers of the Sinumerik 828D was the limited amount of installation space available in very compact machine tools. Despite the relatively small dimensions of the control panels, the controller also needed to be extremely user-friendly.

The result is a very compact solution with a 10.4" TFT color display and a full QWERTY CNC keyboard. For maximum robustness, the control panels are made of tough diecast magnesium and the short-stroke keys on the CNC keyboard are covered with embossed protective film to ensure they are splash-proof.

To make the new CNC low-maintenance, wearing parts such as fans or hard

drives were eliminated. User data is reliably buffered by integrated state-of-the-art NV RAM memory modules – no need for an expensive buffer battery.

Maximum productivity and precision

Productivity and machining precision remain the key requirements for any CNC. For maximum hardware performance and system functionality, the Sinumerik 828D – just like the high-end Sinumerik 840Dsl – comes fully equipped with 80-bit NANO^{fp} precision, which allows machine concepts with a precision of up to 0.1 micrometers.

Milling free-formed surfaces is, however, the ultimate stress test for any CNC. The controller not only has to process an extremely high number of CNC commands in the shortest possible time but must also ensure the workpiece is moved on a path with a steady curvature to achieve the smoothest possible surface finish.

The Sinumerik 828D masters this task effortlessly thanks to Advanced Surface technology. These completely innovative algorithms guarantee virtually identical speed and contour profiles during reverse line-by-line freeform milling and achieve extremely smooth workpiece surfaces. This means that there is no need for costly manual finishing of mold-making workpieces.

CNC programming for all applications

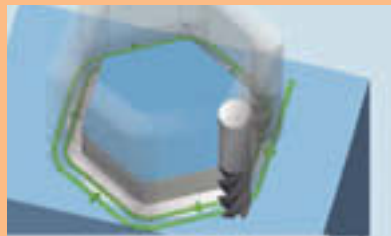
The Sinumerik 828D is equipped with various CNC programming methods to meet the demands of the international machine tool market. The controller is equipped with fully graphical ShopMill and ShopTurn workstep programming with unique workstep inter-linking and dynamic line graphics for manufacturing one-off parts or small series. Large workpiece batches benefit from the Sinumerik CNC programming language offering the high degree of flexibility required by sectors such as the automotive industry and its suppliers. The programGuide function combines the flexibility of the Sinumerik CNC programming language with the convenience of machining cycles to provide users with a huge range of easily accessible technological options.

Technology in detail

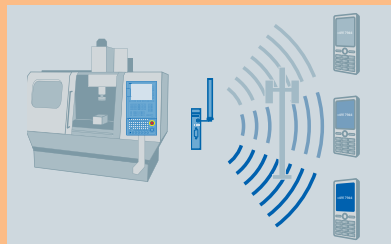
The new Sinumerik 828D provides users with tailored technology cycles for every programming type, along with convenient operating functions and innovative data technology.



Turning cycles enable users to machine inner contours as well as standard geometries such as shoulders or thread undercuts. These cycles are also fully available on the counter spindle, including the drilling and milling cycles.



Animated Elements provide users with handy and intuitive support during input. Whether helical plunging into a milled pocket or clearing swarf in deep holes, the Animated Elements function provides the user with a completely accurate view of the process.



The Easy Message function keeps users up to date with the processing status of their machines by sending a text message to their mobile phones. Just insert any SIM card, create a user profile with the mobile phone number and select the information you require.



The CNC memory on the Sinumerik 828D is easily expandable via a front-side Compact (CF) card, for instance for mold-making programs. A front-side USB interface is also available for transferring data.

Perfect for milling and turning

The Sinumerik 828D includes an extensive technological package. This includes machining cycles for drill thread milling, trochoidal milling of hard materials and milling freely definable pocket geometries with up to 12 isolated contours. Material is swiftly removed through the use of large milling tools. The system

software detects filigree corners automatically so that the residual material can be removed with smaller, more suitable tools. This saves valuable time during the machining process. Users of turning machines with powered tools also benefit from the full scope of drilling and milling cycles, including position patterns, on the end face and lateral >>



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“The new Sinumerik 828D offers many innovative features such as Advanced Surface. These features enable the end-user to produce smoother surfaces with a significantly reduced machining time. The controller can be integrated into virtually any machine thanks to its compact dimensions — with no loss of convenience or performance.”

*Mario Hiroshi Assada,
head of Romi Application Development*

>> surfaces of turned workpieces thanks to intelligent kinematic transformation. In addition, users of milling machines with swivel functions benefit from a powerful swivel cycle capable of transforming all drilling and milling work in any swiveled workpiece level.

The technological edge of the Sinumerik 828D also shows during turning processes. The controller features a contour turning cycle to enable oscillating tool delivery and prevent the typical

plate grooves caused by hard material surfaces. According to leading tool manufacturers, this function can extend tool life by up to 30%. Free segmentation of machining is the absolute highlight of the contour cycle. This enables programmers to machine workpieces step-by-step using the best tools for the job. Residual material is automatically detected to track the unprocessed blank. Steep residual contours can then be removed via contour burring or plunge turning. The Sinumerik 828D has a range of measurement cycles to ensure consistent accuracy of the workpieces during the machining phase. Measurement results are logged automatically in a report file to ensure that proof of workpiece precision can be provided at any time.

