SIEMENS
Ingenuity for life

SINUMERIK

Intelligent solutions for machine tools

usa.siemens.com/cnc

# Increased productivity with SINUMERIK

SINUMERIK delivers the greatest return on CNC

Highly productive automation solutions are demanded for workshops, job shops and large series production—that accompany and support users along the path to digitalization.

SINUMERIK CNC solutions always provide companies, who operate machine tools, with the ideal solution to address their specific requirements—whether for individual parts or mass production—basic or complex workpieces.

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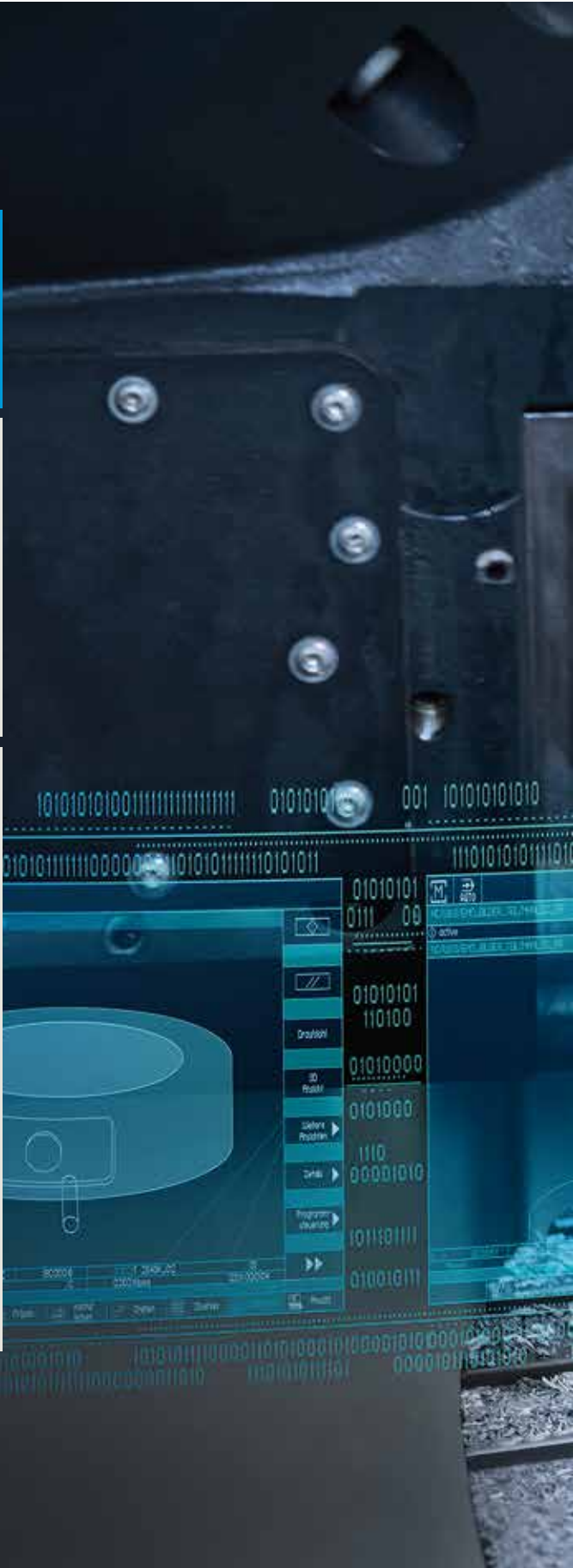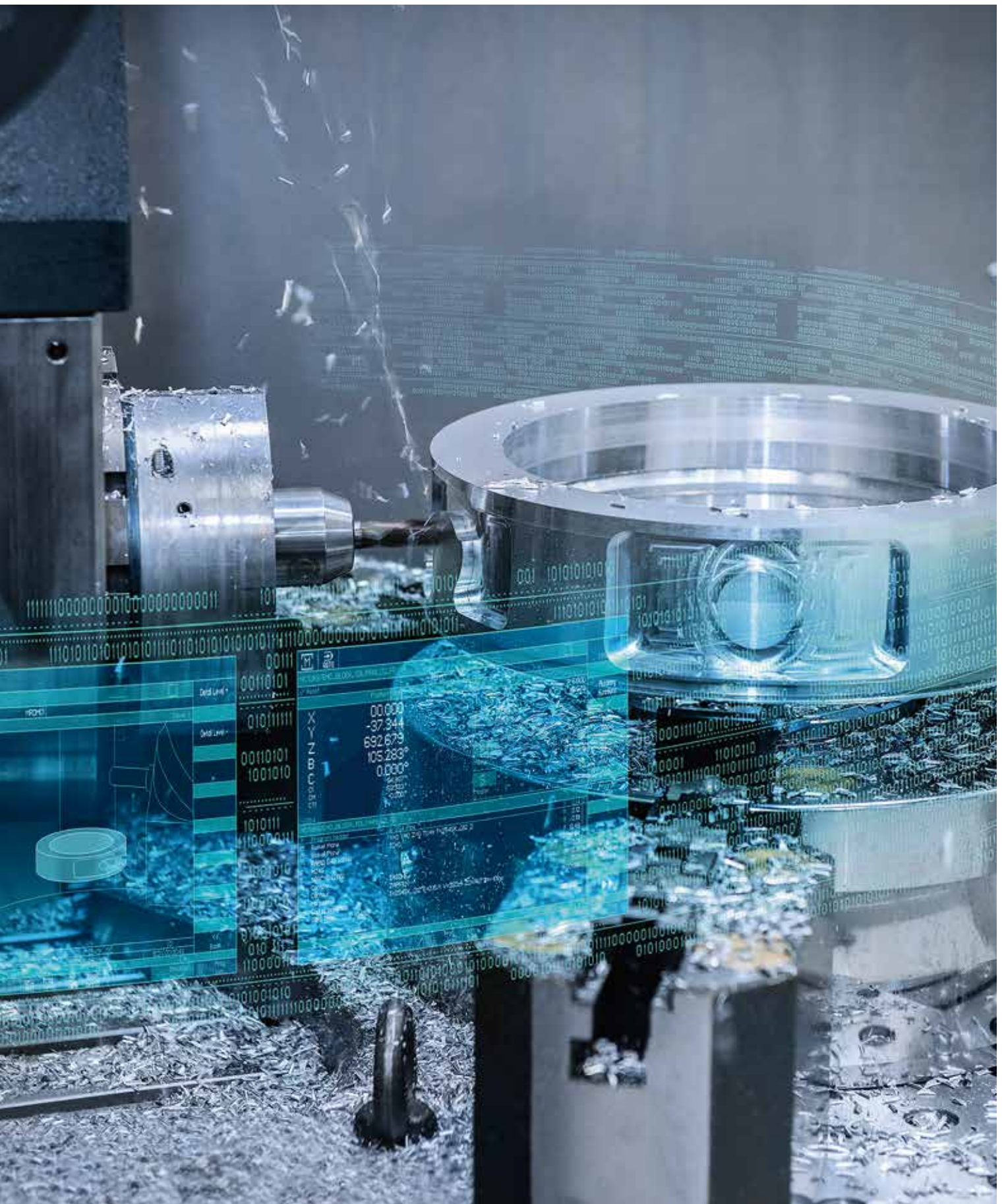
From the idea of a new machine, all the way to ongoing optimization in operation—the machine tool industry demands leading-edge solutions for digitalization and automation.