Ground-breaking technology

State-of-the-art PC operation and communication technology form a further key element of the Sinumerik 828D. Context-based online help is one of the highlights in this area. Information accompanied by detailed graphics is available at the touch of a button, regardless of which menu the operator is currently using. Most parameters entered into a CNC controller during the course of the day are for programming machine movement. The Animated Elements function (see page 5) uses short moving image sequences to visualize input parameters so that the difference between swarf milling and deburring during deep-hole

drilling or synchronous and conventional milling in a circular pocket is obvious at first glance. This not only simplifies CNC programming, but also increases process reliability, for instance when touching workpiece zero points.

Users do not require additional data transfer software as data can be transferred conveniently via Compact Flash (CF) card or USB stick — in the same file format as on a PC. The Ethernet networking capabilities of the Sinumerik 828D also represent the latest IT developments. No optional CNC hardware or additional software on data servers is required to connect the system to a factory network. If a factory network is too extensive to implement, a portable PC can be connected directly to the front interface on the Sinumerik 828D via a network cable without any adjustment of network settings needed.

With Easy Message, the Sinumerik controller can send a text message to a mobile phone that gives information on the operational status of the machine. This can significantly increase machine availability for very little expense. For instance, the machine operator can set the system to send a text message when the workpiece counter reaches a certain value to let the user know that new material needs to be loaded into the machine's rod feed system. A hardware package in the form of a GSM modem and a transmission antenna is all that is needed to use Easy Message functionality. <

Support for machine tool dealers and customers

All-Round Support and Service

Medium-sized businesses, the target customer base of the compact class Sinumerik 828D CNC, often purchase their machines from local machine tool dealerships. Siemens supports these dealers by managing the complete value-added chain for CNC machines.

> Dealers are the link between machine manufacturers and end-users. To support this important customer group, Siemens offers comprehensive dealer support. Expert consultants are available all over the world to provide swift on-site assistance. In addition, Siemens maintains a network with other technology providers to pool skills and expand technical expertise with the ultimate goal of increasing the competitiveness of dealers.

Various options for acquiring expertise

Dealers can also draw on expert advice available from a global network of technology centers (TCs). These centers are equipped with state-of-the-art turning and milling machines and are staffed by machining experts who are happy to offer support and advice. Sales staff, application and service technicians, and CNC machine tool operators can also acquire machining-related skills at Siemens training centers and local training institutes. Siemens provides training modules for this purpose.

Financing partner

And last but not least, Siemens Financial Service (SFS) represents a reliable and competent partner when it comes to financing new purchases. Based on a leasing contract, the dealer receives the purchase amount from SFS and the user then pays the leasing installments to the financial service provider. <



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Dealer support services in detail

For customers

- > Second commissioning support on the customer's premises
- > Fast assistance to rectify machine faults
- > Spare parts service

For employees

- > Sales training
- > Technical training for service personnel
- > CNC training and basic Sinumerik training

For businesses

- > Support for in-house exhibitions, workshops and customer trade shows (advertising material, lectures, etc.)
- > Specific sales support material and demonstration material for PCs



Technology-oriented packages for milling

Competence in Milling

For industries requiring perfect surface quality, precision, quality and speed, Siemens has developed the Sinumerik MDynamics, has developed milling packages for three- and five-axis milling. These packages combine powerful CNC hardware, intelligent CNC functions and a unique CAD-CAM-CNC process chain.

> High-Speed Cutting (HSC) is becoming increasingly important in machining. It not only improves productivity, but also produces excellent surface quality. The main areas of application for HSC

machining technology are found wherever a high processing performance and surface quality are required, i.e. particularly in tool- and mold-making. Whether it is the automotive industry, consumer goods or medical technology, molds have

to be manufactured with even greater complexity, sophistication and accuracy, and in the shortest possible time. In addition to the machine properties, control technology plays a particularly important role in HSC machining. With

Sinumerik MDynamics

integrated	Sinumerik 828D	Sinumerik 840D sl	
	Sinumerik MDynamics for three-axis milling	Sinumerik MDynamics for three-axis milling	Sinumerik MDynamics for five-axis milling
	Advanced Surface	Advanced Surface	Advanced Surface
	256MB HMI user memory on Compact Flash (CF) card	256MB HMI user memory on Compact Flash (CF) card	256MB HMI user memory on Compact Flash (CF) card
		Spline interpolation	Spline interpolation
		Transmit and lateral area transformation	Transmit and lateral area transformation
		Automatic measuring cycles	Automatic measuring cycles
		3D simulation	3D simulation
		ShopMill workstep programming	ShopMill workstep programming
		Residual material identification	Residual material identification
			Five-axis processing package
			3D milling radius correction
			Kinematic measuring
optional			
	Spline interpolation	Volumetric Compensation (VCS)	Volumetric Compensation (VCS)
	Transmit and lateral area transformation	Kinematics measurement	
	Automatic measuring cycles		
	3D simulation		
	ShopMill workstep programming		
	Residual material identification		
	Enhanced operation functions		

Sinumerik MDynamics, technological packages consisting of CNC hardware, intelligent CNC functions and CAD/CAM solutions are now available for three- and five-axis milling machines for Sinumerik control systems.

Intelligent movement

At the heart of the technological packages is the new, intelligent motion control package 'Advanced Surface' which ensures significantly improved surface quality. With HSC machining of complex parts and free-formed surfaces, the new movement guidance system from Sinumerik enables complete machining in a single operation — with the best possible surface quality, maximum precision and highest processing speeds.

Other innovative functions

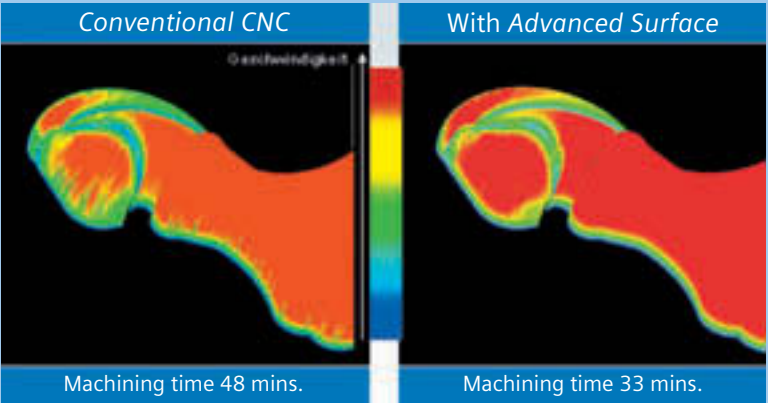
In addition to the new, optimized motion control system, Sinumerik MDynamics offers other innovative functions such as the new tool and program management system and innovative measuring functions in JOG for simple machine setup. In addition, there are new programming functions such as the ShopMill workstep programming and programGuide, which makes programming workpieces even simpler. There are also innovative technology cycles, automatic measuring cycles, 3D simulation for support in programming and quotation costing, and efficient HSC functions. Of particular note in this respect are the Cycle832 high-speed setting, the cycle for trochoidal or plunge milling, and the Cycle800 swivel cycle.

Cycle832 enables the machining strategy to be adapted even more quickly, while the new Cycle800 swivel cycle enables simple and quick handling of complex workpieces in a clamp in both JOG and automatic mode for complete machining. And finally, the display of machining time left and the visualization of large mold making programs offer support to the operator during machining. The package is completed by simple data and program handling with additional CF card memory, spline interpolation and workpiece simulation for multi-lateral processing. The five-axis package is supplemented by the Cycle996 kinematic measurement cycle. 3D radius compensation and enhanced five-axis

Technology in detail

Perfect surfaces with Advanced Surface:

- > optimized "look ahead" function for greater accuracy and speed
- > optimized speed management for maximum processing speed
- > optimized online compressor in the control system that guarantees both precise contour accuracy and optimized behavior for "mixed" CNC programs with G01 and G02/G03 units
- > new, intelligent jerk limitation for gentle acceleration/braking of the axes to protect the mechanics of the machine
- > a torque pre-control system fitted to the new motion control system that responds according to acceleration and ensures high processing quality in critical production situations



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Through optimized speed management, Advanced Surface offers an optimal workpiece surface at the highest processing speed

functionalities, including the integrated kinematic Transformation Tool Center Point Programming TRAORI, are included in the milling package.

For both machine types, i.e. the three- and five-axis machines, Sinumerik MDynamics also offers functions such as the optional Volumetric Compensation System (VCS) with which, for the first time ever, all geometric errors produced by a machine tool can be compensated quickly and reliably via the control system alone. This means that production accuracy can be increased, thereby saving on reworking with machine adjustment.

Integrated user interface included

Sinumerik MDynamics also features the new Sinumerik Operate user interface for all operation and programming. Sinumerik Operate integrates the exist-

ing user interfaces for shopfloor applications, HMI Advanced, ShopMill and ShopTurn into a single, integrated HMI system with configurable functionality. In addition, it offers a familiar Windows-style display, is clearly structured, and is intuitive in terms of operation, thereby guaranteeing absolute user-friendliness. Workstep programming, such as ShopMill or ShopTurn, Sinumerik high-level language with programGuide or ISO code with cycle support: whatever programming type the operator chooses, Sinumerik offers advantages such as short programming, setup and processing times, maximum flexibility and ISO code-compatibility with the new, integrated user interface. <

Sinumerik MDynamics successfully used on five-axis machines

Passing the Shopfloor Test

Spinner has pilot-tested the new Sinumerik 840D sl CNC milling technology package with the innovative Sinumerik Operate user interface on the company's U-series machining centers. Spinner developers and application engineers alike are extremely pleased with the results of the tests, carried out on the company's own shopfloor.