We offer you an integrated portfolio of automation solutions and technological expertise that support machine tool builders and end-users. See how Siemens can bring you a greater return on your machines, your operations and your people.

Strong partner in the world of machine tools

Leading-edge solutions for digitalization and automation

Benchmark for productivity

SINUMERIK CNC is the first choice when new, revolutionary machine concepts must be implemented — and if the maximum productivity is required for a machine tool application. For more than 60 years, SINUMERIK CNCs have been setting standards in the machine tool industry. Siemens has an innovative, unique and experienced development team to ensure highly-productive machine concepts, based upon SINUMERIK controls, can be implemented now and well into the future.

Constantly striving for quality

We are continually improving our development, production and test processes in order to secure maximum availability of our hardware and software. This includes short response times to address customer requirements, testing to secure a high degree of ruggedness — as well as high-quality software.

Your global partner

With a tightly meshed global network of sales, service and training centers, as well as international production facilities, Siemens is ideally structured to address the needs of the global machine tool market. The know-how of our experts extends far beyond SINUMERIK CNCs — highly qualified machining specialists, located in our global Technology and Application Centers (TACs), have a wealth of application expertise.

SINUMERIK

The CNC portfolio for the global machine tool market

From basic, standard CNC machines through mid-range machine tools, up to modular, high-end machine tools—SINUMERIK controls offer the perfect solution for each and every machine concept. Whether individual parts or mass production, basic or complex workpieces—SINUMERIK delivers the greatest return on your CNC investment.

SINUMERIK 808

The entry-level CNC for basic machines

The SINUMERIK 808D ADVANCED control is a panel-based CNC for the lower performance range. The compact and user-friendly, entry-level solution is used for basic turning and milling applications. Features such as simple operation, commissioning and maintenance, in conjunction with an optimal cost position, represent the perfect basis for equipping basic CNC machines.

SINUMERIK 808

- Panel-based compact CNC
- Up to 5 axes / spindles
- 1 machining channel
- 8.4" color display
- SIMATIC S7-200 PLC

SINAMICS V70, SIMOTICS S-1FL6
SINUMERIK 808D ADVANCED

SINUMERIK 828

The compact CNC for standard, mid-range machines

SINUMERIK 828 controls are ideal for standard machines that are produced in high unit quantities with a low degree of modularity. Whether SINUMERIK 828D BASIC, 828D or 828D ADVANCED—these powerhouses in the compact class are the perfect solution for cost-sensitive markets, where CNC performance and easy commissioning are required.

SINUMERIK 828

- Panel-based compact CNC
- Up to 10 axes / spindles and 2 auxiliary axes
- Up to 2 machining channels
- 10.4" / 15.6" color display
- SIMATIC S7-200 PLC

SINAMICS S120, SINAMICS S120 Combi		
SINUMERIK 828D BASIC	SINUMERIK 828D	SINUMERIK 828D ADVANCED

SINUMERIK 840

The open CNC for modular, high-end machine concepts

SINUMERIK 840D sl offers an absolute maximum degree of openness and flexibility. This makes SINUMERIK 840D sl the optimum CNC for machine tools, whose mechanical design must be individually adapted to address the requirements of individual users.

SINUMERIK 840D sl BASIC, based upon the SINAMICS S120 Combi drive system, facilitates the entry into the modular and flexible premium class for machines with up to six axes.

SINUMERIK 840

- Drive-based, modular CNC
- Multi-technology CNC
- Up to 93 axes / spindles and any number of PLC axes
- Up to 30 machining channels
- Modular panel concept up to 24" color display
- SIMATIC S7-300 PLC

SINAMICS S120 Combi	SINAMICS S120, SINAMICS S120 Chassis
SINUMERIK 840D sl BASIC	SINUMERIK 840D sl

SINUMERIK 808

Outstanding performance, simply intelligent

Compact and rugged

Thanks to a panel-based CNC design with few interfaces and an operator panel with IP65 degree of protection, SINUMERIK 808D ADVANCED is the perfect answer for applications in harsh environmental conditions. The small dimensions of these units allow them to be used in compact machines.

Optimized for basic milling and turning applications

As a result of its technology-specific versions, the SINUMERIK 808D ADVANCED control is pre-configured for milling and turning. The range of applications addressed extends from basic, standard milling machines or simple machining centers, through cycle-controlled lathes, up to basic, full CNC lathes. Based upon its hardware and software expansions, SINUMERIK 808D ADVANCED offers you sufficient performance for mold-making and tool-making for basic milling functions.

Ideal for entry-level machine tool operators

Based upon the innovative, integrated startGUIDE and the standard SINUMERIK operating and programming philosophy, the SINUMERIK 808D ADVANCED is ideal for users entering the world of CNC. Commissioning is also explained interactively in a graphical format.

SINUMERIK 808D ADVANCED brings impetus into basic turning and milling machines. CNCs from the global technology leader, teamed up with a revolutionary operating system, make the SINUMERIK 808D ADVANCED the perfect entry into the world of CNC.

SINUMERIK 828

The powerhouse in the compact class

The unique CNC performance of SINUMERIK 828D BASIC, SINUMERIK 828D and SINUMERIK 828D ADVANCED controls set productivity benchmarks when it comes to milling and turning on standard machines, as well as functions that automate grinding machines.

Rugged and maintenance-free

With their die-cast magnesium operator panel fronts, plus their panel-based CNC design with just a few interfaces, as well as a high degree of protection, SINUMERIK 828 controls are the perfect CNCs even in harsh environments.

With no fan and no hard disk, and an NV-RAM memory without a battery, SINUMERIK 828D BASIC, SINUMERIK 828D and SINUMERIK 828D ADVANCED are completely maintenance-free CNC systems.

User-friendly

SINUMERIK 828 CNCs are very easy to operate thanks to a full QWERTY CNC keyboard with short-stroke keys and a high-resolution 10.4" TFT color display / 15.6" touch display.

Equipped with USB, CF card (for 10.4") and RJ45 interfaces at the operator panel front, CNC data is quickly and easily transferred.

Optimum scalability

In addition to two CNC high-performance versions of SINUMERIK 828D, the SINUMERIK 828D BASIC represents a favorably-priced entry into the compact class.

And the SINUMERIK 828D ADVANCED rounds off the portfolio upwards with two additional axes / spindles.

Scalable CNC performance

Software version 28 x ADVANCED

- Up to 8 axes /spindles (milling),
  10 axes /spindles (turning and G-Tech)
- Up to 2 machining channels
- Minimum block change time approx. 1 ms
  (milling)
- 768 tools, 1536 cutting edges
- 10 MB user memory
- In addition, up to 2 help axes

Software version 28 x

- Up to 6 axes/spindles (milling),
  8 axes / spindles (turning)
- 1 machining channel
- Minimum block change time approx. 1 ms
  (milling)
- 512 tools, 1024 cutting edges
- 8 MB user memory
- In addition, up to 2 help axes

15.6"

PPU 290.3

Software version 26 x

- Up to 6 axes / spindles
- 1 machining channel
- Minimum block change time approx. 2 ms
  (milling)
- 256 tools, 512 cutting edges
- 5 MB user memory
- In addition, up to 2 help axes

10.4"

PPU 281.3

Software version 24 x

- Up to 5 axes / spindles
- 1 machining channel
- Minimum block change time approx. 3 ms
  (milling)
- 128 tools, 256 cutting edges
- 3 MB user memory

10.4"

PPU 241.3

SINUMERIK 828D
ADVANCED

SINUMERIK 828D

SINUMERIK 828D
BASIC

11

SINUMERIK 840

The ultimate in machine tool performance

SINUMERIK 840D sl is considered to be the standard in premium class CNCs, which is certainly justified. Maximum CNC performance, along with a degree of flexibility and openness that has not been able to be achieved until now, are the basis for almost any machine concept.