Across-the-board flexibility — from the control system to the machine compartment



Spinner Werkzeugmaschinenfabrik GmbH, based in Sauerlach, Germany, offers its customers a convincing portfolio with a wide range of machine tools that provide excellent value for money. This approach gives the company a competitive edge, even in times of economic downturn, as Axel Spinner, authorized signatory and sales manager, confirms: "With our U-series universal machining centers, which have been on the market since the AMB trade fair in 2008, we are offering five-axis machines at the price of three-axis machines. This investment pays for our customers even in difficult economic times." As well as being reasonably priced, these machines offer high-quality workmanship and a suite of technical features, including 32 tools as standard and a double arm for rapid tool changeover; linear axes on roller bearing guides; an innovative guide on both swivel axes; play-free high-precision bearings and centrally installed direct measuring systems. In addition to all this, highly dynamic drives from Siemens allow quick and precise simultaneous five-axis-machining.

Tried-and-tested hardware and software

High quality and reliability are important factors for Spinner, which is why the company opted for the Sinumerik 840D sl three years ago. It now has over 1,000 machines based upon this CNC. Spinner was also one of the first machine tool manufacturers to actively use the new version 2.6 Sinumerik technology packages for three- and five-axis milling machines, known as Sinumerik MDynamics, on a five-axis U-620 and a U-1520. Dipl.-Ing. Helmut Maier, head of



Bert Andrä tests the new 2.6 version of the Sinumerik 840D sl software with new user interface

Electrical Design, and his colleague Bert Andrä, head of Application Engineering and Production, were pleasantly surprised at how well the tests in April of this year went: "All the important aspects worked straight away," Andrä explains.

As intuitive as a PC

Among the many features improving milling capability are the new Sinumerik Operate user interface and Advanced Surface motion control system, which reduces the machining times required to achieve the high levels of surface quality required. Sinumerik Operate combines two previously distinct user interfaces, one for the Embedded System on Linux and the other for the Advanced System on Windows, creating a single user interface with additional functionality. This means that users will only require one user interface in the future. In addition, the new menu navigation now resembles that of a normal PC much more closely; however, the basic structure has not been completely redesigned and is based on ShopMill. Bert Andrä can see the obvious benefits: "As nearly all machine operators are technically-minded and have a PC at home, the new integrated user interface will be more intuitive to use than before."

Another new feature of version 2.6 that was conceived and implemented during the pilot phase acts as a time-saver, too: the control system now contains an autonomous simulation area, so the machine is able to simulate new components in their entirety while machining a different workpiece. This ability to perform two tasks in parallel is of particular advantage when working with complex workpieces because individual cycles can be tested step-by-step, thus eliminating collisions in advance.

Productive collaboration

The success of the pilot test would have been unthinkable had it not been for the close cooperation between Spinner and Siemens. Thanks to coordinated efforts on the part of both companies on issues such as operation, programming, commissioning and milling results, the milling technology package includes everything needed for user-friendly operation. Helmut Maier highlights the importance of the Technology and Application Center (TAC) in this regard. "The Siemens employees working there have practical experience of machining equipment so our requests are dealt with more effectively," emphasizes the Electrical Design manager.

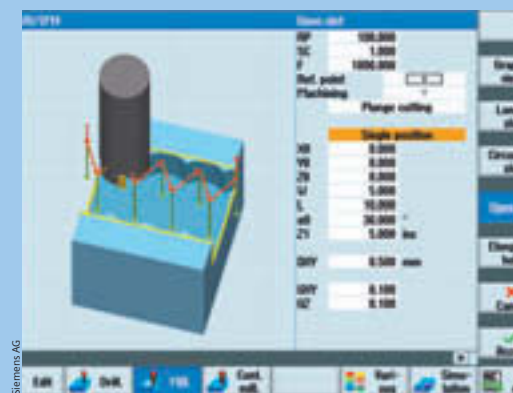
Technology in detail

Simple to operate and program: the Sinumerik Operate user interface

The new Sinumerik Operate integrated user interface is compatible with almost all control systems and enables the user to manage all tool data efficiently. It also displays all active zero offsets clearly and saves time thanks to convenient program administration. Meanwhile, a variety of measuring functions simplify the machine setup process. Programming takes place in ShopMill/ShopTurn (graphically supported interface) or programGuide (G-code with cycle support) and the program editor and an integrated operating and programming interface simplify the process. The Animated Elements function generates a simulated preview of each machining step before it is performed.



Sinumerik Operate offers advanced setup functions such as swivel in JOG mode ...



... and innovative technologies like plunging for machining with low cutting pressure

High-speed cutting with Sinumerik 840D sl and NX CAM

Small Parts – Big Impact

Due to their delicate structure, the impellers used in turbo chargers place high demands on milling processes, as shown in the following example. Perfect interplay between a highly dynamic five-axis machine, the CNC Sinumerik 840D sl and a high-performance CAD/CAM program guarantees excellent results.

> In automotive engines, turbo chargers improve overall efficiency as the compressed air allows the engine to deliver increased performance. Put more simply, the recovered exhaust-gas energy drives an impeller, which in turn powers a centrifugal compressor via a fixed shaft. The compressed air is then fed into the engine. The cold and warm air sections of the turbo charger each contain one impeller. The rotor on the cold-air side is made from high-quality aluminum alloy, while heat-resistant nickel-iron alloy is used on the warm-air side.

High-speed cycle

The finish-machining of the impeller is performed by means of hobbing. This requires extremely high contour accuracy and machining speeds, which in

turn necessitates using a powerful CAD/CAM system such as NX CAM or Open Mind's hyperMill with the Sinumerik 840D sl. When executing the CAM programs, the control system must deliver excellent surface quality with micrometer precision at feed rates of up to 10 meters per minute. For this reason, Sinumerik 840D sl includes Cycle832, which activates all required mold-making functions. The Compcad function of the 840D sl is selected in this cycle to enable higher speeds. This function activates the spline compressor (see box "Technology in detail").

Optimization through simulation

After program creation, the simulation function can be used to check the accuracy of the specified parameters. For this

purpose, NX CAM provides information on collision monitoring, milling paths, feed movements and much more. To optimize empty runs, it is possible to adjust the milling strategy in the CAM system. NX CAM generates a realistic machining simulation in the virtual NC kernel (VNCK). The post-processor converts the data into NC programs, which can then be passed to the control system for processing via a network or USB stick.

A perfect part in two-and-a-half minutes

To create the impeller, a pre-turned blank with a diameter of 48 millimeters and a height of 25 millimeters was affixed to a highly dynamic, five-axis milling machine (e.g., a DMG HSC 20 linear). Since a high run-out accuracy is required



of the rotor within the turbo charger, this is first measured using a 3D measuring probe and Cycle977. This determines the exact position of the workpiece in the machine. To optimize the production process, a milling/turning machine can also be used to create the impeller from an unprocessed blank. This complete machining operation can be performed in full within NX CAM. Parts with a perfect surface not only place high demands on the programming, but also on the machine itself. To ensure high dynamics and utmost precision, the DMG HSC 20 employs linear motors on the X, Y and Z axes as well as torque drives on the rotational axes. The spindle rotates at speeds of up to 42,000 RPM; this is an important factor when working with cutting speeds of 500 to 600 meters per minute. In addition, the southern-German company Emuge provides a tool range that is specifically designed for the production of impellers. However, even the very best individual components still require this perfect interplay between the control system, CAD/CAM system, tools and machine. Only then is it possible to produce a perfect impeller in two-and-a-half minutes. >>

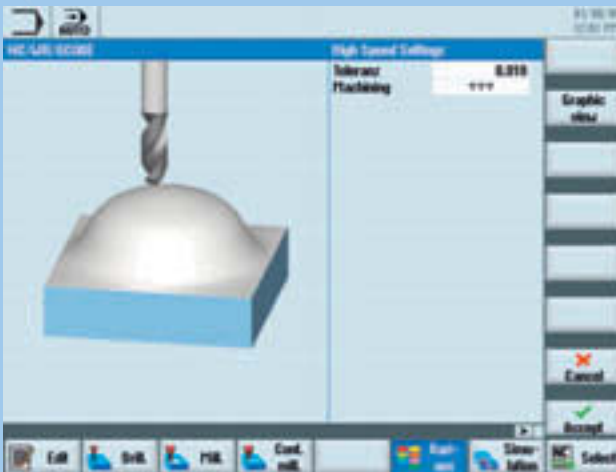


Cutting-edge Sinumerik technology enables perfect milling of complex parts for the automotive industry



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Technology in detail



In Cycle832, the high-speed setting cycle for the 840D sl, only two values are required: tolerance and machining type. These can be set in the control system itself.