Maximum performance

SINUMERIK 840D sl offers an almost inexhaustible performance potential—thanks to its drive-based, high-performance NCUs (Numerical Control Units) with state-of-the-art multi-core processor technology. This means that up to 93 axes in 30 machining channels can be controlled in the NCU link.

Machine tools with fewer axes benefit from the performance of the SINUMERIK 840D sl as a result of the highest degree of machining precision with the shortest machining times.
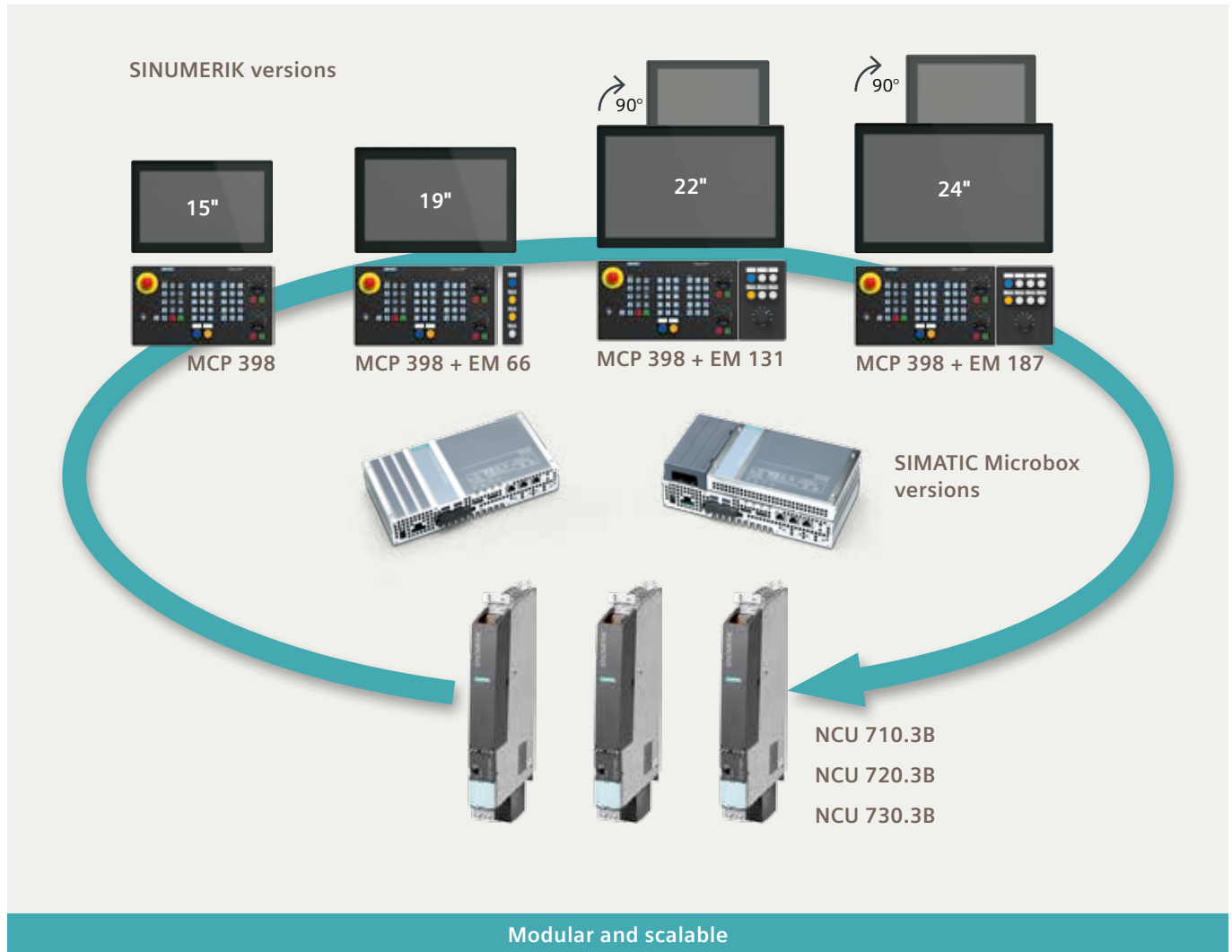
Benchmark for open architecture

The openness of the SINUMERIK 840D sl is second to none. The CNC can be adapted to the machine's technology. For example, the operating system can be supplemented and adapted, or even robots and handling systems can be integrated. With the openness in the CNC kernel and in the drive, unique mechanical concepts can be implemented—such as adapted closed-loop control algorithms or specific kinematic transformations.

Communication at every level

Using PROFINET, the leading Industrial Ethernet standard, SINUMERIK 840D sl is perfectly embedded in the Siemens automation environment. Totally Integrated Automation stands for a unique level of integration—from the field, through the production, up to the company's supervisory level.

The result—every component within the automation solution interacts perfectly with one another. This allows you to achieve maximum transparency and availability of the production process.

SINUMERIK versions

90°   90°

15"   19"   22"   24"

MCP 398   MCP 398 + EM 66   MCP 398 + EM 131   MCP 398 + EM 187

SIMATIC Microbox versions

NCU 710.3B

NCU 720.3B

NCU 730.3B

Modular and scalable

Intuitive operation and monitoring

SINUMERIK panels make operation and visualization easier for machine tool operators. In conjunction with the state-of-the-art SINUMERIK Operate graphical user interface, multi-touch and gesture operation are establishing themselves in the production environment. In addition, machine tool operators can choose from various mobile handheld terminals — for example, the SINUMERIK HT 8, which combines operator panel and machine control panel to make operation even simpler.

Modular and scalable

In addition to scalable NCU performance, the SINUMERIK 840D sl has a high degree of modularity when it comes to the operating components. With a flexible M:N operating concept, for example, any operator panel can be combined with the NCU, making the SINUMERIK 840D sl the ideal solution when operating high-end CNC machines. With SINUMERIK 840D sl BASIC, compact machines can also be optimally addressed as a result of the data link with the compact SINAMICS S120 Combi drive system.

Drives and motors— everything from a single source

SINAMICS V70   SINAMICS S120 Combi   SINAMICS S120 Booksize   SINAMICS S120 Chassis

SINAMICS drives

The complete and integrated SINAMICS drive family addresses all of the performance levels and sets itself apart as a result of the highest degree of flexibility, functionality and efficiency.

SINAMICS drives and SIMOTICS motors are the driving force for SINUMERIK CNCs, which set the standard for maximum precision and speed.

Drives

SINAMICS V70—small and powerful

The SINAMICS V70 drive concept is simply unbeatable when it comes to price-sensitive, entry-level machines. The compact design of the single-axis, fan-less motor modules ensures the highest degree of ruggedness. The motor modules can be quickly adapted to the requirements of the feed axes by simply setting a few parameters.

SINAMICS S120—the highest degree of flexibility

SINAMICS S120 is synonymous with performance and flexibility when it comes to equipping machine tools. In addition to a wide range of motor modules up to a power rating of 300 kW, there is also an infeed unit with a controlled DC link. This ensures the shortest spindle acceleration times and facilitates perfect reactive power compensation for the complete machine (cos φ = 1).

SINAMICS S120 Combi— the ideal drive for compact CNC machines

SINAMICS S120 Combi combines the performance of the modular S120 in a compact, rugged design. One infeed and up to four motor modules are integrated in one housing. This drive is the ideal basis for compact, standard machine tools with a spindle power of up to 15 kW and can control up to five feed axes.

SINUMERIK control systems, together with SINAMICS drives and SIMOTICS motors, are perfectly designed to address the need of CNC machines.

SIMOTICS servomotors   SIMOTICS linear and torque motors   SIMOTICS spindle motors

SIMOTICS motors

SINAMICS S120 Booksize — minimal footprint for the control cabinet

The new SINAMICS S120 Booksize drives combine compactness with power density. The width can be reduced for machine tool applications that are dimensioned according to the maximum current, such as discontinuous motion or positioning axes. The height has also been reduced as a result of a new motor connection / shield concept.

SINAMICS S120 Chassis

SINAMICS S120 chassis drives allow the power unit and control module to be separately mounted, which means that this drive system can be perfectly adapted to address the widest range of drive tasks.

Motors

SIMOTICS servomotors

High stall torques, high maximum speeds and smooth-running characteristics make SIMOTICS servomotors the optimum feed drive for machine tools. A high degree of protection, strong bearings and rugged design mean that these synchronous servomotors have outstanding reliability. Our portfolio of servomotors has been expanded to include compact SIMOTICS 1FG1 servo geared motors.

SIMOTICS linear and torque motors

Going beyond conventional rotary motor principles, the SIMOTICS range also encompasses linear and torque motors with a high dynamic performance. Elasticity, backlash and friction in the machine drive train — along with mechanical transmission elements — can be almost completely eliminated when using SIMOTICS 1FN3 linear motors. Further, using SIMOTICS 1FW6 torque motors, completely new technological requirements can be addressed — for example, turning on milling machines.

SIMOTICS spindle motors

An outstanding portfolio is obtained by teaming up the expertise in spindle design and construction of Weiss Spindeltechnologie together with the long tradition of building electric motors of Siemens.

This unique portfolio supports every kind of spindle solution — from classic mechanical spindles based upon 1PH8-mounted spindle motors, through 1FE1 and 1FE2 synchronous built-in spindle motors — up to hybrid and high-performance motor spindles.

Every manufacturing industry has its own specific requirements. Whether standardized automation concepts for the automotive sector or a holistic approach across every phase of the product and production lifecycle— all the way up to aerospace.

Siemens has been a partner to the machine tool industry for many years and offers industry-specific solutions that are deployed around the globe.

Solutions for every manufacturing industry that are fit for the future

Many years of industry expertise is convincing

Based upon our unique experience and the industry know-how that we have built up over the years, we can provide the most ideal solutions for cost-effective component production in the automotive, aerospace, power generation and electronics manufacturing industries.

We are your partner for machine tool automation

Throughout decades of direct contact with end-users in key manufacturing industries, we clearly understand the requirements that are placed upon current generations of machines—and those in the future. This know-how flows directly into our product development—which ensures that SINUMERIK control systems are closely aligned to address market requirements.

As a full-line supplier, in addition to automating machine tools, Siemens can act as the general contractor for the automation of your entire manufacturing facility. Customers will also benefit from Siemens as their single-source supplier—ultimately helping you to achieve a highly-productive manufacturing environment.

Setting trends in manufacturing

Siemens is viewed as an innovation leader in the machine tool market. The development of cutting-edge solutions is a given for us. Our digitalization solutions ensure maximum productivity, flexibility and availability.

Leverage the bandwidth of machining technologies

With SINUMERIK, every manufacturing environment is optimally equipped to address technological challenges — today and in the future. SINUMERIK is powerful when it comes to turning, milling and grinding — as well as nibbling, laser machining and gear wheel machining. In addition, it's open for new technological concepts, such as multi-tasking, Additive Manufacturing and the machining of composites.

Turning

Highest precision and productivity from cycle-controlled and standard CNC turning through milling on lathes up to multi-channel and multi-tasking machining.

Milling

Superlative milling with SINUMERIK MDynamics, Advanced Surface and Top Surface along with Collision Avoidance.
From 3-axis milling through 5-axis simultaneous machining, up to multi-tasking machining.

Multi-tasking

Based upon SINUMERIK Operate, multi-tasking machining is seamlessly supported across every technology — whether in series production or in the job shop.
Best for efficient and highly-productive CNC machining.

Nibbling, laser, water jet and plasma machining

Going beyond standard technologies, the openness of the SINUMERIK CNC system allows nibbling, laser, water jet and plasma machining solutions to be engineered.

Machining composites

When it comes to machining composites, the quality of the final product is absolutely decisive. Depending upon the particular material, production techniques such as laser machining, milling or grinding are used — all of which can be flexibly controlled by SINUMERIK.

Additive Manufacturing

In additive techniques, such as material extrusion or laser cladding, the 5-axis technology of our SINUMERIK 840D sl — in conjunction with the SINAMICS S120 drive system and SIMOTICS motors — results in precise and dynamic motion control.

Grinding

New or re-profiling operations using the SINUMERIK "axis parallel profiling" option increases the productivity of grinding machines and reduces profiling times. Clamping faults and torsion at the clamping point are compensated using the cylindrical error compensation function.

Gear machining

Machining gears is a complex process that demands the highest degree of precision. The advantages of SINUMERIK controls are fully leveraged when it comes to turning a gear wheel, cutting gears with a hobbing cutter — along with the final beveling and chamfering.

Automated cell

Robots must be able to be simply integrated into CNC machines and production workflows. SINUMERIK Run MyRobot offers solutions that range from a simple connection via the user-friendly integration for handling tasks — up to high-precision motion control of machines using robot kinematics.

"My production? It's fit for the future."

With SINUMERIK, you can use all machining technologies	SINUMERIK 808	SINUMERIK 828	SINUMERIK 840
Turning	✓	✓	✓
Milling	✓	✓	✓
Grinding	–	✓	✓
Multi-tasking	–	–	✓
Additive Manufacturing	–	–	✓
Gear machining	–	–	✓
Nibbling, laser, water jet and plasma machining	–	–	✓
Machining composites	–	–	✓
Automated cell	–	✓	✓

Productivity, precision, availability, costs.

These are the decisive factors in the machine tool market. Packed with special functions, SINUMERIK controls precisely satisfy these requirements—helping to accomplish maximum CNC performance.

Always achieve the maximum CNC performance

Achieve high productivity through a wide range of possibilities

Robot handling, intelligent motion control, as well as continuous optimization are the relevant keywords when it comes to leveraging the wide-ranging possibilities of boosting your productivity.

Robotic handling

In the production environment, robots are increasingly being used for handling tasks, independent of the company size. Idle times, especially, where the machine is no longer productive, represent a critical productivity-inhibiting factor. The objective is to boost your manufacturing productivity by automating workpiece flow to the highest extent.

Intelligent motion control

With its intelligent Advanced Surface and Top Surface motion control functions, the SINUMERIK CNC can achieve ideal workpiece surfaces with the highest machining speed.

Continuous optimization

Maximum dynamic performance and precision of machine axes are achieved using the Auto Servo Tuning (AST) functionality of SINUMERIK Operate, which allows control parameters to be optimized automatically. This simplifies commissioning of the machine, and during operation, the machine can be optimized on a regular basis. This ensures maximum machine tool precision over the complete lifecycle.

Precision during manufacturing

SINUMERIK is highly-precise thanks to the software used to compensate mechanical effects. These include functions such as nodding compensation, 80-bit NANO accuracy, as well as friction compensation.