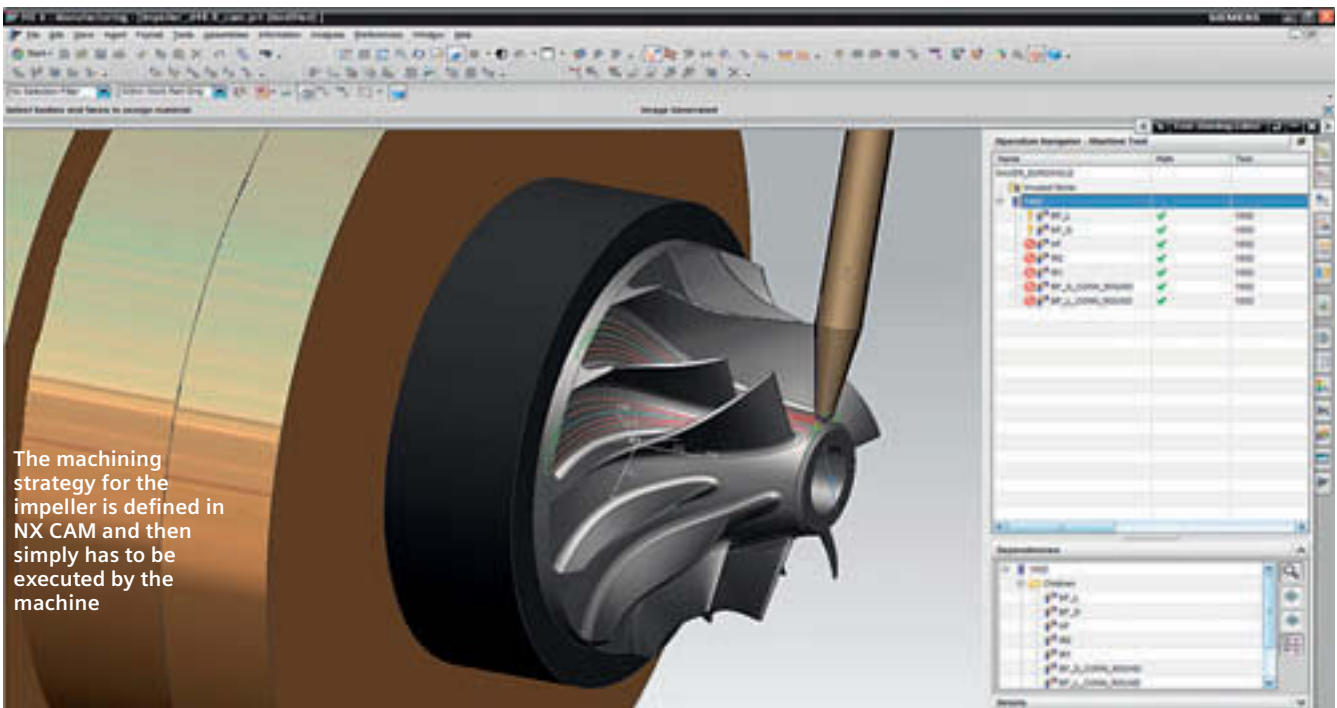


Cycle832 guarantees maximum speeds, utmost precision and perfect surface quality without the need for reworking

High-speed cycle for perfect impellers

Following the creation of the impeller mold in the CAD program, the data is transferred to the CAM system. Cycle832, the high-speed setting cycle integrated in Sinumerik, is then used to implement suitable mold-making functions for the machining process. The first step is to select the compressor function Compcad. Once this is selected, the system no longer passes through every point in the NC program, but instead calculates a spline from several G1, G2 and G3 records, which can then be processed directly by the control system. This results in a significantly more homogeneous surface. The next step is to define the G-code groups for rough machining, pre-finishing and smoothing in Cycle832 and specify the tolerance. The latter value is used for the internal calculation of the splines as a tunnel tolerance, which the machine must not deviate from. This ensures the maximum possible, consistent speed along the contour. The value is taken from the CAM system and depends on the accuracy programmed in this system. The rule is that the tolerance in the CAD/CAM system must be transferred to the control on a "one-to-one" basis.

<



The machining strategy for the impeller is defined in NX CAM and then simply has to be executed by the machine

For more information >

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Innovative GARANT thread turntable saves costs

Single-Sided is Out

The new GARANT cutting insert from the Hoffmann Group facilitates thread cutting while Sinumerik offers users a simple way to program thread cycles.



Hoffmann Group



There are several methods for creating threads, one of which is thread cutting, also known as chasing. The process can be carried out on both manual and CNC turning machines. In CNC technology, programming cycles facilitate production and considerably boost productivity.

Impressive innovation

The Hoffmann Group, a global specialty provider of quality tools, has recently introduced a new thread cutting insert to its range. The innovative GARANT thread turntable has six cutters rather than the usual three. This offers cost-savings of 25% compared to the previous standard thread plates. The GARANT V6 cutting insert range is available as a 60° full and partial profile for metric external and internal threads. When com-

bined with the matching base plate, the thread turntables can be fitted to any standard clamp tool holder. An added benefit is the increased economic efficiency thanks to the low costs for each cutter.

Fast programming

Threads are quick and easy to program with the Sinumerik thread cycle. The thread cycle is available in both G-Code (programGuide) and in ShopTurn, and is absolutely identical in each programming environments. Tables, for example for metric and inch threads, are defined in the cycle. The thread diameter and depth are automatically calculated once the required thread size has been selected. The cycle can be used to machine not just longitudinal threads, but also tapered threads and flat threads.



Technology in detail

Working with the Sinumerik thread cycle

Feeding on one flank only is recommended for a gradient of less than 1 mm, fewer than 24 threads/inch, or if vibrations occur during cutting. In addition, the feed angle (parameter αP) should be around 1° to 5° less than the flank angle of the thread. With very large gradients and long-chipping materials, it is advisable to apply the feed to alternating flanks.

When machining items with multiple threads, the gradient in the cycle must be adapted to the number of threads.