Nodding compensation

Nodding compensation increases machining accuracy and improves the surface quality. It achieves this by monitoring accelerating axes and compensating the predicted nodding motion (position correction).

Precision

SINUMERIK CNCs and SINAMICS drives compute with high-performance 80-bit NANO accuracy. This eliminates rounding errors and results in an extremely high internal computational accuracy in the complete controller circuit.

Friction compensation

Friction-related path errors are even more effectively eliminated by compensating the effects of friction as a function of the velocity. This facilitates a high and constant contour accuracy and high-precision workpieces.

Increase the availability of your machines

High machine tool availability is achieved by quickly identifying faults and errors, and a simple and straightforward user interface. SINUMERIK provides functions such as Collision Avoidance for precisely this purpose.

Collision Avoidance

Collision Avoidance in SINUMERIK offers 3D collision monitoring in real-time—for 1-channel machines with one NCU—and also for complex machining such as 5-axis simultaneous milling. Collision monitoring is available in all operating modes (JOG, MDA and automatic).

Monitoring machine elements with respect to one another, and with respect to tool cutting edges, can be visualized in 3D in SINUMERIK Operate.

Lower your operating costs

Operating costs can be reduced based upon energy-efficient solutions over the complete machine lifecycle.

SINUMERIK Ctrl-Energy

SINUMERIK Ctrl-Energy encompasses a wide range of high-efficiency drive / motor components, CNC / drive functions, software solutions and services.

Users have intelligent functions at their fingertips, such as the ability to analyze the energy costs associated with a specific workpiece.

SINUMERIK helps you to sustainably save energy by simply pressing the Ctrl+E shortcut key.

Protect yourself and your intellectual property

Protecting intellectual know-how embedded in the program code and protecting against malware are two essential aspects when it comes to the system integrity of SINUMERIK.

Increasing Security

PC-based systems and the control must be protected against cyber attacks. SIMATIC STEP 7 program blocks and the know-how protection afforded by SINUMERIK 840D sl protect intellectual property. Without knowing the password, it is not possible to access program blocks and their content.

With the cycle encryption function, cycles can be saved to the control system where they are protected. This is complemented by manipulation protection. Anti-virus and whitelisting software prevent PC-based systems from being infected by malware.

User-friendly operation and programming

Operation

A wealth of functions in SINUMERIK Operate ensure a high degree of operator-friendliness of SINUMERIK controls. These include state-of-the-art touch and gesture control and the use of animated elements.

Touch and gesture operation

The next generation of SINUMERIK touch panels with projected capacitive touch technology offers you the highest degree of performance for demanding, PC-based visualization tasks. This comes along with an attractive front panel design. With its scratch-proof, non-reflecting surface and brilliant display, SINUMERIK-equipped machines can be operated even in harsh manufacturing environments.

Animated Elements

With its Animated Elements, SINUMERIK Operate makes it very easy to enter parameters. With its unique moving image sequences, Animated Elements makes machine tool operation even more user-friendly.

Sidescreen

The pre-configured sidescreen offers an additional display surface with more functionality in the HMI. Machine tool users have all the information they need at a glance in any operating situation on a "foldable" sidescreen. They can even scroll horizontally and vertically through the information displayed on this sidescreen.

Machine tool setup

Based upon an intelligent JOG mode and intuitive tool management in SINUMERIK Operate, all of the typical setup functions can be graphically and interactively supported. This keeps unproductive times to an absolute minimum.

Measuring

Measuring tools and workpieces are supported in the intelligent JOG mode. It is sufficient to probe an edge, corner or hole to determine the clamping position, including the basic rotation of the tool—also in swiveled workpiece planes. By pressing just one key, the geometry is transferred into the tool offset memory of the CNC.

Zero points

Integrated measuring cycles ensure workpiece precision during the machining process. Tool geometries and work offsets are corrected automatically so that the required production tolerances are maintained, even for high batch quantities.

Optimizing programs

When running in and testing a program, ShopTurn can interrupt the machining process after each program block that initiates motion or a help function at the machine. This means that the result of a machining operation can be checked when a program is run for the first time. When running in several channels, SINUMERIK Operate allows machine operators to choose between a spindle-by-spindle and channel-by-channel approach.

Tool management

Tool data and magazine location information are clearly displayed on a screen. Selecting a suitable magazine location is fully automatic—simply select a tool, press a key and the SINUMERIK CNC does the rest. It goes without saying that tool lifetime is monitored, and when required, the appropriate replacement tool is loaded. This reduces the amount of time needed when setting up a machine.

Protection of your people

The intelligent SINUMERIK Safety Integrated system functions allow user-friendly operation, with the highest degree of safety for the operator and the machine itself—for example, when setting up the machine with the protective door opened. With SINUMERIK Safety Integrated plus, SINUMERIK 840D sl machine operators have various functions at their fingertips (e.g. graphically-supported commissioning).

Programming

SINUMERIK Operate offers the ideal programming for each and every task: DIN ISO for large-series production and the shortest cycle times—as well as graphical programming, so individual parts and components can be programmed even faster.

High-level CNC language

The SINUMERIK high-level language means that the variance associated with families of parts or special tools can be simply mastered. The SINUMERIK high-level language comes into its own precisely where graphical programming, DIN ISO and cycle programming reach their limits. Quickly programming workpieces with a wide range of variance means that the complete range of workpieces can be flexibly addressed—which is what makes it so unique.

DXF reader

The DXF reader supports the display of the CAD data format and direct transfer into the CNC program. Programming times can be slashed by up to 90 percent as the CAD reader is used to transfer data. DXF files can be directly opened on the CNC, and transferred to the CNC program with a simple click of your mouse.

programGUIDE

Using programGUIDE, SINUMERIK CNC programs can be easily combined with high-performance technology and measuring cycles. Even classic ISO codes can be programmed. As a result, SINUMERIK is especially attractive for machine operators who prefer this classical method of programming.

Machining step programming

Machining step programming (ShopMill / ShopTurn) ensures that demanding and complex parts and components can be quickly and simply programmed. Using the SINUMERIK contour computer, each contour can be entered and programmed directly at the machine. This results in maximum machine tool productivity when it comes to programming and operation.

### SinuTrain for SINUMERIK Operate

SinuTrain is a control-identical, NC programming station based upon the original SINUMERIK CNC kernel. This PC software can be used for offline programming in an office environment and facilitates the identical behavior when programming and operating the system as on the real control. Users benefit from increased machine availability, a higher degree of productivity and enhanced security as a result of the offline verification. SinuTrain can be also be used to train your people on how to program and operate the SINUMERIK CNC—as well as for presenting and testing new SINUMERIK control functions.