Example for a metric thread:

M30x1 with 4 threads, gradient $1 \times 4 = 4$

The value 4 must be entered for parameter P at the top of the input screen

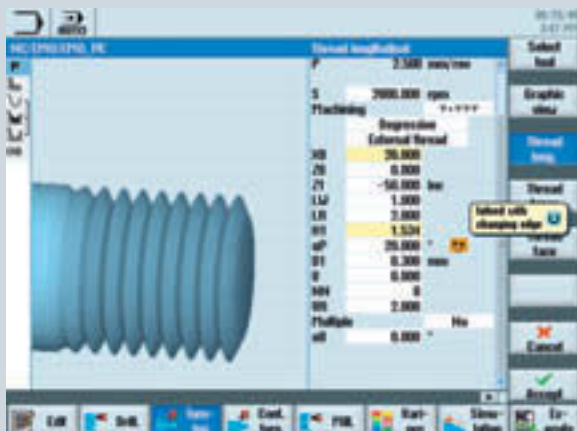
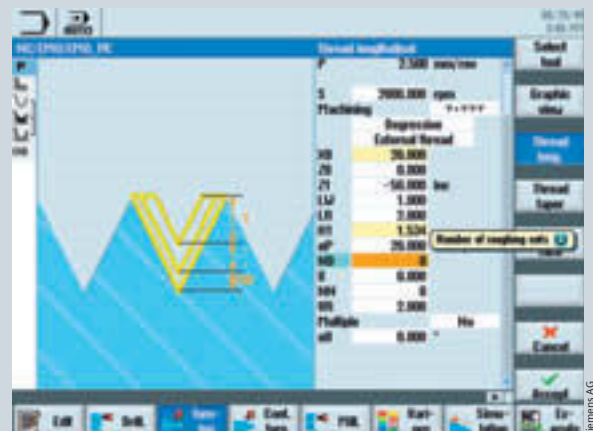


Table selection: Users can choose between metric, Whitworth BSW, Whitworth BSP and UNC



The ND parameter will specify the number of roughing steps or the first infeed

Freelance trainer certificate for
Peter Schweyer

Certified Experience

Peter Schweyer has been working as a freelance trainer and milling specialist for 10 years. He runs three- and five-axis training sessions using the ShopMill graphical user interface around the world. With his years of experience, it was a logical step for him to form a partnership with Siemens, which is confirmed by his certification as a freelance trainer. We spoke to Peter Schweyer about the partnership.



Peter Schweyer gained his freelance trainer certification for ShopTurn at the Technical and Application Center (TAC), Erlangen, Germany



Mr. Schweyer, you are certified as a Siemens trainer for ShopMill and Sinumerik 802D sl. You recently also became a certified ShopTurn trainer.

Why did you take this step?

Schweyer: I used to work on turning machines. ShopMill and ShopTurn, the user interfaces for milling and turning, have the same layout and same operating principles, so it was a simple step for me to become a ShopTurn trainer for turning, as well.

Did you already know the milling cycles in ShopTurn?

Schweyer: Yes, they're exactly the same as ShopMill. This reflects a trend we are seeing in machining: turning and milling on a single machine is standard practice today.

Mr. Schweyer, what are the advantages for you being a freelance certified Siemens trainer?

Schweyer: Well, the advantage for me personally is that I always get excellent support from the application engineers in the Technology and Application

Center in Erlangen (TAC). They are specialists in all fields of Siemens turning and milling PLCs. The TAC team provides straightforward and expert answers to my questions and those of my customers at the machine itself. Drawing on this knowledge, I can offer the best possible training to my customers as a Siemens representative.

Where else do you receive support from Siemens?

Schweyer: As a freelance certified trainer, I can download the latest Siemens material at any time via the Internet. The material is tailored individually to my customers, and is always available in both German and English. This ensures that customer training is always of the same consistently high quality. And if my customers are happy, then I am too.

Mr. Schweyer, thank you for the interview.





Student Version of SinuTrain Available

With its training software SinuTrain for Sinumerik, Siemens offers a practical and integrated solution for CNC training — for beginners, retraining and experts alike. The CNC training software behaves just like the real CNC and enables effective acquisition of knowledge on how to program and operate the Sinumerik CNCs, from the very basic to certified qualification. SinuTrain is now available as a student version for apprentices, school and university and students (with ID).

It has the functionality of the full version 6.3 Edition 4, but is valid for only 365 days. It allows the creation and simulation of NC programs in DIN/ISO, ShopMill and ShopTurn that could also be used on actual machines. Users also benefit from all of the software's general features, including six supported languages, online help, documentation, training and programming examples, graphical simulation, print function, and an option to convert contours and position samples (CAD reader).

Training Cooperation in Italy

Close cooperation between colleges and companies is a key factor to ensure that future workers receive good training. Siemens is therefore cooperating with vocational training centers in Italy that are equipped with training machines and Sinumerik controls. Partnerships with machine manufacturers such as DMG have proven particularly beneficial in this program. The colleges receive a complete turning/milling package and the SinuTrain training software with a three-day training course tailored to the machine equipment available. One such example is the cooperation with AFP (Azienda Formazione Professionale), a training center in Verzuolo in Piedmont. Once Siemens had provided 15 licenses for the SinuTrain training software, AFP organized two advanced-level seminars under the guidance of support manager Nicodemo Megna and product developer Dario Topini from Siemens. Training center director Raffaella Gramaglia explains: "As AFP plans to offer more courses with a focus on technology and innovations, it has for some time encouraged cooperation with companies in areas such as NC, metal and automotive engineering. The partnership with Siemens confirms that we are on the right path."