Diagnostics

Especially in large serial manufacturing, machine downtimes can result in an enormous loss of production. SINUMERIK Operate offers intelligent diagnostics if problems arise so that machine operation can be resumed as quickly as possible.
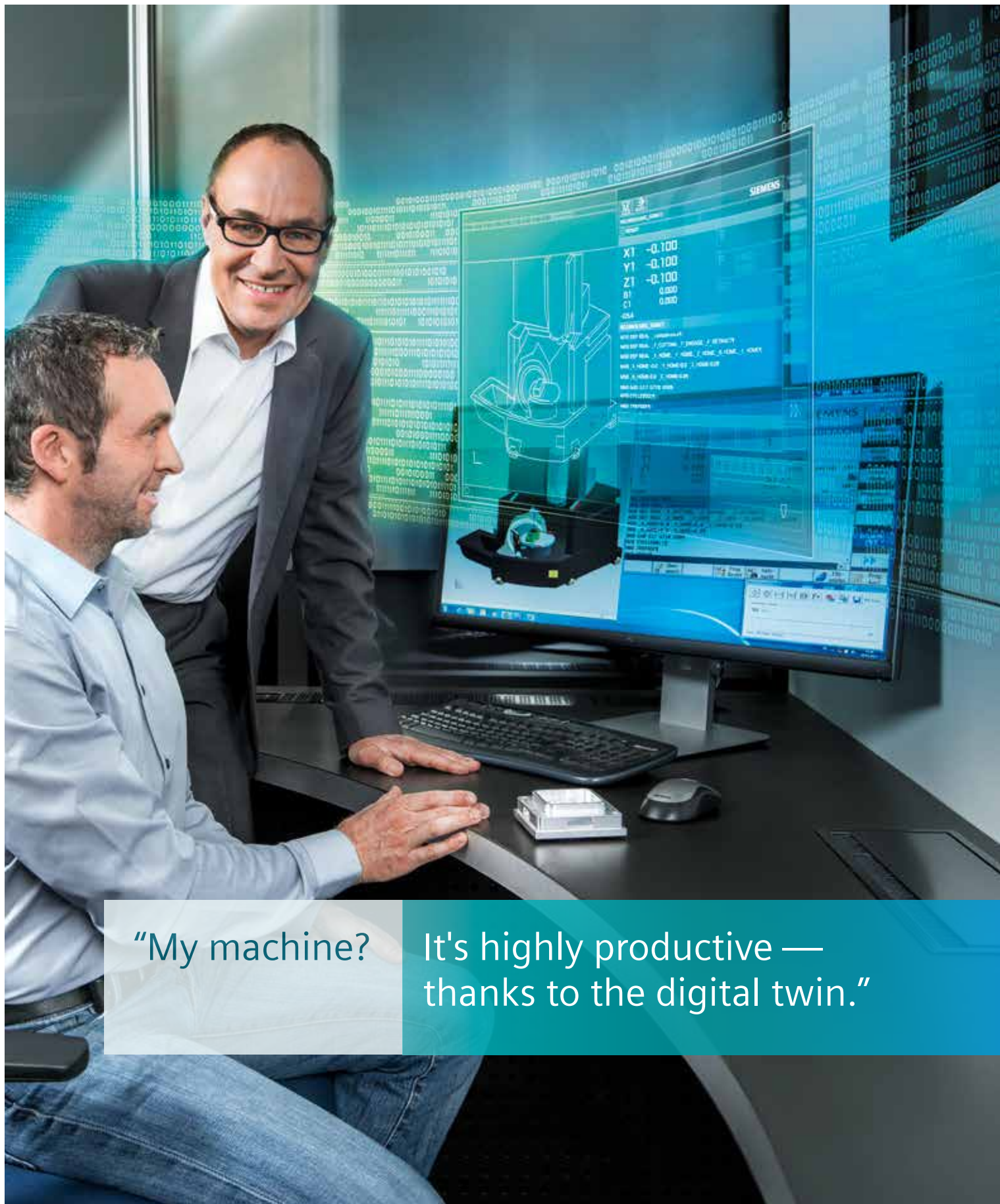
In addition to the bus diagnostic tools for drive, peripheral and network components, there is also a powerful trace function, which is used to trace and troubleshoot NC, PLC and drive signals.
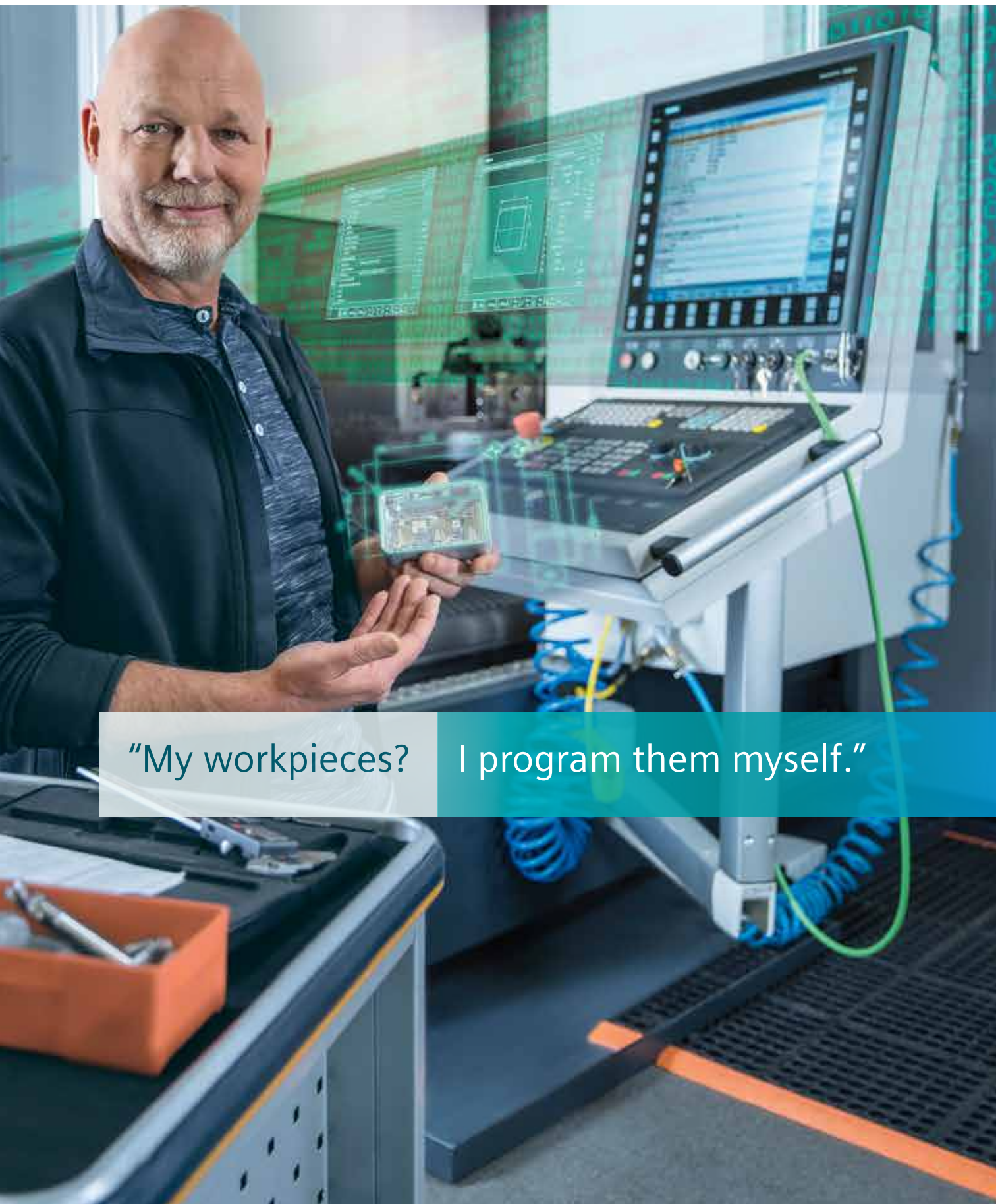
"My workpieces? I program them myself."

"My machine? It's highly productive — thanks to the digital twin."

On track to achieve higher productivity with CNC shopfloor management software

Through digitalization, machine tool builders and end-users can respond more flexibly to changing market demands—while simultaneously increasing their productivity. CNC Shopfloor Management Software specifically addresses your machine requirements. It facilitates the management, analysis and optimization of machine tools—independent of the control system manufacturer being used.

Higher engineering productivity

From the idea to the machine—quickly and flexibly

There are two main objectives when it comes to machine building. On the one hand, a higher degree of efficiency and flexibility during development, e.g. with consequential virtualization in the development process. On the other hand, supplementing portfolios to digitalize customers manufacturing environments—all the way up to new business models.

Increased productivity during production

Optimizing performance in your production environment

Machine tools are intelligently integrated into the production process. The pre-condition is that production planning and production—along with the various machines—are all networked together using the SINUMERIK Integrate platform. This allows machine tool programs and data to be transferred error-free.

The digital twin—the virtual image

Production planning can be shifted from the machine to the PC by virtually emulating machines and SINUMERIK controls. Machine programming and setup become virtual when using a digital twin—increasing the productivity of real machines.

CNC Shopfloor Management Software—the ecosystem

A leading-edge IT architecture is created based upon the CNC Shopfloor Management Software—and more specifically—at three levels: "In Cloud," "In Line" and "In Machine."

These levels correspond to the three platforms: MindSphere, SINUMERIK Integrate and SINUMERIK / SINUMERIK Edge with many customized functions that extend from the field up into the Cloud.

This is complemented by the opportunity of creating new business models, in service, for example. By leveraging digitalization, the potential for optimization not known until now can be tapped into so that productivity and competitiveness can be sustainably increased.

In Cloud		MindSphere
In Line		SINUMERIK Integrate
In Machine		SINUMERIK	SINUMERIK Edge
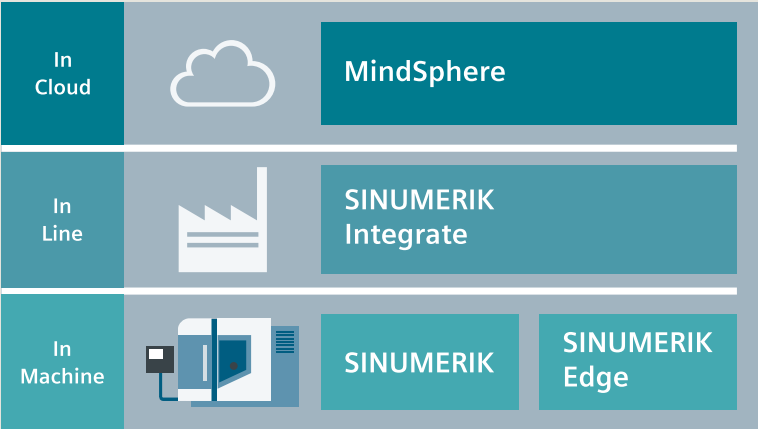
## Digitalization with Cloud-based applications — optimally networked

Cloud-based applications offer all of the advantages when working with a common database. Intelligent tools are used for networking design, production planning and machine tools across various sites and locations to create seamless production processes with the highest degree of efficiency. Production and machines are continually analyzed. The captured data is evaluated, creating a high degree of transparency. This allows the possibility for optimization, unknown up until now, to be identified and fully utilized.

Manage MyMachines — more transparency for new business models in digital enterprises

Up-to-date machine and production data is available at a glance. Generation of displays for visualization and analysis is achieved via the web. Operate machine tools, transparently and efficiently — this is all possible with Manage MyMachines, an application for MindSphere, the Cloud-based, open IoT operating system from Siemens. This MindApp centrally collects data in the Cloud and provides a customized status overview of a CNC machine at any time.

Manage MyMachines
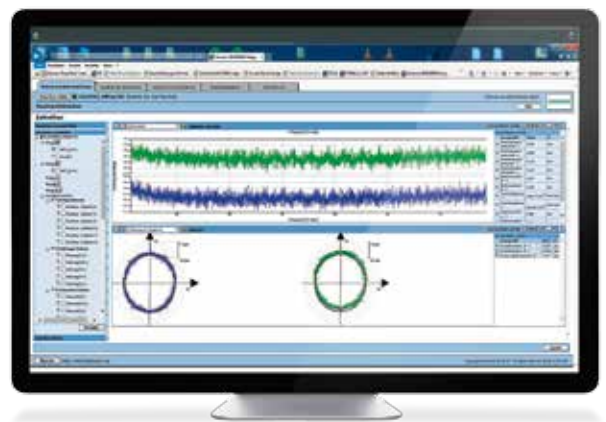
Analyze MyCondition local

SINUMERIK Integrate — wide-ranging applications to optimize machine availability

The advantages of a digital landscape can be utilized even without a connection to the Cloud. SINUMERIK Integrate hosts a wide range of applications that provide functions adapted to machine tool engineering and production — for example, condition monitoring.

SINUMERIK Edge — process analysis and optimization based upon real-time data

SINUMERIK Edge is a rugged high-performance hardware and software solution for machine-related use (Edge Computing). High-frequency process data can be processed and analyzed in the field in real-time. Processes can also be monitored and optimized using customized EdgeApps, for example.

Motion Control Services—digitalization of machine tools and optimization of your production

Digital services—the path to a digital production environment

Based upon the CNC Shopfloor Management Software, Manufacturing IT Services represents a partial or full digitalization of the mechanical production workflow. Siemens can offer you a complete solution from a single source extending from the requirement analysis—through the installation with subsequent customer training—all the way up to ongoing support when operating and maintaining the system.

1. Consulting

Analysis and creation of digitalization concepts (defining the software modules), tailored to address customer requirements.

- **Digitalization check as a service**   This service supports customers as they digitalize their production environment. The local service organization provides recommendations when it comes to networking machines in production IT systems. Machine data is continuously captured and evaluated in a standardized way, while the CNC machines remain operational.

2. Implementation

Motion Control Service specialists will support you when configuring and commissioning the various software modules. This makes your production even more efficient, more profitable and increases your security of investment.

- **Digitalization preparation**   If individual machines in the installed base cannot be integrated into the IT system, this service provides a software update so that they can be integrated digitally. Depending upon the particular application, a hardware upgrade or retrofit may be required.

3. Training

Training courses ensure that applications are safely and correctly used. This allows companies to extract their own usage data and derive the correct optimization measures.

4. Data and process analysis

Individual optimization measures are derived based upon the data that has been captured and analyzed. Here, a classic services portfolio is deployed.

5. Maintenance

This service ensures that IT systems remain operational, to secure operating time, as well as resolve faults in the case of non-scheduled machine downtimes.

Motion Control Services provide support to machine tool dealers, importers and end-users over the complete lifecycle of production systems—for controls, drives and motors.

The emphasis is on increasing transparency so that every type of resource and machine can be used more efficiently, productively and flexibly—and of course to increase overall machine availability.

Classic services—the basis for continuous improvement

Service contracts

Harmonized and aligned to specific requirements and business objectives, our service contracts are modular and allow machine tool end-users to create a customized service program to reduce their machine downtimes.

Technical support

In more than 25 regions around the world, our hotline experts answer every question related to the SINUMERIK control—in your time zone and in your language.

Spare parts and repair services

A closely-meshed, flexible and accommodating service and repair network ensures that spare parts are quickly available and at reasonable prices.

Upgrade services

Component upgrades extend system and machine tool usage times to secure investments over the long term.