Inauguration of the Istituto Salesiano training center in Milan: the institute uses a DMG machine with Sinumerik 810D and ShopTurn

Turning Machine Equipped with Fire Protection System

A turning machine equipped with a Sinorix al-deco STD fire extinguisher was added in January 2009 to the already extensive range of machine tools available for customer demonstrations at the TAC (Technology and Application Center). An on-screen presentation provides information on machine fires and their impact, along with statistics on previous fires extinguished by Sinorix al-deco STD to demonstrate the benefits of fire protection devices on machine tools.

A real fire can be triggered on the machine to see a "live" demo of the extinguishing process. The extinguishing process is performed with a quantity of CO₂ that was defined specifically for this application to allow a realistic, yet safe extinguishing presentation. The technology boasts the most advanced safety properties currently available on the market thanks to the wattless functionality of the extinguisher and the patented "LIFDES" linear fire sensor from Siemens. Data relevant to safety and functionality are logged online during the operation of the Sinorix al-deco STD fire extinguisher and can be read via an interface. This provides reliable data for potential liability disputes. With the wattless operation of the extinguishing system and the ability to record safety-relevant data, Siemens offers a protection system for machine tools that is globally unique. <



Fire protection on machine tools: a turning machine equipped with a Sinorix al-deco STD fire extinguisher at the TAC

New Manual for Five-Axis Machining



Achieving the best possible workpiece results with five-axis machining calls for more than just intelligent control functions. The entire process chain needs to be harmonized, from CAD design and CAM systems through to CNC production. The new Sinumerik five-axis machining manual covers all of these areas from both the programmers' and the machine operators' point of view. It offers an overview of all important control functions, how to use them to best effect, and the requirements for the CAD/CAM environment. The first chapter explains the basic terminology and requirements of five-axis machining. The chapter on workpiece production deals with the individual links of the process chain and des-

cribes basic Sinumerik control functions such as measuring and setting up tools and the workpiece. The next chapter provides an overview of more significant control functions that should also be taken into consideration with regard to the CAM system's post-processor. The manual then concludes with industry-specific chapters on aerospace, structural components, engine and turbine components and complex free-formed surfaces. A manual on tool- and mold-making with basic information on multi-axis machining is also available. This manual is particularly useful for three-axis machining and also serves as a basis for five-axis machining. You can download the manuals from www.siemens.com/sinumerik. <

Would you like to find out more about Siemens and shopfloor production online?

Visit us at **www.siemens.com/cnc4you**

to find free workpiece downloads, up-to-date technical information about Sinumerik CNC, events, tips and tricks, and even competitions. On this website, you can also subscribe to the magazine for the job shop, CNC4you.

Another TAC Opened in Italy

The CNOS-FAP vocational training center, a Siemens training partner in Italy, opened its new Technology and Application Center (TAC) in Bearzi near Udine on February 20, 2009. About 150 students and 130 guests from 56 companies (including company owners, application engineers, production managers and dealers) attended the inauguration ceremony. Siemens now has access to a second TAC in Italy for technological training

and education. Participants learn how to use Sinumerik CNC in the computer training room using SinuTrain software. Workpieces are programmed using ShopMill/ShopTurn or DIN-ISO. CAD/CAM systems capable of generating NC programs are also available for handling more complex machining tasks. Special training documentation is available for manufacturing turned and milled parts — in Italian, of course. Once the students have simu-

lated an error-free workpiece with SinuTrain, the workpiece is transferred via the network to the machine tools, where it is then machined. Two machining centers with five- and three-axes, along with a turning machine with power tools are available for use, all of which are equipped with Sinumerik 840D. The machine hall was constructed and equipped with the support of partners Renishaw, Delcam, Sandvik, Metris, Sincert and Speroni. <

CAD-CAM Corner at TAC Erlangen, Germany

In the future, the CAD-CAM corner at the TAC (Technology and Application Center) in Erlangen present the complete CAD-CAM-CNC process chain used in cutting applications. The three new CAD-CAM workstations are equipped with programs including NX software from Siemens. In addition to proprietary software, Siemens will present the process chain using CAD-CAM products from TAC partners such as Open Mind, SESCOI, Mastercam and VirtualGibbs. The new CAD-CAM corner mirrors a programming area as can be

found in many companies where NC programs for production are created with the help of CAM systems. The TAC now offers interested users, customers, dealers, trainers and sales employees a comprehensive overview of the process chain, with all interrelationships and influencing factors of the various components. The CAD-CAM corner at the TAC shows how NC programs can be optimized and verified in the virtual world — before the program is installed on the machine and while the machine is still processing another workpiece. <

From blueprint to the finished part: the CAD-CAM corner at the TAC shows the workflow for cutting applications using NX CAM



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