Productivity Improvement

Especially when it comes to machine tools that are used intensively with high utilization levels, leveraging the machine capacity to its fullest has significant economic benefits. With productivity improvement, we optimize the production potential for machine tools equipped with SINUMERIK 840D sl or SINUMERIK 840D powerline controls.

Retrofit

CNC retrofit is the cost-effective alternative to purchasing a new machine. This is the case if the machine's mechanical system is still in good condition—however, the control or drive system no longer represents state-of-the-art technology.

As part of this service, we upgrade specific components. Cycle times can be significantly reduced and part quality can be optimized by just upgrading the control system.
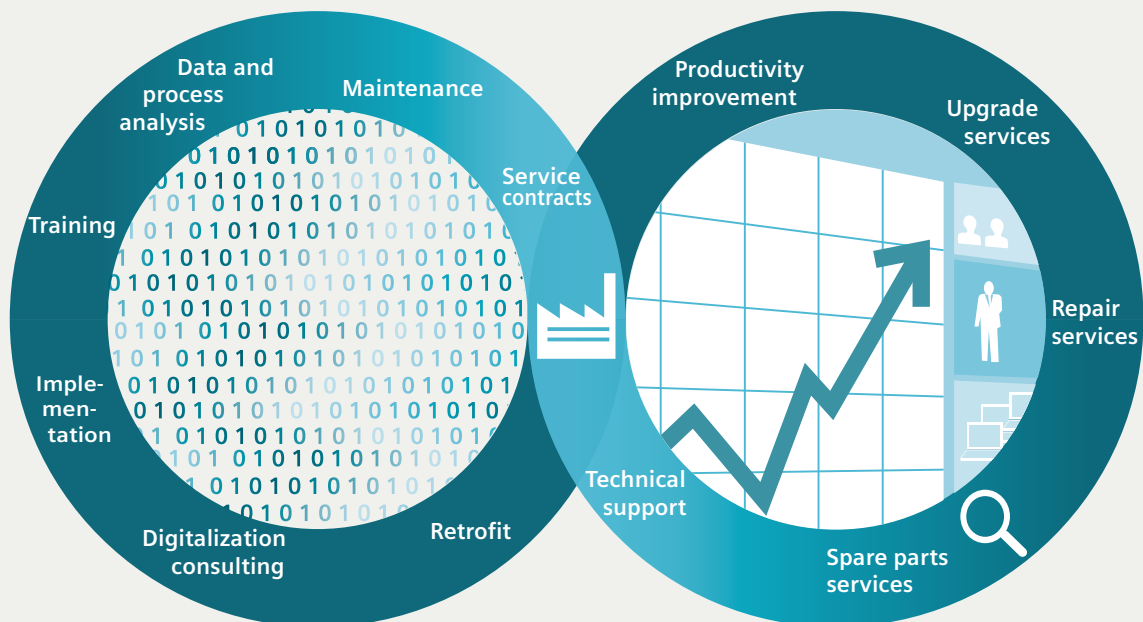
SINUMERIK

Technical information—an overview

	SINUMERIK 808	SINUMERIK 828	SINUMERIK 840
Configuration			
Mechanical design	Panel-based	Panel-based	Drive-based
CNC performance versions	PPU15X PPU16X	PPU24X (828D BASIC) PPU28X PPU29X	NCU710 NCU720 NCU730
Display size (TFT color displays)	8.4"	10.4"/15.6"	7.5"/10"/12"/15"/19"/22"/24"
Maximum number of axes/spindles	5	10 plus 2 auxiliary axes	93 + any number of PLC axes
PLC adaptation control	SIMATIC S7-200	SIMATIC S7-200	SIMATIC S7-300
Machine channels/mode groups, up to	1	2	30
CNC user memory, up to	1.25 MB	10 MB	22 MB
Extended CNC user memory	–	100 MB	100 MB
Additional CNC user memory on SSD, up to	–	–	120 GB
Servomotor operation	✓	✓	✓
Torque motor operation	–	✓	✓
Linear motor operation	–	–	✓
Spindle motor operation	✓	✓	✓
OPC UA	–	✓	✓
Standard data transfer	USB/Ethernet	USB/CF card/Ethernet	USB/Ethernet
Axis functions			
Acceleration with jerk limiting	✓	✓	✓
Dynamic pre-control	✓	✓	✓
Dynamic Servo Control in the drive	✓	✓	✓
Interpolation			
Simultaneously interpolating axes, up to	4	8	20
Straight line, circle, helix	✓	✓	✓
Splines	–	✓	✓
Advanced Surface	✓	✓	✓
Top Surface	✓ (PPU16X)	✓	✓
Look Ahead	✓	✓	✓
Compressor	✓ (PPU16X)	✓	✓
Tools/tool management			
Number of tools/cutting edges, up to	64/128	768/1536	1500/3000
Unit quantity/tool lifetime monitoring with management of replacement tools	–	✓	✓
Monitoring functions			
Work zone limiting	✓	✓	✓
Collision avoidance	–	✓ (ECO)	✓ (ECO, ADVANCED)
Compensations			
Measuring system and spindle pitch compensation	✓	✓	✓
Temperature compensation	–	✓	✓
Nodding compensation	–	✓	✓
Friction compensation	–	✓	✓
Other compensations (sag, volumetrics)	–	–	✓

	SINUMERIK 808	SINUMERIK 828	SINUMERIK 840
SINUMERIK synchronous architecture			
Motion synchronized actions	–	✓	✓
Asynchronous subprograms	✓	✓	✓
Transformations			
Face / peripheral surface transformation	✓	✓	✓
Multi-side machining (3+2-axis machining)	–	✓	✓
Dynamic 5-axis machining (TRAORI)	–	–	✓
Additional machine-specific kinematic transformations	–	–	✓
CNC operation			
SINUMERIK Operate	✓ (BASIC)	✓	✓
Animated Elements	–	✓	✓
startGUIDE: graphic interactive commissioning, onboard tutorials	✓	–	–
User interface on NCU / PPU (Linux) / IPC (Windows®)	✓ / –	✓ / –	✓ / ✓
Training and offline programming tools	✓ (808D on PC)	✓ (SinuTrain)	✓ (SinuTrain)
CNC programming			
SINUMERIK CNC programming language with high-level language elements	✓	✓	✓
Online ISO dialect interpreter	✓	✓	✓
DXF reader	–	✓	✓
programGUIDE	✓ (BASIC)	✓	✓
Technology cycles for drilling, milling and turning	✓	✓	✓
Technology cycles for grinding	–	✓	✓
Cycles for process measurements	–	✓	✓
Balance Cutting	–	✓	✓
ShopMill / ShopTurn machining step programming	–	✓	✓
CNC simulation for turning / milling	✓ (2D)	✓ (3D)	✓ (3D)
Onboard optimization and diagnostics			
Context-sensitive onboard help system	✓	✓	✓
Onboard servo and drive optimization (AST)	✓	✓	✓
Onboard signal, bus and network diagnostics	–	✓	✓
Onboard maintenance and service tools	✓	✓	–
Safety functions			
SINUMERIK Safety Integrated	–	✓	✓ (plus)
SINUMERIK Ctrl-Energy			
Ctrl-E Analysis / Profiles (energy usage / energy management)	–	✓	✓
Automatic reactive current compensation	–	✓	✓
Automatic flux reduction for induction spindle motors	–	✓	✓

–   not available
✓   available (certain functions are available as an option on the CNC; please ask your machine tool builder for more information)

**Everything about SINUMERIK CNC
can be found on the web**

usa.siemens.com/cnc